City of High Point

Municipal Office Building
211 S. Hamilton Street
High Point, NC 27260

Meeting Agenda

Tuesday, January 19, 2021

5:30 PM

Council Chambers

City Council

Jay W. Wagner, Mayor
Britt W. Moore (At Large), Mayor Pro Tem
Tyrone Johnson (At Large), Cyril Jefferson (Ward 1), Christopher Williams (Ward 2), Monica L. Peters (Ward 3), S. Wesley Hudson (Ward 4), Victor Jones (Ward 5), and Michael Holmes (Ward 6)

As part of the city of High Point's on-going COVID-19 mitigation efforts, in-person attendance will not be allowed at this meeting. Instead, the meeting will be live-streamed and the public can listen to the meeting as it is being live-streamed by clicking on the following link www.HighPointNC.gov/VirtualPublicMeeting.

ROLL CALL, PRAYER, AND PLEDGE OF ALLEGIANCE

STRATEGIC PLAN UPDATE

2021-18 Council will receive an update on the Strategic Plan from Council Member Williams, Chair of the Community Development Committee.

PUBLIC COMMENT PERIOD

2021-17

Public Comment Period

A Public Comment Period will be held on Tuesday, January 19, 2021 at 5:30 p.m. As part of the city of High Point's COVID-19 mitigation efforts, in-person public attendance will not be allowed at this meeting. Instead, the city will be live streaming this meeting. Once the City Council is in Session, please click on the following link to listen to the meeting as it is being live-streamed www.highpointnc.gov/VirtualPublicMeeting <http://www.highpointnc.gov/VirtualPublicMeeting>

Although the public is unable to physically participate in the meeting, the public can submit comments by

1. Calling 336-883-3522 and leaving a message, or by
2. Emailing written comments to publiccomment@highpointnc.gov <mailto:publiccomment@highpointnc.gov>, or by
3. Dropping off written comments in the city of High Point's utility payment drop-boxes located on both sides of the Municipal Building located at 211 S. Hamilton Street in the Green Drive and the Commerce Avenue parking lots.

All comments received will be forwarded to the City Council and will be incorporated as part of the permanent proceedings of the January 19, 2021 City Council Meeting. The City of High Point's Public Comment Policy restricts comments to no more than three (3) minutes which will apply for the telephone message submission. Email submissions and written comments should be kept at 350 words or less. The deadline for submitting public comments is Friday,January 15 at 5:00 p.m.

FINANCE COMMITTEE - Mayor Pro Tem Moore, Chair

CONSENT AGENDA ITEMS

2021-11 **Resolution - Declaration of Surplus Property - Police Canine - Hoss**

The High Point Police Department is requesting that City Council declare Canine Hoss as surplus property and adopt a Resolution approving the sale of personal property by private negotiations and sale pursuant to N.C.G.S. 160A-266.

Attachments: 1. Retire K-9 Hoss

2021-12 **Contract - HH Architecture - High Point City Lake Park Site Master Plan Phase 1**

City Council is requested to award a contract to HH Architecture in the amount of $474,500 to perform construction documentation and bidding services for the High Point City Lake Park Site Master Plan Phase 1 and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Attachments: 2. HH Architecture Construction Documentation CLP January 2021

2021-13 **Resolution - Donation of Surplus Radio Equipment - Fair Grove Fire Department**

City Council is requested to adopt a resolution approving the donation of ten (10) used surplus Motorola XTS 5000 handheld radios to Fair Gove Fire Department and authorizes the appropriate city official to execute all necessary documents.

Attachments: 3. Fair Grove Radio Donation

2021-14 **Contract - Sole Source - Application Support Infor Lawson - RPI Consultants, LLC**

City Council is requested to award a contract to RPI Consultants, LLC in the amount of $175,500.00 for a three (3) year technical support agreement to continue support for the City's ERP application, *Lawson* by Infor and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Attachments: 4. Contract ERP Application Support Service Agreement

2021-15 **Contract - CPM (Civic Platform) Accela, Inc. - High Point Fire Department**

City Council is requested to award a contract to Accela, Inc. in the amount of $233,615.32 for five (5) year license agreement with Accela, Inc. to afford the Fire Department access to the City's CPM application, *Civic Platform* by Accela and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Attachments: 5. CPM Application Licenses Accela

PUBLIC HEARINGS

2021-16 **Public Hearing - Fitesa**

Tuesday, January 19, 2021 at 5:30pm is the date and time established to receive public comments regarding a request for City Council to approve performance based incentives up to the amount of $342,720.00 for Fitesa for a project at 200 S West Point Avenue and authorize the City Manager to execute a performance agreement with Fitesa containing benchmarks for the company to achieve and a schedule for the payment of incentives.

Attachments: 6. Fitesa Performance Based Incentives Public hearing

REGULAR AGENDA ITEMS

COMMUNITY DEVELOPMENT COMMITTEE - Council Member Williams, Chair

2021-19 **Ordinance - Demolition of Dwelling - 216 Underhill Street**

Adoption of an ordinance ordering the building inspector to effectuate the demolition of a dwelling located at 216 Underhill Street belonging to Heirs of Carol A. Kirby.

Attachments: 216 Underhill Council Packet

2021-20 **Ordinance - Demolition of Dwelling - 802 S. Elm Street**

Adoption of an ordinance ordering the building inspector to effectuate the demolition of a dwelling located at 802 S. Elm Street belonging to Eugene and Cora Lang.

Attachments: 802 S Elm Council Packet

PENDING ITEMS

2020-456 **Ordinance - Demolition of Dwelling - 208 Lawndale Avenue**

Adoption of an ordinance ordering the building inspector to effectuate the demolition of a dwelling located at 208 Lawndale Avenue belonging to Margaret Ann Robbins.

Attachments: 208 Lawndale Council Packet

2020-422 **Ordinance - Demolition of Dwelling - 711 Hines Street**

Adoption of an ordinance ordering the building inspector to effectuate the demolition of a dwelling located at 711 Hines Street belonging to Dolores Lobo Martinez, property deed date 7/19/2019, Lis Pendens record 8/27/2018, Previous owner Isa Irina Reyes-Lobo.

Attachments: 711 Hines St Council Packet

PLANNING & DEVELOPMENT - Mayor Jay Wagner

2021-21 **Resolution of Intent - Annexation 20-08**

Approval of a Resolution of Intent to establish a public hearing date of February 1, 2021, to consider a voluntary annexation of approximately 4.21-acres located at the eastern terminus of E. Springfield Road, approximately 160 feet south of E. Springfield Road. The property is known as Guilford County Tax Parcel 196054 (portion) and 158007 (portion).

Attachments: Resolution of Intent AN-20-08

PUBLIC HEARINGS

2021-22 **BRC Spirit LLC and BRC Spirit II LLC - Zoning Map Amendment 20-20**

A request by BRC Spirit LLC and BRC Spirit II LLC to rezone approximately 3.6 acres from the Residential Single Family - 3 (R-3) District and a Conditional Use Office Institutional (CU-OI) District to a Conditional Zoning General Business (CZ-GB) District. The site is located west of Eastchester Drive and north of Hilton Court, and addressed as 1801 and 1809 Eastchester Drive.

Attachments: Staff Report ZA-20-20

1. Vesta Kennedy Email #1.pdf
2 Vesta Kennedy Emails #2 #3 #4 .pdf
3. Vesta Kennedy Email #5.pdf
4. Vesta Kennedy Email #6.pdf
5. Vesta Kennedy Email #7.pdf
6. Vesta Kennedy Email #8.pdf
7. Vesta Kennedy Email # 9.pdf
8. Vesta Kennedy Email #10.pdf
9. Vesta Kennedy Email #11.pdf
10. Vesta Kennedy Email #12.pdf
11. Vesta Kennedy Email #13.pdf
12. Vesta Kennedy Email #14.pdf
13. Vesta Kennedy Email #15.pdf
14. Vesta Kennedy Email #16.pdf
15. Vesta Kennedy Email #17.pdf
16. Vesta Kennedy Email #18.pdf
17. Vesta Kennedy Email #19.pdf
18. Vesta Kennedy Email #20.pdf
19. Vesta Kennedy Email #21.pdf
20. Vesta Kennedy Email #22.pdf
Robb Jolly Email 01.15.21 (link to petition and compilation of comments)..pdf
Vesta Kennedy Emails #23 - #28 with attachments.pdf
Public Comments from Others ZMA 20-20.pdf

2021-23 **City of High Point - Zoning Map Amendment 20-23**

A request by the High Point City Council to rezone 286 properties, totaling approximately 88 acres, as part of the Comprehensive Zoning Map Amendment project. The properties are located within the Chatham Wood Apartment complex (856 Lakecrest Avenue), Foxcroft Townhome development (Rockingham Road/James Court), Windchase Townhome development (Windchase Court), Northbridge Townhome development (Northbridge Drive/Northbridge Court), 608 and the southern portion of 610 James Road, 1221 E. Hartley Drive (Journey Church), 2051, 2097 & 2103 Johnson Street and that portion of the 1875 Eastchester Drive parcel lying along the west side of Johnson Street and at the northwest corner of Johnson Street and E. Hartley Drive.

Attachments: Staff Report ZA-20-23

Jerry Corns Public Comment ZMA 20-23.pdf

GENERAL BUSINESS AGENDA

PUBLIC HEARINGS

2021-24 **Ordinance - Amending Article II Mayor and Council Terms of Office - City of High Point Charter**

Monday, January 19, 2021, at 5:30 pm is the date and time established to receive public comments regarding an Ordinance Amending Article II, Mayor and Council, Section 2.2 Council; number; terms of office, and Section 2.3 Mayor; term of office, duties of the City Charter of the City of High Point to correct the language regarding term limits from two years to four years, making it consistent with the language in Article III- Elections, Article 3.1 Method of Election of the City of High Point Charter.

Attachments: REVISED FINAL Amendment to City Charter for Consistent Reference to Fc

REGULAR AGENDA ITEMS

2021-25 **Resolution - Guilford County Multi-Jurisdictional Hazard Mitigation Plan**

City Council is requested to adopt a resolution to approve the 2020 update to the Guilford County Multi-Jurisdictional Hazard Mitigation Plan.

Attachments: FINAL Guilford County HMP

2021-26 **The Mercer Group, Inc. - City Manager Position Ad & Timeline**

City Council is requested to approve the advertisement and timeline provided by The Mercer Group, Inc. for the purpose of preparing to advertise availability of the City Manager position and recruit actively for candidates.

Attachments: FINAL City Manager Timeline & draft Ad

2021-27 **Reappointments - Human Relations Commission - Dev Bhandari - Stacy Jones - Sharon McGregor**

Council Member Hudson is recommending the reappointment of Dev Bhandari, Council Member Holmes is recommending the reappointment of Stacy Jones, Mayor Pro Tem Moore is recommending the appointment of Sharon McGregor to the Human Relations Commission to be effective immediately and will expire 11/1/2022.

Attachments: FINAL Appointments to Human Relations Commission

2021-28 **Reappointment - Library Board of Trustees - Rick Cornwell - Dorotea Evans - Bill Philips - Donna Kaiser**

Council Member Hudson is recommending the reappointment of Rick Cornwell
Council Member Jones is recommending the reappointment of Dorotea Evans
Council Member Jefferson is recommending the appointment of Bill Philips
Mayor Pro Tem Moore is recommending the appointment of Donna Kaiser
to the Library Board of Trustees to be effective immediately and will expire 10/31/2023.

Attachments: FINAL Appointments to Library Board of Trustees

2021-29 **Reappointment - High Point ABC Board - Ashley Tillery**

Mayor Wagner is recommending the reappointment of Ashley Tillery to the High Point ABC Board. Term to be effective 2/8/2021 and will expire 2/8/2024.

Attachments: FINAL Reappointment to ABC Board

2021-30 **Minutes To Be Approved**

Finance Committee Meeting; Thursday, December 17, 2020 4:00 p.m.
Special Meeting of Council; Monday, December 21, 2020 4:30 p.m.
Regular Meeting of Council; Monday, December 21, 2020 5:30 p.m.
Recessed Meeting of Council; Wednesday, December 23, 2020 5:30 p.m.

Attachments: 1. December 17 2020 Finance Committee Minutes.pdf
2. December 21 2020 Special Meeting Minutes.pdf
3. December 21 2020 High Point City Council Minutes.pdf
4. December 23 2020 Recessed Meeting Minutes.pdf

ADJOURNMENT

CITY OF HIGH POINT
AGENDA ITEM

Title: **Resolution of Intent for a Voluntary Contiguous Annexation**
Annexation 20-08 *(James Martin and Shirley Martin)*

From: Lee Burnette, Planning & Development Director

Meeting Date: January 19, 2021

Public Hearing: No

Advertising Date: Not applicable

Advertised By: Not applicable

Attachments:
A. Resolution of Intent for Annexation 20-08
B. Map of property proposed to be annexed

PURPOSE:
Approval of a Resolution of Intent to establish a public hearing date of February 1, 2021, to consider a voluntary contiguous annexation of approximately 4.21 acres located at the eastern terminus of E. Springfield Road, approximately 160 feet south of E. Springfield Road. The property is known as Guilford County Tax Parcel 196054 (portion) and 158007 (portion).

BACKGROUND:
Resolution of Intent for Annexation 20-08 is enclosed.

BUDGET IMPACT:
There is no budget impact associated with the adoption of this resolution.

RECOMMENDATION / ACTION REQUESTED:
Staff requests City Council set a public hearing date of Monday, February 1, 2021.

PUBLISH ONCE: Thursday, January 21, 2021

RESOLUTION TO ESTABLISH A PUBLIC HEARING DATE FOR VOLUNTARY CONTIGUOUS ANNEXATION (AN-20-08)

WHEREAS, the City Council has been petitioned to annex the property of James Martin and Shirley Martin. The proposed annexation site is approximately 4.21 acres, and located at the eastern terminus of E. Springfield Road, approximately 160 feet south of E. Springfield Road. The property is also known as Guilford County Tax Parcel 196054 (portion) and 158007 (portion).

WHEREAS, the City Clerk is in receipt of said petition and has determined its sufficiency in accordance with G.S. 160A-31;

NOW, THEREFORE BE IT RESOLVED, THAT THE CITY COUNCIL establishes Monday, February 1, 2021, at 5:30 p.m., in the Council Chambers in the Municipal Building at 211 South Hamilton Street, High Point, North Carolina, as the date for the public hearing regarding the requested annexation.

As part of the City of High Point's COVID-19 mitigation efforts, the City Council will hold a remote public hearing and in-person public attendance will not be allowed at this meeting. Once the City Council is in session, please use the following link to listen to the meeting live. www.HighPointNC.gov/VirtualPublicMeeting.

The public can submit comments to the City Council by emailing comments to build@highpointnc.gov and/or publiccomment@highpointnc.gov or by calling 336-883-3522 and leaving a message. Written comments can also be placed in the City of High Point's utility payment drop-boxes located on both sides of the Municipal Building located at 211 S. Hamilton Street in the Green Drive and the Commerce Avenue parking lots. We request that you include the case number at the top of the notice with your comment so it can be applied to the correct case. Public comments are being accepted now and will be until 24 hours after the close of the public hearing.

Following the public hearing, the City Council shall have authority to adopt an ordinance annexing the territory described in the petition. The City Council shall have authority to make the annexing ordinance effective immediately or on any specified date within six (6) months from date of passage of ordinance.

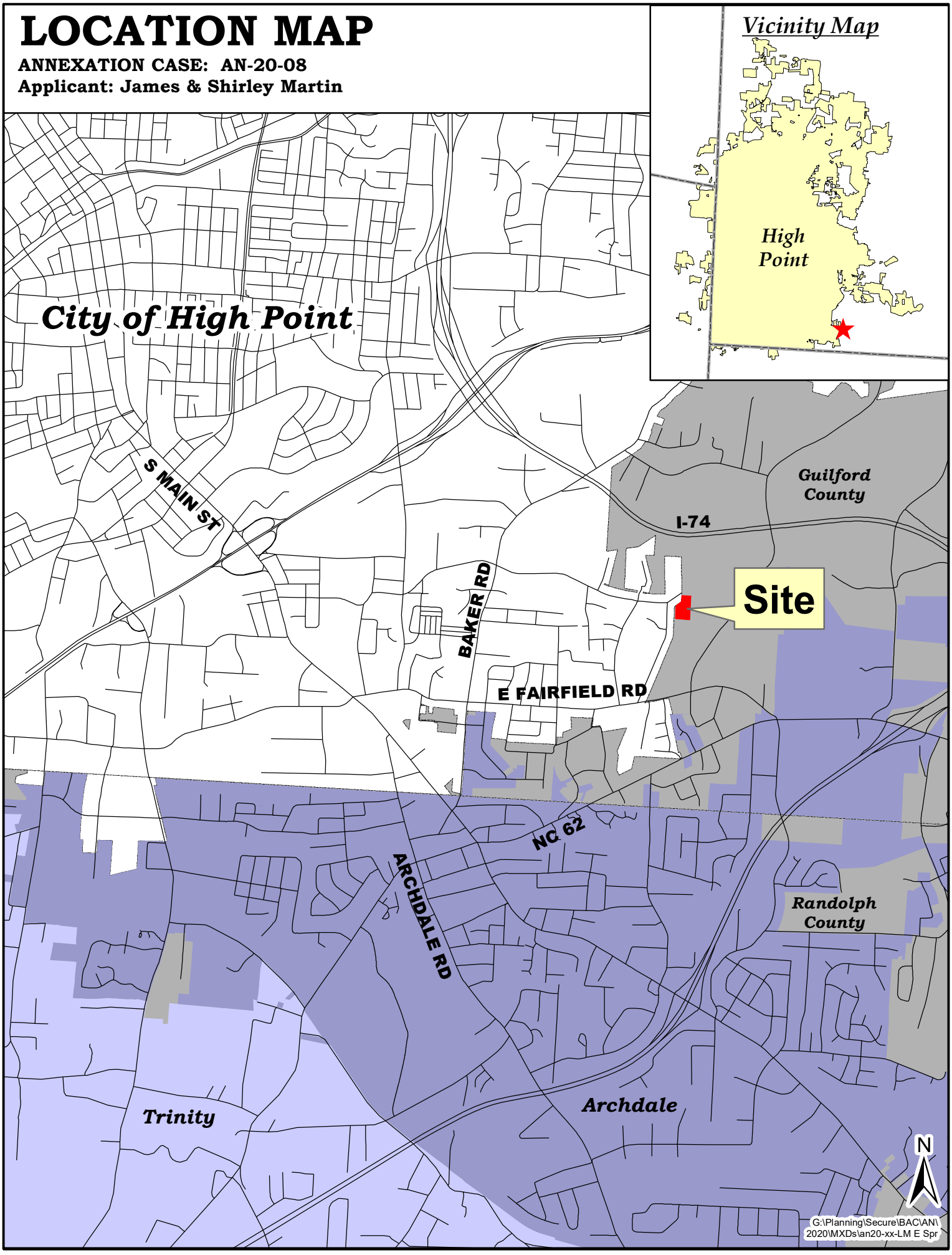
Further information pertaining to this request is available for public inspection upon request at the Planning and Development Department in the Municipal Office Building, 211 South Hamilton Street, Room 316, High Point, North Carolina, (336) 883-3328.

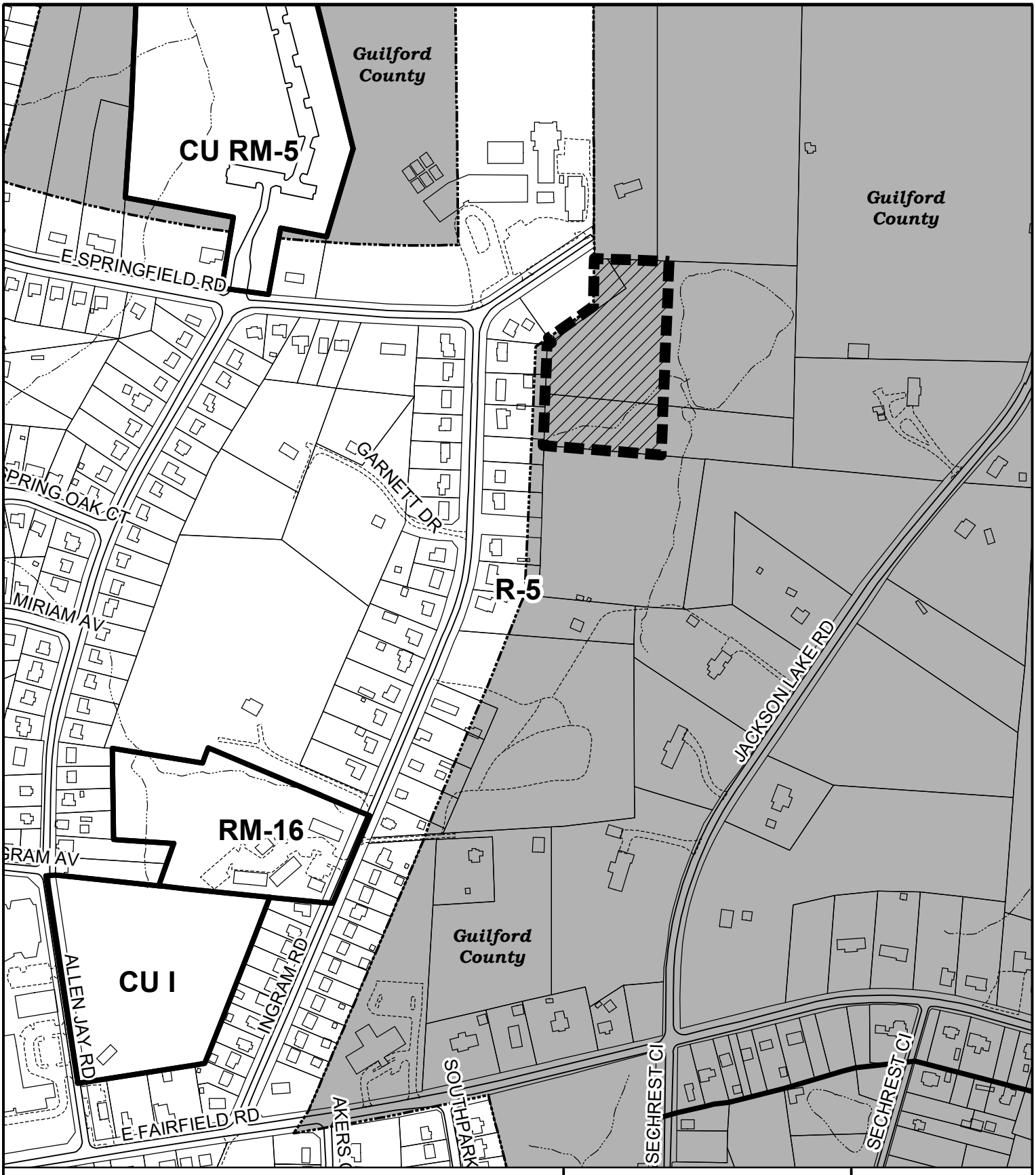
By order of the City Council,
This the 19th day of January, 2021

Lisa B. Vierling, City Clerk

LOCATION MAP

ANNEXATION CASE: AN-20-08
Applicant: James & Shirley Martin





PROPOSED ANNEXATION REQUEST

Applicant: James Martin and Shirley Martin

Area: 4.21 acres (approximate)

Existing Zoning Boundary

Subject Property Boundary

Planning & Development Department

City of High Point

N

Scale: 1'=400'

G:\Planning\Secure\BAC\Anx\2020\MXDs\an-20-xx E Springfield

CITY OF HIGH POINT
AGENDA ITEM

Title: Approval of City Manager Search Draft Advertisement & Timeline

From: Randy McCaslin
Interim City Manager

Meeting Date: January 19,2021

Public Hearing: N/A

Advertising Date / Advertised By: N/A

Attachments: Draft Advertisement
Draft Timeline

PURPOSE:
The Mercer Group, Inc. consultant has prepared a timeline and draft advertisement for the purpose of preparing to advertise availability of the City Manager position and recruit actively for candidates. The ad will run in and on carefully targeted publications and websites for six weeks, an adequate length of time to help bring the availability of the position to the attention of many well qualified potential applicants. The timeline allows the consultants to deliver applications and summaries about well qualified candidates in advance of the proposed semifinalist selection meeting.

BACKGROUND:
The City of High Point is currently preparing for a City Manger search. The Mercer Group, Inc. has been hired to facilitate this process and provide guidance to attract top candidates.

BUDGET IMPACT: N/A

RECOMMENDATION / ACTION REQUESTED:
City Council is requested to approve the proposed advertisement and timeline to initiate the search for the City Manager candidates with the goal of appointing a new City Manager who is a good match with the desired background, qualifications, experience and characteristics identified as a good fit for High Point.

The Mercer Group, Inc.
Consultants To Management

PROPOSED SEARCH TIMELINE

Our search process normally takes just less than 120 days from award of the contract to the final decision to appoint the new manager (the intervening holiday period extends that slightly here). That gives us abundant time to advertise availability of the position, recruit actively, and conduct thorough evaluation and background checks on finalist candidates. Several factors could extend the search time and work start date—difficulty scheduling Council meetings at key decision points, need to re-advertise and reopen the application process if an inadequate number of well qualified candidates apply initially, inability to negotiate a mutually acceptable employment agreement with the selected candidate, selected candidate's need to provide a longer than normal notice period to his or her current employer, etc.

CITY OF HIGH POINT
CITY MANAGER SEARCH
PROPOSED/DRAFT TIMELINE FOR SEARCH PROCESS
(Highlighted bolded events indicate Council meetings)

Proposal Accepted, Contract Executed	Dec. 7, 2020
Consultant Meet Individually with Mayor & Council members, & with Department Heads as a Group, to Discuss Desired Background, Qualifications, Experience & Characteristics	Dec. 15
Consultant Send Revised Proposed/Draft Timeline & Job Ad for Council Consideration	Jan. 10, 2021
Consultant Talk With Remaining Council Members	Mid-Jan.
Consultant Discuss Desired Background, Qualifications, Experience & Characteristics With Interested Citizens	Mid-Late Jan.
Draft Recruitment Brochure/Position Profile to Council for Review and Approval	Jan. 18
Consultant Place Job Ads (stating that "first review of applications begins on March 4"), Formally Begin Search Process	Jan. 20-21
Mayor, Council or Designees Approve Draft Recruitment Brochure Text (with requested revisions by individual email messages)	Jan. 25

CITY MANAGER -- HIGH POINT, NC

City of High Point (pop. 115,000, metro area pop. 747,000) seeks well qualified candidates for City Manager position. High Point is located in the Piedmont Triad region of North Carolina, primarily in Guilford County, with portions in Davidson, Forsyth and Randolph counties—the state's only city in four counties. The city is the home of the biannual High Point Market, the world's largest furniture and furnishings merchandising market.

City Manager is appointed by and works under the direction of the Mayor and eight-member City Council. General Fund budget $109.5 million, Water & Sewer Fund $71.2 million, Electric Fund $133.4 million; supervises one Deputy Manager, two Assistant Managers and 20 department directors; 1,463 full-time employees. Sound finances.

QUALIFICATIONS

Requires a Bachelor's degree in Public or Business Administration or other relevant field; Master's degree is preferred. Candidates should have at least 10 years of progressively responsible leadership and management experience in local government or business; experience as a local government manager, assistant manager or department head is preferred. Experience in NC municipal government or in comparable communities is a plus.

TO APPLY

Send letter of interest and resume to: Ellis Hankins, Sr. VP, The Mercer Group, Inc. highpointcitymanager2021@gmail.com (email preferred), cell & text: 919-349-8988. Request recruitment brochure for more information. Apply by 3/4//2021. Competitive salary DOQ, attractive benefits. EOE, City values diversity.

Formatted Color Recruitment Brochure to Council for Final Review and Approval	Jan. 29
Begin Disseminating Brochure and Consideration/Invitation Letters and E-mail Messages	Feb. 4
Consultant Begin Phone Calls To and About Potential Candidates, Aggressively Recruit Qualified Candidates	Feb. 8
Report to Council on Search Progress	Bi-Weekly
Phone Conversations w/ Strong Candidates, Preliminary Reference & Background Checks	Feb. 15-March 7
Soft Application Deadline ("first review of applications begins on March 4")	March 4
Consultant Deliver 8-12 (or more) Applications & Summaries to Council By E-mail &/or FedEx	March 10
Council Meeting to Consider Recommended Candidates (8-12 or more), Select 5-7 Semifinalists to Interview (closed session meeting, 1 ½ - 2 hours)	~Monday, March 15
Consultant Invites/Schedules Semifinalists for Council Interviews, Sends Supplemental Questions, Begins Preliminary Reference & Background Checks	March 15-16
Interview Guide Materials to Council	March 30
Consultants Complete Reference and Background Checks on Selected Semifinalists	April 1
Council Interviews ~5-7 Semifinalists—Determines Preferred Candidate or Selects 1-2 Finalists for Second Interview	~Fr., April 2
Consultants Talk with Additional References, Other Due Diligence	After initial interviews
Council Second Interview(s) if Desired, Potential Finalists Public Forum	~Monday, April 12
Council Decision, Negotiate with Selected Candidate	After initial or 2d interview

Council Votes to Appoint City Manager in Open Meeting (and probably approve employment agreement)	By Mid-April
Announce Appointment of New City Manager	Late April
New City Manager Reports to Work, Transition Work With Interim City Manager (2-3 days, if applicable)	June (earlier if internal candidate)
Search Completed, Consultants Assist with Transition	After start date

Note: This is a sound and realistic timeline designed to bring the availability of the position to the attention of a significant number and diversified range of well qualified potential candidates. The timeline cannot be shortened much without running the risk that well qualified, experienced managers who might be interested do not learn of the opening by the deadline. This gives the consultants adequate time to check references and complete thorough background checks. We always counsel clients to allow adequate time for a successful process, with the opportunity to review strong candidate applications and deliberate carefully. Once the Council approves this detailed timetable, with desired changes, the consultant and Mayor and Council will need to follow it faithfully.

The job ad will run in and on carefully targeted publications and websites for **six weeks**, an adequate length of time to help bring the availability of the position to the attention of many well qualified potential applicants (particularly important because of varying publication dates). The consultants will supplement the job advertising with targeted calls and email messages to well qualified city managers and other well qualified potential candidates to encourage them to consider applying for the position.

The timeline also allows the consultants to deliver applications and summaries about well qualified candidates in advance of the proposed semifinalist selection meeting, so the Mayor and Council members will have a few days to review the information before the Council discussion with us about which candidates to invite for interviews. The consultants will be readily accessible and provide full support to the Council in your interview process, toward the goal of appointing a new City Manager who is a good match with the desired background, qualifications, experience and characteristics identified by the Council and interested citizens at the beginning of the process, and a good fit for High Point. We also will assist with an orderly transition as an important part of our scope of services.

CITY OF HIGH POINT
AGENDA ITEM

Title: **Zoning Map Amendment 20-20**
(BRC Spirit LLC and BRC Spirit II LLC)

From:	Lee Burnette, Planning & Development Director	**Meeting Date:**	January 19, 2021
Public Hearing:	Yes	**Advertising Date:**	January 6, 2021, and January 13, 2021
Attachments:	A. Staff Report B. Zoning Ordinance	**Advertised By:**	Planning & Development

PURPOSE:
A request by BRC Spirit LLC and BRC Spirit II LLC to rezone approximately 3.6 acres from the Residential Single Family - 3 (R-3) District and a Conditional Use Office Institutional (CU-OI) District to a Conditional Zoning General Business (CZ-GB) District. The site is located west of Eastchester Drive and north of Hilton Court, and addressed as 1801 and 1809 Eastchester Drive.

BACKGROUND:
The Planning and Zoning Commission reviewed this request at their December 8, 2020 regular meeting and took final action when the meeting was reconvened on December 10, 2020. On the date of final action, all members of the Commission were present. Mr. Herbert Shannon, Senior Planner, presented the case and recommended denial of the request as outlined in the staff report.

Speaking on the request:
Speaking in favor of the request on behalf of the applicant were Mr. Tom Terrell, attorney, Fox Rothschild LLP, 300 N. Greene Street, Suite 1400, Greensboro and the applicant's representative, Ms. Judy Stalder, PO Box 5581, High Point. These speakers provided an overview of their client's proposal to rezone the site to the CZ-GB District to support development of a convenience store with fuel pumps and a restaurant with drive-through window. Key points from their presentation were:

- The recent Eastchester Drive/ I-74 assessment should not apply. Also, the adopted Eastchester plan and related policies are outdated.
- The speakers stated that the demand for office uses is weak due to remote work habits, and that the highest and best use of the site is for commercial uses.
- The TIA states that there is adequate road capacity for the proposed volume of traffic that will be generated by the proposed l development.
- The neighborhood adjacent to the zoning site only consists of a few homes. And the proposed commercial development will not be visible from the Cypress Court townhome development.
- Any development on the property must meet the architectural standards of the Eastchester Gateway Corridor District and the watershed regulations.

A comment from the public in favor of the request was submitted by Claudio Rayes, 145 W. Parris Avenue. He stated that the project will benefit the Eastchester Corridor and if approved he wants his abutting

property at 1811 Eastchester Drive rezoned to General Business District or his property will be harder to develop.

Comments from the public in opposition to the request were submitted by:

- Elisa Cameron 2311 Cypress Ct.
- Stacey Jolly & Robb Jolly 1821-B Eastchester Dr.
- B. Van Locke (no address provided)
- Cheryl Lawson 2219 Dover Pl
- Mary Soles (no address provided)
- Tim Tucker (no address provided)
- Vesta Kennedy 1821-A Eastchester Dr.
- Lee Ann Patterson (no address provided)
- Beverly Bard 2205 Delaine Pt
- Rick Morgan 1920 Greenstone Pt.
- Caroline McGuinn 1034 Sweetbriar Road
- Jane Dawson 2300 Cypress Ct

Key concern from those in opposition were:

- Land Use Plan and Compatibility
  - The land use plan for this area does not recommend commercial development.
  - The proposal goes against the recommendations of the recent land use assessment for this area.
  - This is not the right place for this type of development.
  - The homes near the zoning site shouldn't be dismissed – the impact on them is important to consider.
  - It would be shortsighted to allow the proposal for a drive-thru based on a temporary pandemic.
  - There are other nearby residential areas that would also be impacted by the proposal.
  - Concern with the intensity of development in this area.

- Environmental Impacts
  - Concern with potential impact on the water quality.
  - The increase in impervious surface area will lead to additional flooding in the Foxwood Meadows Subdivision downstream for this site.
  - The underground fuel tanks would threaten the water supply. Newer technology for fuel tanks is no guarantee there will be no leaks in the future.

- Traffic Impact
  - Access from the site to Eastchester Drive would be problematic.
  - The proposal goes against the recommendations of the City Transportation Department.
  - Concern with increase traffic congestion.
  - Will create new transportation issues in this area.

Once the public hearing was closed and final public comments were received and reviewed, the Planning & Zoning Commission deliberated on the request. The Chair acknowledged receipt of 14 comments from the public, including the submittal of an online petition with approximately 600 signatures in opposition Key points from their discussion were as follows:

- The site is not visible from I-74 and it's not clear how you easily access the site from Eastchester Drive.
- Questions were raised as to the installation of underground storage tanks and its impact to the City's water supply. These questions were addressed by the applicant's geological engineer.
- Concern with transportation impacts; there is already traffic congestion in this area.
- There is no use like this along this segment of the corridor because of the location and environmental impacts from Oak Hollow Lake.
- Should not make a zoning decision based on the temporary lifestyle changes from the Covid-19 impacts.
- Focus on the zoning district not the proposed site plan or uses stated by the applicant. The zoning runs with the land not the owner.

- Could be a domino effect as other area property owners will also want commercial zoning.
- Grading of property toward the street (from Oak Hollow Lake to City Lake) is not related to storage tanks, but to allow more impervious cover (higher development intensity) on the site.

BUDGET IMPACT:
There is no budget impact.

RECOMMENDATION / ACTION REQUESTED:

A. Staff Recommendation
Staff recommended ***denial*** of this request as outlined in the attached staff report.

B. Planning and Zoning Commission Action

1. The Planning and Zoning Commission recommended ***denial*** of this request, as recommended by staff, by a vote of 9-0.

   A zoning map amendment application receiving a recommendation for denial from the Planning and Zoning Commission shall only be approved by the City Council with a two-thirds (⅔) majority vote of the City Council members present and voting.

2. Consistency and Reasonableness Statements
   The Planning and Zoning Commission voted 9-0 to approve the following statement:

   That Zoning Map Amendment 20-20 is not consistent with the City's adopted policy guidance because there have been no changes in the type or nature of development in this area, no changes to the Land Use Plan and no changes in policies of the corridor plan to support commercial uses in this area. The land use impacts from the I-74/Eastchester Drive interchange improvements were recently studied. That land use assessment reported that the transportation improvements did not warrant a change in land use policy or zoning for the site and surrounding area.

   Furthermore, the Commission stated that the recommendation of denial is reasonable and in the public interest because the established zoning and development pattern along this segment of the corridor primarily consists of OI Districts and residential districts. The requested CZ-GB District, to permit intense commercial use of the site, is not consistent with the established zoning and development pattern of the surrounding area.

CITY OF HIGH POINT
PLANNING AND DEVELOPMENT DEPARTMENT

STAFF REPORT
ZONING MAP AMENDMENT ZA-20-20
February 15, 2021
(Revised)

Request	
Applicant: BRC Spirit LLC and BRC Spirit II LLC	**Owners:** BRC Spirit LLC and BRC Spirit II LLC
Zoning Proposal: To rezone approximately 3.6 acres	**From:** R-3 Residential Single Family - 3 District CU-OI Conditional Use Office Institutional District
	To: CZ-GB Conditional Zoning General Business District

Site Information	
Location:	The site is located west of Eastchester Drive and north of Hilton Court (1801 and 1809 Eastchester Drive).
Tax Parcel Number:	Guilford County Tax Parcels 200162 and 200163
Site Acreage:	Approximately 3.6 acres
Current Land Use:	The parcels are currently developed with a single-family detached dwelling and a fitness center use.
Physical Characteristics:	The site has a relatively gentle slope to the north and northwest, and is wooded to the rear.
Water and Sewer Proximity:	An 8-inch City water line and an 8-inch City sewer line lie adjacent to the site along both Eastchester Drive and Hilton Court.
General Drainage and Watershed:	The site drains in a general north and northwesterly direction and development is subject to the City Lake General Watershed Area (GWA) and Oak Hollow Lake Watershed Critical Area (WCA) requirements. Within the GWA, engineered storm water treatment measures are required for development with a total impervious surface area greater than 24% of the site. Development within Tier 3 of the WCA is limited to 35% built upon area and Tier 2 of the WCA only permits 1 dwelling unit per acre.
Overlay Districts:	• City Lake GWA • Oak Hollow Lake WCA – Tier 3 • Oak Hollow Lake WCA – Tier 2 • Eastchester Gateway Corridor Overlay District

Adjacent Property Zoning and Current Land Use			
North:	R-3	Residential Single Family - 3 District	Single family dwelling
South:	R-3	Residential Single Family - 3 District	Undeveloped parcels and a single-family dwelling
East:	R-3	Residential Single Family - 3 District	Undeveloped parcel and a single - family dwelling
West:	R-3	Residential Single Family - 3 District	Single-family dwelling

Relevant Land Use Policies and Related Zoning History	
Community Growth Vision Statement	Goal 1: Preserve and enhance High Point's most important natural and cultural resources. Obj. 1C: Protect the city's water supply through compatible use and design innovation, and minimizing the disturbance of land. Goal 5: Balance the efficient movement of vehicles with the needs of pedestrians, alternative transit modes, and aesthetic quality. Obj. 5B: Focus particular attention on the appearance of key gateways into High point to convey to visitors a positive first and last impression of the community.
Land Use Plan Map Classification:	The site has an Office land use designation. This classification includes professional, personal and business service uses.
Land Use Plan Goals, Objectives & Policies:	The following goal and objectives of the Land Use Plan are relevant to this request: Goal #1: Ensure that development respects the natural environment. Obj. #2. Protect and preserve environmentally sensitive locations including designated open space and watershed critical areas from inappropriate development. Obj. #9. Where feasible and appropriate, provide a transition in land uses between more and less intensive land uses. Obj. #11. Enhance the aesthetic appearance of High Point by preserving the scenic quality of its major gateway streets and travel corridors and by providing appropriate landscaped buffers and transitional uses between low and high-intensity land uses.
Relevant Area Plan:	<u>Eastchester Drive Corridor Plan - Phase II (Lassiter Drive to Penny Road)</u> The Eastchester Drive Corridor Plan Phase II recommends limiting commercial uses to well separated clusters located at designated major intersections. The other areas along this section of the corridor are recommended for office and residential uses.
Zoning History:	<u>Gateway Corridor Zoning History</u>: Since the 1980s, this segment of the Eastchester Gateway Corridor has had multiple parcels rezoned to various office districts and developed with various office and personal service uses. a) Approximately 17 zoning map amendment requests near the subject site were approved for the CU-OI designation between 1988 and 2000, allowing for various office and medical uses. b) In 1989, the eastern portion of this current zoning site (fitness center), was rezoned from a single-family residential zoning district to a CU-OI District (ZA-89-22). c) Approximately 0.7 miles north of the current zoning site, a CZ-GB District was approved in 2018 (ZA-18-23). The Council's approval was specifically to allow the reuse of an existing two-story office building with the only allowable uses being OI District uses and an internal self-storage facility. The exterior of the structure cannot be changed, to keep its appearance as an office building.

<table>
<tr><th colspan="5">Transportation Information</th></tr>
<tr><td rowspan="3">Adjacent Streets:</td><td colspan="2">Name</td><td>Classification</td><td>Approx. Frontage</td></tr>
<tr><td colspan="2">Eastchester Drive</td><td>Major Thoroughfare</td><td>320 feet</td></tr>
<tr><td colspan="2">Hilton Court</td><td>Local</td><td>476 feet</td></tr>
<tr><td>Vehicular Access:</td><td colspan="4">The applicant proposes to have access from Hilton Court and Eastchester Drive.</td></tr>
<tr><td>Traffic Counts:
(Average Daily Trips)</td><td colspan="2">Eastchester Drive———
Hilton Court———</td><td colspan="2">40,000 AADT (NCDOT 2017 traffic count)
None, traffic counts are not typically taken from local streets by the NCDOT.</td></tr>
<tr><td>Estimated Trip Generation:</td><td colspan="4">The proposed convenience store with fuel sales and a major eating establishment (restaurant with drive through window) are anticipated to generate approximately 7,227 daily trips (during a 24-hour time period), with approximately 212 AM peak-hour trips and approximately 210 PM peak-hour trips.</td></tr>
<tr><td rowspan="2">Traffic Impact Analysis (TIA):</td><td colspan="2">Required</td><td colspan="2">TIA Comments</td></tr>
<tr><td><u>Yes</u>
X</td><td><u>No</u></td><td colspan="2">Although reviewed by the High Point Transportation Department, the NCDOT has not completed its review of the TIA at the time of this report. There may be additional required improvements once their review is complete.</td></tr>
<tr><td>Conditions:</td><td colspan="4">The High Point Transportation Department recommends the following conditions be part of any conditional zoning ordinance approval for this site.
1. <u>Access:</u> No access to Eastchester Drive. Access is to be taken from Hilton Court.
2. <u>Improvements:</u> Construct a right turn lane, with a minimum of 100 feet of storage and a minimum of 150 feet of taper, at the intersection of Eastchester Drive and Hilton Court. NCDOT requirements may include a longer storage and taper length.
3. <u>Right of Way Dedication:</u> The property owner shall dedicate adequate right-of-way across the Eastchester Drive frontage to accommodate the construction of the right turn lane at the Hilton Court intersection.
4. The City of High Point Transportation Director and the NCDOT shall approve the exact location and design of all access points and improvements.</td></tr>
</table>

School District Comment
Not applicable to this zoning case.

Details of Proposal

The applicant desires to develop a convenience store with fuel sales and a major eating establishment (restaurant with drive-through window) at the northwestern corner of the intersection of Eastchester Drive and Hilton Court. The current zoning districts of the parcels, the R-3 District and a CU-OI District, do not permit these commercial uses. Therefore, the applicant has requested to rezone the site to a CZ-GB District.

The applicant has included with their application a conditional zoning ordinance in which they have offered conditions to allow right-in only access to the site from Eastchester Drive and to provide a 100-foot wide buffer adjacent to residential uses to the rear of the site. The applicant has also offered conditions to prohibit underground fuel storage tanks and to restrict allowable GB District uses to convenience store with fuel sales, major eating establishment, hotels or motel, microbrewery, microdistillery/microwinery, major personal service and major retail sales uses, which includes retail establishments up to 50,000 square feet of gross floor area.

Staff Analysis

The zoning site is located along Eastchester Drive, approximately 0.2 miles north of the I-74 interchange. In 1997, the western half of the Eastchester Drive/I-74 interchange was opened when the US 311 Bypass (I-74) was built between US 311 (N. Main Street) and Eastchester Drive. In 2004, the eastern half of the interchange was opened when the Bypass was extended southward to Business I-85.

Eastchester Drive is an important major thoroughfare in the city, moving traffic entering the city from the north and from I-74. With Eastchester Drive being a major gateway into High Point from I-40 and the Piedmont Triad International Airport (PTIA), the Eastchester/I-74 intersection has emerged as a major interchange. The segment of Eastchester Drive near the I-74 interchange carries approximately 40,000 vehicle trips a day. In 2020, the NCDOT began construction of road improvements to alleviate congestion along Eastchester Drive and on the exit ramps of I-74. The improvements include the addition of exit loops in the southwest and northeast quadrants of the interchange and the elimination of left turns on the Eastchester Drive overpass to access the interstate.

Land development along the Eastchester Drive corridor has been primarily shaped by the Eastchester Drive Corridor Plan. Beginning in 1986, the City through a series of adopted corridor plans and an overlay zoning district, established policies and standards to enhance and protect the corridor as a major gateway into the city. The roadway and the land development along it provides first impressions to visitors entering the city from Interstate 40 and PTIA. Some of the goals and policy objectives of the Eastchester Corridor Plan are to:

- Minimize traffic congestion caused by haphazard commercial development;
- Prevent strip commercial development, which in turn will degrade the corridor's primary purpose of serving as a travel corridor and gateway to the City;
- Limit commercial uses to well separated clusters located at major intersections;
- Implement a deceleration lane policy to conserve the capacity of Eastchester Drive;
- Require driveways for corner lots to be from side streets; and
- Retain the Office land use designation because of concerns that commercial uses will hinder the efficiency of the Eastchester Drive/I-74 (former US 311) interchange.

Over the last 35 years, there has been significant commercial development occurring along the Eastchester Drive corridor in three main areas. To manage traffic and to protect the gateway qualities of the corridor, the Eastchester Corridor Plan limited commercial development to well-separated clusters, or nodes, located at major intersections. Major commercial nodes were planned at 1) the intersection of N. Main Street and along the corridor to the N. Centennial Street intersection, 2) the mid-point of the corridor at the Skeet Club Road/Wendover Avenue intersection, and 3) the northern point of the corridor at the Regency Drive and Gallimore Dairy Road intersections. Over the years, these three planned commercial nodes were expanded in area to accommodate additional commercial development where traffic could be adequately managed in those major intersection areas. The interchange at I-74 was never planned as a commercial node by the Eastchester Corridor Plan as there are watershed protection restrictions, development constraints and concerns that commercial development would adversely impact the efficiency of the interchange.

Due to the I-74 interchange improvement project, the City recently conducted a land use assessment of a 148-acre area along Eastchester Drive. The Eastchester Drive/I-74 Land Use Assessment studied the transportation project's impacts on adjacent land along Eastchester Drive from Festival Park on the

northern end to Lassiter Drive on the southern end. The purpose of the study was to review the impacts and to evaluate the current land use policies for this portion of the corridor.

The assessment documents that the land area in and around the I-74 interchange is narrow and does not offer large areas for development, and that direct vehicular access from Eastchester Drive has been restricted by NCDOT from the I-74 interchange northward to the newly constructed Hilton Court/Gordon Road signalized intersection. In addition, land in this area is constrained by Oak Hollow Lake to the west, which is part of the City's potable water supply, and by established neighborhoods to the east. Furthermore, the area is impacted by the development restrictions of the Oak Hollow Lake Watershed Critical Area, as a significant portion of land to the west of this segment of Eastchester Drive are within Tiers 1, 2 and 3 of the Watershed Critical Area.

The zoning site is contained within Area 3 as denoted in the assessment report. The report states that Area 3 consists of approximately 6 acres that are split between Oak Hollow Lake WCA Tiers 2 and 3 and City Lake GWA. Furthermore, it states that a portion of Area 3 could be graded so that it drains out of the Oak Hollow Lake WCA and into the City Lake GWA, which would allow more impervious surface and allow increased development intensity. The 3.6-acre zoning site is the only portion of Area 3 or the entire assessment study area where such development intensity could be increased by changing the grade of the site. While this may increase the development potential for the zoning site, the surrounding area is more significantly constrained with watershed development restrictions, topographic constraints, controlled access and a classified stream.

The land use assessment concludes that Area 3 should remain in the Office land use category, which would support the OI district. The OI district now allows a wider variety of land uses that offer additional development opportunities while still adhering to the longstanding policies of the corridor. Approval of the requested CZ GB district would enable commercial development of the zoning site inconsistent with the character of development, both existing and planned, for this segment of the Eastchester Drive corridor. No other properties in the surrounding area can be developed similarly. Therefore, commercial development on the zoning site could negatively affect the potential of those surrounding properties to be developed with office, institutional or residential uses, which are allowed by policy. In addition, the requested CZ GB district would allow access directly to Eastchester Drive, inconsistent with the corridor plan and against the recommendation of the Transportation Department.

Section 2.4.6.C. of the Development Ordinance states that the advisability of a conditional zoning is a matter committed to the legislative discretion of the City Council and is not controlled by any one factor. In determining whether to approve or deny a conditional zoning, the City Council shall weigh the relevance of and consider the following issues outlined below. Based on the applicant's submittal and proposed conditions, as they existed on the date of this report, the Planning and Development Department offers the following comments relative to these ordinance considerations.

Consistency with Adopted Policy Guidance
Whether and the extent to which the proposed conditional zoning district is appropriate for its proposed location, and is consistent with the City's adopted policy guidance.
The requested CZ-GB District would allow commercial development and access to Eastchester Drive at a location not supported by the goals, objectives and policies of the Eastchester Corridor Plan.

Reasonableness/Public Interest:

Why a decision to approve, or to deny, the proposed conditional zoning would be reasonable and in the public interest.

The request would allow commercial development inconsistent with the character of development, both existing and planned, for this segment of the Eastchester Drive corridor and could impact the potential development of surrounding properties.

Compatibility with Surrounding Areas

- Whether the proposed conditional zoning district will result in a development that is compatible with the character of surrounding existing or proposed development and land uses.
- Where there are issues of compatibility, the proposed conditional zoning district shall provide for appropriate transition areas that address incompatibility through increased buffering, landscaping, fencing, building height, mass and scale or other means designed to promote a complimentary character of development.
- Determination of complimentary character may be based on densities/intensities, use types, lot sizes and dimensions, building height, mass and scale, exterior lighting, siting of service areas, or other aspects that may be identified by the City Council.

- Approval of the requested CZ GB district would enable commercial development of the zoning site inconsistent with the character of surrounding development. No other properties in the surrounding area can be developed similarly and at the potential level of development intensity. Commercial development on the zoning site could negatively affect the potential of the surrounding properties to develop with land uses that are supported by the Eastchester Corridor Plan.
- The condition to prohibit underground fuel storage tanks means if such a use occurs that offers fuel sales, then the fuel storage tanks would be above ground and visible. This furthers the concern that commercial use of this site would be inconsistent with the existing and planned character along this segment of the corridor. The Eastchester Gateway Overlay District does not contain standards for above ground tanks and any required spill containment structures. And the applicant did not offer any conditions to address the visual impacts with such tanks located along the Eastchester Drive corridor. Therefore, there are no standards to control the number, size, bulk, or height of fuel storage tanks and their location, nor are there any requirements to screen them from view along the Eastchester Drive corridor. The visual impacts from above ground storage tanks conflict with the purpose of the Overlay District to enhance the visual character of the Eastchester Drive corridor.

Mitigation of Impacts

Whether the applicant's proposed conditional zoning district, including the proposed use(s), written conditions, and conditional zoning plan (if applicable), will satisfactorily:

Mitigation #1	**Minimize or effectively mitigate any identified adverse impact on adjacent and nearby land, such as that caused by traffic, parking, noise, lighting, trash, loading areas, etc.**
	❖ As recommended by the Transportation Department, prohibiting access to Eastchester Drive and the installation of a turn lane at the signalized intersection will assist to alleviate traffic impacts along Eastchester Drive; the applicant's proposed district does not offer these conditions.

	❖ Lighting and screening requirements of the Development Ordinance will assist to mitigate negative impact as to spill over lighting onto adjacent property and to screen trash loading areas from the public right of ways. ❖ The condition offered by the applicant to install a 100-foot wide buffer area, planted to a Type A rate, will push commercial activities away from abutting residential uses at the rear of the site.
Mitigation #2	**Minimize or effectively mitigate any identified adverse environmental impact on water and air resources, minimize land disturbance, preserve trees and protects habitat.**
	Most of the site is within the Oak Hollow Lake Watershed Critical Area, while a small portion of the site is within the City Lake General Watershed. The site can be graded such that a majority of the on-site development is within the City Lake General Watershed. Development of the site is required to meet the applicable watershed standards of the Development Ordinance.
Mitigation #3	**Minimize or effectively mitigate any identified adverse impact on municipal facilities and services, such as streets, potable water and wastewater facilities, parks, police and fire.**
	❖ High-intensity commercial uses are not supported in this area due to continued policy concerns about the protection of the city's water supply. ❖ To maintain the safe and efficient transportation functionality of the corridor, the Transportation Department recommends no access be permitted from Eastchester Drive, which is not a condition in the proposed district.
Mitigation #4	**Minimize or effectively mitigate any identified adverse effect on the use, enjoyment or value of adjacent lands.**
	❖ The applicant has offered a condition to provide a 100-foot wide buffer to the rear of the site adjacent to abutting residential uses. ❖ The surrounding area is more significantly constrained with stringent watershed restrictions, topographic constraints, controlled access and a classified stream that makes it infeasible for commercial development in the surrounding area. The requested CZ-GB District would not be consistent with the surrounding character of this section of the gateway corridor.

Supportive Changes in the Area

Whether and the extent to which there have been changes in the type or nature of development in the area of the proposed conditional zoning district that support the application.

There have been no changes in the type or nature of development in this area, no changes to the Land Use Plan and no changes in policies of the corridor plan to support commercial uses in this area. The land use impacts from the I-74/Eastchester Drive interchange improvements were recently studied. That land use assessment reported that the transportation improvements did not warrant a change in land use policy or zoning for the site and surrounding area.

Promotes a Preferred Development Pattern

Whether and the extent to which the proposed conditional zoning district will result in development that promotes a logical, preferred, and orderly development pattern.

The established zoning and development pattern along this segment of the corridor primarily consists of OI Districts and residential districts. The requested CZ-GB District, to permit intense commercial

use of the site, is not consistent with the established zoning and development pattern of the surrounding area.

Recommendation

Staff Recommends Denial:

The request to rezone this 3.6 acre site to a CZ-GB District conflicts with the Eastchester Corridor Plan and the recent Eastchester Drive/I-74 Land Use Assessment – each of which recognize the physical constraints in the immediate area, the need to protect water quality, the objective to maintain the safe and efficient flow of traffic on Eastchester Drive, and the objective to enhance and maintain the visual characteristics of the corridor. The requested district does not protect transportation efficiency, nor does it promote safety because it does not include the Transportation Department's recommendations for the development to take access from Hilton Court and to construct a right-turn lane at that intersection.

Required Action

Planning and Zoning Commission:

The NC General Statutes require that the Planning and Zoning Commission place in the official record a statement of consistency with the City's adopted plans when making its recommendation. This may be accomplished by adopting the statements in the Staff Analysis section of this report or by adopting its own statement.

City Council:

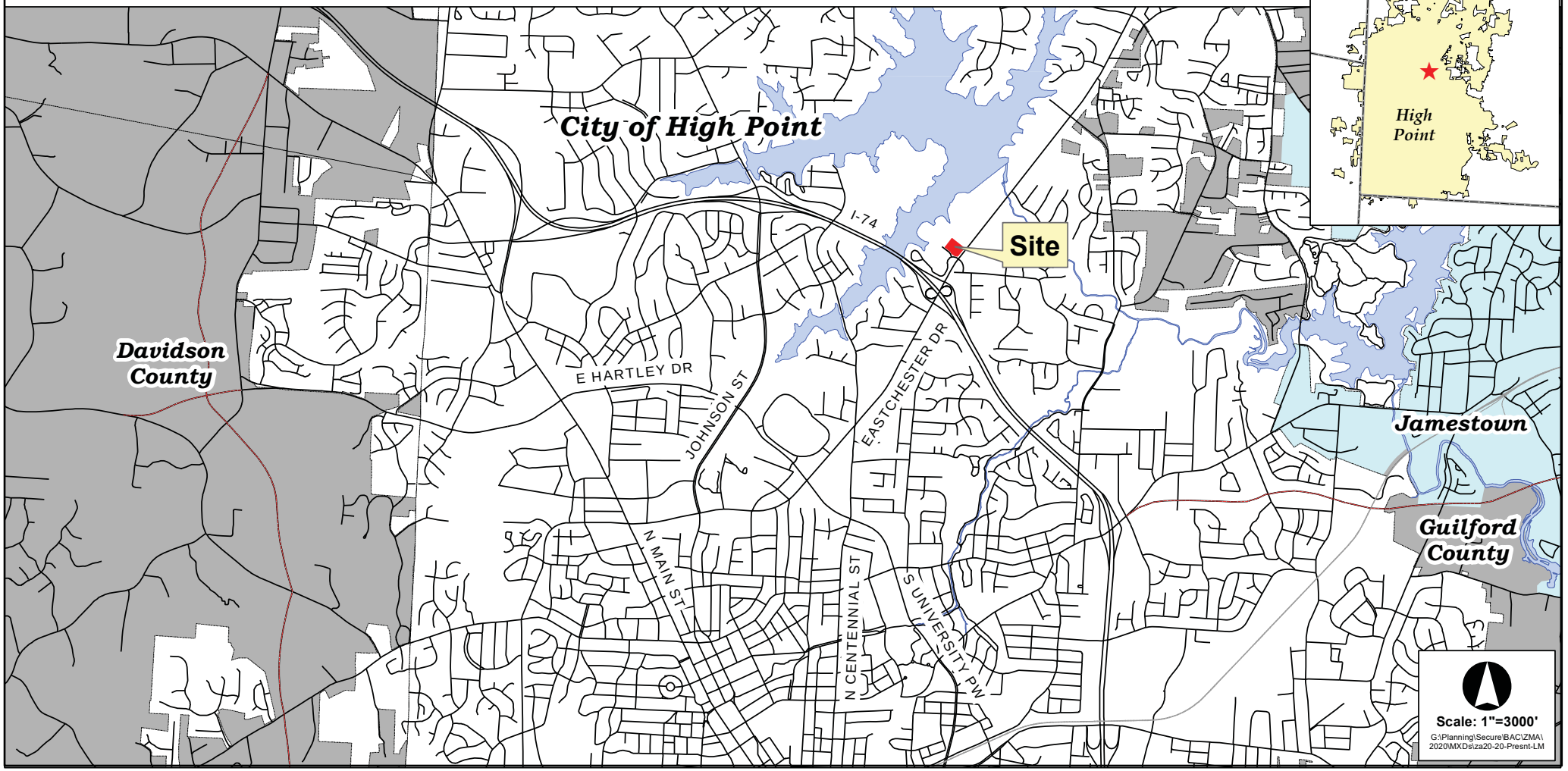
The NC General Statutes require that the City Council also place in the official record a statement of consistency with the City's adopted plans, and explain why the action taken is considered to be reasonable and in the public interest when rendering its decision in this case. This may be accomplished by adopting the statements in the Staff Analysis section of this report or by adopting its own statement.

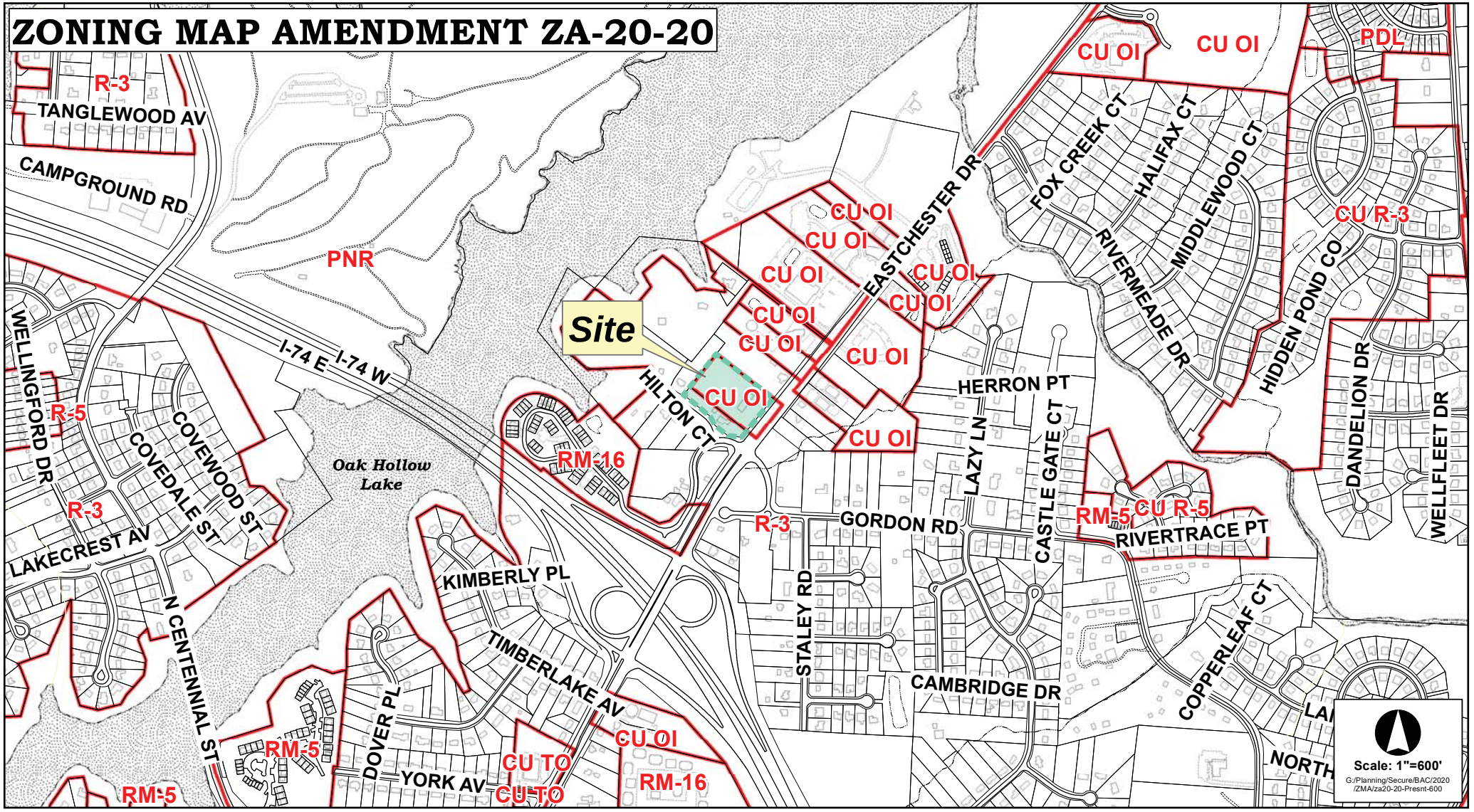
Report Preparation

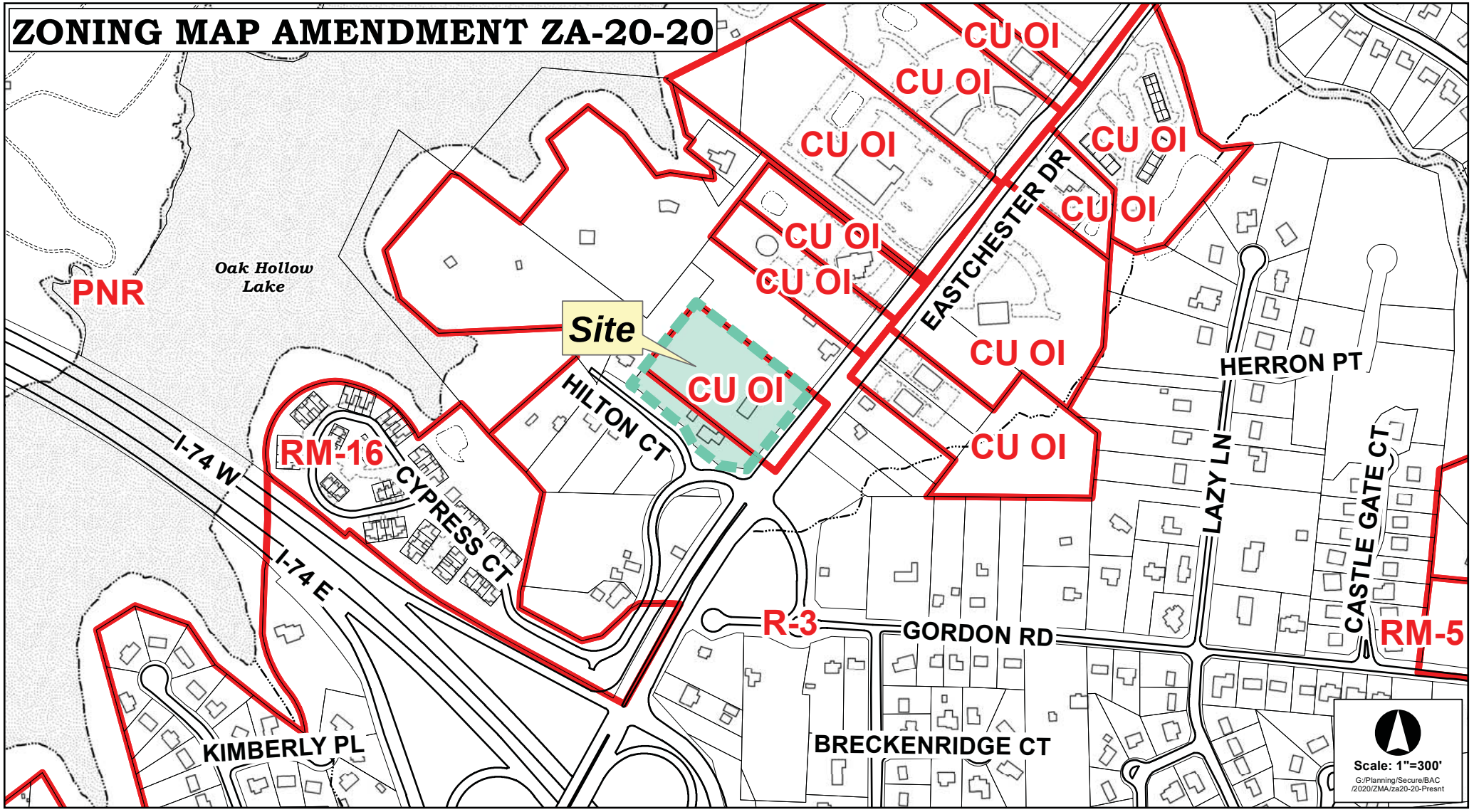
This report was prepared by Planning and Development Department staff member Herbert Shannon Jr. AICP, Senior Planner and reviewed by Chris Andrews AICP, Development Administrator and Lee Burnette AICP, Director.

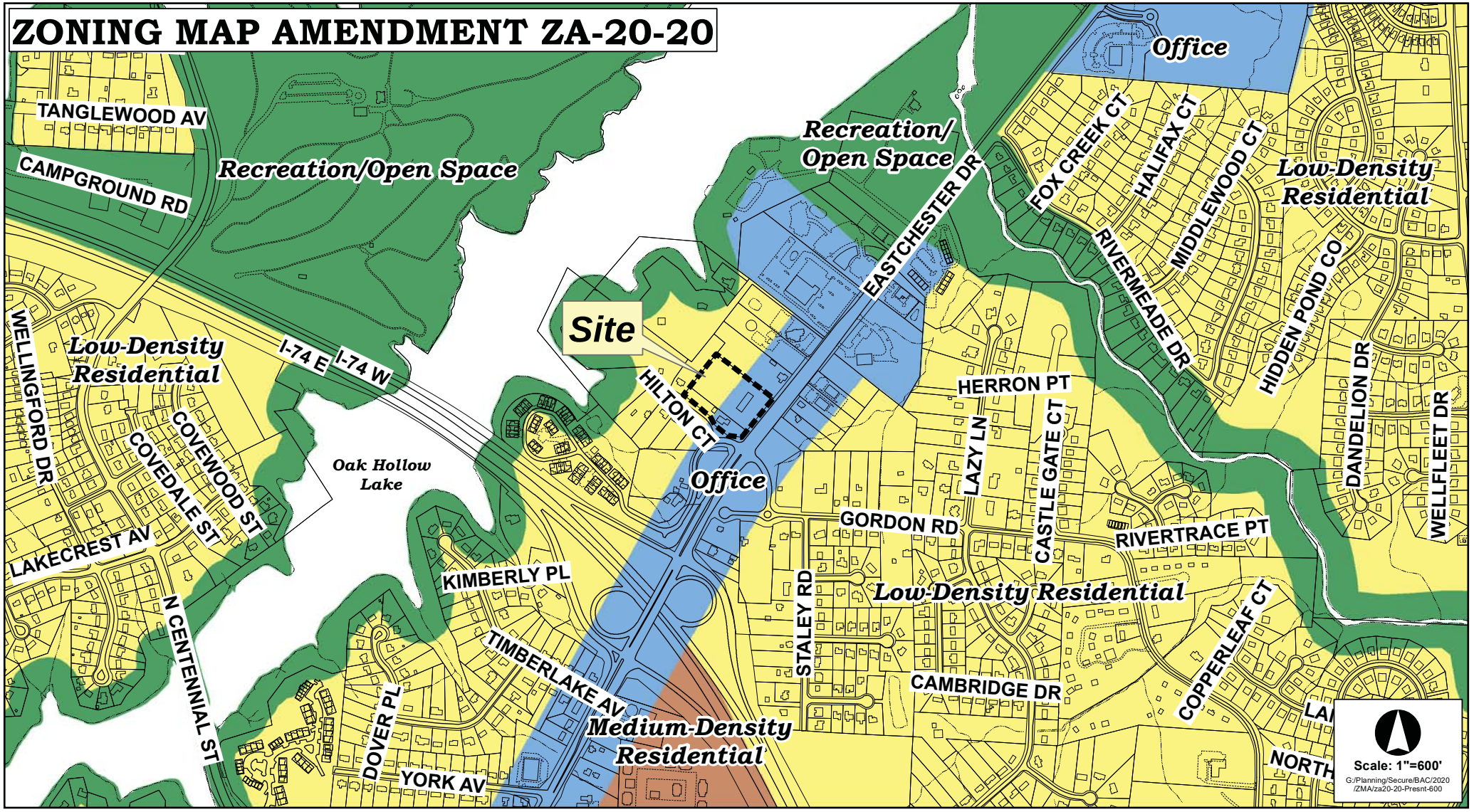
LOCATION MAP

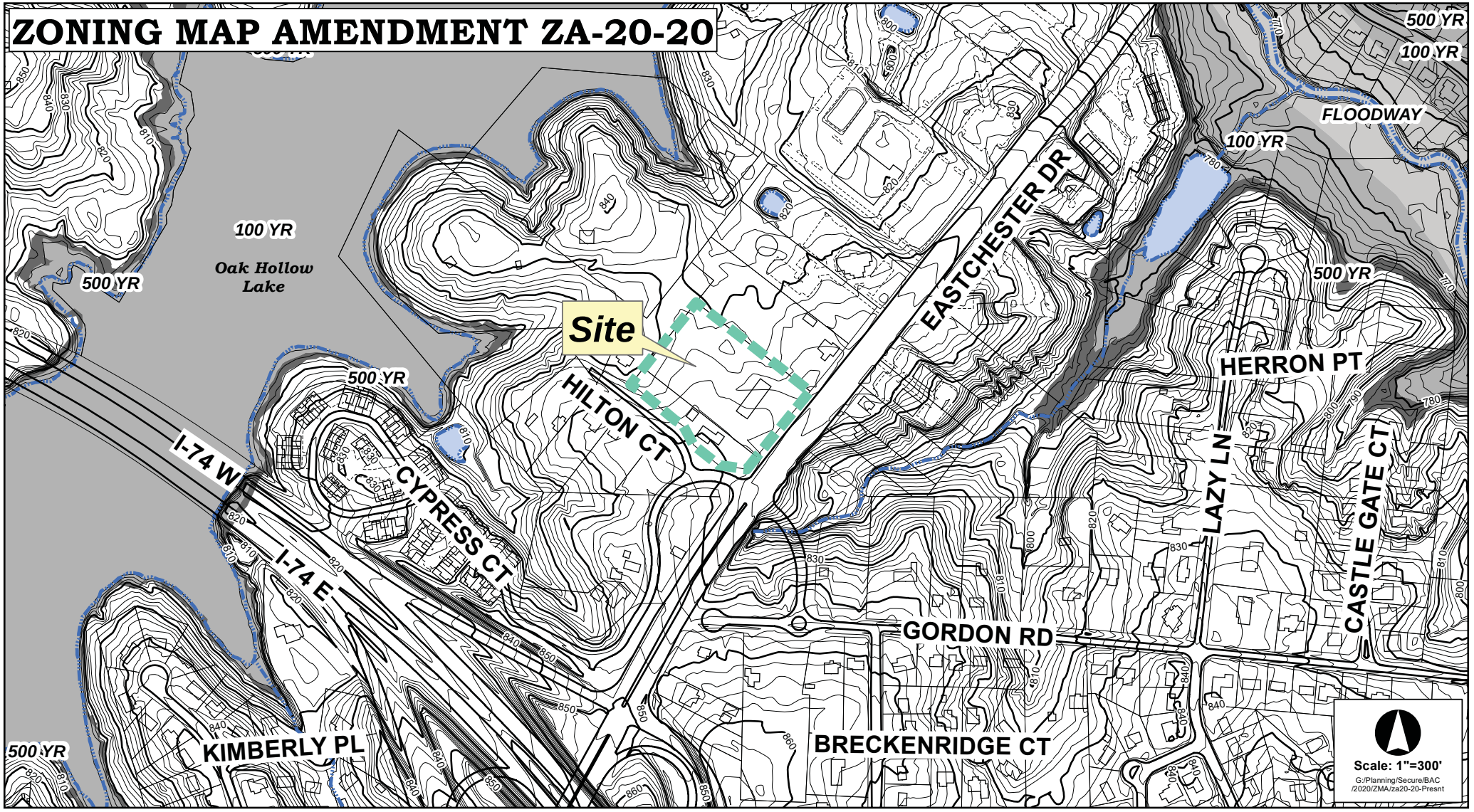
ZONING MAP AMENDMENT: ZA-20-20
Applicant: BRC SPIRIT LLC

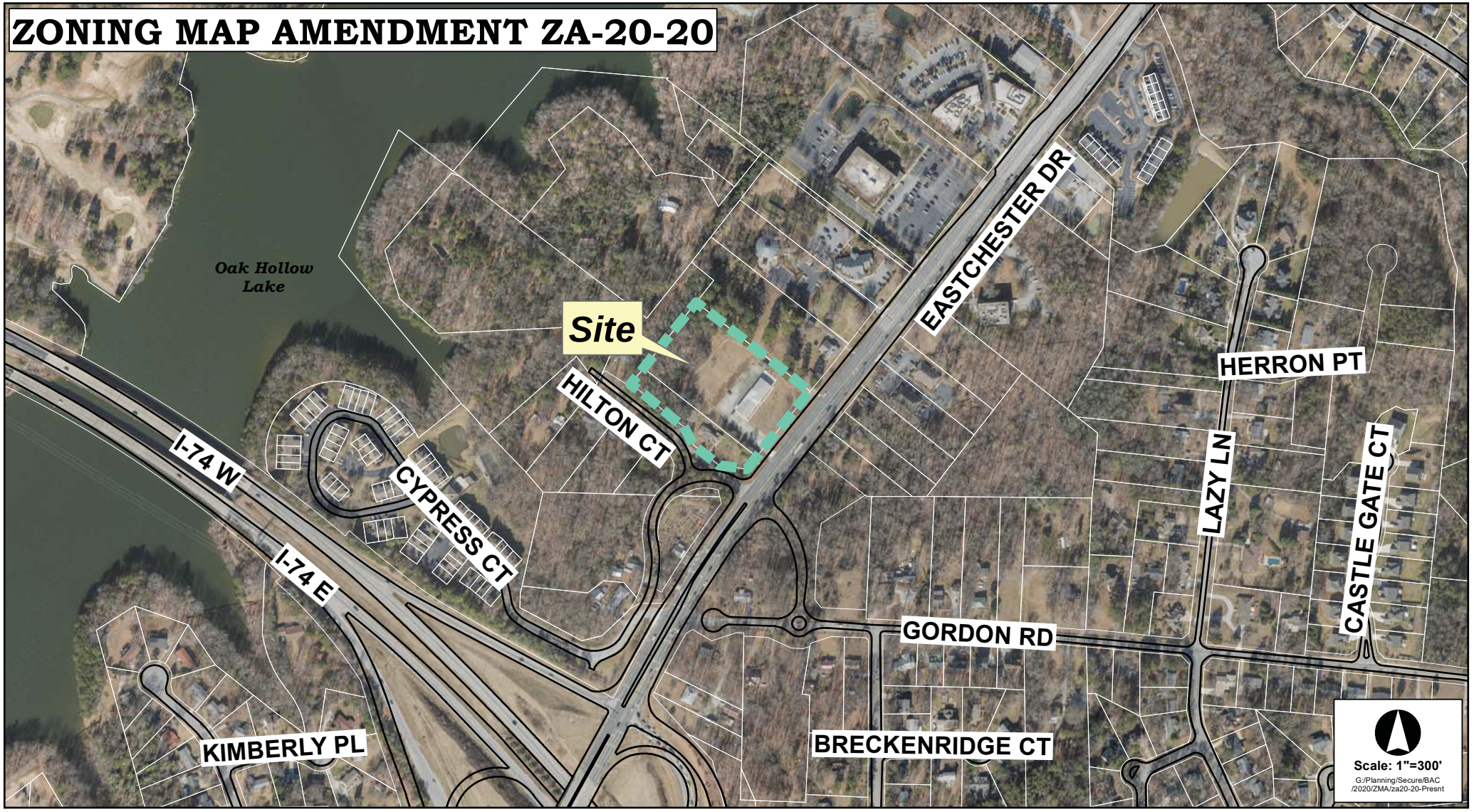


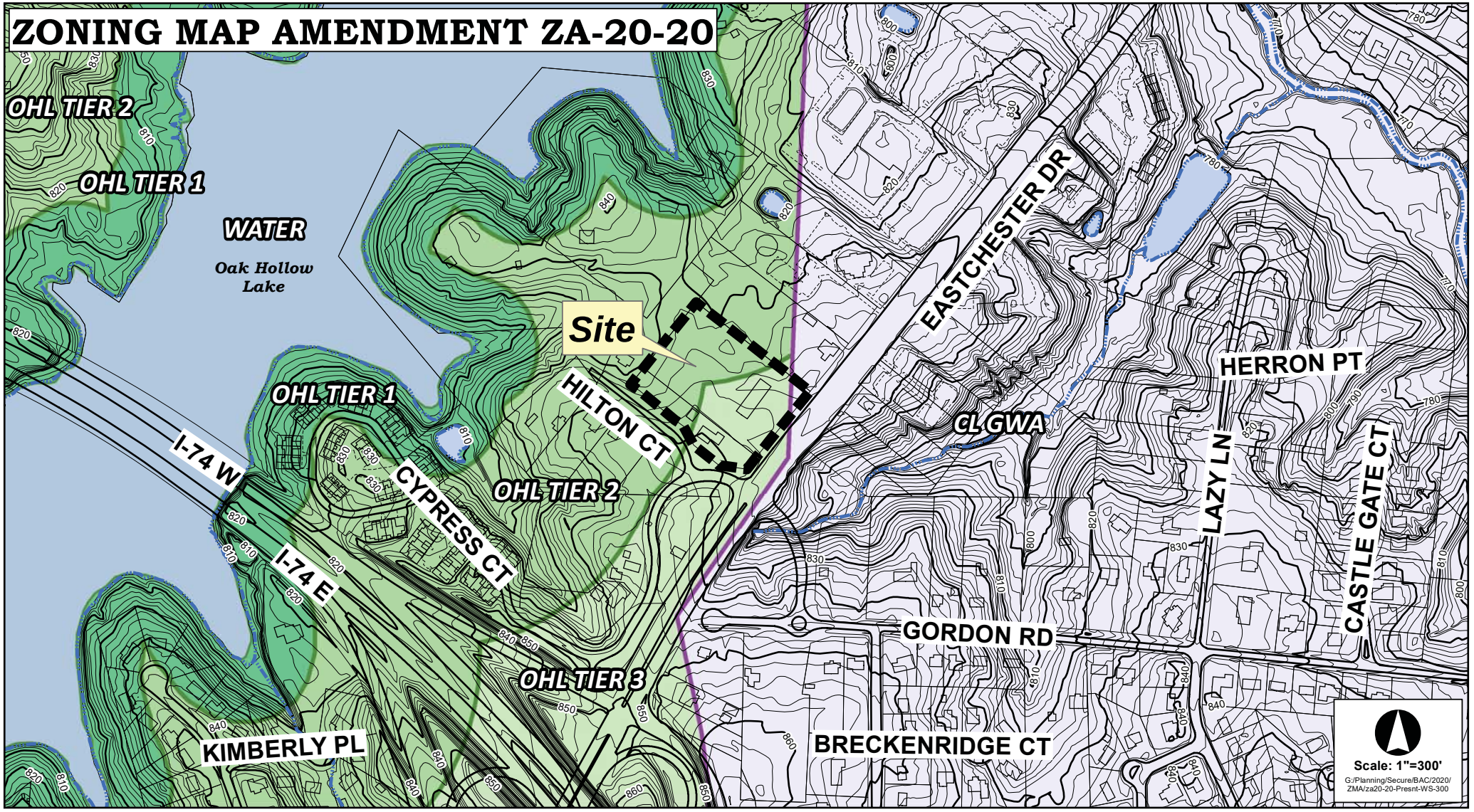

ZONING MAP AMENDMENT ZA-20-20
R-3
TANGLEWOOD AV
CAMPGROUND RD
PNR
I-74 E
I-74 W
Site
CU OI
EASTCHESTER DR
FOX CREEK CT
HALIFAX CT
MIDDLEWOOD CT
RIVERMEADE DR
HIDDEN POND CO
CU R-3
PDL
DANDELION DR
WELLFLEET DR
HILTON CT
HERRON PT
LAZY LN
CASTLE GATE CT
RM-5
CU R-5
RIVERTRACE PT
GORDON RD
R-3
R-5
WELLINGFORD DR
COVEDALE ST
COVEWOOD ST
LAKECREST AV
N CENTENNIAL ST
Oak Hollow Lake
RM-16
KIMBERLY PL
TIMBERLAKE AV
DOVER PL
YORK AV
CU TO
STALEY RD
CAMBRIDGE DR
COPPERLEAF CT
NORTH
Scale: 1"=600'
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ZONING MAP AMENDMENT ZA-20-20
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CU OI
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CU OI
CU OI
Site
PNR
Oak Hollow Lake
EASTCHESTER DR
HILTON CT
HERRON PT
LAZY LN
CASTLE GATE CT
RM-16
CYPRESS CT
I-74 W
I-74 E
R-3
GORDON RD
RM-5
KIMBERLY PL
BRECKENRIDGE CT
Scale: 1"=300'
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ZONING MAP AMENDMENT ZA-20-20
Office
TANGLEWOOD AV
CAMPGROUND RD
Recreation/Open Space
Recreation/
Open Space
EASTCHESTER DR
FOX CREEK CT
HALIFAX CT
MIDDLEWOOD CT
Low-Density
Residential
RIVERMEADE DR
HIDDEN POND CO
Site
WELLINGFORD DR
Low-Density
Residential
I-74 E
I-74 W
HILTON CT
HERRON PT
LAZY LN
CASTLE GATE CT
DANDELION DR
WELLFLEET DR
COVEWOOD ST
COVEDALE ST
Oak Hollow
Lake
Office
GORDON RD
RIVERTRACE PT
LAKECREST AV
KIMBERLY PL
STALEY RD
Low-Density Residential
N CENTENNIAL ST
TIMBERLAKE AV
COPPERLEAF CT
CAMBRIDGE DR
DOVER PL
Medium-Density
Residential
YORK AV
NORTH
Scale: 1"=600'
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ZONING MAP AMENDMENT ZA-20-20
100 YR
Oak Hollow Lake
500 YR
Site
HILTON CT
EASTCHESTER DR
FLOODWAY
HERRON PT
LAZY LN
CASTLE GATE CT
CYPRESS CT
I-74 W
I-74 E
GORDON RD
KIMBERLY PL
BRECKENRIDGE CT
Scale: 1"=300'
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ZONING MAP AMENDMENT ZA-20-20
Oak Hollow Lake
Site
EASTCHESTER DR
HILTON CT
HERRON PT
LAZY LN
CASTLE GATE CT
I-74 W
I-74 E
CYPRESS CT
GORDON RD
KIMBERLY PL
BRECKENRIDGE CT
Scale: 1"=300'
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ZONING MAP AMENDMENT ZA-20-20
OHL TIER 2
OHL TIER 1
WATER
Oak Hollow Lake
Site
HILTON CT
EASTCHESTER DR
HERRON PT
CL GWA
LAZY LN
CASTLE GATE CT
OHL TIER 1
I-74 W
CYPRESS CT
OHL TIER 2
I-74 E
GORDON RD
OHL TIER 3
KIMBERLY PL
BRECKENRIDGE CT
Scale: 1"=300'
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AN ORDINANCE AMENDING "THE CITY OF HIGH POINT, NORTH CAROLINA DEVELOPMENT ORDINANCE," PURSUANT TO SECTION 2.4.20, ZONING MAP AMENDMENT, OF THE DEVELOPMENT ORDINANCE.

WHEREAS, the City Council of the City of High Point adopted "The City of High Point Development Ordinance" on May 16, 2016 with an effective date of January 1, 2017, and subsequently amended;

WHEREAS, public hearings were held before the Planning and Zoning Commission of the City of High Point on December 8, 2020 and before the City Council of the City of High Point on January 19, 2021 regarding **Zoning Map Amendment Case 20-20 (ZA-20-20)** a proposed amendment to the Official Zoning Map of the "City of High Point Development Ordinance";

WHEREAS, notice of the public hearings were published in the High Point Enterprise on November 29, 2020, for the Planning and Zoning Commission public hearing and on January 6, 2021 and January 13, 2021, for the City Council public hearing pursuant to Chapter 160A-364 of the General Statutes of North Carolina; and

WHEREAS, the proposed amendment was adopted by the City Council of the City of High Point on **January 21, 2021**.

THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HIGH POINT:

SECTION 1

That the Official Zoning Map of the City of High Point be amended to establish the following described area as a: **Conditional Zoning General Business (CZ-B) District.** The property is approximately 3.6 acres, located west of Eastchester Drive and north of Hilton Court (1801 and 1809 Eastchester Drive). The property is also known as Guilford County Tax Parcel 200162 and 200163.

SECTION 2

That the property herein described shall be perpetually bound by the following use(s) authorized and condition(s) imposed, unless subsequently changed or amended as provided for by the Development Ordinance.

Part I. USES:

a) Any principal use of the General Business (GB) District, as listed in the Principal Use Table 4.1.9 of the Development Ordinance, that is also a permitted use in the Office Institutional (OI) District (use must be a permitted principal use in both districts). Development shall be subject to standards of the GB District and the specific conditions listed in this ordinance.

b) The follow General Business (GB) District uses, as listed in the Principal Use Table 4.1.9 of the Development Ordinance, shall also be permitted:
   i. Convenience store with fuel sales
   ii. Major Restaurant
   iii. Hotels or motels

iv. Microbrewery, microdistillery, or microwinery
v. Major personal service
vi. Major retail sales

Part II. CONDITIONS:

A. Development and Dimensional Standard: Underground fuel storage tanks shall be prohibited.

B. Buffering/Undisturbed Area: A minimum 100-foot wide undisturbed buffer shall be retained along the western (rear property line) of the zoning site abutting Guilford County Tax Parcel 200161 (also known as 2214 Hilton Court). All existing trees and vegetation within this undisturbed buffer shall be preserved and supplemented, where necessary, to meet the Type A Perimeter Landscape Yard rate. The property owner shall be permitted to remove unhealthy vegetation and vegetation that may pose a danger to occupants of the rezoning site or abutting parcels. The property owner shall be permitted to prune existing vegetation within the planting yard area in order to maintain the health of the existing vegetation

C. Transportation:

1. Access (Eastchester Drive): Only one point of access shall be permitted from Eastchester Drive. This access point shall be designed to permit a right-in only access from Eastchester Drive and also designed to allow no exiting from the site onto Eastchester Drive.

2. The City of High Point Transportation Director and the North Carolina Department of Transportation (NCDOT) shall approve the exact location and design of all access points and improvements.

SECTION 3
That plans for any development on the property described herein shall be pursued in accordance with this conditional zoning district and shall be submitted to the City of High Point and other approval authorities for review in the same manner as other such plans that are required to be approved by the City of High Point.

SECTION 4
Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 5
That all ordinances or parts of ordinances in conflict with the provisions of this ordinance are hereby repealed.

SECTION 6.
This ordinance shall become effective upon the date of adoption.

Adopted by the City Council
City of High Point, North Carolina
The **xx** day of **xxxxxxxxxxxx, 2020**

By: _____

Jay W. Wagner, Mayor

ATTEST:

_____

Lisa B. Vierling, City Clerk

The applicant's traffic engineer submitted the following Executive Summary from their Traffic Impact Analysis (TIA).

In addition to this summary, the complete TIA has been submitted to the City of High Point Transportation Department for review.

DAVENPORT

October 20, 2020

TECHNICAL MEMORANDUM

CrossFit Property

High Point, NC

Prepared for Blue Ridge Companies

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All paper is FSC Certified. The entire document, including binding, is 100% recyclable.

Project #: 200010

DAVENPORT

Technical Memorandum

CrossFit Property
High Point, NC

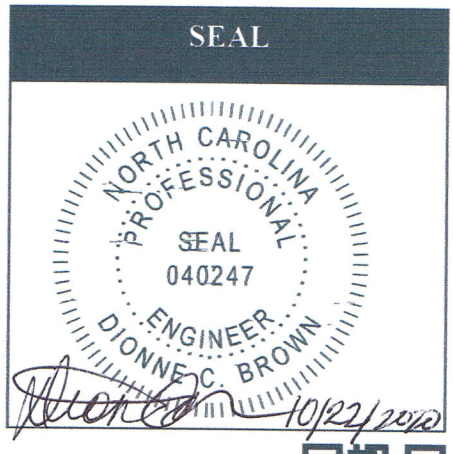
Prepared for Blue Ridge Companies
October 20, 2020

Analysis by: Dionne C. Brown, PE

Drafting/Graphics by: Dionne C. Brown, PE

Reviewed by: Nick Liguori, PE

Sealed by: Dionne C. Brown, PE



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Home Office:
119 Brookstown Ave. Suite PH1
Winston-Salem, NC 27101
Main: 336.744.1636; Fax: 336.458.9377

Technical Memorandum
Traffic Analysis
CrossFit Property, High Point, NC
Prepared for Blue Ridge Companies
October 20, 2020

Introduction

The parameters of this technical memorandum were based upon coordination with North Carolina Department of Transportation (NCDOT) and in response to the request from the City of High Point Department of Transportation (HPDOT) to provide analysis for an alternative access scenario from that in the original Transportation Impact Analysis (TIA) submitted dated September 28, 2020. The alternative analysis will include the CrossFit Property development to have one access point on Cypress Lane/Hilton Court and no access on NC 68 (Eastchester Drive). In the previous TIA, a right-in only access was proposed on NC 68 in addition to the access on Cypress Lane/ Hilton Court.

DAVENPORT has completed the requested traffic analysis for the alternative access scenario. The purpose of this study was to determine the impacts to the roadway network with the elimination of the access on NC 68 (Eastchester Drive). The CrossFit Property is proposed to consist of a convenience store with gas pumps, a fast food with drive-thru, and a carwash. CrossFit Property is proposed to be located northwest of Cypress Lane / Gordon Road on NC 68 (Eastchester Drive) in High Point, NC. The site plan is shown in the supporting documents.

The parameters of this analysis were based upon coordination with NCDOT and City of High Point.

Existing Conditions & Base Assumptions

The conditions and results for existing and no build analysis will remain the same from the original TIA.

Build Conditions

Due to the elimination of the access on NC 68 (Eastchester Drive) a trip distribution for the development was adjusted for one access and can be found in Figures 1A and 1B. The primary site trips are illustrated in Figure 2A and pass-by site trips in Figure 2B with a total site trips in Figure 3. The build conditions were analyzed for a 2022 build year and a 2025 build year based on City of High Point's guidelines. The future traffic volumes are illustrated in Figures 4 and 5.

Table 1 presents the summary of the level of service analysis for all study intersections:

Table 1 - Level of Service Summary				
	2022 Build		**2025 Build**	
AM Peak	Original TIA	Alternative Scenario	Original TIA	Alternative Scenario
NC 68 at Cypress Lane / Gordon Road	C (21.7)	C (22.0)	C (23.2)	C (23.6)
NC 68 at I-74 WB Ramp	C (21.1)	C (21.2)	C (24.2)	C (24.3)
NC 68 at I-74 EB Ramp	C (24.2)	C (24.6)	C (27.7)	C (28.1)
Hilton Court at Site Access	B (11.1) SB Approach	B (11.7) SB Approach	B (11.1) SB Approach	B (11.7) SB Approach
PM Peak	Original TIA	Alternative Scenario	Original TIA	Alternative Scenario
NC 68 at Cypress Lane / Gordon Road	C (26.9)	C (27.3)	C (28.2)	C (29.1)
NC 68 at I-74 WB Ramp	B (16)	B (16.1)	B (16.8)	B (16.9)
NC 68 at I-74 EB Ramp	B (18.6)	B (18.5)	B (19.9)	B (19.9)
Hilton Court at Site Access	B (11.2) SB Approach	B (11.9) SB Approach	B (11.2) SB Approach	B (11.9) SB Approach
LOS (delay in seconds) Note for unsignalized conditions, LOS and delay indicates only minor street approach with longest delay				

The need for auxiliary turn lanes was evaluated based on the NCDOT "Policy on Street and Driveway Access to North Carolina Highways". Based on 2021 and 2025 future build projected traffic volumes at the access on Hilton Court, there are no improvements recommended at this intersection. This site access should be designed in accordance with NCDOT standards.

Based on the results, the elimination of the site access on NC 68 (Eastchester Drive), the level of service will remain the same as reported in the original TIA. However, there is an increase in delay at the intersection at NC 68 (Eastchester Drive) at Cypress Lane/ Gordon Road.

Table 2 illustrates the changes in 2022 Future Build.

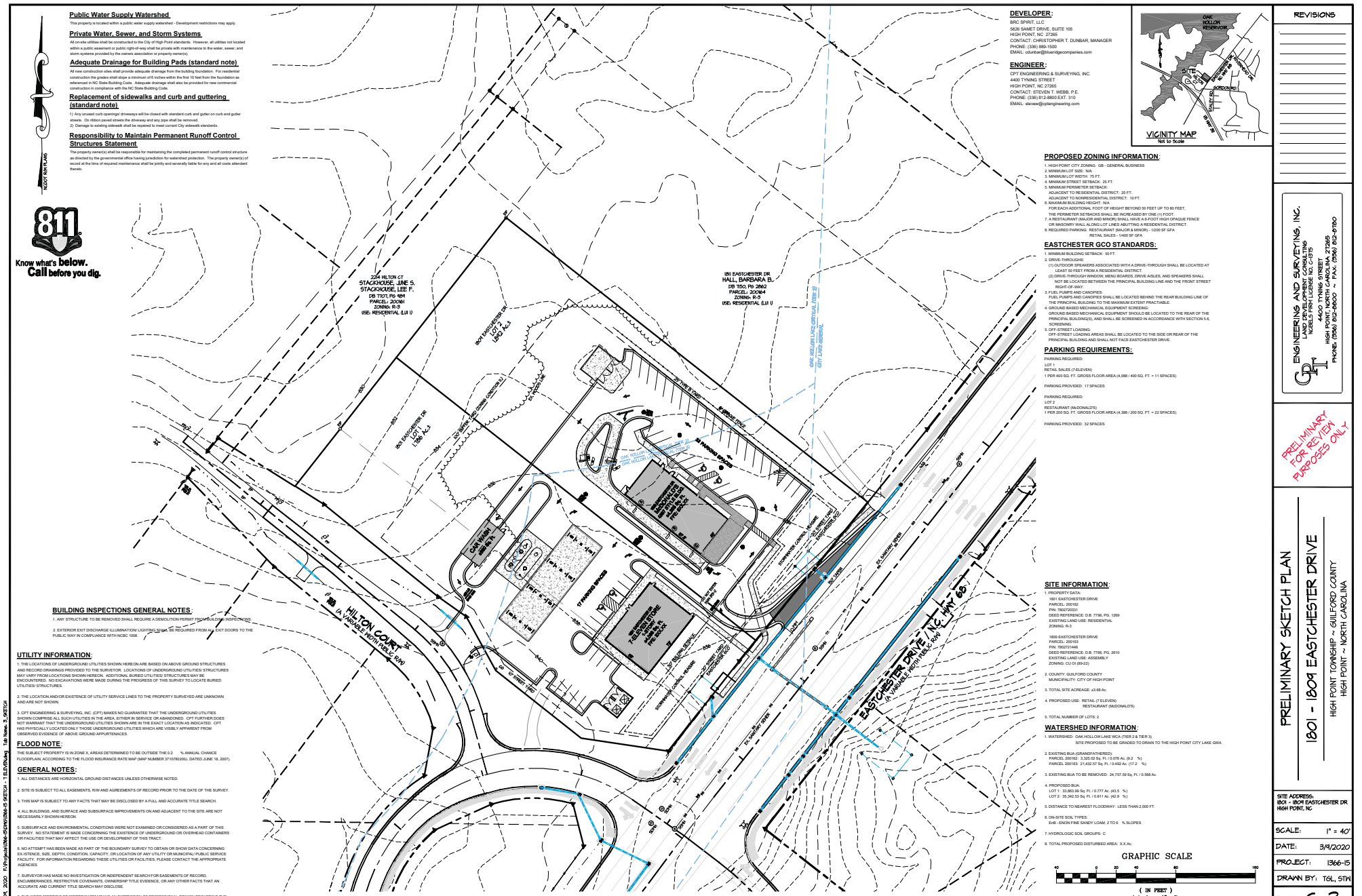
Table 2 – NC 68 at Cypress Lane/ Gordon Road 2022 AM Build									
	EBL	EBTR	WBL	WBTR	NBL	NBT	NBR	SBL	SBTR
Original TIA (LOS)	E (62.4)	F (91.2)	F (203.0)	D (51.9)	D (53.9)	B (12.6)	A (5.0)	A (4.6)	B (14.6)
Original TIA (95th Percentile Queue)	143	#302	#214	112	M#88	753	M12	9	445
Alternative Scenario (LOS)	E (62.4)	F (91.2)	F (203.0)	D (51.9)	D (53.9)	B (12.6)	A (4.9)	A (4.6)	**B (15.7)**
Alternative Scenario (95th Percentile Queue)	143	#302	#214	112	M#88	753	M12	9	**496**
2022 PM Build									
Original TIA (LOS)	F (86.2)	F (158.3)	F (400.1)	E (62.9)	F (147.1)	A (5.8)	A (4.1)	B (13.1)	B (16.2)
Original TIA (95th Percentile Queue)	#187	#391	#233	65	#326	211	M35	32	714
Alternative Scenario (LOS)	F (86.2)	F (158.3)	F (400.1)	E (62.9)	F (147.1)	A (5.8)	A (4.0)	B (13.1)	**B (18.1)**
Alternative Scenario (95th Percentile Queue)	#187	#391	#233	65	#316	211	M35	32	**804**

The additional access on NC 68 (Eastchester Drive) will alleviate queuing and delay at the signalized intersection of NC 68 at Cypress Lane/ Gordon Road. With the additional site trips, the southbound through-right turn lane experiences an increase in delay and queue. The queues are reported by feet from the Synchro 95th Percentile.

Summary and Conclusion

DAVENPORT has completed the requested traffic analysis for the alternative access scenario. The purpose of this study was to determine the impacts to the roadway network with the elimination of the access on NC 68 (Eastchester Drive). The CrossFit Property is proposed to consist of a convenience store with gas pumps, a fast food with drive-thru, and a carwash. CrossFit Property is proposed to be located northwest of Cypress Lane / Gordon Road on NC 68 (Eastchester Drive) in High Point, NC.

The elimination of the site access on NC 68 (Eastchester Drive) does cause an increase in delay and queue at the intersection of NC 68 (Eastchester Drive) at Cypress Lane/ Gordon Road. From this observation, a right-in only access on NC 68 (Eastchester Drive) will help alleviate the delay and queue at the signalized intersection.


224 HILTON CT
STACKHOUSE, LINE S.
STACKHOUSE, LEE F.
DB 7307, PG 484
PARCEL: 200361
ZONING: R-3
USE: RESIDENTIAL (LU 1)
1801 EASTCHESTER DR
HALL, BARBARA B.
DB 7350, PG 2662
PARCEL: 200364
ZONING: R-3
USE: RESIDENTIAL (LU 1)
1804 EASTCHESTER DR
LOT 2
1.188 AC.±
1804 EASTCHESTER DR
LOT 1
1.188 AC.±
OAK HOLLOW LAKE CRITICAL (TIER 2)
CITY LAKE GENERAL
OAK HOLLOW LAKE WATERSHED
CITY LAKE GENERAL
HILTON COURT
(A PUBLIC WIDTH PUBLIC R/W)
EASTCHESTER DRIVE / N.C. HWY 68
(A PUBLIC WIDTH PUBLIC R/W)
OAK WASH
±600 SQ. FT.
RESTAURANT
±4,388 SQ. FT.
7-ELEVEN STORE
±4,088 SQ. FT.
57 PARKING SPACES
32 PARKING SPACES
STORMWATER CONTROL MEASURE
STORMWATER CONTROL MEASURE
DRIVE-THRU WINDOW
DRIVE-THRU WINDOW
12" WATER
12" SANITARY SEWER
8" SANITARY SEWER
8" SANITARY SEWER
EX. CONTOUR
EX. CONTOUR
EX. CONTOUR

Citizens Information Meeting Report
Zoning Map Amendment 20-20

Submitted by: Judy Stalder, Development Consultant, on behalf of BRC Spirit LLC and BRC Spirit II LLC

Citizen Information Meeting Report

Eastchester Drive

Zoning Case ZA-20-20

Citizen Information Meetings were held for property owners near 1801 and 1809 Eastchester Drive. An informational letter dated October 16 was sent by US Mail to the 14 addresses supplied by the City of High Point Planning and Development Department to set a Zoom meeting date of October 22. This mailing included the *City of High Point Conditional Use District Zoning Citizen Information Meetings* statement and a site map. A copy of the letter and list of addressees is attached. The letter explained the requested zoning of Conditional General Business and proposed uses of a convenience store with gas pumps and a restaurant with a drive through window.

After the mailing, a second Zoom meeting was scheduled for October 21 for residents that were unable to attend the originally scheduled meeting. Though the two meeting dates caused some confusion, we believe that all residents that were interested in meeting with the applicant were included.

Also, in response to an invitation from residents at the October 21 meeting, the applicant visited property at 1821 Eastchester Drive and 2214 Hilton Court.

Both meetings began with a brief presentation from Judy Stalder. Here is a brief outline:

- Location of the property
  - Major interchange I-74 and NC 68
  - Service type uses are to be expected
  - Improvements being made by NCDOT accomodate the flow of traffic in the area
- Uses permitted on the property currently
  - Apartments
  - Restaurant without a drive-thru
  - Retail Sales
  - Medical Services/Personal Services/Offices
- City's Land Use Plan and recent studies in this area point to the need for
  - Combination of smaller lots
  - Protection of the water supply
    - Front part of property where development will take place is in the City Lake General Watershed Area not the Oak Hollow Lake Critical Area
  - Protect adjacent neighbors
    - We intend to use only the frontage of the property will drain away from Oak Hollow Lake
  - Maintain safe and efficient transportation of the corridor
    - Commissioned a Traffic Impact Analysis according to parameters dictated by the CityDOT and NCDOT and will follow the recommendations.
  - Different from other properties in this area
    - Do not expect this to trigger a series of rezonings for service uses
    - Other lots in the area do not drain into General Watershed Area
    - Other properties have size and topographic limitations
- Specifics for this property
  - Using just the frontage
  - Creating two points access
    - Eastchester Drive
    - Hilton Ct
- City will have a public hearing on December 10 at 6:00 pm
  - Virtual/Email comments will be considered

OCTOBER 21 MEETING

Attendees
Robb Jolly, 1821 Eastchester Drive, High Point NC 27265
Stacey Jolly, 1821 Eastchester Drive, High Point NC 27265
Vesta Kennedy, 1821 Eastchester Drive, High Point NC 27265
Tony Ficken, 2309 Cypress Court, High Point NC 27265

Questions and Comments

Do you own the property? *Yes, the applicant owns the property.*

Who will develop the property? *The applicant, Blue Ridge Properties will develop the property for sale or lease.*

Did you meet with the City Engineer? *Yes. Members of our team have met with the City Engineer, City Planners, the City's Transportation Department and NCDOT.*

Who should we talk to at the City? *Our main contact is Herb Shannon in the Planning and Development Department. (336) 883-3328*

How do we get access to the Planning and Zoning Commission public hearing? *Mr. Shannon will be able to help you with that.*

Where do I get information on improvements at the interchange? *You may get updated information at www.ncdot.gov*

May we have a copy of the site plan? *Yes, the plan is preliminary. (The preliminary site plan was emailed to all that requested a copy)*

Can you build a noise barrier similar to the ones along highways between the site and residential properties? *It is not likely. We will be leaving an undisturbed buffer between any development and adjacent residentially zoned properties. (A condition was added to the application requiring the 100 foot undisturbed buffer).*

Is it safe to have underground fuel tanks this close to the water supply? *Underground storage tanks are permitted in a General Watershe Area. We will follow local, state and federal regulations as well as observe best practices for the proposed location.*

Where are the watershed boundaries? *Watershed boundaries are illustrated on an official City of High Point map. (The map was emailed to all attendees that requested).*

How much undisturbed buffer will be preserved? *100 feet measured from the rear property line.*

Can you build a fence on the property line to protect our families? *A fence may be possible. However, building a fence on the property line may require some disturbance in the 100 foot buffer. A better location may be closer to the development site.*

Has the City seen your plan? *Yes. We are in close contact with the Planning Department and the Transportation Department.*

How tall does your sign have to be to be seen from the highway? *Signs will meet the standards of the Eastchester Gateway Overlay District. It will most likely not be visible from the highway.*

How will you ensure security for our family from the criminals and drug addicts that hang out at convenience stores? *We expect any business on the property will maintain adequate security.*

What prevents this convenience store from being like the Sheetz on South Main Street? *The situation on South Main Street was unfortunate. We do not expect the same thing to happen in this area.*

Who may we contact from your team with more questions? *You may contact Judy Stalder or Jim Grdich*

The traffic is terrible in this area. How can you add more? *Traffic should improve with the completion of current construction. We have retained a transportation engineer to provide a Traffic Impact Study for the site. The Traffic Impact Analysis shows that the completion of the interchange will handle current traffic as well as any traffic associated with the proposed use.*

OCTOBER 22 MEETING

Attendees
Claudio Rayes 145 W Parris Avenue, High Point NC 27262
Rhonda Hart 2315 Cypress Court, High Point NC 27265
Glen McVicker 2510 Cypress Court, High Point NC 27265
Tim Tucker 2313 Cypress Court, High Point NC 27265
Julie Krawied, 2215 Hilton Court, High Point NC 27265

Who will occupy the restaurant? *We do not have a specific tenant at this time.*

What uses can currently occur here? *Currently the zoning permits apartments, a restaurant without a drive-thru, retail sales, medical services/personal services/offices*

The state has spent money to improve traffic and we are still having trouble turning left which is very concerning. *The improvements by NCDOT have not yet been completed.*

We (Tim Tucker) are not opposed to rezoning, we just think there is too much traffic here already and the entrance to our development is too congested and the entrance has been changed too many times. *We expect you will see some relief in the congestion when all the improvements by NCDOT have been completed.*

Will the homes on Hilton Court be rezoned? *No. Those properties are not part of this request.*

How many feet to Oak Hollow Lake shore from this property? *The distance from the boundary of the proposed area to be developed to the closest point of water is approximately 750 feet.*

What happens if there is an emergency leak into Oak Hollow Lake? *All proper safety precautions will be followed. Underground storage tanks are permitted in a General Watershed Area. We will follow local, state, and federal regulations as well as observe best practices for the proposed location.*

This is a safety issue. You know what happened at the Sheetz on South Main Street. *The situation on South Main Street was unfortunate. We do not expect the same thing to happen in this area.*

How will this affect our property values? *Typically property values increase with development. In this case the property is already zoned for office and some commercial services. I do not expect much increase.*

This does not seem fair. I (Claudio Rayes) cannot rezone my property on Eastchester Drive because my neighbors will oppose it. *Anyone can petition to rezone their property. Your property on Eastchester is already zoned for offices and some commercial services.*

The problem is that it is a gas station that will sell rolling papers and alcohol.

I (Claudio Rayes) own property on North Main Street near a convenience store and I have problems with drinkers from the gas station. *That sounds like an issue that should be reported to the police.*

If my (Claudio Rayes) property was rezoned too, then I would be ok with it.

Was the property purchased specifically to build a convenience store? *The property was purchased several years ago. There was not a specific use designated at the time other than the current Crossfit.*

Did you look at other options? *Yes. We are requesting a few different uses to be added with the rezoning, including hotels or motels and a microbrewery.*

There is too much traffic and this will cause more. I will not be able to walk to the mailbox in my pajamas.

Have you considered a hotel for this property? *We are requesting that use as an option.*

Will signs be posted before the public hearing? *Yes. The City of High Point will post the signs and mail a notice to owners within 300 feet of the property.*

May we have a copy of the site plan? *Yes. (The site plan was emailed to those that provided an email address.)*

The Stalder Group LLC **PO Box 5581 High Point NC 27262**
336.688.2204 jstalder@northstate.net

October 16, 2020

Dear Neighbor,

This letter is to notify you of a request to rezone 3.68 acres on the northeast corner of the intersection of Eastchester Drive and Cypress Court (Hilton Court). We are unable to meet with you in person, due to necessary health precautions associated with Covid19. However, we have scheduled a **Zoom meeting for Thursday, October 22 at 6:00 pm** and look forward to talking with you online.

Join Zoom Meeting:
https://us02web.zoom.us/j/8269935080?pwd=VzE1c2F6eDZ5YXJWTXFlUEY4dlRUZz09
Meeting ID: 826 993 5080
Passcode: TREBIC

You may email me at jstalder@northstate.net for a direct link.

The property is currently zoned Conditional Use Office Institutional and Residential Single Family. The owner, BRC Spirit, is requesting a Conditional Use General Business Zoning to allow a convenience store with gas pumps and a restaurant with a drive through window. Please refer to the enclosed map for the location of the property. Conditions attached to the request will restrict uses and access.

The next step will be a public hearing by the City of High Point Planning and Zoning Commission. The City will notify you of the date and time for the public hearing.

If you are unable the attend the meeting, you may contact me directly at 336-688-2204 or jstalder@northstate.net.

Sincerely,

Judy Stalder
Development Consultant

ADARE PROPERTIES LLC
1227 WESTWOOD AVE
HIGH POINT NC 27262

BRC SPIRIT II LLC
5826 SAMET DR STE 105
HIGH POINT NC 27265

BRC SPIRIT LLC
5826 SAMET DR STE 105
HIGH POINT NC 27265

CITY OF HIGH POINT
PO BOX 230
HIGH POINT NC 27261

DEPARTMENT OF TRANSPORTATION
1505 MAIL SERVICE CENTER
RALEIGH NC 27699

GIBSON, THURMAN CLARK;GIBSON, LAU
1604 HEATHGATE PT
HIGH POINT NC 27262

GOODMAN, BETTY LOGAN;WHITE, JOYCE LOGAN
2405 LAKE RIDGE DR
HIGH POINT NC 27265

HARRIS, KENNETH
2109 GORDON RD
HIGH POINT NC 27265

HILTON, COY LEONARD JR
10025 GRAMERLY LN
ORLANDO FL 32821

HINDS, AMANDA MARLENE;HINDS, JONATHAN V
2201 GORDON RD
HIGH POINT NC 27265

JOLLY, H ROBERT JR;JOLLY, STACEY S
1821 EASTCHESTER DR
HIGH POINT NC 27265

KRAWIEC, JULIE
2215 HILTON CT
HIGH POINT NC 27265

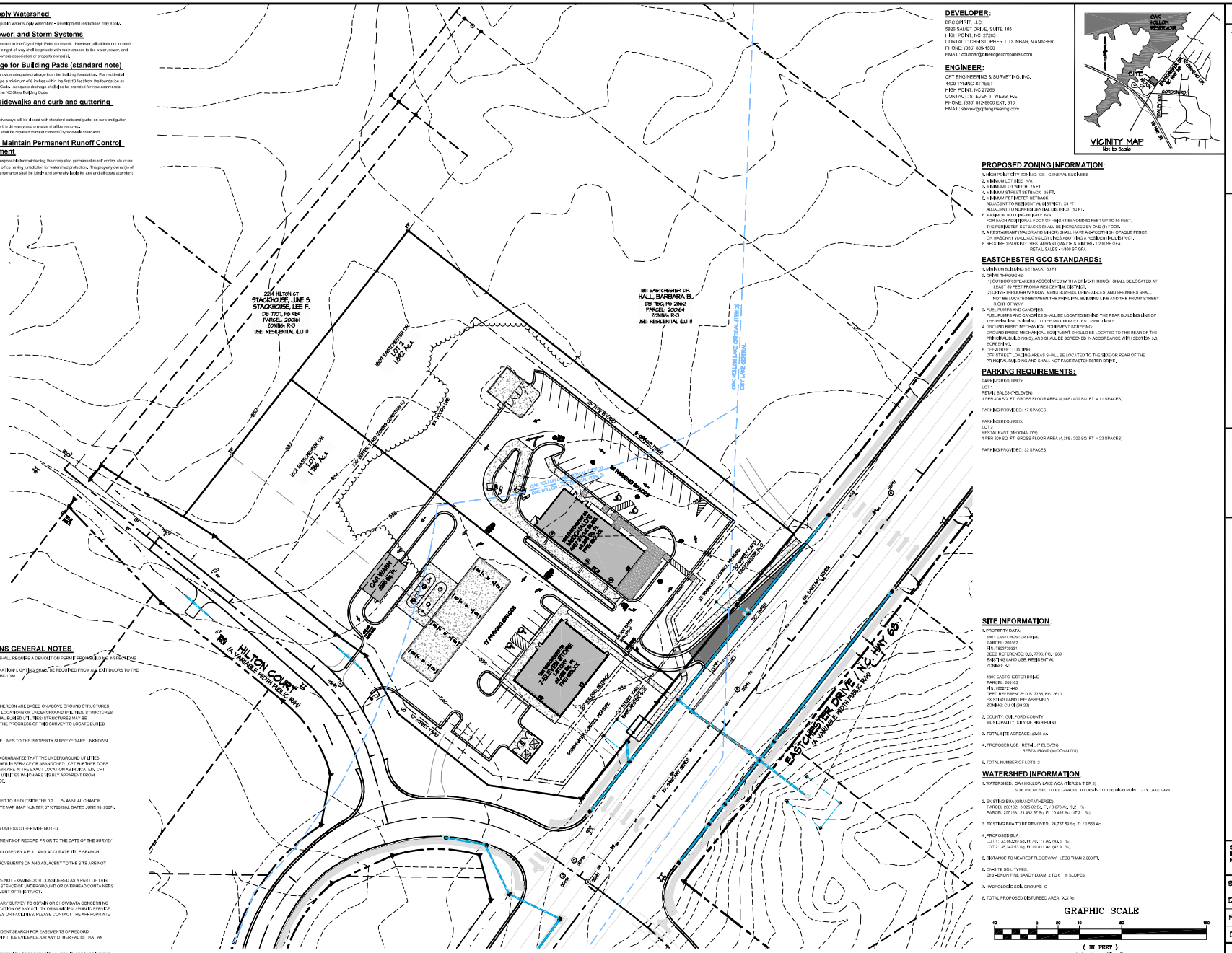
NORTH HIGH POINT LLC
145 W PARRIS AVE STE 103
HIGH POINT NC 27262

STACKHOUSE, JUNE S;STACKHOUSE, LEE F
109 PENNY RD APT 211
HIGH POINT NC 27260

TREBIC - Judy Stalder
115 S Westgate Drive
GREENSBORO NC 27407

UDO REALTY LLC
2827 COUNTY CLARE RD
GREENSBORO NC 27407

ZTB LLC
376 BRANCHWOOD BEND
DENTON NC 27239



VICINITY MAP
Not to Scale

Public Water Supply Watershed

This property is located within a public water supply watershed - Development restrictions may apply.

Private Water, Sewer, and Storm Systems

All on-site utilities shall be constructed to the City of High Point standards. However, all utilities not located within a public easement or public right-of-way shall be private with maintenance to the water, sewer, and storm systems provided by the owners association or property owner(s).

Adequate Drainage for Building Pads (standard note)

All new construction sites shall provide adequate drainage from the building foundation. For residential construction the grades shall slope a minimum of 6 inches within the first 10 feet from the foundation as referenced in NC State Building Code. Adequate drainage shall also be provided for new commercial construction in compliance with the NC State Building Code.

Replacement of sidewalks and curb and guttering (standard note)

1) Any unused curb openings/ driveways will be closed with standard curb and gutter on curb and gutter streets. On ribbon paved streets the driveway and any size shall be removed.
2) Damage to existing sidewalk shall be repaired to meet current City sidewalk standards.

Responsibility to Maintain Permanent Runoff Control Structures Statement

The property owner(s) shall be responsible for maintaining the completed permanent runoff control structure as directed by the governmental office having jurisdiction for watershed protection. The property owner(s) of record at the time of required maintenance shall be jointly and severally liable for any and all costs standard thereto.

811 Know what's below. Call before you dig.

DEVELOPER:
BRC SPIRIT, LLC
5826 SAINET DRIVE, SUITE 105
HIGH POINT, NC 27265
CONTACT: CHRISTOPHER T. DUNBAR, MANAGER
PHONE: (336) 889-1520
EMAIL: cdunbar@blueridgecommpanies.com

ENGINEER:
CPT ENGINEERING & SURVEYING, INC.
4400 TYNING STREET
HIGH POINT, NC 27265
CONTACT: STEVEN T. WEBB, P.E.
PHONE: (336) 812-8800 EXT. 310
EMAIL: stevew@cptengineering.com

PROPOSED ZONING INFORMATION:

1. HIGH POINT CITY ZONING: GS - GENERAL BUSINESS
2. MINIMUM LOT SIZE: N/A
3. MINIMUM LOT WIDTH: 75 FT.
4. MINIMUM STREET SETBACK: 25 FT.
5. MINIMUM PERIMETER SETBACK:
   ADJACENT TO RESIDENTIAL DISTRICT: 25 FT.;
   ADJACENT TO NONRESIDENTIAL DISTRICT: 10 FT.
6. MAXIMUM BUILDING HEIGHT: N/A
   FOR EACH ADDITIONAL FOOT OF HEIGHT BEYOND 50 FEET UP TO 80 FEET, THE PERIMETER SETBACKS SHALL BE INCREASED BY ONE (1) FOOT.
7. A RESTAURANT (MAJOR AND MINOR) SHALL HAVE A 6-FOOT HIGH OPAQUE FENCE OR MASONRY WALL ALONG LOT LINES ABUTTING A RESIDENTIAL DISTRICT.
8. REQUIRED PARKING: RESTAURANT (MAJOR & MINOR) - 1/200 SF GFA
   RETAIL SALES - 1/400 SF GFA

EASTCHESTER GCO STANDARDS:

1. MINIMUM BUILDING SETBACK: 50 FT.
2. DRIVE-THROUGHS
   (1) OUTDOOR SPEAKERS ASSOCIATED WITH A DRIVE-THROUGH SHALL BE LOCATED AT LEAST 50 FEET FROM A RESIDENTIAL DISTRICT;
   (2) DRIVE-THROUGH WINDOW, MENU BOARDS, DRIVE AISLES, AND SPEAKERS SHALL NOT BE LOCATED BETWEEN THE PRINCIPAL BUILDING LINE AND THE FRONT STREET RIGHT-OF-WAY.
3. FUEL PUMPS AND CANOPIES
   FUEL PUMPS AND CANOPIES SHALL BE LOCATED BEHIND THE REAR BUILDING LINE OF THE PRINCIPAL BUILDING TO THE MAXIMUM EXTENT PRACTICAL.
4. GROUND BASED MECHANICAL EQUIPMENT SCREENING
   GROUND BASED MECHANICAL EQUIPMENT SHOULD BE LOCATED TO THE REAR OF THE PRINCIPAL BUILDINGS, AND SHALL BE SCREENED IN ACCORDANCE WITH SECTION 5.4 SCREENING.
5. OFF-STREET LOADING
   OFF-STREET LOADING AREAS SHALL BE LOCATED TO THE SIDE OR REAR OF THE PRINCIPAL BUILDING AND SHALL NOT FACE EASTCHESTER DRIVE.

PARKING REQUIREMENTS:

PARKING REQUIRED
LOT 1
RETAIL SALES (7-ELEVEN)
1 PER 400 SQ.FT. GROSS FLOOR AREA (4,088 / 400 SQ. FT. = 11 SPACES)

PARKING PROVIDED: 17 SPACES

PARKING REQUIRED
LOT 2
RESTAURANT (MCDONALD'S)
1 PER 200 SQ.FT. GROSS FLOOR AREA (4,388 / 200 SQ. FT. = 22 SPACES)

PARKING PROVIDED: 22 SPACES

BUILDING INSPECTIONS GENERAL NOTES:

1. ANY STRUCTURE TO BE REMOVED SHALL REQUIRE A DEMOLITION PERMIT FROM BUILDING INSPECTIONS.
2. EXTERIOR EXIT DISCHARGE ILLUMINATION LIGHTING SHALL BE REQUIRED FROM ALL EXIT DOORS TO THE PUBLIC WAY IN COMPLIANCE WITH NCBC 1008.

UTILITY INFORMATION:

1. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON ABOVE GROUND STRUCTURES AND RECORD DRAWINGS PROVIDED TO THE SURVEYOR. LOCATIONS OF UNDERGROUND UTILITIES STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/ STRUCTURES.
2. THE LOCATION AND/OR EXISTENCE OF UTILITY SERVICE LINES TO THE PROPERTY SURVEYED ARE UNKNOWN AND ARE NOT SHOWN.
3. CPT ENGINEERING & SURVEYING, INC. (CPT) MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. CPT FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION AS INDICATED. CPT HAS PHYSICALLY LOCATED ONLY THOSE UNDERGROUND UTILITIES WHICH ARE VISIBLY APPARENT FROM OBSERVED EVIDENCE OF ABOVE GROUND APPURTENANCES.

FLOOD NOTE:

THE SUBJECT PROPERTY IS IN ZONE X, AREAS DETERMINED TO BE OUTSIDE THE 0.2 % ANNUAL CHANCE FLOODPLAIN, ACCORDING TO THE FLOOD INSURANCE RATE MAP (MAP NUMBER 3710780200J, DATED JUNE 16, 2007).

GENERAL NOTES:

1. ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED.
2. SITE IS SUBJECT TO ALL EASEMENTS, R/W AND AGREEMENTS OF RECORD PRIOR TO THE DATE OF THE SURVEY.
3. THIS MAP IS SUBJECT TO ANY FACTS THAT MAY BE DISCLOSED BY A FULL AND ACCURATE TITLE SEARCH.
4. ALL BUILDINGS, AND SURFACE AND SUBSURFACE IMPROVEMENTS ON AND ADJACENT TO THE SITE ARE NOT NECESSARILY SHOWN HEREON.
5. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND OR OVERHEAD CONTAINERS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT.
6. NO ATTEMPT HAS BEEN MADE AS PART OF THE BOUNDARY SURVEY TO OBTAIN OR SHOW DATA CONCERNING EXISTENCE, SIZE, DEPTH, CONDITION, CAPACITY, OR LOCATION OF ANY UTILITY OR MUNICIPAL/ PUBLIC SERVICE FACILITY. FOR INFORMATION REGARDING THESE UTILITIES OR FACILITIES, PLEASE CONTACT THE APPROPRIATE AGENCIES.
7. SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE.
8. THE WORD "CERTIFY" OR "CERTIFICATE" MEANS AN EXPRESSION OF PROFESSIONAL OPINION REGARDING THE FACTS OF THE SURVEY AND DOES NOT CONSTITUTE A WARRANTY OR GUARANTEE, EXPRESSED OR IMPLIED.

SITE INFORMATION:

1. PROPERTY DATA
   1801 EASTCHESTER DRIVE
   PARCEL: 200362
   PIN: 7850720331
   DEED REFERENCE: BUL 7799, PG. 1299
   EXISTING LAND USE: RESIDENTIAL
   ZONING: R-3

   1804 EASTCHESTER DRIVE
   PARCEL: 302463
   PIN: 7850721446
   DEED REFERENCE: BUL 7799, PG. 2610
   EXISTING LAND USE: ASSEMBLY
   ZONING: CU-GI (89-22)
2. COUNTY: GUILFORD COUNTY
   MUNICIPALITY: CITY OF HIGH POINT
3. TOTAL SITE ACREAGE: 4.528 Ac.
4. PROPOSED USE: RETAIL (7 ELEVEN)
   RESTAURANT (MCDONALD'S)
5. TOTAL NUMBER OF LOTS: 2

WATERSHED INFORMATION:

1. WATERSHED: OAK HOLLOW LAKE WCA (TIER 2 & TIER 3)
   SITE PROPOSED TO BE GRADED TO DRAIN TO THE HIGH POINT CITY LAKE GWA
2. EXISTING BUA (GRANDFATHERED):
   PARCEL 200162: 3,325.20 SQ. FT. / 0.076 Ac. (16.2 %)
   PARCEL 200163: 21,452.37 SQ. FT. / 0.492 Ac. (17.2 %)
3. EXISTING BUA TO BE REMOVED: 24,757.59 SQ. FT. / 0.568 Ac.
4. PROPOSED BUA:
   LOT 1: 33,863.89 SQ. FT. / 0.777 Ac. (45.5 %)
   LOT 2: 35,347.53 SQ. FT. / 0.811 Ac. (45.9 %)
5. DISTANCE TO NEAREST FLOODWAY: LESS THAN 2,000 FT.
6. ONSITE SOIL TYPES:
   EvB-ENGLISH FINE SANDY LOAM, 2 TO 6 % SLOPES
7. HYDROLOGIC SOIL GROUPS: C
8. TOTAL PROPOSED DISTURBED AREA: X.X Ac.

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

REVISIONS

GPT
ENGINEERING AND SURVEYING, INC.
LAND DEVELOPMENT CONSULTING
NCBELS FIRM NO. C-1975
4400 TYNING STREET
HIGH POINT, NORTH CAROLINA 27265
PHONE: (336) 812-8800 ~ FAX: (336) 812-8180

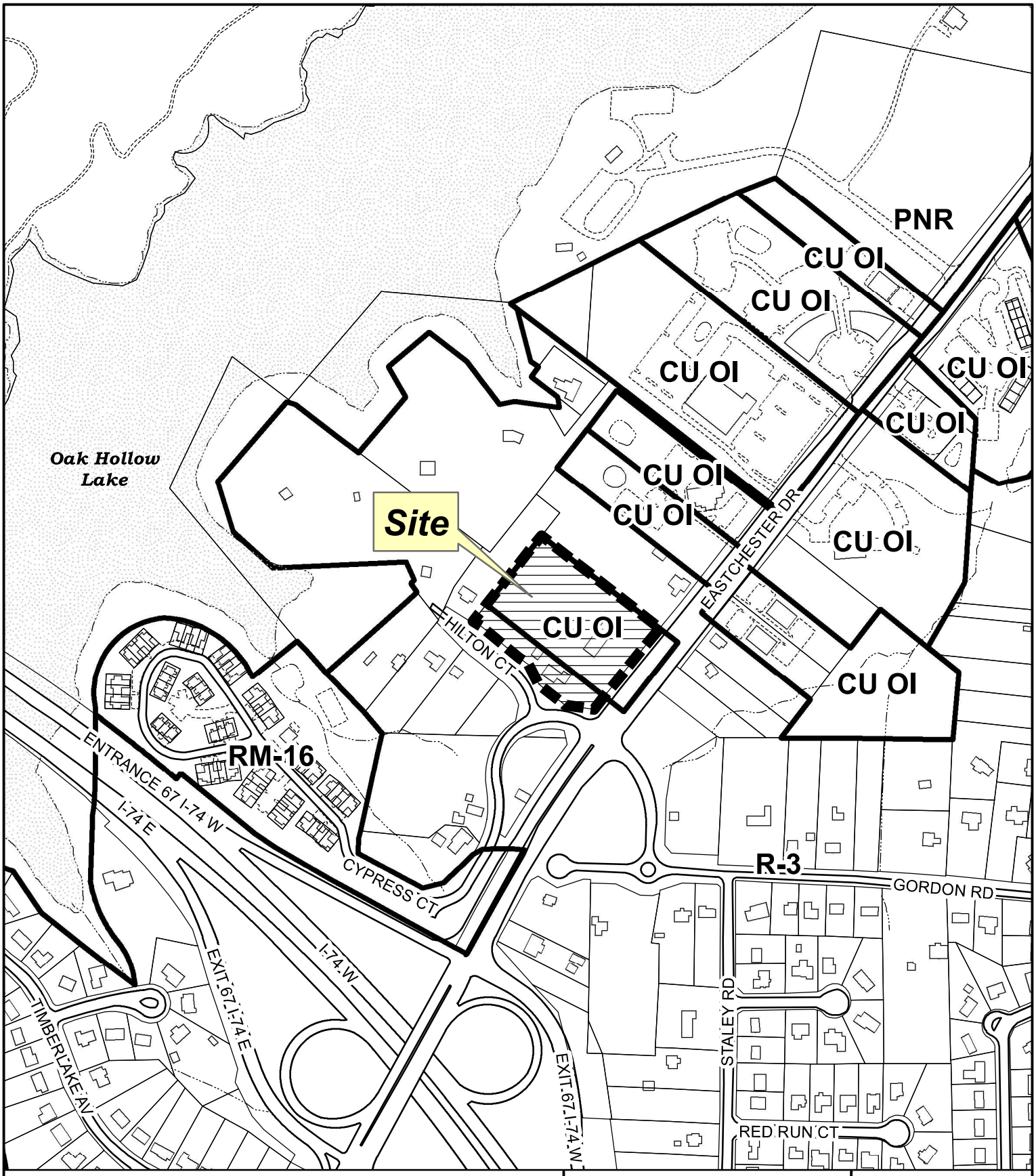
PRELIMINARY FOR REVIEW PURPOSES ONLY

PRELIMINARY SKETCH PLAN
1801 - 1804 EASTCHESTER DRIVE
HIGH POINT TOWNSHIP ~ GUILFORD COUNTY
HIGH POINT ~ NORTH CAROLINA

SITE ADDRESS:
1801 - 1804 EASTCHESTER DR
HIGH POINT, NC

SCALE:	1" = 40'
DATE:	3/9/2020
PROJECT:	1366-15
DRAWN BY:	TGL, STW
SHEET	C-3

Mar 09, 2020 P:\Projects\366-15\DWG\366-15 SKETCH - TELEVENing Tab Name: S_SKETCH



ZONING MAP AMENDMENT ZA-20-20

From: Residentail Single Family-3 and Conditional Use Office Institutional

To: Conditional Zoning General Business

Existing Zoning Boundary ——————

Subject Property Boundary - - - - - - - - - -

Planning & Development Department

City of High Point

N

Scale: 1"=400'

G:\Planning\Secure\BAC\ZMA\2020\MXDs\za20-20

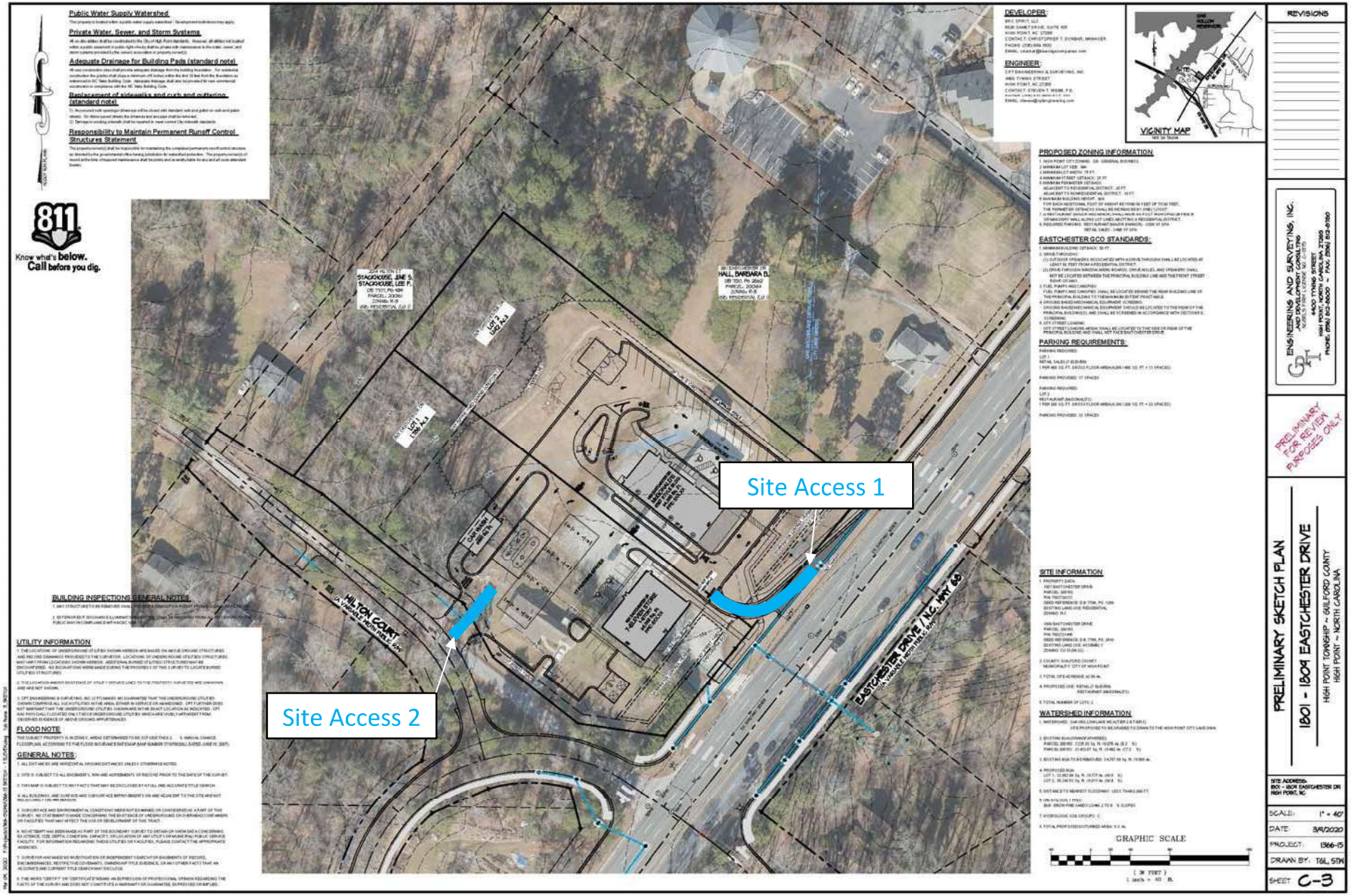


FIGURE 1
SKETCH PLAN

City of High Point

Citizen Information Meetings

Persons filing certain development applications with the City of High Point are required to hold a citizen information meeting. This requirement applies to applications for a Conditional Zoning District, Planned Development District, Special Use and a Zoning Map Amendment that proposes to establish a more intense zoning district.

The City of High Point finds that quality development is better achieved through an informed and cooperative process than an adversarial one. The purpose of the citizen information meeting is to allow the person fling an application, otherwise known as the applicant, the opportunity to inform citizens about their development proposal and to provide citizens the opportunity to ask questions and find out more about the proposal prior to any official public hearings.

The applicant's development proposal is officially presented to the Planning & Zoning Commission and City Council at their respective public hearings. At the public hearings, the Commission and Council hear comments and concerns from citizens regarding the proposal prior to making decisions. The public hearings are not the preferred setting for citizens to learn about a development proposal for the first time. It is difficult to gain understanding of a proposal and offer well thought out comments during the relatively short time of a public hearing. The citizen information meeting is important in that it can provide basic information and allow communication with the applicant before the public hearings, so that citizens may informatively develop their comments and any concerns, and later present them at the public hearings for consideration.

Applicants may vary the form and number of citizen information meetings they conduct; however, they are required to contact or otherwise notify owners of property located within 300 feet of the proposed site. Whatever form the meeting takes, those citizens participating are provided with this written statement from the City of High Point, which describes the purpose of the citizen information meeting, the application process and where additional information may be obtained from the City. In addition, the applicant must provide a description of the development proposal and are encouraged to share any other available information that would help citizens to better understand it.

After the application is filed with the City's Planning & Development Department, the applicant submits to the City a written summary of the citizen information meeting(s). At a minimum, this report records:

- The date, time, and location of the meeting;
- The method and date of notification about the meeting;
- A list of landowners notified about the meeting;
- A list of meeting attendees;
- If the meeting was conducted as a series of telephone calls;
- The description of the development proposal presented to the attendees; and
- A summary of attendee comments, ideas, and suggestions from citizens to be incorporated into the development proposal.

Before the public hearings are held, the City's Planning & Development Department mails notices to all owners of property located within 300-feet of the site. This notice provides a brief summary of the application; the time, date and place of the Planning & Zoning Commission public hearing; and contact information. A second notice is mailed prior to the City Council's public hearing with similar information. Also, signs are placed on the site giving notice of the request and the City's public hearings.

After hearing public comments and considering the development proposal, the Planning & Zoning Commission makes a recommendation to the City Council who, after holding their public hearing, decides what action should be taken on the proposal. Changes to the applicant's proposal can occur during this process in order to insure consistency with City policy and development regulations, and to minimize expected impacts that can be generated by the development or use of the site.

Development conditions can be adopted by the City Council for a Conditional Zoning District, Planned Development District, or Special Use. However, no condition can be included that:

- Specifies the ownership status, race, religion, or other characteristics of the development's occupants;
- Establishes a minimum size of a dwelling unit;
- Establishes a minimum value of buildings or improvements;
- Excludes residents based upon race, religion, or income; or
- Obligates the City to perform in any manner relative to the approval of or development of the land.

Citizens are strongly encouraged to contact the City's Planning & Development Department and visit the website below for additional information on the City's zoning process, and for information about specific development proposals.

Contact:

Planning & Development Department 336-883-3328

www.buildhighpoint.com

Revised 09-05-17

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Bill Philips
1303 Forrest Street
High Point, NC 27262

RE: Appointment- Library Board of Trustees

Dear Bill Philips:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Library Board of Trustees. Your appointment will be effective immediately and will expire on October 31,2023.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

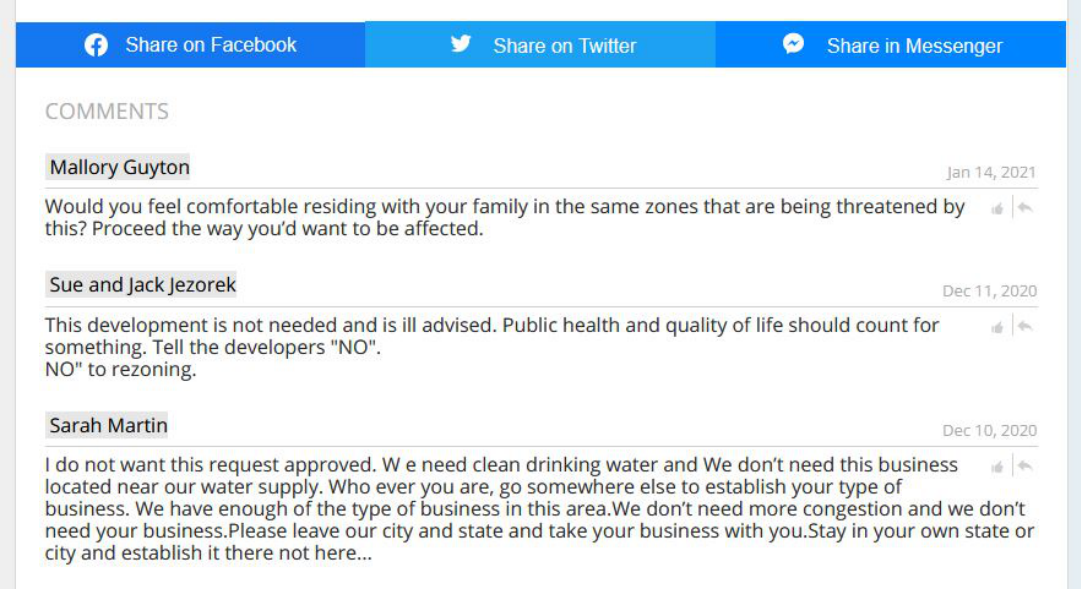
Mary S. Brooks, Deputy City Clerk

From: Robb Jolly
To: Public Comment
Subject: public comments opposed to Zoning Map Amendment 20-20, 1809 Eastchester Dr.
Date: Friday, January 15, 2021 11:29:45 AM

Dear Members of High Point City Council,
Please read the 180 comments below that have been made in opposition to the rezoning request #20-20 at 1809 Eastchester Dr. These comments were made directly by some of the **567 signers** of this petition opposing the change in rezoning:
https://www.ipetitions.com/petition/save-high-point-water
As you will see from the comments, people have multiple concerns about this particular rezoning request & development proposal: fears about how it could adversely affect our city's water quality, and at the same time NOT wanting increased traffic, accidents and high-intensity development (such as the proposed gas station, convenience store, and drive-thru restaurant) at this location.Several comments are specifically opposed to having a gas station and/or drive-thru restaurant built at this location.

Thank you for your attention to these comments and to the support for our efforts to oppose this rezoning request which is demonstrated in the 567 petition signatures.

- Robb Jolly
1821 Eastchester Dr.



Mike HIll Nov 08, 2020

How is this even a question when all the signs point to "don't even think about it"? 1

Rhonda Hunt Nov 08, 2020

The DOT has spent so much money to alleviate the traffic and move it along. This can only cause more congestion. Our water is vital! Please protect our water source. 1

Heather Ward Nov 08, 2020

Our water source is VERY important and vital to everything we do! Once the water source is contaminated the damage is irreversible. Other cities are already dealing with water issues....LET'S BE PROACTIVE AND STOP THIS NOW! 1

Karen Tucker Nov 08, 2020

Too close to the lake & will cause horrible traffic congestion!!! 1

Valda Ford Nov 08, 2020

Our water is precious. Do not take chances with our water. A gas station can be put anywhere. 1

Kathy Johansen Nov 08, 2020

Save HP Water!!

Sign in to comment

SIGNATURES

Nic — Nov 09, 2020

High point 4L❤️

Jennifer Dill — Nov 09, 2020

High Point resident, keep me posted.

Grant Griggs — Nov 09, 2020

Ridiculous even considering building up that area with a gas station and stores. A few houses would be one thing but that area is ALREADY too far congested to add retail businesses. The whole point of the new interchange was to alleviate some of the traffic burden, and now they want to add that congestion BACK?! Ridiculously short-sighted at best; greedily seeking new property tax revenue at worst. 1

Scott Blevins — Nov 08, 2020

Surely there is a better place to build this 1

Lee Ann Patterson — Nov 08, 2020

Water is life! Keeping it clean is so much less expensive than cleaning it up after the fact. I give you Flint, Michigan as an example... so much pain and suffering to save/make a little money. 1

Linda W Everhart — Nov 08, 2020

Please protect our water supply! 1

Susan Wright — Nov 08, 2020

Stop the Sheets constitution! Gas and water do not mix. 1

Elizabeth Schmedding — Nov 08, 2020

High Point,
Please keep your priorities in tack and don't be a sell out to the almighty dollar. This decision effects everyone in this city. 1

Stacey Jolly — Nov 08, 2020

I am all for development in High Point, but in the right location. A gas station, with underground tanks in this location, so close to our watershed, is NOT the right place. It is just crazy to risk contaminating our drinking water and then having to clean it up, as opposed to keeping it clean in the first place! Not to mention there are 4 other gas stations, and 2 other carwashes all within 2 miles of this location, none of which sit on our watershed. Protecting our watershed is way more important than a 5th gas station in a 2 mile radius! 1

Juli McCallister — Nov 09, 2020

Nothing can replace CLEAN WATER!!!

Tim Castle — Nov 09, 2020

We must keep our water clean!!

Tanner Castle — Nov 09, 2020

Save our drinking water!!!

David Guillen — Nov 09, 2020

Keep the town water clean!!

April Wilkins-Little — Nov 09, 2020

Please understand the importance of cleaning drinking water and how vital it is to all living organisms.

Robb Jolly — Nov 09, 2020

NO to this rezoning & development plan. This area already has enough traffic and accidents, and we REALLY don't want to add 2 high-intensity businesses so close to the Oak Hollow watershed. Noise, light pollution, and crime will also increase, resulting in negative effects for nearby residents and businesses. 1

Susie castle — Nov 09, 2020

Clean water is needed for all living things. Please don't allow building near the water shef 1

Shelley Garis — Nov 09, 2020

We have enough Sheetz currently. That's way too close to the watershed.

Maura Kern — Nov 09, 2020

Water is life! 1

Tracy Griggs — Nov 09, 2020

There is heavy traffic in this area. This would only create more traffic in an area that is undergoing construction to alleviate a traffic burden. 1

Allison Shavitz — Nov 10, 2020

It would be harmful to the residents of High Point to allow gas tanks to be buried so close to a lake that supplies over 100,000 people their water.
Besides that, Eastchester Dr is already congested and crowded, especially near the highway being there. There are other places they can build farther away from our water source.

Kathleen Railey — Nov 10, 2020

TOO CLOSE TO THE LAKE!!!!

Betsy phillips — Nov 10, 2020

Leave this worl$. A little better than you found it

Lori DeRue — Nov 10, 2020

Oak Hollow lake should be spared from this pollution....

Michael Arcidiacono — Nov 09, 2020

Please Don't let them build a gas station on the lake side of the road. Protect our drinking water.

Sidney Cameron — Nov 09, 2020

KEEP OUR WATER SAFE!!!

Elisa Cameron — Nov 09, 2020

Contact our Planning & Zoning Committee members and the City Counsel members! They need to know we oppose this project!!!!!

Lisa Tate — Nov 09, 2020

No gas station near our water source. Keep HP water safe and clean.

Sarah Sowers — Nov 09, 2020

Keep our water clean!

Hugo Richard — Nov 09, 2020

Don't pollute our water!!

Augie Spano — Nov 11, 2020

No!

Troy Li-barber — Nov 11, 2020

There is already too much traffic and issues with Eastchester/Westchester.

Kathy Tritschler — Nov 11, 2020

Protect this High Point watershed!

Susie Bland — Nov 11, 2020

Keep our water safe do not allow this development!

Meredith Mowery — Nov 11, 2020

Really? The people deserve clean water!

Anonymous — Nov 11, 2020

Please think of all the damage you will cause. Think of your own family. Of your own health. Do not polute our water for your money

John Young — Nov 11, 2020

This is a bad idea. Do not even risk our water supply, and possibly polluting the deep river that comes off the dam. What will we do if a tank ruptures? We just recently had a 5.1 earthquake in Sparya NC, that was well felt here in High Point! Do not risk it!

Sarah Smith — Nov 10, 2020

fresh drinking water is a precious resource that needs to be protected

Melanie Butensky — Nov 10, 2020

Save our water supply. It's precious and irreplaceable!

Evelyn Solero — Nov 11, 2020

Stop the over development of our beautiful City of High Point

Deborah McLaughlin — Nov 11, 2020

This development is just way too close to the source of our drinking water and we cannot take that chance. As safe as it will be presented, accidents happen and we cannot afford to risk our water supply and our community's beautiful recreational facility. I am NOT in favor of this development!

Michael Sankewitsch — Nov 11, 2020

Emphatically NO!

Lu Hayes — Nov 11, 2020

Save High Point water!!

Stephanie Douglas — Nov 11, 2020

We all know what happens to our water sources after years of pollution from gas stations, restaurants and etc near lakes and streams. This is not a good idea.

Anonymous — Nov 11, 2020

Please protect our water

Lynn Kahl — Nov 11, 2020

Such an environmental hazard!

Daphnee — Nov 11, 2020

High Point does not need anymore gas stations!

Judy Marion — Nov 11, 2020

Save High Point Water. No to this new construction!!

valentin reinaldo — Nov 11, 2020

just plain dumb

Concetta Libertore — Nov 11, 2020

NO WAY ❗ HOW IRRESPONSIBLE ❗

Diane Stallings — Nov 11, 2020

Let's stop this from hurting our water supply!

Chris Whitley — Nov 11, 2020

Stalder is very good as a private planner for developers and forgot about this group of council they are only interested in growing the tax base.

Anonymous — Nov 11, 2020

Planning and Zoning Committee- Please reject this development. My family has owned adjacent land since 1946. I grew up there and watched Oak Holllow Lake being developed in the 1960's. Please protect the watershed and surround community as Eastchester has developed enough.
Paige Duncan Collins, Windy Hill and 1821 Eastchester Family Member.

Judy Cranford — Nov 11, 2020

This area is so congested now. I can't imagine what it will be like if this proposal comes to fruition.

Scott — Nov 11, 2020

The whole point of the new construction was to alleviate some of the congestion/traffic in this area. This will simply add more congestion back. Build it somewhere else!

Ann Sankewitsch — Nov 11, 2020

Save High Point Water!

Anonymous — Nov 11, 2020

Stop this now!

John Carroll Haynes — Nov 11, 2020

I totally agree. This is a bad idea.

Kathleen Koch — Nov 11, 2020

clean water!

Cindy Holder Nov 11, 2020

We have to stop this! Please email the Planning & Zoning Committee Members and let them know we are not in favor of this rezoning! Thad Juszczak thad.juszczak@highpointnc.gov
Tom Kirkman tom.kirkman@highpointnc.gov
Angela McGill angela.mcgill@highpointnc.gov
Alex Moore alex.moore@highpointnc.gov
Mark Morgan mark.morgan@highpointnc.gov
Joan Swift (ETJ) joan.swift@highpointnc.gov
Terry Venable terry.venable@highpointnc.gov
Mark Walsh mark.walsh@highpointnc.gov
Ray Wheatley ray.wheatley@highpointnc.gov

Heather Payne Nov 11, 2020

Please protect the beautiful water of High Point!

Maria Carter Nov 11, 2020

That area is already way too congested and the risk to the water supply is needless...

Bill Kilgore Nov 11, 2020

Stay away from our water supply!

Anonymous Nov 11, 2020

We don't need to have a gas station and car wash this close to our water supply.

Eric Marion Nov 11, 2020

Aaaaaaggggghhhhh!!!!! Head on fire!

Michele Basile Nov 11, 2020

Save our water!

Anonymous Nov 11, 2020

We need safe drinking water, not another gas station.

Kim Simmons Nov 11, 2020

This is a bad idea !!!

Doreen Amponsah — Nov 11, 2020

You are not wanted here. Take your business some where that won't hurt us or the environment.

Anonymous — Nov 11, 2020

We don't need another gas station or car wash.

Debra Lynn Welborn — Nov 11, 2020

This area is already hugely congested, we don't need anything else to jam up Eastchester!

Claire Walker — Nov 11, 2020

This greedy action will harm our commu

James Womack — Nov 11, 2020

I don't want anything that would jeopardize our safety to be built. This doesn't sound like it has the well being of the community in mind.

LaJoyia Womack — Nov 11, 2020

I don't want anything that would jeopardize my safety or others to be built. Profits should not come before the people of the community.

Tammy M Funderburk — Nov 11, 2020

This plan will become the same huge failure as Oak Hollow Mall. No, I do not want any type of chemical storage anywhere near The City of High Point's fresh water supply!

Ron Holder — Nov 11, 2020

Stop this irresponsible re-zoning request! Check out the www.savehighpointwater.com website for more information, and email addresses for Zoning Committee and City Council members.

Nadine Winberry — Nov 12, 2020

There is already too much traffic on 68. Don't add anymore .

Christena Clark — Nov 12, 2020

Don't need need another a gas station to potentially damage our water supply or traffic congestion at this site . No Thank you.

Hugo Patterson — Nov 12, 2020

Keep the water safe!

Jeffrey Olsen — Nov 12, 2020

Living off of Timberlake Ave, I highly oppose this rezoning. The purpose of moving the Gordon intersection north as part of the 68/311/74 interchange upgrade currently underway, was to relieve congestion in that area as its long been prone to traffic accidents. Allowing this development would only replace the congestion we've just spent millions of dollars to relieve. How does that serve the safety of our citizens or the mindful spending of our tax dollars?

Bonnie Belaj — Nov 12, 2020

We don't need this

Morena Montanari — Nov 12, 2020

Clean water for high point

Tony D Ficken — Nov 12, 2020

Let's rethink this proposal.

Greta Bambalis — Nov 12, 2020

This area definitely does not need anything else to cause congestion and we surely don't need anything to possibly contaminate our water supply. Definite NO is what we need.

Anonymous — Nov 12, 2020

A little worried about the water, and DEFINITELY too conjested! I say no.

Debbie Ayscue — Nov 11, 2020

Please think of the residents need of clean water, which is much more important than a gas station. There are other places they can build further away from our water supply!

Stephanie Reese — Nov 12, 2020

This development is not needed and comes with too many potential threats.

Melinda King — Nov 12, 2020

This intersection was not designed for this type of traffic. I think it would be irresponsible for the City to approve a rezoning of this nature based on the environmental impacts as well as the traffic related impacts. The residents of this area have gone through far too much construction for far too long to only have more redesign that will not work. The amount of accidents in this area will skyrocket from what is already an unprecedented amount.

Catherine Coleman — Nov 12, 2020

Absolutely not

James Croft — Nov 12, 2020

Please NO gas stations', car washes or fast food restaurant near or on our lakes

Jim Persinger — Nov 12, 2020

I lived in this proposed development area for a year and it is shocking that High Point would even consider allowint a gas station move in due to the proximity to Oak Hollow lake ...this entire property drains directly down hill into the lake...Terrible idea just from an environmental standpoint. This is a natural area that has been a buffer for the city watershed and it is not possible to have gas tanks that close to the lake and not have them seep in to the watershed.... Dont let property prospectors benefit by rezoning this property... do the right thing !!

Daniel Nicholson — Nov 12, 2020

The lake is a nature habitat and the water for drinking. The last thing that part of High Point needs is another fast food restaurant!

Marilyn preddy — Nov 12, 2020

Do not need because of traffic congestion

Ronald Preddy — Nov 12, 2020

Land use for that area was to protect the water supply. Developer with big bucks will get anything they want in HP

tim webb — Nov 12, 2020

no more development around oak hollow lake, now or ever, residential or business.

Priscilla Welch — Nov 13, 2020

Agree that congestion there is unreal even now.. it will become like I40 and Wendover.
Plus our water supply is crucial to be kept
as clean and viable as can be.

Anonymous — Nov 13, 2020

Go somewhere else!!!

Sherry Lawson — Nov 13, 2020

Please do not allow this gas station to be built. I live in Timberlake and the traffic is bad enough in this area as it is. The existing businesses in this corridor do not generate a lot of traffic and are closed in the evening. Quite a contrast to a 24 gas station with all the noise and bright lights at night. Please preserve the appearance of this area of town and the quality of life in what is still considered a residential area. Also, I feel that no gas stations should be allowed this close to our water supply. Thank you.

Esmeralda — Nov 13, 2020

Stop this project please

Barbara Stephenson — Nov 13, 2020

We do not need or want anything endangering our water.

Sheila Williams — Nov 13, 2020

I live in the Timberlake neighborhood and traffic is heavy enough here without a gas station at this location. Not to mention this would put our water supply in danger!

Anonymous — Nov 13, 2020

No no no

Audrey M Meixner — Nov 12, 2020

We must keep our water clean!

Hayley MELISSIA Rogers — Nov 12, 2020

I am sick over this. Praying someone changes the problem before it is too late.

Victoria Lemp — Nov 17, 2020

I do not support this rezoning. Too close to my water supply and too much traffic already.

Stephanie Sonk — Nov 16, 2020

Noooo

Olivia Cashwell — Nov 15, 2020

As a High Point resident, I DO NOT want the gas station, car wash, restaurant built! I value the safety of our lake and water.

Stephanie stanley — Nov 15, 2020

We don't need another gas station on that stretch of road

George Nickolson — Nov 14, 2020

I am not in favor of the expansion and the resulting new congestion and water and pollution impact.

Toni Phillips — Nov 14, 2020

Please rethink this development.

Mary Connor-Hill — Nov 14, 2020

Please don't do this!

M T McCulloch — Nov 13, 2020

As a concerned citizen, am hoping the new business development is denied; not just for High Point, but the entire water system in NC.

Linda Barton — Nov 13, 2020

OUTRAGED!

Sean Ward — Nov 13, 2020

I don't want to drink gasoline - tanks have lots of safeguards but there is no such thing as 100% effective or 0 risk.

Wesley Adam — Nov 20, 2020

I LOVE RED...also, great video

Wesley Burleson — Nov 20, 2020

Save our water! Great video!

Jana Darling — Nov 20, 2020

Why would they do this? It makes no sense at all.

Ivonne Rodriguez — Nov 19, 2020

Save our water

LaToya — Nov 19, 2020

Save our water

Dianne Luperchio — Nov 18, 2020

Area is too congested already. looks like they will never finish what they are doing now. It is such a mess.

Kajal Bhatt — Nov 18, 2020

Save planet save water save earth

Janis Stephenson — Nov 17, 2020

PLEASE DO NOT LET THIS HAPPEN!! The current zoning protects this important area from contamination of our water and blight of our City Lake and Park and the surrounding residential and business

Gail Roby — Nov 17, 2020

Building a gas station/convenience store/restaurant at this location so close to our water source is dangerous and certainly not needed as there is plenty of access to these types of businesses in close proximity to this location. Approving the building of this establishment at an already extremely busy traffic area will cause significant congestion and other problems. Please to not allow this plan to transpire as it will damage High Point in many ways.

robert parsley — Nov 24, 2020

I would like members ofthe PlanningCommittee to come to the proposed site between 7 and 8 AM to traffic and comeback between 5-6PM to do the same.
But an equally important concern is to what this gas station/car wash/fast food place would do our water supply.

Leslie Cue — Nov 24, 2020

Highway 68 already has enough traffic and the residents have a hard time even getting out their own neighborhood. We have enough gas stations and car washes.

Jose Mejia — Nov 24, 2020

Please don't allow gas station and car wash to be built. Our water is more important!

Kathy Palmer — Nov 24, 2020

Once the damage is done, the negative impact to the environment potentially will be great enough so as to become irreversible. Don't go there!

Vinelle Kennedy — Nov 23, 2020

The eagle nesting area is inside the proposed development...the water must be protected for everyone...

Mark johnson — Nov 22, 2020

A little common sense is needed! Water sheds are pure, run-off is not. 1

Mary Walker — Nov 22, 2020

I strongly oppose this development as it puts our drinking water at serious risk.

Anthony M Harris — Nov 22, 2020

Instead let's invest monies into the park to enhance it and give the citizens of our city more opportunities to support our own city instead of spending money in Greensboro and WS.

Chelle Stinson Jeffery — Nov 22, 2020

Keep our water safe

Amy hanson — Nov 21, 2020

No gas In our water!

Gayle Kearns — Nov 27, 2020

The proposed project is a danger to our drinking water. Thank you.

Caroline McGuinn — Nov 27, 2020

It's not worth the risk of total disaster.

CJ Smith — Nov 25, 2020

Save High Point wate

Michael Goodman — Nov 25, 2020

I am against the proposed development of a gas station, car wash, fast food station at the proposed location close to Eastchester and Gordon Road. I am an engineer and teacher who has lived in Highpoint for 20 years. I own my home. I have been an enthusiastic kayaker on both High Point City Lake and Oak Hollow. I agree with the comments in the video that save this is the wrong location, that while development is important, this is the wrong kind of development.

Michael Callahan — Nov 25, 2020

This would cause more congestion and be a detriment to Oak Hollow Lake. Besides, fuel and food are available two miles away. High Point doesn't need this.

Geraldine Ingam — Nov 25, 2020

Save our water

Richard Clark — Nov 25, 2020

Ridiculous to put that kind of development that close to Oak Hollow Lake.

Anonymous — Nov 25, 2020

We do not need another fueling station or fast food restaurant. This area is already over-congested, and the watershed needs first priority.

Phyllis Allen — Nov 25, 2020

Totally against this development!!!!!!

Gail Cormier — Dec 01, 2020

We need to have preserve our safe drinking water. High Point resident

Megan Longstreet — Dec 01, 2020

Absolutely against this waste of community resources. There are better suited locations for a development like this! Protect our water supply and wildlife!!!!

Beverly Bard — Dec 01, 2020

I encourage development but only if it is sustainable and causes no possible harm to our air, water, earth. Thank you.

Renee Kenan — Dec 01, 2020

I am opposed to this project.

Edward Catherwood — Dec 01, 2020

Don't let them destroy our lake!

Pete Moffitt — Dec 01, 2020

Thank you Stacey!

Susan Eanes — Nov 30, 2020

HP water has a pinkish tint to it. This is why I only use other water from other sources! We do not need anymore foolishness near our water!

Shirley LeRoy — Nov 29, 2020

Keep High Point water safe. Do not allow a gas station to be built this close to our water supply. Protect the people AND the wildlife of High Point. Be responsible stewards of the people.

Anonymous — Nov 28, 2020

I am against any new development that is near or affects our water or environment in a negative way.

David Phillips — Nov 27, 2020

Save the land water and community!

Myron Kenan — Dec 02, 2020

Please stop this before it's too late!

Bill Wallace — Dec 02, 2020

This is a bad idea, something CHP seems to have a penchant for supporting nowadays.

Virginia Coussa — Dec 02, 2020

I totally oppose the building of a gas station/restaurant on Eastchester near the the High Point water system.

Marilyn Evans — Dec 02, 2020

Please keep our water safe!

Mary Ensley — Dec 02, 2020

As a lifelong resident of High Point, please do not jeopardize our water supply. This is not a good use for this property. It won't be a question of "if" contamination occurs; it will be a question of "when".

Don Chiariello — Dec 01, 2020

Not the best use of this property. A significant threat to our water supply

Linda Stokes — Dec 01, 2020

Please do not rezone our Area

Brenda Deets — Dec 01, 2020

I implore you to build this somewhere else, if we truly need another gas station and car wash. We must preserve our water sources! if not for us, then for future residents

Kay Sanders — Dec 01, 2020

Protect our water source and lake. It's not a good idea to build a gas station at 1809 Eastchester Dr. in High Point. I'm against it.

Marianne Royle — Dec 01, 2020

Save High Point's water supply - please!

Patricia Land — Dec 01, 2020

High Point does not need to be a Flint, Michigan. We need clean water, not more development.

COMMENTS

Diane Ilardi Dec 08, 2020

My water is bad enough now. Please do not allow this development to take place.

Anonymous Dec 07, 2020

To keep our water safe and clean as possible all land owners around the lake should be of residential, not commercial ! The City should not even question putting commercial properties close to our lake which is our main source of potable water. Retention ponds only work for so many years. The City does not need to keep adding more employees to check the ponds for safety , which includes main shut off valves that do break and or get stuck. So if a car, truck , school bus that somehow has an accident lands in the retention pond and the valve is stuck or broken that could be a liability issue for the city. Not to mention the fact of fuel , oil and hazard cleanup. No way this zoning for commercial purposes will be safe for our drinking water!

Betsy Pegram Dec 06, 2020

Save our water!

Lois Jane Rauch Dec 06, 2020

We need safe water, not more gas stations.

Theressa Smith Dec 04, 2020

The intersection is too busy now.

Stephen Cannon Dec 03, 2020

Let's keep this area safe and clean.

Barbara McKusick Dec 03, 2020

A terrible due to possible leak into water/reservoir.. My sister and I experienced the worry concerns in selling a residential property years ago in NY state.

Anonymous Dec 03, 2020

Water is Life. Keep our water clean.

Ken Sunshine Dec 02, 2020

what a traffic nightmare this will be.

--
Robb Jolly
Technology Specialist
New Garden Friends School
www.ngfs.org / (336) 299-0964

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

Emails with Attachments #12 - #17

Email #12 with Attachment(s)

From: rollovernclover
To: Public Comment
Subject: RE: ZA-20-20 EPA UST end of year 9/2020
Date: Wednesday, January 6, 2021 12:44:57 PM

Thank you Ms Vierling.
Please let me know if these are better.
I wanted to maintain the USGS heading.

Sent from my Galaxy

-------- Original message --------
From: Public Comment <publiccomment@highpointnc.gov>
Date: 1/6/21 12:04 PM (GMT-05:00)
To: rollovernclover <rollovernclover@aol.com>, Public Comment <publiccomment@highpointnc.gov>
Cc: Lisa Vierling <lisa.vierling@highpointnc.gov>, Mary Brooks <mary.brooks@highpointnc.gov>
Subject: RE: ZA-20-20 EPA UST end of year 9/2020

Good morning, Ms. Kennedy.

All the information that you sent via e-mail with attachments have been forwarded to the Mayor and City Council.

We were able to open all the attachments; however, there were a couple that looked like screenshots regarding rain fall and snow fall that did not print clearly. I have attached it to this email so you can see. As you can see, we tried printing it in landscape orientation as well as portrait orientation, but neither captured the entire text.

Please feel free to re-send and we will replace them.

If we can be of any further assistance, please let us know.

Thank you.

Lisa B. Vierling, MMC

CITY OF HIGH POINT
City Clerk

211 S Hamilton, Room 320| High Point, NC 27260
336.883.3536 | fax: 336.822.7067
lisa.vierling@highpointnc.gov | www.highpointnc.gov

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Please be aware that e-mail and attachments sent to and from this address are subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: rollovernclover <rollovernclover@aol.com>
Sent: Tuesday, January 5, 2021 4:09 PM
To: Public Comment <publiccomment@highpointnc.gov>
Subject: ZA-20-20 EPA UST end of year 9/2020

Dear Town Council, Mayor, and City Manager,

Attached please find the EPA's end of fiscal year report of North Carolina's USTs.

Please note that of the 27,039 confirmed releases, only 24, 726 clean ups have been initiated, leaving a backlog of 2,784.

Please note that 68 % of UST facilities were in Release Detection compliance, but only 50% of facilities were in Technical Compliance overall.

These facts being stated, I want to say the people that work for NCDepartment of Environmental Quality day in and day out, are hardworking and dedicated. This department seems to be grossly underfunded and understaffed.

Given the EPA's 2016 study of emerging fuels and the damage they are causing to USTs, I foresee this issue getting worse, not better.

Thank you for giving continued consideration to this extremely important public safety issue. I encourage each of you to use the NCDEQ tool forwarded to you to look at UST, AST, and Notices of Residual Petroleum (permanent soil and groundwater contamination) in each of your wards, as well as overall for the city. It is quite dismaying.

Thank you,

Vesta Kennedy

Sent from my Galaxy

Attachments to Email #12

Learn More

Water Science Activity Center

Opinion Surveys:
- Biggest water problem in the future?
- Vote for your favorite water body!
- How serious are these environmental problems?
- Water Shortage! How would you fix it?
- Where does the water cycle begin?

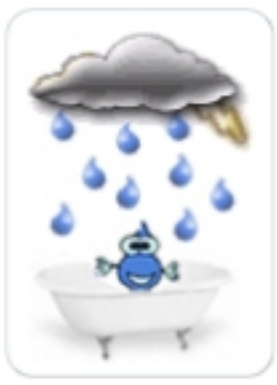
Challenge Questions:
- How much water falls during a storm?
- How much water does a dripping faucet waste?
- How much water does it take to grow a hamburger?

True/False Quizzes:
- Water properties
- Groundwater

Questionnaires:
- How does your home drinking water taste?
- What is your daily home water use?

Rainfall calculator (Englis
How much water falls du
storm?

Use our metric-system versio



It is the middle of July in
both you and your tomat
wilting in your yard, both
the sky and hoping for rain. Or, m
pressure cell has been napping
and your arm is hurting from ho
umbrella while you watch your b
up with water.

Either way, you would like to kno
much rain has fallen—how many
have come down from the skies
roof, yard, block, or town. You m
want to know how many baths y
from your rainstorm?

The amount of rain that fell duri
storm is dispayed below.

Area	Rainfall (inches)	Total gallons (US)	Cubic feet	40-gallon baths
0 by 0 feet	1.5	0	0	0
4 acres	1.5	162,924	21,781	4,073
square miles	1.5	0	0	0

k to the water-cycle home page.

Precipitation

High Point USA averages 42.3 inches of precipitation annually; July thunderstorms account for much of this precipitation. Most of the big snows that impact areas east of the mountains come from extratropical cyclones which approach from the south across Georgia and South Carolina before moving offshore. Average annual snowfall for High Point is 8.6 inches.

Average Temperatures & Rainfall

- Source: WGHP-TV, Fox 8 High Point

End of Email #12 with Attachment(s)

Email #13 with Attachment(s)

From:	rollovernclover
To:	Public Comment
Subject:	Rainfall calculator (English units) How much water falls during a storm? USGS Water Science School
Date:	Wednesday, January 6, 2021 12:57:21 PM

---

https://water.usgs.gov/edu/activity-howmuchrain.html

Ms Vierling

Here is the link to USGS tool, as well as a new screenshot from USGS. Please attach to the impervious surface email.

Thank you so much!

Vesta Kennedy

Sent from my Galaxy

- **Amount of urbanization:** As a city is being built, a lot of money and **construction goes into moving water out of built-up areas**. Roads, pavement, and parking lots create **impervious areas** where water can no longer seep into the ground. Rather, water is funneled into creeks and streams that were never meant by nature to handle so much runoff. This can cause problems in urban areas.

End of Email #13 with Attachment(s)

Email #14 with Attachment(s)

From: rollovernclover
To: Public Comment
Subject: ZA-20-20 larger pic of USGS rainfall calculator
Date: Thursday, January 7, 2021 10:51:43 AM

Sent from my Galaxy

- **Amount of urbanization:** As a city is being built, a lot of money and **construction goes into moving water out of built-up areas**. Roads, pavement, and parking lots create **impervious areas** where water can no longer seep into the ground. Rather, water is funneled into creeks and streams that were never meant by nature to handle so much runoff. This can cause problems in urban areas.

Email #14 with Attachment(s)

From: rollovernclover
To: Public Comment
Subject: ZA-20-20 larger pic of USGS rainfall calculator
Date: Thursday, January 7, 2021 10:51:43 AM

Sent from my Galaxy

- **Amount of urbanization:** As a city is being built, a lot of money and **construction goes into moving water out of built-up areas**. Roads, pavement, and parking lots create **impervious areas** where water can no longer seep into the ground. Rather, water is funneled into creeks and streams that were never meant by nature to handle so much runoff. This can cause problems in urban areas.

Email #15 with Attachment(s)

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 groundwater, water table, size of USTs
Date:	Sunday, January 10, 2021 2:58:12 PM

Dear Mayor and Town Council,

Please find an image from USGS regarding water table/ groundwater information, images screenshot from The Point development tool from build@highpointnc.gov , and screenshot from Southern Sales, an UST supplier. I included link to Southern's website if image needs to be verified.

Please note that the elevation of proposed rezoning site is 832 feet and the elevation of Oak Hollow Lake is 811 feet. This means the water table begins 21 feet below the earth's surface.

The dimensions of an 8,000 gallon UST are 8 foot by 21 foot,4 inches, which is typically the smallest commercial size tank. Typical commercial size tanks increase to 15,000 gl or 20,000 gl in size, with the latter's dimensions being 10 foot,6 inches by 31 foot!!!!!!!!!. These dimensions do not include the required riser piping upon the installation of tanks. Most gas stations will have at least 3 USTs on site of various sizes, ranging from 8,000 gl to 20,000 gl.

This being said, it appears that the Underground Storage Tanks for this particular usage of 1809 and 1801 Eastchester Dr will be SITTING...SUBMERGED...IN the water table of Oak Hollow Lake, even if the typically smallest (8,000 gl) commercial size tank is used for all types of gasoline being sold.

PLEASE do not allow this travesty of public safety to happen in our watershed. PLEASE do not allow the rezoning of 1809 and 1801 of Eastchester Drive to happen. If they are rezoned, it would set the most dangerous kind of precedent; one that effects the public safety of 108,000 and counting.

Thank you,
Vesta Kennedy

https://www.southerntank.net/horizontal-tank-sizes/

Sent from my Galaxy

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Please find an image from USGS regarding water table/ groundwater information, images screenshot from The Point development tool from build@highpointnc.gov , and screenshot from Southern Sales, an UST supplier. I included link to Southern's website if image needs to be verified.

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Thank you,

Vesta Kennedy

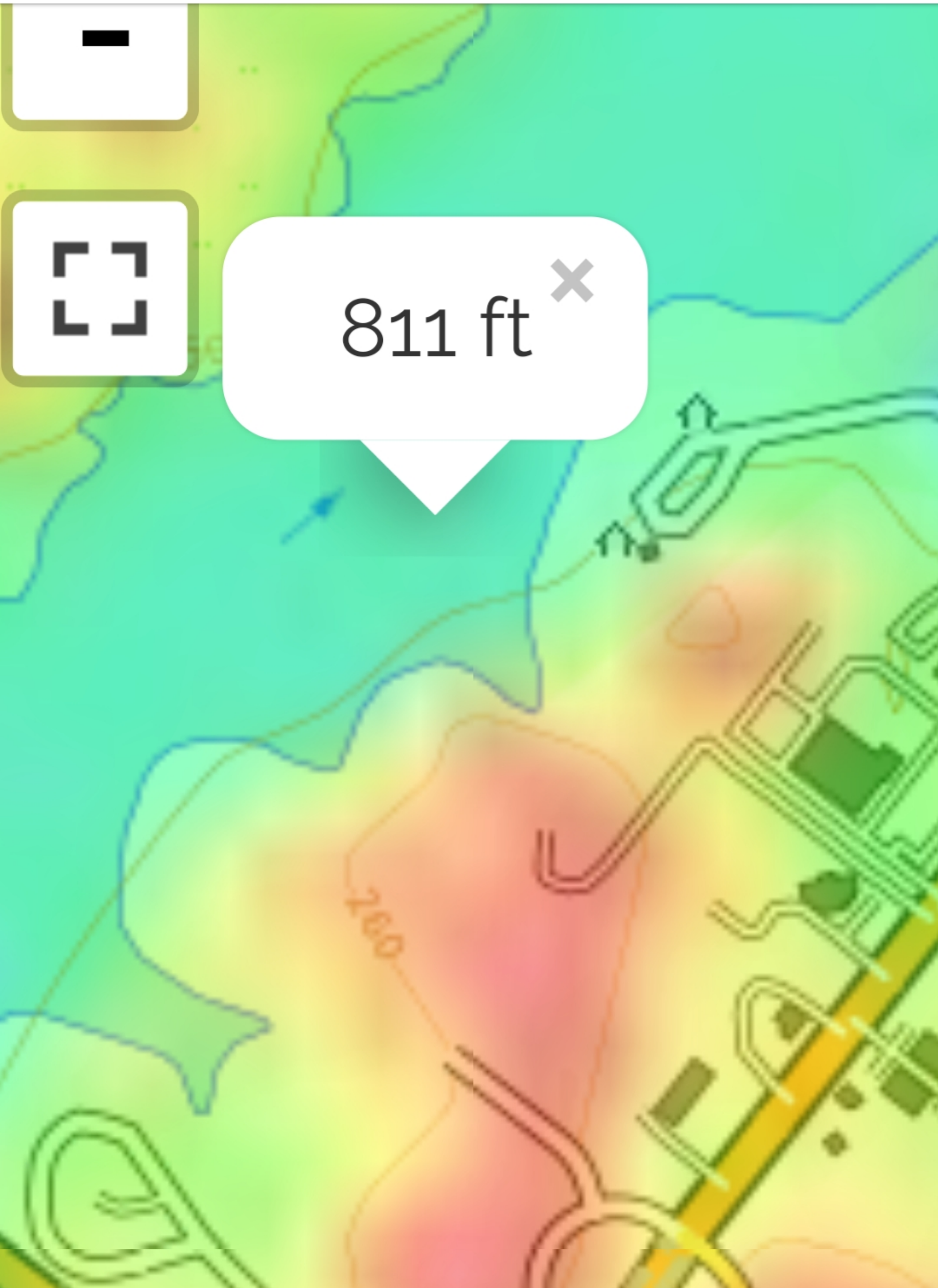
https://www.southerntank.net/horizontal-tank-sizes/

Sent from my Galaxy

Attachments to Email #15

97% 12:10 PM

High Point topogra...
n-us.topographic-map.com



GERMAN ENGLISH

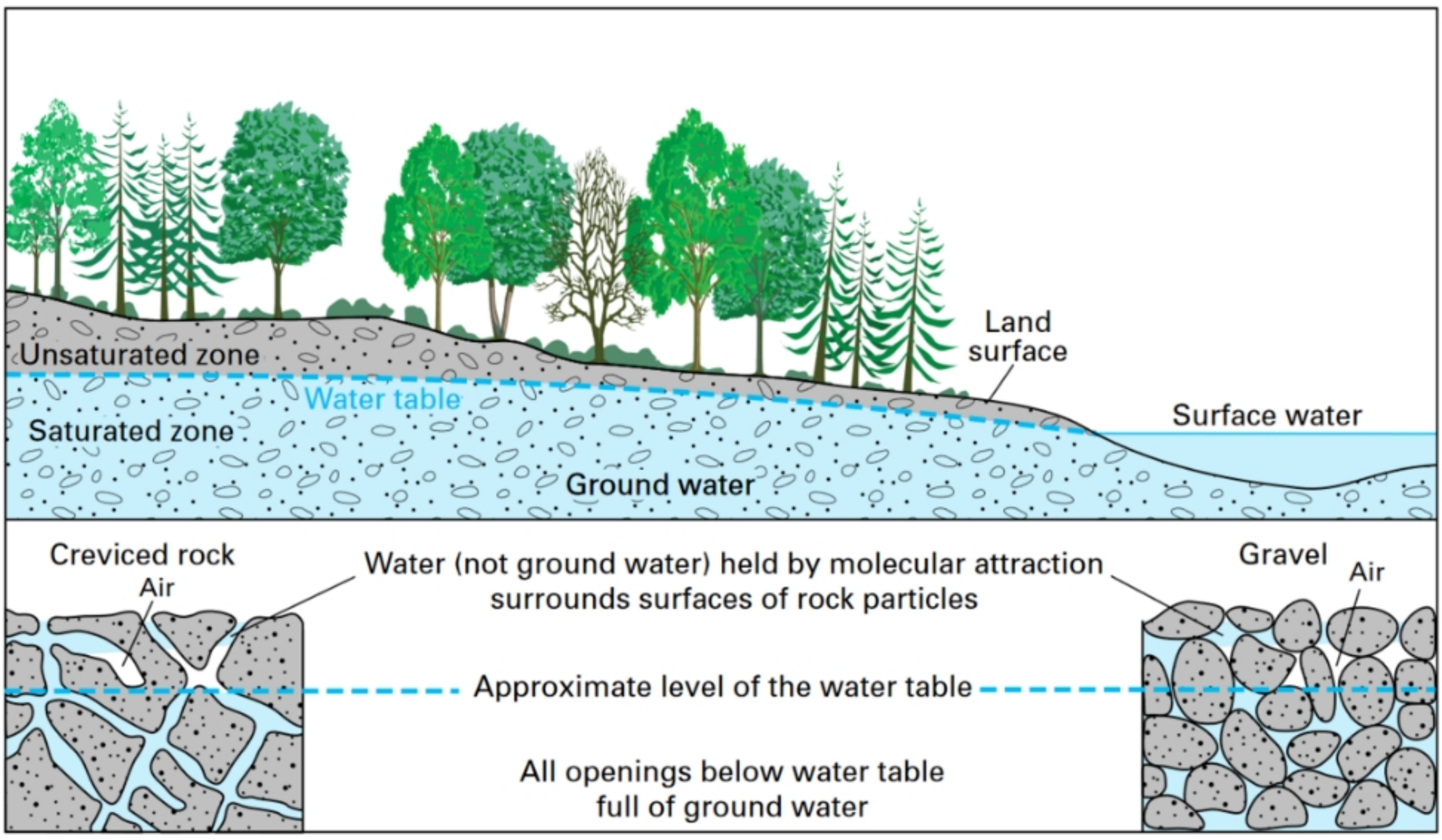
832 ft

39° ··· 72% 10:27 PM

Groundwater is the satur...
usgs.gov

USGS
science for a changing world

Groundwater is the saturated zone of soil/rock below the land surface



How ground water occurs in rocks.

(Public domain.)

Thumbnail Medium Original

8,000	96" x 21'-4"	1/4" shell and heads	668
10,000	96" x 27'-0"	1/4" shell and heads	836
12,000	96" x 32'-0"	1/4" shell and heads	983
15,000	126" x 23'-2"	1/4" shell and heads	102
20,000	126" x 31'-0"	1/4" shell and heads	123

Email #16 with Attachment(s)

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 Report for PopShoppe Incident#45311 and NRP for Oak Hollow Tire
Date:	Tuesday, January 12, 2021 11:45:49 AM
Attachments:	WS-27764_47075_C_NFA_20200702_NFAII.pdf WS-10178_45311_CA_LSA_20200205.pdf

---

Dear Lisa Vierling,

Please find the 2 attachments for email sent January 4, 2:42am timestamp.

Thanks so much!
Vesta Kennedy

Attachment to Email #16

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

July 1, 2020

Attn: Ronald E. Bridges
Oak Hollow Tire
2410 Eastchester Drive
High Point, NC 27265

Re: Notice of No Further Action 15A NCAC 2L .0407(d)
Risk-based Assessment and Corrective Action for Petroleum Underground Storage Tanks

Oak Hollow Tire
2410 Eastchester Drive
High Point, Guilford County
Incident Number: pending
Risk Classification: Low
Ranking: 94D

Dear Mr. Bridges:

The Limited Site Assessment / Site Closure Request received by the UST Section, Division of Waste Management, Winston-Salem Regional Office on June 11, 2020 and the Notice of Residual Petroleum received on June 29, 2020 have been reviewed. The review indicates that soil contamination exceeds the soil-to-groundwater but below residential maximum soil contaminant concentrations (MSCCs) established in Title 15A NCAC 2L .0411 and groundwater contamination meets the cleanup requirements for a low-risk site but exceeds the groundwater quality standards established in Title 15A NCAC 2L .0202.

The UST Section determines that no further action is warranted for this incident. All required actions have been completed. On June 29, 2020, the UST Section received a certified copy of the Notice of Residual Petroleum which is filed with the Register of Deeds. On June 29, 2020, the UST Section was provided with proof of receipt of the conditional Notice of No Further Action letter or of refusal by the addressee to accept delivery of the letter or with a description of the manner in which the letter was posted.

This determination shall apply unless the UST Section later finds that the discharge or release poses an unacceptable risk or a potentially unacceptable risk to human health or the environment. Pursuant to Title 15A NCAC 2L .0407(a) you have a continuing obligation to notify the Department of Environmental Quality of any changes that might affect the risk or land use classifications that have been assigned.

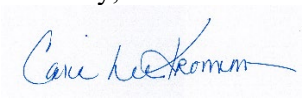
Be advised that as groundwater contamination exceeds the groundwater quality standards established in Title 15A NCAC 2L .0202, groundwater within the area of contamination or within the area where groundwater contamination is expected to migrate is not suitable for use as a water supply.

Interested parties may examine the Soil Cleanup Report/ Site Closure Request by contacting this regional office and may submit comments on the site to the regional office at the address or telephone number listed below.

This No Further Action determination applies only to the subject incident; for any other incidents at the subject site, the responsible party must continue to address contamination as required.

If you have any questions regarding this notice, please contact **Gene Mao** at the Guilford County Department of Health and Human Services, 400 W. Market Street, Suite 300, North Carolina 27401 and/or **(336) 641-3589**.

Sincerely,



Carin Lee Kromm, L.G.
Regional Supervisor
Winston-Salem Regional Office
UST Section, Division of Waste Management, NCDEQ

cc: Guilford County Department Health and Human Services
Brett Higgins via email brett@pyramidenvironmental.com
Matt Scheidt via email mscheidt@northwestgeoscience.com

Attachment to Email #16

LIMITED SITE ASSESSMENT

THE POP SHOPPE – HICKSWOOD RD
2400 EASTCHESTER DRIVE
HIGH POINT, GUILFORD COUNTY, NC
GROUNDWATER INCIDENT: 45311
FACILITY ID: 00-0-0000035614

FEBRUARY 5, 2020

UST OWNER/OPERATOR:

Mid-State Petroleum Leasing, Inc.
P.O. Box 1618
Jamestown, NC 27282
Phone Number: (336) 841-3000

PROPERTY OWNER:

Triad Holding Company, LLC
7622 Bentley Road
Greensboro, NC 27409
Phone Number: (336) 299-4500

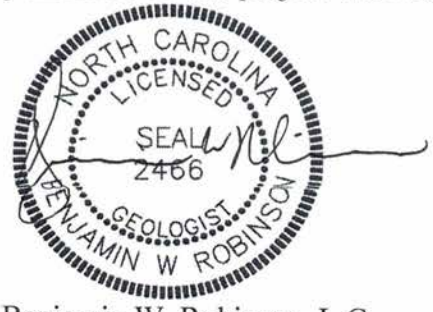
CONSULTANT:

Paragon Environmental Consultants, Inc.
P. O. Box 157
Thomasville, NC 27361-0157
Phone Number: (336) 669-6037

RELEASE INFORMATION:

Date Discovered: October 9, 2019
Estimated Quantity of Release: Unknown Cause of Release: Spill Bucket Failure
Source of Release: Regular-Grade Gasoline UST Spill Bucket
Size and Contents: One (1) 12,000 Gallon Regular-Grade Compartment Gasoline UST
Latitude: N 36.02531424° Longitude: W 79.97185323°

The Limited Site Assessment for this site has been prepared by Paragon Environmental Consultants, Inc. under the direct supervision of a licensed geologist. All activities performed on this project were conducted under my direct supervision:



Benjamin W. Robinson, L.G.
North Carolina License #2466

PARAGON
Environmental Consultants, Inc.

February 5, 2020

Tony Perez
Mid-State Petroleum Leasing, Inc.
P.O. Box 1618
Jamestown, NC 27282

Reference: Limited Site Assessment
The Pop Shoppe – Hickswood Rd
2400 Eastchester Drive
High Point, Guilford County, NC
Groundwater Incident # 45311
Facility ID # 00-0-0000035614

Dear Mr. Perez:

In accordance with the requirements of a correspondence dated December 9, 2019 from the North Carolina Department of Environmental Quality (NCDEQ), contained herein is a Limited Site Assessment for the release which occurred at the above referenced facility. These activities have been conducted following the discovery of petroleum above the action limits beneath the spill bucket on the regular-grade gasoline underground storage tank (UST) at 2400 Eastchester Drive. All activities were conducted in accordance with NCDEQ guidelines and the requirements of 15A NCAC 2L .0115.

Mr. Perez, if you have questions regarding this report, please contact our office.

Sincerely,

Benjamin W. Robinson, L.G.
Paragon Environmental Consultants, Inc.

R20-1530A

P.O. Box 157 • Thomasville, NC 27361-0157
Business Ph: (336) 669-6037 • Fax: (336) 476-7708

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3.0	**RECEPTOR INFORMATION**	**4**
4.0	**SITE GEOLOGY AND HYDROGEOLOGY**	**5**
5.0	**SAMPLING RESULTS**	**6**
6.0	**CONCLUSIONS AND RECOMMENDATIONS**	**7**

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Appendix C: Well Construction Record
Appendix D: Standard Operating Procedures
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LIMITED SITE ASSESSMENT

The Pop Shoppe – Hickswood Rd
2400 Eastchester Drive
High Point, NC

1.0. - SITE HISTORY AND SOURCE CHARACTERIZATION

Mid-State Petroleum Leasing, Inc. owns and operates a UST system at 2400 Eastchester Drive in High Point, NC which is referred to as The Pop Shoppe – Hickswood Rd. This property contains one permanent structure which is utilized as a convenience store. Figure 1 illustrates the location of this facility on the Guilford Quadrangle U.S.G.S. Topographic Map. This facility contains one (1) two-compartment 20,000 gallon gasoline UST with one (1) 12,000 gallon regular-grade gasoline compartment and one (1) 8,000 gallon premium-grade gasoline compartment, as well as one (1) 6,000 gallon non-ethanol gasoline UST which are used for the retail sale of petroleum. Information regarding the ownership of the regulated USTs which are located at this facility is contained in Table 1. A compliance inspection noted damage to the spill buckets on the regular-grade and premium-grade gasoline USTs and directed site check soil sampling. Figure 2 illustrates the site layout and the existing UST locations. Soil samples were collected by Paragon Environmental Consultants, Inc. on October 2, 2019 beneath the spill buckets on the regular-grade and premium-grade gasoline tanks. One of the regular-grade gasoline UST spill bucket samples showed contamination by EPA Method 5030 at a level of 86.9 milligrams per kilogram (mg/kg).

2.0 - RISK CHARACTERIZATION AND LAND USE FORM

Part I <u>Groundwater/Surface water/Vapor impact</u>
<u>High Risk</u>

1. Has discharge or release contaminated any water supply wells including any used for non-drinking purposes?

   NO

2. Is a water supply well used for drinking water located within 1,000 feet of the source area of the discharge or release?

   YES

3. Is a water supply well used for any purpose (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the discharge or release?

   NO

4. Does groundwater within 500 feet of the source area of the discharge or release have the potential for future use in that there is no other source of water supply other than the groundwater?

   NO

5. Do vapors from the discharge or release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety or the environment?

   NO

6. Are there any factors that would cause the discharge or release to pose an imminent danger to public health, public safety or the environment?

   NONE KNOWN

Intermediate Risk

7. Is a surface body located within 500 feet of the source area of the discharge or release?

   NO

   If yes, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B .0200 by a factor of 10?

   N/A

8. Is the source area of the discharge or release located within a designated wellhead protection area as defined in 42 USC 300h-7(e)?

   NO

9. Is the discharge or release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985?

   NO

   If yes, is the source area of the discharge or release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water?

   N/A

10. Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established (see Table 7 in guidelines) by the department?

NO

Part II-Land Use

Property containing Source Area of Discharge or Release

The questions below pertain to the property containing the source area of the release.

1. Does the property contain one or more primary or secondary residences (permanent or temporary)?

NO

2. Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly?

NO

3. Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped?

YES, THE PROPERTY IS OPERATED AS A CONVENIENCE STORE

4. Do children visit the property?

YES

Explain.

CHILDREN MAY VISIT THE STORE FOR LIMITED PERIODS OF TIME

5. Is access to the property reliably restricted consistent with its use?

YES

6. Do pavement, buildings, or other structures cap the contaminated soil?

YES

If yes, what mechanisms are in place or can be put into place to ensure that the contaminated soil will remain capped in the foreseeable future?

THE UST SYSTEM AS WELL AS THE ASPHALT AND CONCRETE PAVING WILL REMAIN IN PLACE

7. What is the zoning status of the property?

   COMMERCIAL

8. Is the use of the property likely to change in the next 20 years?

   NO

Property Surrounding Source Area of Discharge or Release.

9. What is the distance from the source area of the release to the nearest primary or secondary residence (permanent or temporary)

   APPROXIMATELY 430 FEET TO THE WEST

10. What is the distance from the source area of the release to the nearest school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly?

    APPLEVILLE ACADEMY IS LOCATED APPROXIMATELY 1,100 FEET TO THE SOUTH

11. What is the zoning status of properties in the surrounding areas?

    COMMERCIAL / RESIDENTIAL

12. Briefly characterize the use and activities of the land in the surrounding area.

    COMMERCIAL / RESIDENTIAL

3.0 - RECEPTOR INFORMATION

3.1 Water Supply Wells

A supply well survey has been conducted within a radius of 1,000 feet from the release area. During this reconnaissance, five (5) water supply wells were found to be located within this radius and three (3) of these are in use for consumption. Figure 3 illustrates the locations of the supply wells, and Table 2 lists the owners and addresses for the wells within 1,000 feet of the release source.

3.2 Public Water Supplies

Public water supplies are available to all of the surrounding properties within a radius of 1,000 feet from 2400 Eastchester Drive, with the exception of the residences on Gardenia Court to the south of the project site.

3.3 Surface Water

The partial U.S.G.S. map included as Figure 1 indicates that surface waters in the vicinity of the release area generally drain towards the Oak Hollow Reservoir located approximately 1,900 feet to the west. Oak Hollow Reservoir drains into the West Fork Deep River approximately 6,450 feet to the southwest. The West Fork Deep River is situated within the Cape Fear River Drainage Basin.

3.4 Wellhead Protection Areas

No wellhead protection areas are known to exist within the area of this release.

3.5 Deep Aquifers in the Coastal Plain Physiographic Region

This release is not located in the coastal plain.

3.6 Subsurface Structures

Subsurface utilities in the form of the USTs, product lines, and electrical conduits are located above the petroleum affected area at this facility. The building located on the impacted property does not have a basement; however, other subsurface utilities are present in the form of water lines, sewer lines, and electrical conduits. Figure 4 illustrates the locations of all known subsurface utilities.

3.7 Land Use

The possibility of human exposure to soil contamination at The Pop Shoppe – Hickswood Rd is minimal. The marginally impacted soils beneath the spill bucket are capped by concrete and will not allow exposure to persons at the store property. The facility lies within a primarily commercial area, with residential areas to the west and south.

3.8 Property Owners and Occupants

Figure 5 illustrates the surrounding properties, and Table 3 contains information regarding the adjacent property owners. This information was obtained from the Guilford County Tax Department's records.

4.0 - SITE GEOLOGY AND HYDROGEOLOGY

4.1 Site Geology

The site is situated in the Piedmont Region of the North Carolina Slate Belt. According to the Geological Map of North Carolina local bedrock geology of the region consists of Late Proterozoic to Cambrian aged metamorphosed granitic bedrock. Competent bedrock was not encountered to a depth of 23 feet below land surface which was the maximum depth explored during the subsurface investigation.

4.2 Soils Investigation

The soils at the project site consist of clay with varying amounts of silt. Two soil samples were obtained immediately adjacent to the spill bucket on the premium-grade compartment, and two soil samples were collected directly beside the regular-grade compartment spill bucket. The samples were obtained by coring holes through the concrete which surrounded the suspect spill buckets and then using a probe sampling tool to complete the site check sample collection. Paragon obtained the samples from in-situ material at a depth of approximately 2½ feet below the surface grade. The samples were labeled as spill bucket #1 (SB-1A and SB-1B) to represent the premium-grade gasoline compartment and spill bucket #2 (SB-2A and SB-2B) to represent the regular-grade gasoline compartment.

All four of the soil samples obtained at the subject site were submitted to Meritech, Inc. for laboratory analysis according to EPA Method 5030. Method 5030 tests for total petroleum hydrocarbons (TPH) from low boiling-point fuels such as gasoline, aviation fuel, and gasohol. The current action level for Method 5030 constituents is 50 mg/kg. The sample labeled as SB-2A was reported at a level of 86.9 mg/kg which is above the action limit. Sample SB-2A was also analyzed for BTEX by VPH methods as required by the current UST Section guidelines if a concentration of TPH exceeding 50 mg/kg is noted by the TPH analysis. The other three soil samples were below the action limit according to EPA Method 5030. Since sample SB-2A indicated the only TPH level in excess of 50 mg/kg, it was then analyzed for BTEX by VPH methods. Xylenes were indicated at a concentration of 6.3 mg/kg which exceeds the lowest Maximum Soil Contaminant Concentration (MSCC) of 4.6 mg/kg. Toluene was below its lowest MSCC, and Benzene and Ethylbenzene were both below the laboratory detection limit for sample SB-2A.

A soil boring log for the boring advanced for monitor well installation at the site is contained as Appendix A. One "Risk-Based" sample was collected for laboratory analyses from the monitor well boring at a depth of 10 feet below land surface. This sample, labeled as MW1-10, was analyzed by EPA Method 8260 and for Volatile Petroleum Hydrocarbons (VPH) by MADEP methods. All compounds according to EPA Method 8260 and all carbon fraction classes by VPH were below the laboratory detection limits. Figure 6 illustrates the location of the soil sample collected at 2400 Eastchester Drive, and Table 4 summarizes the analytical results for the "Risk-Based" soil sample obtained at The Pop Shoppe – Hickswood Rd. Appendix B contains a copy of the laboratory analytical report and the chain-of-custody record for the soil sample collected by Paragon at this subject site.

5.0 - SAMPLING RESULTS

5.1 Monitor Well Installation

One North Carolina Type II groundwater monitoring well has been installed at the site. Figure 7 illustrates the site layout and the location of the monitor well which was labeled as MW-1A. The monitoring well was constructed of 2-inch Schedule 40 PVC pipe with 15 feet of 0.010 inch slotted screen. Based on the assumption that the contaminants being addressed were primarily hydrocarbon constituents with specific gravities of less than 1.0, the groundwater monitoring well was installed so that the screened interval intersected the shallow groundwater table at the time of installation. Table 5 summarizes the monitoring well information and groundwater elevation as measured on January 5, 2020, and Appendix C contains a copy of the well construction record for this monitor well.

5.2 Groundwater Analyses

Following installation, the monitoring well was developed and sampled in accordance with Paragon's Standard Operating Procedures which are contained as Appendix D. The groundwater sample was submitted to Meritech, Inc. for laboratory analysis according to EPA Method 6200B plus MTBE and IPE. The groundwater sample was also analyzed for Lead and by MADEP methods for VPH.

According to the analytical results for monitor well MW-1A, Benzene was reported at a concentration of 1,760 micrograms per liter (ug/L), which exceeds the 2L Standard of 1 ug/L. Toluene, which has a 2L Standard of 600 ug/L, was detected at a level of 1,020 ug/L. Ethylbenzene was reported at a concentration of 1,220 ug/L, which is above the 2L Standard of 600 ug/L. Xylenes were listed at a level of 2,915 ug/L, which is in excess of the 2L Standard of 500 ug/L. Naphthalene, which has a 2L Standard of 6 ug/L, was reported at a concentration of 172 ug/L. n-Propylbenzene was detected at a level of 122 ug/L, which exceeds the 2L Standard of 70 ug/L. IPE was reported at a concentration of 91 ug/L, which is above the 2L Standard of 70 ug/L. Isopropylbenzene, 1,2,4-Trimethylbenzene, and 1,3,5-Trimethylbenzene were also detected at concentrations below their respective 2L Standards. All other 6200B compounds were below the laboratory detection limits. C5-C8 Volatile Aliphatics were listed at a level of 2,670 ug/L, in excess of the 2L Standard of 400 ug/L. C9-C18 Aliphatics were reported at a concentration of 9,190 ug/L, which is above the 2L Standard of 700 ug/L. C9-C22 Aromatics were detected at a concentration of 2,350 ug/L, which exceeds the 2L Standard of 200 ug/L. The sample collected from monitor well MW-1A was below the laboratory detection limits for Lead. All of the detected groundwater contaminant concentrations at 2400 Eastchester Drive are below the Gross Contaminant Levels (GCLs). Table 6 summarizes the groundwater analytical results, and Appendix E contains a copy of the laboratory analytical report and the chain-of-custody record for the groundwater sample.

6.0 - CONCLUSIONS AND RECOMMENDATIONS

6.1 General Summary

Limited Site Assessment activities at The Pop Shoppe – Hickswood Rd have been completed. From a review of all information gathered during this project, Paragon Environmental Consultants, Inc. makes the following conclusions:

- A petroleum release of unknown quantity has occurred at this site. The spill bucket soil samples were below the Residential Standards according to the BTEX analysis conducted during the site check at 2400 Eastchester Drive.
- One groundwater monitoring well was constructed at the site during this investigation. Free product was not observed in monitor well MW-1A.
- The analytical results for the groundwater sample from MW-1A indicated seven EPA Method 6200B compounds and three carbon fraction classes at concentrations that are in excess of the 2L Standards.

6.2 Recommendations

Based upon a review of all information gathered during this project, Paragon makes the following recommendations:

- Since soil concentrations are below the Residential Standards, but the petroleum contaminant levels in the groundwater are above the 2L Standards, NCDEQ should make a determination about additional assessment required at the subject site.

- A copy of this report should be forwarded to the following address:

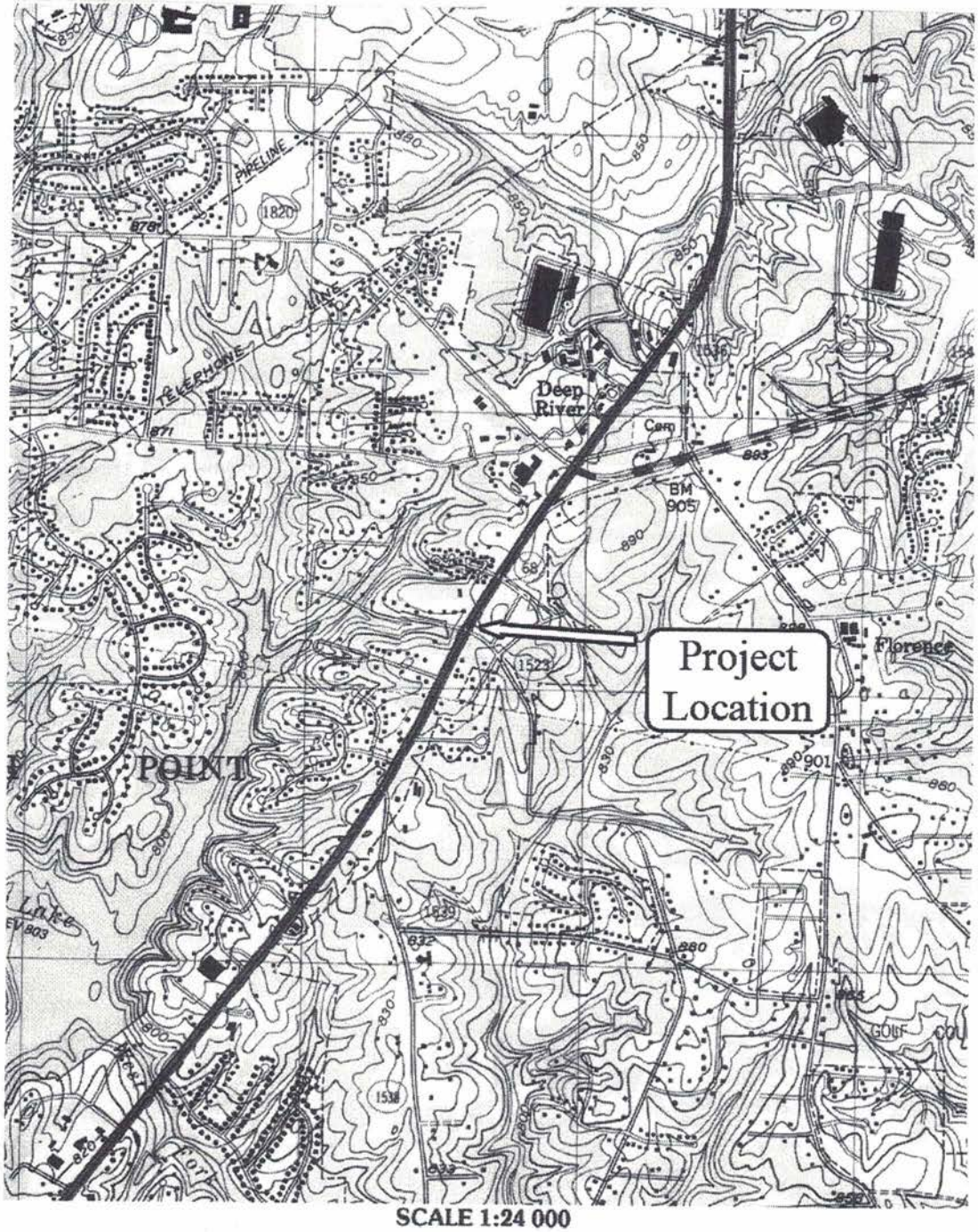
  Guilford County Health Department
  400 W. Market Street – Suite 300
  Greensboro, NC 27401

6.3 Limitations

This report has been prepared for the exclusive use of Mid-State Petroleum Leasing, Inc. for the specific application to the referenced site located in Guilford County, North Carolina. The evaluation was conducted based on the scope of work and level of effort desired by the client and with resources adequate only for the scope of work. Our findings have been developed in accordance with generally accepted standards for Limited Site Assessments in the State of North Carolina, available information, and our professional judgment. No other warranty is expressed or implied.

The data presented in this report are indicative of conditions at the precise locations sampled and the time the sample was collected. Additionally, the data obtained from the samples would be interpreted as meaningful with respect to the parameters in the laboratory reports. No additional information can be logically inferred from this data.

FIGURES



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
TO CONVERT FROM FEET TO METERS, MULTIPLY BY 0.3048

FIGURE 1

PARAGON ENVIRONMENTAL CONSULTANTS, INC.
THOMASVILLE, NORTH CAROLINA

CLIENT: MID-STATE PETROLEUM LEASING
JAMESTOWN, NC

PROJECT: LSA
2400 EASTCHESTER DRIVE
HIGH POINT, NC

TITLE: PROJECT LOCATION
U.S.G.S. TOPOGRAPHIC MAP
GUILFORD QUADRANGLE

SCALE: 1"=2,000'
DATE: 2/3/20
DWN. BY: BWR
DWG. NO. L20-15302

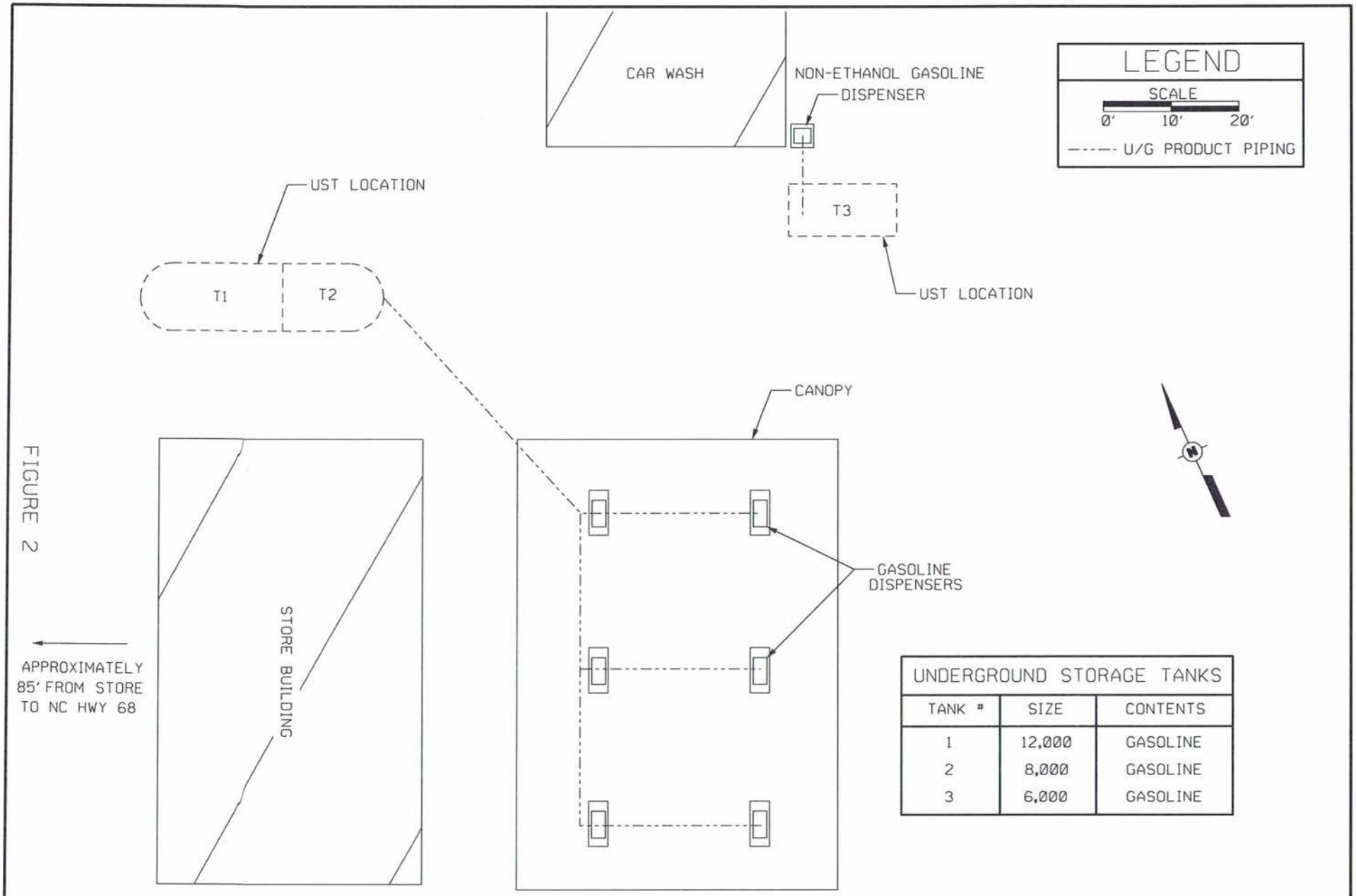
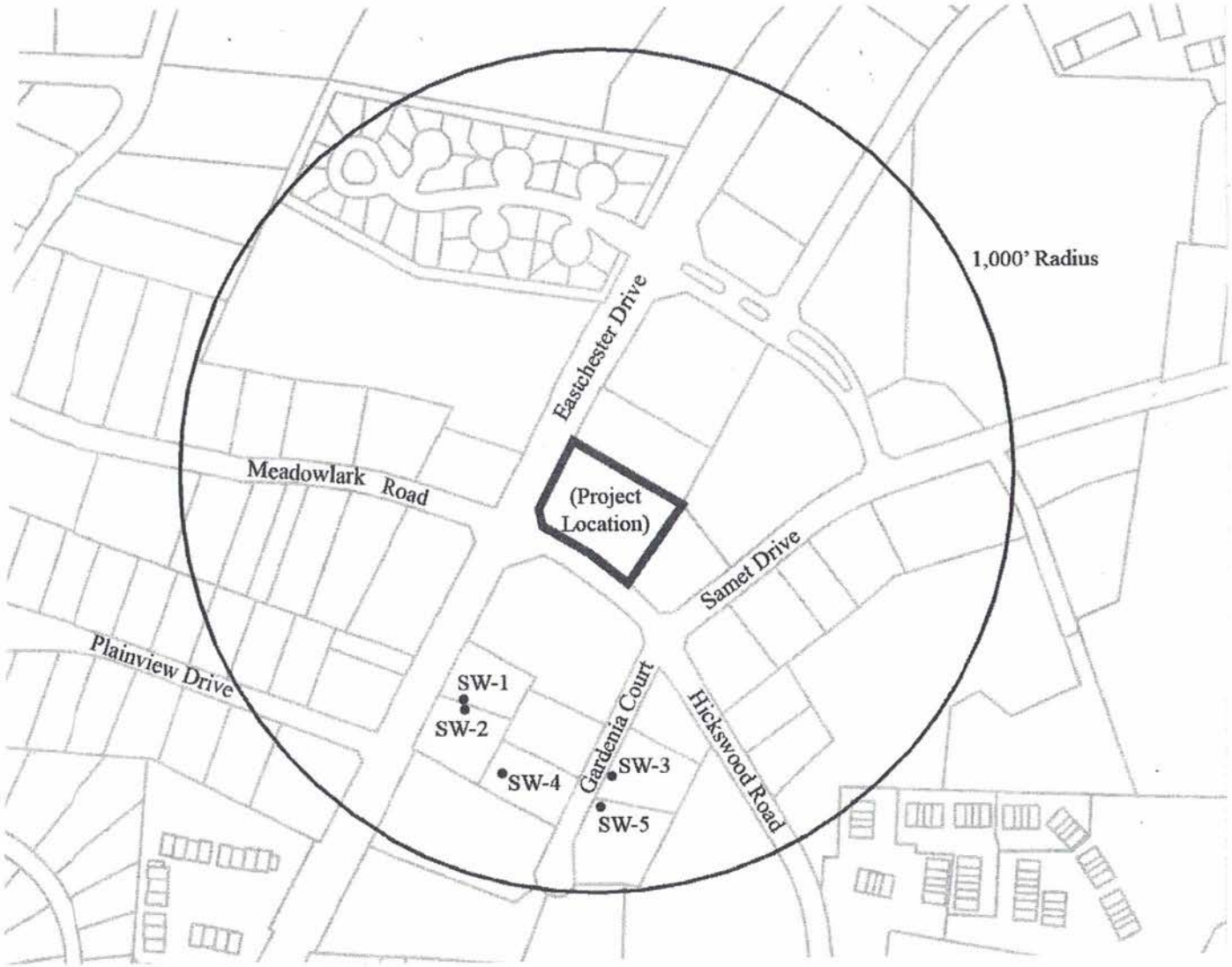


FIGURE 2

UNDERGROUND STORAGE TANKS		
TANK #	SIZE	CONTENTS
1	12,000	GASOLINE
2	8,000	GASOLINE
3	6,000	GASOLINE

SCALE: 1"=20'	TITLE:	PROJECT:	CLIENT:	PARAGON ENVIRONMENTAL CONSULTANTS, INC.
DATE: 2/3/20	SITE LAYOUT AND UST LOCATIONS	LSA	MID-STATE PETROLEUM LEASING	THOMASVILLE, NORTH CAROLINA
DWN. BY: BWR		2400 EASTCHESTER DRIVE	JAMESTOWN, NC	
DWG. NO. L20-1530		HIGH POINT, NC		

FIGURE 3



SCALE: 1"=400'	TITLE:	PROJECT:	CLIENT:	PARAGON ENVIRONMENTAL CONSULTANTS, INC.
DATE: 2/4/20	SUPPLY WELL LOCATIONS MAP	LSA 2400 EASTCHESTER DRIVE HIGH POINT, NC	MID-STATE PETROLEUM LEASING JAMESTOWN, NC	THOMASVILLE, NORTH CAROLINA
DWN. BY: BWR				
DWG. NO. L20-1530X				

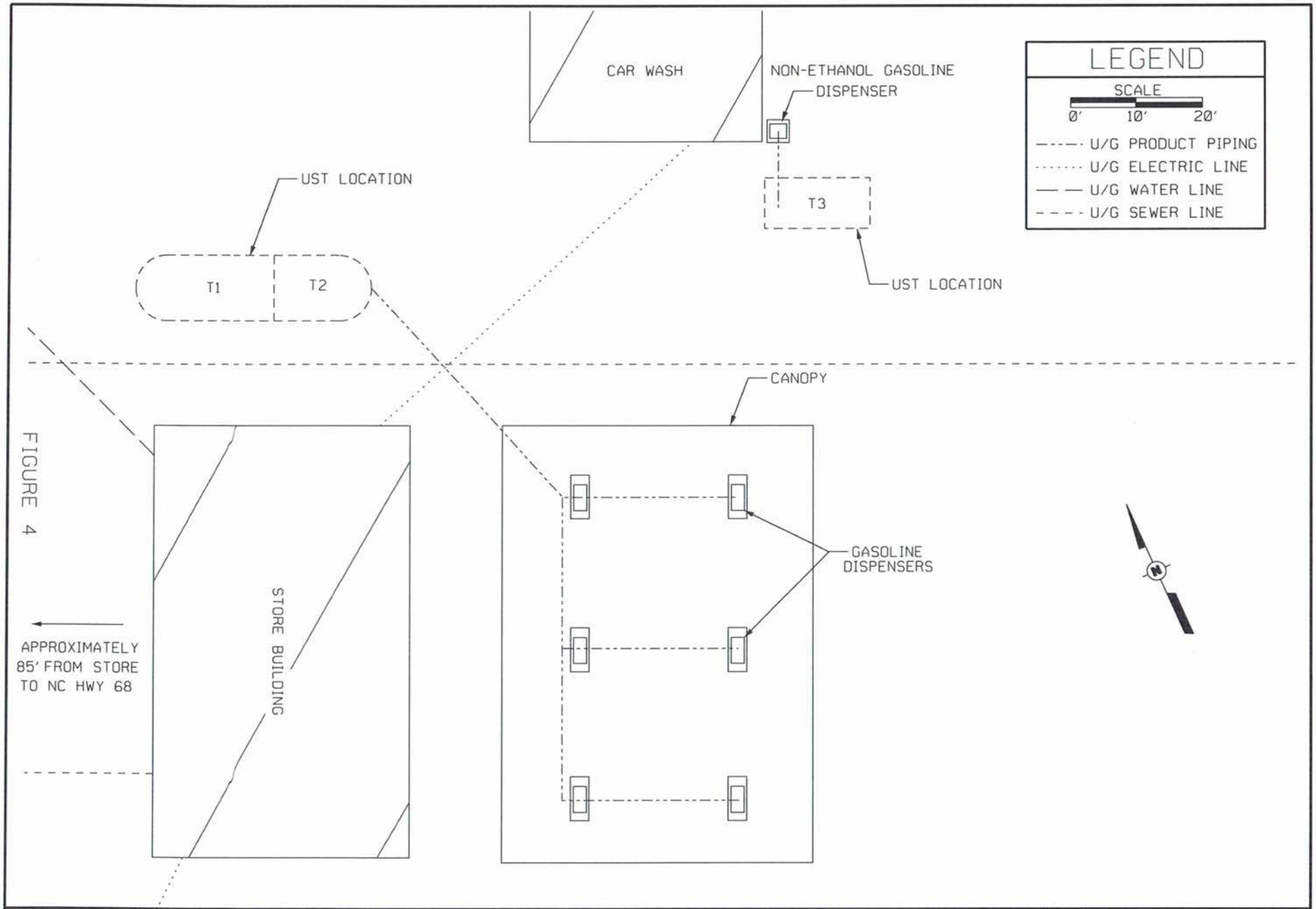


FIGURE 4

SCALE: 1"=20'	TITLE:	PROJECT:	CLIENT:	PARAGON ENVIRONMENTAL CONSULTANTS, INC.
DATE: 2/4/20	SUBSURFACE UTILITIES MAP	LSA 2400 EASTCHESTER DRIVE HIGH POINT, NC	MID-STATE PETROLEUM LEASING JAMESTOWN, NC	THOMASVILLE, NORTH CAROLINA
DWN. BY: BWR				
DWG. NO. L20-1530A				

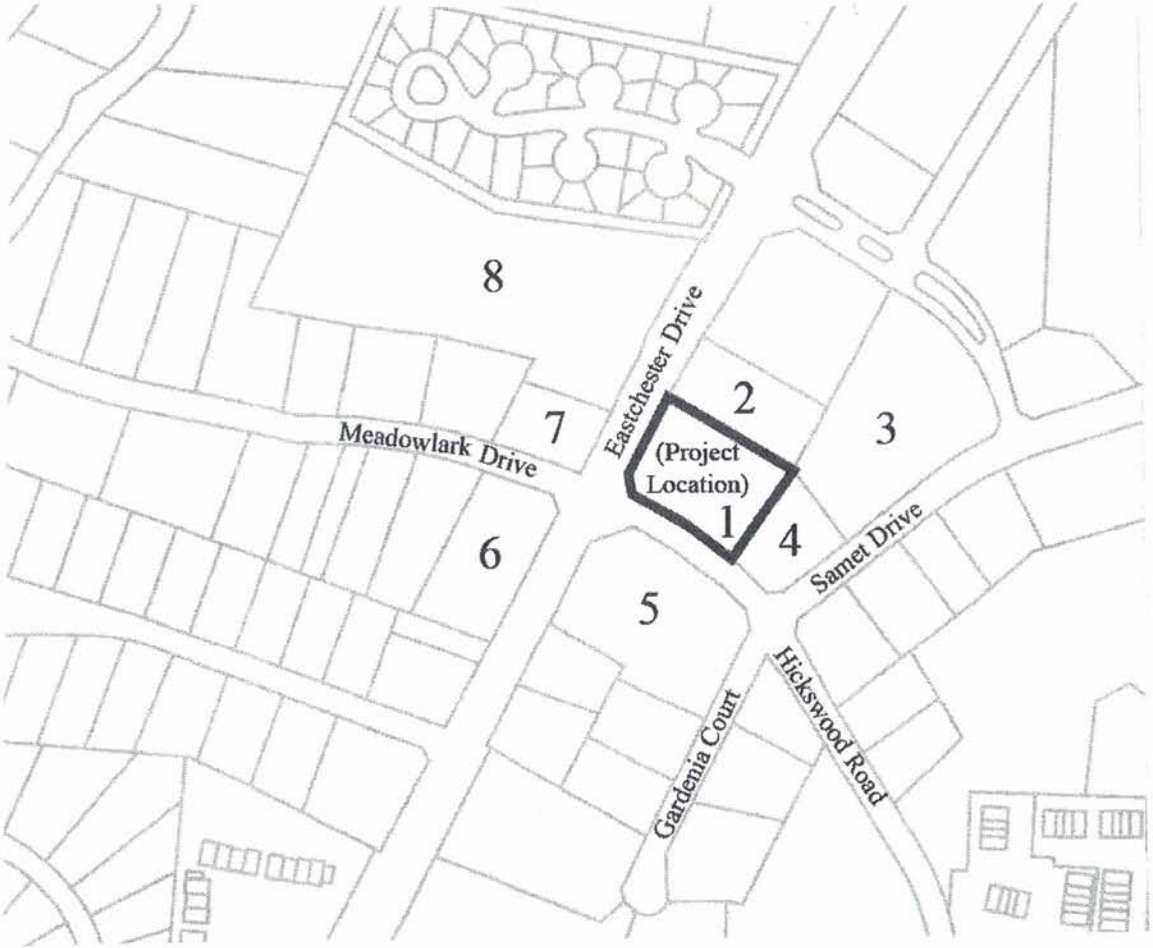


FIGURE 5

SCALE: 1"=400'	TITLE:	PROJECT:	CLIENT:	PARAGON ENVIRONMENTAL CONSULTANTS, INC.
DATE: 2/3/20	ADJACENT PROPERTIES MAP	LSA	MID-STATE PETROLEUM LEASING	THOMASVILLE, NORTH CAROLINA
DWN. BY: BWR		2400 EASTCHESTER DRIVE	JAMESTOWN, NC	
DWG. NO. L20-1530Y		HIGH POINT, NC		

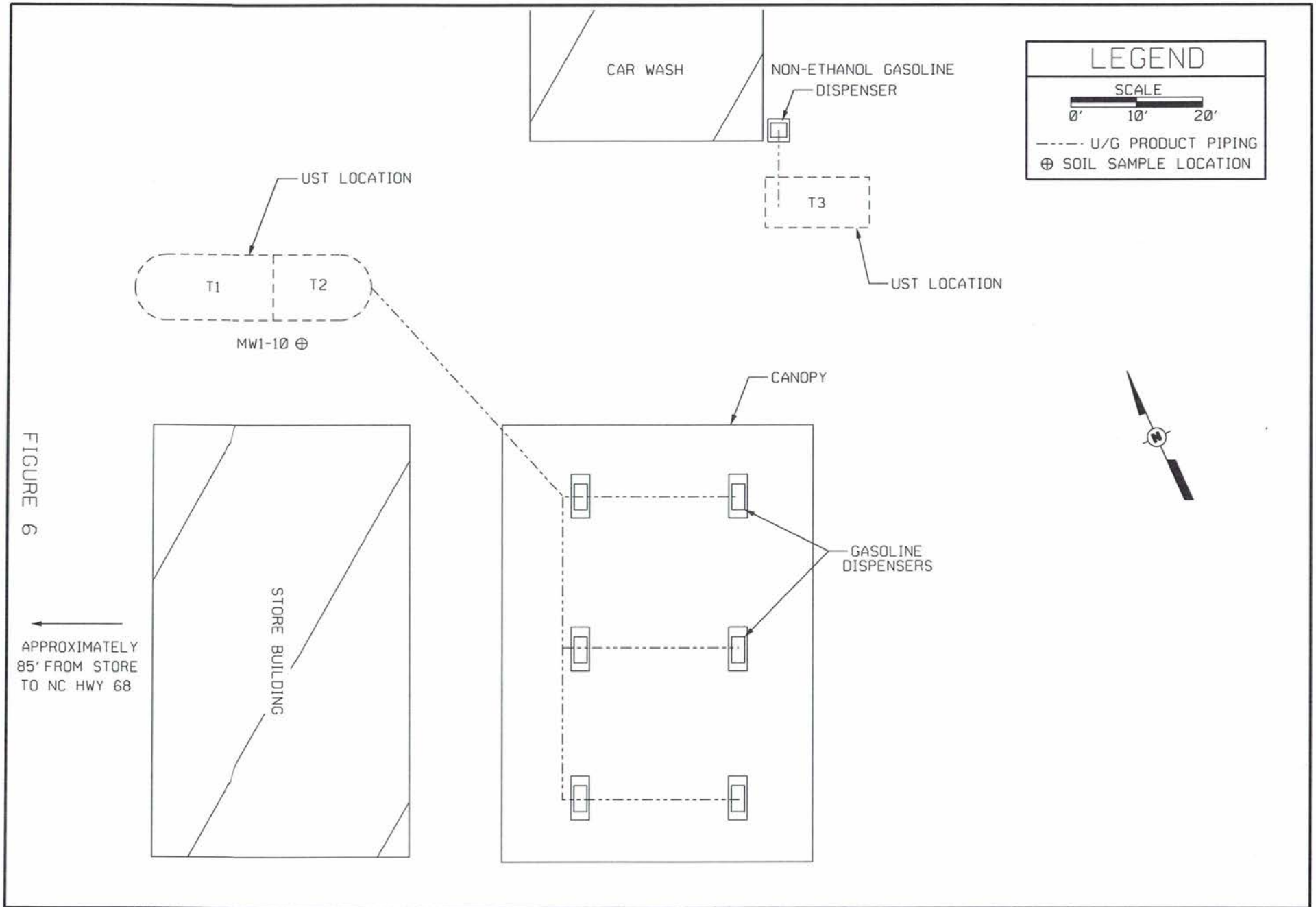


FIGURE 6

SCALE: 1"=20'	TITLE: SITE LAYOUT AND SOIL SAMPLE LOCATION	PROJECT: LSA 2400 EASTCHESTER DRIVE HIGH POINT, NC	CLIENT: MID-STATE PETROLEUM LEASING JAMESTOWN, NC	PARAGON ENVIRONMENTAL CONSULTANTS, INC. THOMASVILLE, NORTH CAROLINA
DATE: 2/3/20				
DWN. BY: BWR				
DWG. NO. L20-1530B				

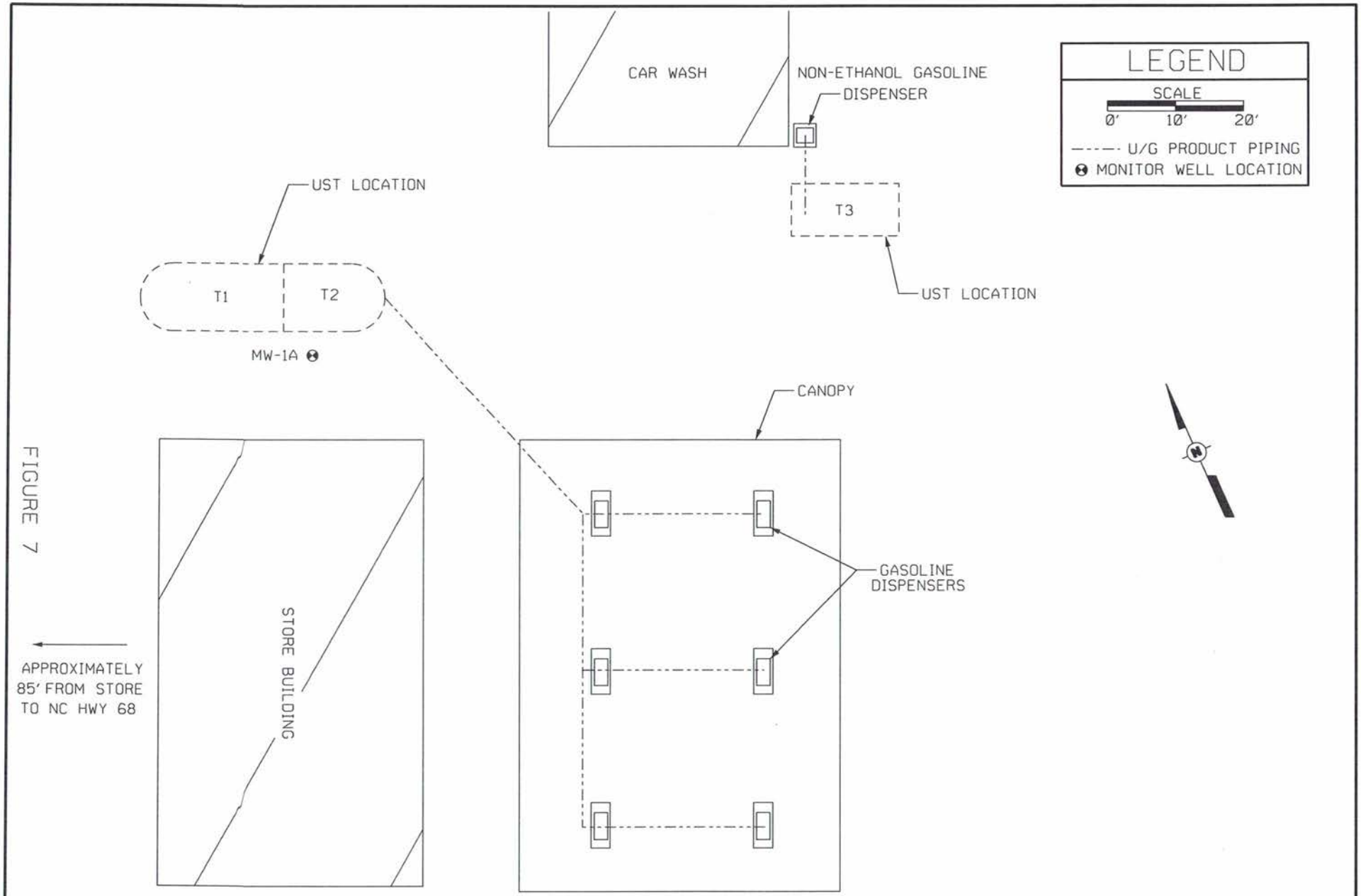


FIGURE 7

SCALE: 1"=20'	TITLE: SITE LAYOUT AND MONITOR WELL LOCATION	PROJECT: LSA 2400 EASTCHESTER DRIVE HIGH POINT, NC	CLIENT: MID-STATE PETROLEUM LEASING JAMESTOWN, NC	PARAGON ENVIRONMENTAL CONSULTANTS, INC. THOMASVILLE, NORTH CAROLINA
DATE: 2/3/20				
DWN. BY: BWR				
DWG. NO. L20-1530C				

TABLES

TABLE 1: SITE HISTORY

THE POP SHOPPE – HICKSWOOD RD
2400 EASTCHESTER DRIVE
HIGH POINT, NC

Property Owner:

Triad Holding Company, LLC
7622 Bentley Road
Greensboro, NC 27409

UST Owner / Operator:

Mid-State Petroleum Leasing, Inc.
P.O. Box 1618
Jamestown, NC 27282

UST Information:

Tank No	Installation Date	Size (Gal)	Closure Date	UST Status	Tank Contents
T1	6/30/1997	12,000	Not Applicable	In Use	Gasoline
T2	6/30/1997	8,000	Not Applicable	In Use	Gasoline
T3	11/1/1998	6,000	Not Applicable	In Use	Gasoline

TABLE 2

WATER SUPPLY WELL INFORMATION
1,000' Radius

The Pop Shoppe - Hickswood Rd
High Point, North Carolina

Well Identification	SW-1	SW-2	SW-3	SW-4	SW-5
Owner Name	Nan Soon Jon	Thanh Le & Mong Thu Thi Luu	Jerome C. Thompson	B. Frazier & S. Watson	Robert E. Eanes
Owner Mailing Address	P.O. Box 2246 Jamestown, NC 27282	2300 Eastchester Drive High Point, NC 27265	3819 Briarwood Avenue High Point, NC 27265	2102 Carlisle Way High Point, NC 27265	2402 Gardenia Court High Point, NC 27265
Telephone #	Unknown	Unknown	Unknown	Unknown	Unknown
Use of Well	Out of Service	Out of Service	Consumption	Consumption	Consumption
Physical Address	2302 Eastchester Drive High Point, NC 27265	2300 Eastchester Drive High Point, NC 27265	2404 Gardenia Court High Point, NC 27265	2401 Gardenia Court High Point, NC 27265	2402 Gardenia Court High Point, NC 27265
Depth of Casing	Unknown	Unknown	Unknown	Unknown	Unknown
Well Screen Interval	Unknown	Unknown	Unknown	Unknown	Unknown
Feet from Source	640'	645'	740'	775'	810'

X20-1530C

TABLE 3: ADJACENT PROPERTY OWNERS

THE POP SHOPPE – HICKSWOOD RD
2400 EASTCHESTER DRIVE
HIGH POINT, NC

SITE ID	OWNER INFO
1	Triad Holding Company, LLC 7622 Bentley Road Greensboro, NC 27409 (Project Location)
2	Ronald E. Bridges 2410 Eastchester Drive High Point, NC 27260
3	Cana Holding Company, LLC P.O. Box 49579 Greensboro, NC 27419 (3793 Samet Drive)
4	David J. Novak 3781 Samet Drive High Point, NC 27265
5	Eastchester Medical, LLC 3150 N. Elm Street, Suite 206 Greensboro, NC 27408 (2401 Hickswood Road)
6	Windsor Commercial Properties, LLC Windsor Development Group, LLC Steven and Tamara Buckland 5603 Garden Village Way Greensboro, NC 27410 (2305-2311 Eastchester Drive)
7	First Generation, LLC 172 Fairview Avenue Boonton, NJ 07005 (2501-2503 Eastchester Drive)
8	AAA Storage Management 24, LLC 7622 Bentley Road Greensboro, NC 27409 (2505 Eastchester Drive)

TABLE 4

Summary of Soil Laboratory Analytical Results

The Pop Shoppe - Hickswood Rd
High Point, NC

Constituent	MW1-10	Lowest MSCCs	Residential Standard
Date	*1/3/2020*		
Method 8260 (mg/kg)			
Acetone	BDL	24	14,000
Benzene	BDL	0.0056	18
n-Butylbenzene	BDL	4.3	626
sec-Butylbenzene	BDL	3.3	626
Ethylbenzene	BDL	4.9	1,560
p-Isopropyltoluene	BDL	0.12	100
Naphthalene	BDL	0.16	313
Toluene	BDL	4.3	1,200
1,2,4-Trimethylbenzene	BDL	8.5	782
1,3,5-Trimethylbenzene	BDL	8.3	782
Xylenes (total)	BDL	4.6	3,129
IPE	BDL	0.37	156
MTBE	BDL	0.091	350
Aliphatic Fraction Classes (mg/kg)			
C5-C8 Volatile Aliphatics	BDL	68	939
C9-C12 Volatile Aliphatics	BDL	NSE	NSE
C9-C18 Extractable Aliphatics	N/A	NSE	NSE
C9-C18 Aliphatics (total)	BDL	540	1,500
C19-C36 Extractable Aliphatics	N/A	NSE	31,000
Aromatic Fraction Classes (mg/kg)			
C9-C10 Volatile Aromatics	BDL	NSE	NSE
C11-C22 Extractable Aromatics	N/A	NSE	NSE
C9-C22 Aromatics (total)	BDL	31	469

BDL= Below Detection Limits
N/A = Not Analyzed
NSE = No Standard Established

X20-1530

TABLE 5

Monitoring Well Information and Groundwater Elevation

The Pop Shoppe - Hickswood Rd
High Point, NC

Well Number	Top of Casing Elevation	Top of Screen Elevation	Bottom of Screen Elevation	Depth to Water	Groundwater Elevation
MW-1A	100.00	92.00	77.00	10.58	89.42

Note: All measurements taken in feet and based on an arbitrary benchmark of 100.00 feet; groundwater levels measured on January 5, 2020.

X20-1530B

TABLE 6

Summary of Groundwater Laboratory Analytical Results

The Pop Shoppe - Hickswood Rd
High Point, NC

Constituent	MW-1A	2L Standard	GCL
Date	*1/5/2020*		
Methods 6200B (ug/L)			
Benzene	**1,760**	1	5,000
Toluene	**1,020**	600	260,000
Ethylbenzene	**1,220**	600	84,500
Xylenes (total)	**2,915**	500	85,500
BTEX (total)	BDL	NSE	NSE
n-Butylbenzene	BDL	70	6,900
sec-Butylbenzene	BDL	70	8,500
cis-1,2-Dichloroethene	BDL	70	70,000
Ethanol	BDL	4,000	4,000,000
2-Hexanone	BDL	40	40,000
Isopropylbenzene	61	70	25,000
p-Isopropyltoluene	BDL	25	11,700
Naphthalene	**172**	6	6,000
n-Propylbenzene	**122**	70	30,000
Tetrachloroethene (PCE)	BDL	0.7	700
Trichloroethene (TCE)	BDL	3	3,000
1,2,4-Trimethylbenzene	340	400	28,500
1,3,5 Trimethylbenzene	265	400	25,000
MTBE	BDL	20	20,000
IPE	**91**	70	70,000
Method 3030C (ug/L)			
Lead	BDL	15	15,000
Aliphatic Fraction Classes (ug/L)			
C5-C8 Volatile Aliphatics	**2,670**	400	NSE
C9-C12 Volatile Aliphatics	9,190	NSE	NSE
C9-C18 Extractable Aliphatics	N/A	NSE	NSE
C9-C18 Aliphatics (total)	**9,190**	700	NSE
C19-C36 Extractable Aliphatics	N/A	10,000	NSE
Aromatic Fraction Classes (ug/L)			
C9-C10 Volatile Aromatics	2,350	NSE	NSE
C11-C22 Extractable Aromatics	N/A	NSE	NSE
C9-C22 Aromatics (total)	**2,350**	200	NSE

BDL = Below Detection Limits
N/A = Not Analyzed
NSE = No Standard Established

X20-1530A

APPENDIX A

SOIL BORING LOG

SOIL BORING LOG

Paragon Environmental Consultants, Inc.

Job Name: The Pop Shoppe - Hickswood Rd
Address: 2400 Eastchester Drive High Point, NC
Job No: P-1530
Start Date: 1/3/2020
Driller: Innovative Environmental Technologies, Inc.
Boring No.: MW-1A
Comments:

Sample Number	Depth (ft.)	Soil Description (color, soil type, moisture)	Blow Counts	OVA (ppm)
MW-1A	5	Tan/brown, CLAY with silt, damp		N/A
	10	Brown, CLAY with silt, damp		N/A
	15	Brown/orange, CLAY with silt, damp		N/A
	20	Brown/orange, CLAY with silt, damp		N/A
		Soil Boring Terminated at 23'		
P-1530A				

APPENDIX B

SOIL ANALYTICAL RESULTS

MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062020
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/09/20
Client Sample ID:	Monitor Well # 1 @ 10'	**Analyst:**	VWV
Sample Collection:	01/03/20	**Dilution Factor:**	1

SW846-8260D/5035 VOLATILE ORGANICS - *Soil*

Acetone	< 0.050 mg/kg	cis-1,3-Dichloropropene	< 0.005 mg/kg
Benzene	< 0.005 mg/kg	trans-1,3-Dichloropropene	< 0.005 mg/kg
Bromobenzene	< 0.005 mg/kg	Ethanol	< 0.250 mg/kg
Bromodichloromethane	< 0.005 mg/kg	Ethyl benzene	< 0.005 mg/kg
Bromochloromethane	< 0.005 mg/kg	2-Hexanone	< 0.010 mg/kg
Bromoform	< 0.005 mg/kg	Isopropylbenzene	< 0.005 mg/kg
Bromomethane	< 0.005 mg/kg	Isopropyl ether	< 0.005 mg/kg
2-Butanone (MEK)	< 0.050 mg/kg	p-Isopropyltoluene	< 0.005 mg/kg
n-Butylbenzene	< 0.005 mg/kg	Methylene chloride	< 0.005 mg/kg
sec-Butylbenzene	< 0.005 mg/kg	Methyl Isobutyl Ketone (MIBK)	< 0.050 mg/kg
tert-Butylbenzene	< 0.005 mg/kg	Naphthalene	< 0.005 mg/kg
Carbon Tetrachloride	< 0.005 mg/kg	n-Propylbenzene	< 0.005 mg/kg
Chlorobenzene	< 0.005 mg/kg	Styrene	< 0.005 mg/kg
Chloroethane	< 0.005 mg/kg	1,1,1,2-Tetrachloroethane	< 0.005 mg/kg
Chloroform	< 0.005 mg/kg	1,1,2,2-Tetrachloroethane	< 0.005 mg/kg
Chloromethane	< 0.005 mg/kg	Tetrachloroethene (PCE)	< 0.005 mg/kg
2-Chlorotoluene	< 0.005 mg/kg	Toluene	< 0.005 mg/kg
4-Chlorotoluene	< 0.005 mg/kg	1,1,1-Trichloroethane	< 0.005 mg/kg
Dibromochloromethane	< 0.005 mg/kg	1,1,2-Trichloroethane	< 0.005 mg/kg
1,2-Dibromo-3-chloropropane	< 0.005 mg/kg	Trichloroethene (TCE)	< 0.005 mg/kg
1,2-Dibromoethane (EDB)	< 0.005 mg/kg	1,2,3-Trichlorobenzene	< 0.005 mg/kg
Dibromomethane	< 0.005 mg/kg	1,2,4-Trichlorobenzene	< 0.005 mg/kg
Dichlorodifluoromethane	< 0.005 mg/kg	1,2,3-Trichloropropane	< 0.005 mg/kg
1,1-Dichloroethane	< 0.005 mg/kg	Trichlorofluoromethane	< 0.005 mg/kg
1,2-Dichloroethane	< 0.005 mg/kg	1,2,4-Trimethylbenzene	< 0.005 mg/kg
1,4-Dichlorobenzene	< 0.005 mg/kg	1,3,5-Trimethylbenzene	< 0.005 mg/kg
1,2-Dichlorobenzene	< 0.005 mg/kg	Vinyl acetate	< 0.010 mg/kg
1,3-Dichlorobenzene	< 0.005 mg/kg	Vinyl chloride	< 0.005 mg/kg
1,1-Dichloroethene	< 0.005 mg/kg	m/p-Xylenes	< 0.010 mg/kg
cis-1,2-Dichloroethene	< 0.005 mg/kg	o-Xylene	< 0.005 mg/kg
trans-1,2-Dichloroethene	< 0.005 mg/kg		
1,2-Dichloropropane	< 0.005 mg/kg	**Additional Compounds**	
1,3-Dichloropropane	< 0.005 mg/kg	Methyl-tert-butyl ether (MTBE)	< 0.005 mg/kg
2,2-Dichloropropane	< 0.005 mg/kg	Isopropyl ether (IPE)	< 0.005 mg/kg
1,1-Dichloropropene	< 0.005 mg/kg		
1,2-Dichloropropene	< 0.005 mg/kg		

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062020
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/09/20
Client Sample ID:	Monitor Well # 1 @ 10'	**Analyst:**	VWV
Sample Collection:	01/03/20	**Dilution Factor:**	1
Sample Weight:	4.75g	**Report Date:**	01/10/20
% solid:	84%		
Preparation Date:	01/09/20		

Batch Blank = Below Reporting Limit (Yes) / No **

Internal Standards method criteria acceptable (Yes) / No **

Surrogate Recoveries	Spike Conc	Spike Recovery	Limits
Dibromofluoromethane	30 ug/L	90%	51-141%
Toluene-d8	30 ug/L	103%	67-151%
Bromofluorobenzene	30 ug/L	92%	45-161%

Laboratory QC Check

Matrix / Spike Recoveries acceptable (Yes) / No **

Spike Compound	Spike Conc	Spike %Rec.	Duplicate % Rec.	RPD	RPD Limits	QC Limits
1,1-Dichloroethene	25 ug/L	106%	105%	1	20	40-133
Benzene	25 ug/L	66%	66%	0	20	40-168
Trichloroethene	25 ug/L	73%	69%	5	20	42-143
Toluene	25 ug/L	79%	83%	5	20	58-154
Chlorobenzene	25 ug/L	71%	76%	8	20	48-136

- Fails Limit Check

** - If "no" is selected, see third page for details.

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062020tb
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/09/20
Client Sample ID:	Trip Blank	**Analyst:**	VWV
Sample Collection:	01/03/20	**Dilution Factor:**	1

SW846-8260D/5035 VOLATILE ORGANICS - *Soil*

Acetone	< 0.050 mg/kg	cis-1,3-Dichloropropene	< 0.005 mg/kg
Benzene	< 0.005 mg/kg	trans-1,3-Dichloropropene	< 0.005 mg/kg
Bromobenzene	< 0.005 mg/kg	Ethanol	< 0.250 mg/kg
Bromodichloromethane	< 0.005 mg/kg	Ethyl benzene	< 0.005 mg/kg
Bromochloromethane	< 0.005 mg/kg	2-Hexanone	< 0.010 mg/kg
Bromoform	< 0.005 mg/kg	Isopropylbenzene	< 0.005 mg/kg
Bromomethane	< 0.005 mg/kg	Isopropyl ether	< 0.005 mg/kg
2-Butanone (MEK)	< 0.050 mg/kg	p-Isopropyltoluene	< 0.005 mg/kg
n-Butylbenzene	< 0.005 mg/kg	Methylene chloride	< 0.005 mg/kg
sec-Butylbenzene	< 0.005 mg/kg	Methyl Isobutyl Ketone (MIBK)	< 0.050 mg/kg
tert-Butylbenzene	< 0.005 mg/kg	Naphthalene	< 0.005 mg/kg
Carbon Tetrachloride	< 0.005 mg/kg	n-Propylbenzene	< 0.005 mg/kg
Chlorobenzene	< 0.005 mg/kg	Styrene	< 0.005 mg/kg
Chloroethane	< 0.005 mg/kg	1,1,1,2-Tetrachloroethane	< 0.005 mg/kg
Chloroform	< 0.005 mg/kg	1,1,2,2-Tetrachloroethane	< 0.005 mg/kg
Chloromethane	< 0.005 mg/kg	Tetrachloroethene (PCE)	< 0.005 mg/kg
2-Chlorotoluene	< 0.005 mg/kg	Toluene	< 0.005 mg/kg
4-Chlorotoluene	< 0.005 mg/kg	1,1,1-Trichloroethane	< 0.005 mg/kg
Dibromochloromethane	< 0.005 mg/kg	1,1,2-Trichloroethane	< 0.005 mg/kg
1,2-Dibromo-3-chloropropane	< 0.005 mg/kg	Trichloroethene (TCE)	< 0.005 mg/kg
1,2-Dibromoethane (EDB)	< 0.005 mg/kg	1,2,3-Trichlorobenzene	< 0.005 mg/kg
Dibromomethane	< 0.005 mg/kg	1,2,4-Trichlorobenzene	< 0.005 mg/kg
Dichlorodifluoromethane	< 0.005 mg/kg	1,2,3-Trichloropropane	< 0.005 mg/kg
1,1-Dichloroethane	< 0.005 mg/kg	Trichlorofluoromethane	< 0.005 mg/kg
1,2-Dichloroethane	< 0.005 mg/kg	1,2,4-Trimethylbenzene	< 0.005 mg/kg
1,4-Dichlorobenzene	< 0.005 mg/kg	1,3,5-Trimethylbenzene	< 0.005 mg/kg
1,2-Dichlorobenzene	< 0.005 mg/kg	Vinyl acetate	< 0.010 mg/kg
1,3-Dichlorobenzene	< 0.005 mg/kg	Vinyl chloride	< 0.005 mg/kg
1,1-Dichloroethene	< 0.005 mg/kg	m/p-Xylenes	< 0.010 mg/kg
cis-1,2-Dichloroethene	< 0.005 mg/kg	o-Xylene	< 0.005 mg/kg
trans-1,2-Dichloroethene	< 0.005 mg/kg		
1,2-Dichloropropane	< 0.005 mg/kg	**Additional Compounds**	
1,3-Dichloropropane	< 0.005 mg/kg	Methyl-tert-butyl ether (MTBE)	< 0.005 mg/kg
2,2-Dichloropropane	< 0.005 mg/kg	Isopropyl ether (IPE)	< 0.005 mg/kg
1,1-Dichloropropene	< 0.005 mg/kg		
1,2-Dichloropropene	< 0.005 mg/kg		

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062020tb
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/09/20
Client Sample ID:	Trip Blank	**Analyst:**	VWV
Sample Collection:	01/03/20	**Dilution Factor:**	1
Sample Weight:	N/A	**Report Date:**	01/10/20
% solid:	N/A		
Preparation Date:	N/A		

Batch Blank = Below Reporting Limit (Yes) / No **

Internal Standards method criteria acceptable (Yes) / No **

Surrogate Recoveries	Spike Conc	Spike Recovery	Limits
Dibromofluoromethane	30 ug/L	93%	51-141%
Toluene-d8	30 ug/L	110%	67-151%
Bromofluorobenzene	30 ug/L	90%	45-161%

Laboratory QC Check

Matrix / Spike Recoveries acceptable (Yes) / No **

Spike Compound	Spike Conc	Spike %Rec.	Duplicate % Rec.	RPD	RPD Limits	QC Limits
1,1-Dichloroethene	25 ug/L	106%	105%	1	20	40-133
Benzene	25 ug/L	66%	66%	0	20	40-168
Trichloroethene	25 ug/L	73%	69%	5	20	42-143
Toluene	25 ug/L	79%	83%	5	20	58-154
Chlorobenzene	25 ug/L	71%	76%	8	20	48-136

- Fails Limit Check

** - If "no" is selected, see third page for details.

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

Meritech Inc.

Environmental Laboratories

Laboratory Certification #165

Client Name	Paragon Environmental Consultants, Inc.	Laboratory Name	MERITECH, INC.
Project Name	P-1530	NC Certification # (Lab)	#165
Site Location	Hickswood Rd. Pop - Shoppe	Sample Matrix	Soil
		Report Date	01/22/20

VPH (Aliphatics/Aromatics) Sample Information and Analytical Results

Method for Ranges: MADEP VPH by GC PID/FID Trap: Supelco Cat #21064 Carbopack BTEX Trap "J" Column: Restek Cat #10910 RTX-502.2 105m X 0.53mmID 3um df VPH Surrogate Standard: PID/FID 2,5-Dibromotoluene		Sample Identification			Trip Blank	MW1-10'
		Lab Identification			Trip Blank	01062020
		Collection Option (for soil)*			1	1
		Date Collected			01/03/20	01/03/20
		Date Received			01/06/20	01/06/20
		Date Extracted			N/A	01/22/20
		Date Analyzed			01/22/20	01/22/20
		% Dry Solids			N/A	85%
		Dilution Factor			N/A	N/A
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank		
C5 - C8 Aliphatics*	mg/kg	2.05	5.00	< 5.00	< 5.00	< 5.00
C9 - C12 Aliphatics*	mg/kg	2.08	5.00	< 5.00	< 5.00	< 5.00
C9- C10 Aromatics*	mg/kg	1.52	5.00	< 5.00	< 5.00	< 5.00
		LCS	LCSD			
Sample/QC Surrogate Acceptance Range		70 - 130%	70 - 130%	70 - 130%	70 - 130%	70 - 130%
Aliphatic Surrogate % Recovery - FID		105%	98%	73%	73%	74%
Aromatic Surrogate % Recovery - PID		107%	100%	75%	75%	75%
QC Spike Acceptance Range & RPD Limit		70 - 130%	70 - 130%	RPD=<25		
C5 - C8 Aliphatics* % Recovery		100%	78%	24.7		
C9 - C12 Aliphatics* % Recovery		97%	84%	14.4		
C9- C10 Aromatics* % Recovery		93%	82%	12.6		

* Option 1 = Establish fill line on vial Option 2 = Sampling Device (indicate brand, e.g.EnCore TM)

* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.

MDL = Method Detection Limit RL = Reporting Limit Blank = Laboratory Method Blank

VPH rev. 05/03/18

Were all performance/acceptance standards for required QA/QC procedures achieved?
(YES) NO - Details Attached

Was blank correction applied as a significant modification of the method?
YES (NO)

Were any significant modifications to the VPH method made?
(NO) YES - Details Attached

Reviewed By Vanessa W. Ard.

8/9/18

Chain of Custody Record (COC)

MERITECH, INC.

ENVIRONMENTAL LABORATORIES

642 Tamco Rd. Phone: 336-342-4748

Reidsville NC 27320 Fax: 336-342-1522

Email: info@meritechlabs.com

www.meritechlabs.com

Client: PEI PARAGON Environmental Consultants, Inc.

Address: P.O. Box 157, Thomasville, NC 27361 (336) 669-6037

NPDES#:

Phone:

Fax:

Email:

Project: Hickswood Rd. Pop-Shoppe

P.O.#: P-1530

Attention: Brandon Moore

How would you like your report sent?

Circle all that apply: Email (preferred), Fax, Mail

Turn Around Time*

***RUSH** work needs prior approval, Charges Apply

Std (10 days) | 3 - 5 Days XXX | 24 - 48 Hrs

Person Taking Sample (Sign/Print): Brandon Moore / Brandon Moore

Sample Location and/or ID #	Sampling Dates & Times: Start Date	Start Time	End Date	End Time	Comp? Grab?	# of Cont.	Test(s) Required	Lab Use Only: On Ice? Yes / No	pH OK? Cl OK?
Monitor Well #1 @ 10'	1/3/20	10:05AM			G	5	EPA Method 8260 + MTBE/IPE 20		
(MW1-10)							VPH		
Monitor Well #1A									
(MW-1A)	1/5/20	3:35PM			G	7	EPA Method 6200B + MTBE/IPE	21	
							Lead VPH		
Trip Blank						2	8260/6200B		
VPH Blank						2	VPH		
								Temperature Upon Receipt: NA	

RUSH

*** Dechlorination (<0.5 ppm) of Ammonia, Cyanide, Phenol and TKN samples must be done in the field prior to preservation. ***

Comments:

Compositor #

Jug #

Method of Shipment:

- ☐ UPS
- ☐ Fed Ex
- ☒ Hand Delivery
- ☐ Other

Are these results for regulatory purposes? Yes ☒ No ☐

Report results in: mg/L ☐ soil mg/kg ☒ ug/L ☒ water

Relinquished by: Brandon Moore	Date: 1/6/20	Time: 10:00	Received by: [signature]	Date: 1/6/20	Time: 10:00
Relinquished by: [signature]	Date: 1/6/20	Time: 1:30	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by Lab: Kim Smith	Date: 1-6-20	Time: 130

APPENDIX C

WELL CONSTRUCTION RECORD

Print Form

WELL CONSTRUCTION RECORD (GW-1)

For Internal Use Only:

1. Well Contractor Information:

Terry White
Well Contractor Name

3287-B
NC Well Contractor Certification Number

IET
Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐ Agricultural
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Industrial/Commercial
- ☐ Irrigation
- ☐ Municipal/Public
- ☐ Residential Water Supply (single)
- ☐ Residential Water Supply (shared)

Non-Water Supply Well:
- ☒ Monitoring
- ☐ Recovery

Injection Well:
- ☐ Aquifer Recharge
- ☐ Aquifer Storage and Recovery
- ☐ Aquifer Test
- ☐ Experimental Technology
- ☐ Geothermal (Closed Loop)
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Groundwater Remediation
- ☐ Salinity Barrier
- ☐ Stormwater Drainage
- ☐ Subsidence Control
- ☐ Tracer
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 1/3/2020 **Well ID#** MW-1A

5a. Well Location:

Citgo Gas Station
Facility/Owner Name

Facility ID# (if applicable)

2400 Eastchester Dr. Highpoint 27265
Physical Address, City, and Zip

Guilford
County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36 01 30 N 79 58 18 W

6. Is(are) the well(s): ☒ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☒ **No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: one

9. Total well depth below land surface: 22 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 19 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 8 **(in.)**

12. Well construction method: Auger
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

14. WATER ZONES

FROM	TO	DESCRIPTION
19 ft.	22 ft.	Brown Mud
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	8 ft.	in.		
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
8 ft.	23 ft.	in.			
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
4 ft.	6 ft.	Bentonite	Poured/50LB
0 ft.	4 ft.	Neat Cement	Poured/65LB
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
6 ft.	23 ft.	#2 Sand	Poured
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
ft.	ft.	See Consultant Log
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Terry White
Signature of Certified Well Contractor

1/3/2020
Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit one copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

APPENDIX D

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES
PARAGON ENVIRONMENTAL CONSULTANTS, INC.

I. SOIL SAMPLE PROCEDURES

1. Collect all samples using disposable Latex gloves. Gloves are not to be re-used.

2. Place samples into laboratory supplied glassware following requirements for specific analysis.

3. Label samples with sample ID, date, time, and job number. Immediately place samples on ice or in refrigerator to be cooled to approximately 4 degrees Celsius.

4. Store all samples on ice or refrigerate until samples are delivered to the laboratory.

5. Complete a chain of custody record for samples to be submitted to laboratory. Sign and date the chain of custody when samples are relinquished in accordance with EPA chain of custody protocol.

II. GROUNDWATER SAMPLING

1. Use new disposable bailer and new nylon string to develop well and collect sample. Handle bailer and string with Latex gloves.

2. Develop well by removing 3 well volumes of water. Dispose of water in accordance with NCDEQ guidelines.

3. Following well development obtain samples in laboratory supplied glassware following requirements for specific analysis.

4. Handle, store, and transport samples in same manner as for soil samples. See items I.3, I.4, and I.5 above.

III. EQUIPMENT CONTAMINATION

1. Decontaminate augers, split spoons, and other sampling equipment by the following procedure:

   A. Soap and tap water wash
   B. Tap water rinse
   C. Distilled deionized water rinse
   D. Isopropyl alcohol rinse
   E. Distilled water rinse

2. Use new disposable sampling equipment whenever practical.

APPENDIX E

GROUNDWATER ANALYTICAL RESULTS

Meritech, Inc.

Environmental Laboratory

Laboratory Certification No. 165

Contact: Mr. Brandon Moore
Client: Paragon Environmental Consultants
PO Box 157
Thomasville NC 27361

Report Date: 1/22/2020
PO# P-1530
Project # Hickswood Rd Pop-Shoppe
Date Sample Rcvd: 1/6/2020

Meritech Work Order # 01061920 Sample: MW1-10 Grab 1/3/20

Parameters	Results	Analysis Date	Reporting Limit	Method
EPA 8600 + MTBE/IPE	Attached	1/9/20	- -	5030
VPH	Attached	1/22/20	- -	-

Meritech Work Order # 01061921 Sample: MW-1A Grab 1/5/20

Parameters	Results	Analysis Date	Reporting Limit	Method
Lead, total	<0.010 mg/L	1/7/20	0.010 mg/L	EPA 200.7
EPA 6200B	Attached	1/8/20	- -	5030
VPH	Attached	1/17/20	- -	-

I hereby certify that I have reviewed and approve these data.

Amanda Hancock
Laboratory Representative

642 Tamco Road, Reidsville, North Carolina 27320
tel.(336)342-4748 fax.(336)342-1522



MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062021
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/08/20
Client Sample ID:	Monitor Well # 1A	**Analyst:**	VWV
Sample Collection:	01/05/20	**Dilution Factor:**	**100**

SM-6200B VOLATILE ORGANICS - Water

Acetone	< 5,000 ug/L	cis-1,3-Dichloropropene	< 50.0 ug/L
Benzene	**1,760 ug/L**	trans-1,3-Dichloropropene	< 50.0 ug/L
Bromobenzene	< 50.0 ug/L	Ethanol	< 5,000 ug/L
Bromodichloromethane	< 50.0 ug/L	**Ethyl benzene**	**1,220 ug/L**
Bromochloromethane	< 50.0 ug/L	2-Hexanone	< 100 ug/L
Bromoform	< 50.0 ug/L	Hexachlorobutadiene	< 50.0 ug/L
Bromomethane	< 50.0 ug/L	**Isopropylbenzene**	**61.0 ug/L**
2-Butanone (MEK)	< 500 ug/L	p-Isopropyltoluene	< 50.0 ug/L
n-Butylbenzene	< 50.0 ug/L	Methylene chloride	< 50.0 ug/L
sec-Butylbenzene	< 50.0 ug/L	Methyl Isobutyl Ketone (MIBK)	< 50.0 ug/L
tert-Butylbenzene	< 50.0 ug/L	**Naphthalene**	**172 ug/L**
Carbon Tetrachloride	< 50.0 ug/L	**n-Propylbenzene**	**122 ug/L**
Chlorobenzene	< 50.0 ug/L	Styrene	< 50.0 ug/L
Chloroethane	< 50.0 ug/L	1,1,1,2-Tetrachloroethane	< 50.0 ug/L
Chloroform	< 50.0 ug/L	1,1,2,2-Tetrachloroethane	< 50.0 ug/L
Chloromethane	< 50.0 ug/L	Tetrachloroethene (PCE)	< 50.0 ug/L
2-Chlorotoluene	< 50.0 ug/L	**Toluene**	**1,020 ug/L**
4-Chlorotoluene	< 50.0 ug/L	1,1,1-Trichloroethane	< 50.0 ug/L
Dibromochloromethane	< 50.0 ug/L	1,1,2-Trichloroethane	< 50.0 ug/L
1,2-Dibromo-3-chloropropane	< 50.0 ug/L	Trichloroethene (TCE)	< 50.0 ug/L
1,2-Dibromoethane (EDB)	< 50.0 ug/L	1,2,3-Trichlorobenzene	< 50.0 ug/L
Dibromomethane	< 50.0 ug/L	1,2,4-Trichlorobenzene	< 50.0 ug/L
Dichlorodifluoromethane	< 50.0 ug/L	1,2,3-Trichloropropane	< 50.0 ug/L
1,1-Dichloroethane	< 50.0 ug/L	Trichlorofluoromethane	< 50.0 ug/L
1,2-Dichloroethane	< 50.0 ug/L	**1,2,4-Trimethylbenzene**	**340 ug/L**
1,4-Dichlorobenzene	< 50.0 ug/L	**1,3,5-Trimethylbenzene**	**265 ug/L**
1,2-Dichlorobenzene	< 50.0 ug/L	Vinyl acetate	< 100 ug/L
1,3-Dichlorobenzene	< 50.0 ug/L	Vinyl chloride	< 50.0 ug/L
1,1-Dichloroethene	< 50.0 ug/L	**m/p-Xylenes**	**2,740 ug/L**
cis-1,2-Dichloroethene	< 50.0 ug/L	**o-Xylene**	**175 ug/L**
trans-1,2-Dichloroethene	< 50.0 ug/L		
1,2-Dichloropropane	< 50.0 ug/L	**Additional Compounds**	
1,3-Dichloropropane	< 50.0 ug/L	Methyl-tert-butyl ether (MTBE)	< 50.0 ug/L
2,2-Dichloropropane	< 50.0 ug/L	**Isopropyl ether (IPE)**	**91.0 ug/L**
1,1-Dichloropropene	< 50.0 ug/L		
1,2-Dichloropropene	< 50.0 ug/L		

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax



MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062021
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/08/20
Client Sample ID:	Monitor Well # 1A	**Analyst:**	VWV
Sample Collection:	01/05/20	**Dilution Factor:**	100
Sample Volume:	5ml purge	**Report Date:**	01/09/20
% solid	N/A		

Batch Blank = Below Reporting Limit (Yes) / No *

Internal Standards method criteria acceptable (Yes) / No *

Surrogate Recoveries	Spike Conc	Spike Recovery	Limits
Dibromofluoromethane	30 ug/L	88%	51-141%
Toluene-d8	30 ug/L	99%	67-151%
Bromofluorobenzene	30 ug/L	112%	45-161%

Laboratory QC Check

Matrix / Spike Recoveries Acceptable (Yes) / No *

Spike Compound	Spike Conc	Spike %Rec.	Duplicate % Rec.	RPD	RPD Limits	QC Limits
1,1-Dichloroethene	25 ug/L	129%	117%	10	20	40-133
Benzene	25 ug/L	86%	84%	2	20	40-168
Trichloroethene	25 ug/L	85%	87%	2	20	42-143
Toluene	25 ug/L	123%	106%	14	20	58-154
Chlorobenzene	25 ug/L	106%	99%	6	20	48-136

- Fails Limit Check

* - If "no" is selected, see third page for details.

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062021tb
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/08/20
Client Sample ID:	Trip Blank	**Analyst:**	VWV
Sample Collection:	01/05/20	**Dilution Factor:**	1

SM-6200B VOLATILE ORGANICS - Water

Acetone	< 5.00 ug/L	cis-1,3-Dichloropropene	< 0.500 ug/L
Benzene	< 0.500 ug/L	trans-1,3-Dichloropropene	< 0.500 ug/L
Bromobenzene	< 0.500 ug/L	Ethanol	< 50.0 ug/L
Bromodichloromethane	< 0.500 ug/L	Ethyl benzene	< 0.500 ug/L
Bromochloromethane	< 0.500 ug/L	2-Hexanone	< 1.00 ug/L
Bromoform	< 0.500 ug/L	Hexachlorobutadiene	< 0.500 ug/L
Bromomethane	< 0.500 ug/L	Isopropylbenzene	< 0.500 ug/L
2-Butanone (MEK)	< 5.00 ug/L	p-Isopropyltoluene	< 0.500 ug/L
n-Butylbenzene	< 0.500 ug/L	Methylene chloride	< 0.500 ug/L
sec-Butylbenzene	< 0.500 ug/L	Methyl Isobutyl Ketone (MIBK)	< 0.500 ug/L
tert-Butylbenzene	< 0.500 ug/L	Naphthalene	< 0.500 ug/L
Carbon Tetrachloride	< 0.500 ug/L	n-Propylbenzene	< 0.500 ug/L
Chlorobenzene	< 0.500 ug/L	Styrene	< 0.500 ug/L
Chloroethane	< 0.500 ug/L	1,1,1,2-Tetrachloroethane	< 0.500 ug/L
Chloroform	< 0.500 ug/L	1,1,2,2-Tetrachloroethane	< 0.500 ug/L
Chloromethane	< 0.500 ug/L	Tetrachloroethene (PCE)	< 0.500 ug/L
2-Chlorotoluene	< 0.500 ug/L	Toluene	< 0.500 ug/L
4-Chlorotoluene	< 0.500 ug/L	1,1,1-Trichloroethane	< 0.500 ug/L
Dibromochloromethane	< 0.500 ug/L	1,1,2-Trichloroethane	< 0.500 ug/L
1,2-Dibromo-3-chloropropane	< 0.500 ug/L	Trichloroethene (TCE)	< 0.500 ug/L
1,2-Dibromoethane (EDB)	< 0.500 ug/L	1,2,3-Trichlorobenzene	< 0.500 ug/L
Dibromomethane	< 0.500 ug/L	1,2,4-Trichlorobenzene	< 0.500 ug/L
Dichlorodifluoromethane	< 0.500 ug/L	1,2,3-Trichloropropane	< 0.500 ug/L
1,1-Dichloroethane	< 0.500 ug/L	Trichlorofluoromethane	< 0.500 ug/L
1,2-Dichloroethane	< 0.500 ug/L	1,2,4-Trimethylbenzene	< 0.500 ug/L
1,4-Dichlorobenzene	< 0.500 ug/L	1,3,5-Trimethylbenzene	< 0.500 ug/L
1,2-Dichlorobenzene	< 0.500 ug/L	Vinyl acetate	< 1.00 ug/L
1,3-Dichlorobenzene	< 0.500 ug/L	Vinyl chloride	< 0.500 ug/L
1,1-Dichloroethene	< 0.500 ug/L	m/p-Xylenes	< 1.00 ug/L
cis-1,2-Dichloroethene	< 0.500 ug/L	o-Xylene	< 0.500 ug/L
trans-1,2-Dichloroethene	< 0.500 ug/L		
1,2-Dichloropropane	< 0.500 ug/L	**Additional Compounds**	
1,3-Dichloropropane	< 0.500 ug/L	Methyl-tert-butyl ether (MTBE)	< 0.500 ug/L
2,2-Dichloropropane	< 0.500 ug/L	Isopropyl ether (IPE)	< 0.500 ug/L
1,1-Dichloropropene	< 0.500 ug/L		
1,2-Dichloropropene	< 0.500 ug/L		

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

MERITECH, INC.

Environmental Laboratories

Laboratory Certification #165

Client:	Paragon Environmental Consultants, Inc.	**Meritech ID#:**	01062021tb
Project:	P-1530 Hickswood Rd. Pop-Shop	**Analysis:**	01/08/20
Client Sample ID:	Trip Blank	**Analyst:**	VWV
Sample Collection:	01/05/20	**Dilution Factor:**	1
Sample Volume:	5ml purge	**Report Date:**	01/09/20
% solid	N/A		

Batch Blank = Below Reporting Limit (Yes) / No *

Internal Standards method criteria acceptable (Yes) / No *

Surrogate Recoveries	Spike Conc	Spike Recovery	Limits
Dibromofluoromethane	30 ug/L	85%	51-141%
Toluene-d8	30 ug/L	105%	67-151%
Bromofluorobenzene	30 ug/L	93%	45-161%

Laboratory QC Check

Matrix / Spike Recoveries Acceptable (Yes) / No *

Spike Compound	Spike Conc	Spike %Rec.	Duplicate % Rec.	RPD	RPD Limits	QC Limits
1,1-Dichloroethene	25 ug/L	129%	117%	10	20	40-133
Benzene	25 ug/L	86%	84%	2	20	40-168
Trichloroethene	25 ug/L	85%	87%	2	20	42-143
Toluene	25 ug/L	123%	106%	14	20	58-154
Chlorobenzene	25 ug/L	106%	99%	6	20	48-136

- Fails Limit Check

* - If "no" is selected, see third page for details.

I hereby certify that I have reviewed and approve these data.

Laboratory Representative

642 Tamco Road * Reidsville, NC 27320
(336) 342-4748 Ph * (336) 342-1522 Fax

Meritech Inc.

Environmental Laboratories

Laboratory Certification #165

Client Name	Paragon Environmental Consultants, Inc.	Laboratory Name	MERITECH, INC.
Project Name	P-1530	NC Certification # (Lab)	#165
Site Location	Hickswood Rd. Pop - Shoppe	Sample Matrix	Water
		Report Date	01/22/20

VPH (Aliphatics/Aromatics) Sample Information and Analytical Results

Method for Ranges: MADEP VPH by GC PID/FID Trap: Supelco Cat #21064 Carbopack BTEX Trap "J" Column: Restek Cat #10910 RTX-502.2 105m X 0.53mmID 3um df VPH Surrogate Standard: PID/FID 2,5-Dibromotoluene		Sample Identification			Trip Blank	**MW-1A**
		Lab Identification			Trip Blank	01062021
		Collection Option (for soil)*			N/A	N/A
		Date Collected			01/05/20	01/05/20
		Date Received			01/06/20	01/06/20
		Date Extracted			N/A	N/A
		Date Analyzed			01/16/20	01/17/20
		% Dry Solids			N/A	N/A
		Dilution Factor			N/A	**10**
Hydrocarbon Ranges	Units of Measure	MDL	RL	Blank		
C5 - C8 Aliphatics*	ug/L	4.58	100	< 100	< 100	**2,670**
C9 - C12 Aliphatics*	ug/L	2.84	100	< 100	< 100	**9,190 **J7**
C9- C10 Aromatics*	ug/L	1.24	100	< 100	< 100	**2,350**
		LCS	LCSD			
Sample/QC Surrogate Acceptance Range		70 - 130%	70 - 130%	70 - 130%	70 - 130%	70 - 130%
Aliphatic Surrogate % Recovery - FID		86%	73%	101%	97%	108%
Aromatic Surrogate % Recovery - PID		90%	71%	105%	100%	123%
QC Spike Acceptance Range & RPD Limit		70 - 130%	70 - 130%	RPD=<25		
C5 - C8 Aliphatics* % Recovery		93%	87%	6.67		
C9 - C12 Aliphatics* % Recovery		82%	77%	6.28		
C9- C10 Aromatics* % Recovery		116%	107%	8.07		

* Option 1 = Establish fill line on vial Option 2 = Sampling Device (indicate brand, e.g.EnCore TM)

* Unadjusted value. Should exclude the concentration of any surrogate(s), internal standards, and/or concentrations of other ranges that elute within the specified range.

MDL = Method Detection Limit RL = Reporting Limit Blank = Laboratory Method Blank

VPH rev. 05/03/18

Were all performance/acceptance standards for required QA/QC procedures achieved?
(YES) NO - Details Attached

Was blank correction applied as a significant modification of the method?
YES (NO)

Were any significant modifications to the VPH method made?
(NO) YES - Details Attached

****J7** = Concentration exceeds the upper calibration range of the instrument.
The reported value should be considered **estimated**.

Reviewed By Deanna M. Wirth

8/9/18

Chain of Custody Record (COC)

MERITECH, INC.

ENVIRONMENTAL LABORATORIES

642 Tamco Rd. Phone: 336-342-4748

Reidsville NC 27320 Fax: 336-342-1522

Email: info@meritechlabs.com

www.meritechlabs.com

Client: PARAGON Environmental Consultants, Inc.

Address: P.O. Box 157, Thomasville, NC 27361 (336) 669-6037

NPDES#:

Phone:

Fax:

Email:

Project: Hickswood Rd. Pop-Shoppe

P.O.#: P-1530

Attention: Brandon Moore

How would you like your report sent?

Circle all that apply: Email (preferred), Fax, Mail

Turn Around Time*

***RUSH** work needs prior approval, Charges Apply

Std (10 days) [ ] 3 - 5 Days [XXX] 24 - 48 Hrs [ ]

Person Taking Sample (Sign/Print): Brandon Moore / Brandon Moore

Sample Location and/or ID #	Sampling Dates & Times: Start Date	Start Time	End Date	End Time	Comp? Grab?	# of Cont.	Test(s) Required	Lab Use Only: On Ice? Yes / No	pH OK? Cl OK?
Monitor Well #1 @ 10' (MW1-10)	1/3/20	10:05AM			G	5	EPA Method 8260 + MTBE/IPE 20 VPH		
Monitor Well #1A (MW-1A)	1/5/20	3:35PM			G	7	EPA Method 6200B + MTBE/IPE Lead VPH	21	
Trip Blank						2	8260/6200B		
VPH Blank						2	VPH		

RUSH

Temperature Upon Receipt: NA

Compositor #

Jug #

Method of Shipment:

- [ ] UPS
- [ ] Fed Ex
- [X] Hand Delivery
- [ ] Other

*** Dechlorination (<0.5 ppm) of Ammonia, Cyanide, Phenol and TKN samples must be done in the field prior to preservation. ***

Comments:

Are these results for regulatory purposes? Yes [X] No [ ]

Report results in: mg/L [ ] soil mg/kg [X] ug/L [X] water

Relinquished by: Brandon Moore	Date: 1/6/20	Time: 10:00	Received by: [signature]	Date: 1/6/20 Time: 10:00
Relinquished by: [signature]	Date: 1/6/20	Time: 1:30	Received by:	Date: Time:
Relinquished by:	Date:	Time:	Received by Lab: Kim Smith	Date: 1-6-20 Time: 130

End of Email #16 with Attachment(s)

Email #17 with Attachment(s)

From: Vesta Kennedy
To: Public Comment
Subject: Re: double checking
Date: Thursday, January 14, 2021 10:18:39 AM

Good Morning Lisa

Yes, that's the one. It showed blue for me this morning, where yesterday it did not. Thank you so much for checking it!

Vesta

-----Original Message-----
From: Public Comment <publiccomment@highpointnc.gov>
To: Vesta Kennedy <rollovernclover@aol.com>; Public Comment <publiccomment@highpointnc.gov>
Sent: Thu, Jan 14, 2021 10:00 am
Subject: RE: double checking

Good morning, Vesta.

We have several emails that you sent on January 4th. **Can you provide the specific email that contains the NCDEQ link and the time of the email?**

The only email that contained a link was the one you sent on January 4, 2021 at 12:15 AM. It was a link to NCDENR. I did click on that link and it appears to be working.

If this is not the link that you were referring to, please provide the specific email containing the link and we will see if it is working.

Thank you.

Lisa

Lisa B. Vierling, MMC

CITY OF HIGH POINT
City Clerk

211 S Hamilton, Room 320| High Point, NC 27260
336.883.3536 | fax: 336.822.7067
lisa.vierling@highpointnc.gov | www.highpointnc.gov

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Please be aware that e-mail and attachments sent to and from this address are subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Wednesday, January 13, 2021 8:05 PM

To: Public Comment <publiccomment@highpointnc.gov>
Subject: double checking

Dear Lisa Vierling or Mary Brooks,

Is the tool link working from NCDEQ that I sent on January 4th? I went in to use it tonight for myself and it was no longer working. I double checked it before and after I sent and it worked then.
This is very important that the mayor and council members have it at their disposal.

Thanks so much!
Vesta

End of Email #17 with Attachment(s)

HIGH POINT CITY COUNCIL
REGULAR MEETING (VIRTUAL)
DECEMBER 21, 2020 – 5:30 P.M.
COUNCIL CHAMBERS

MINUTES

As part of the city of High Point's on-going COVID-19 mitigation efforts, in-person attendance will not be allowed at this meeting. Instead, the meeting will be live-streamed and the public can listen to the meeting as it is being live-streamed by clicking on the following link www.HighPointNC.gov/VirtualPublicMeeting

ROLL CALL, MOMENT OF SILENCE, AND PLEDGE OF ALLEGIANCE

Mayor Wagner called the meeting to order at 5:30 p.m.

The recitation of the Pledge of Allegiance followed a Moment of Silence.

The Mayor the roll call for attendance. The following council members were present (9):

Mayor Jay W. Wagner (physically present)
Mayor Pro Tem Britt Moore- At Large (physically present)
Council Member Tyrone Johnson- At Large (physically present)
Council Member Cyril Jefferson- Ward 1 (remote participation)
Council Member Christopher Williams- Ward 2 (remote participation)
Council Member Monica Peters- Ward 3 (physically present)
Council Member Wesley Hudson- Ward 4 (physically present)
Council Member Victor Jones- Ward 5 (remote participation)
Council Member Michael Holmes- Ward 6 (physically present)

The following staff members were physically present:

Randy McCaslin, Interim City Manager; Eric Olmedo, Assistant City Manager; Greg Ferguson, Assistant City Manager; JoAnne Carlyle, City Attorney; Meghan Maguire, Assistant City Attorney; Terry Houk, Public Services Director; Robby Stone, Public Services Assistant Director; Eric Xavier, Assistant Director of IT; Sandy Dunbeck, Executive Vice President, High Point Economic Development Corporation; Mary Brooks, Deputy City Clerk; and Lisa Vierling, City Clerk

The following staff members participated remotely:

Loren Hill, President, High Point Economic Development Corporation; and Marshall Yandle, Vice President, High Point Economic Development Corporation

Others Present:

Judy Stalder, TREBIC

Others Participating in the meeting remotely were:

Matthew Hill, Hot Shots Distributing Inc.; Jim Grdich, Blue Ridge Companies; Scott Wallace, Keystone Group; David Michaels, Windsor Investments; and Marlene Sanford, TREBIC

DRAFT

STRATEGIC PLAN UPDATE

Mayor Wagner advised that there was no strategic plan update at this time.

FINANCE COMMITTEE – *Mayor Pro Tem Moore, Chair*
Committee Members: Moore, Holmes, Jones, and Peters

Mayor Pro Tem Moore advised that the consent agenda would go before the Public Hearing items.

CONSENT AGENDA ITEMS

Finance Committee Chair Moore reported all finance items were discussed at the Finance Committee Meeting held on Thursday, November 12, 2020 at 4:00 p.m. and are being forwarded to the City Council with a favorable recommendation for approval.

Motion by Mayor Pro Tem Moore, seconded by Council Member Hudson to approve all matters on the Finance Committee Consent Agenda. Following a roll call vote by the Mayor, the motion carried by the following unanimous 9-0 vote.

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

Note: Although one motion was made to approve/adopt these matters under the Finance Committee Consent Agenda, action on all of these matters will be reflected throughout the Consent Agenda portion of these minutes as being made and seconded by the same persons

2020-515 Contract - Sole Source - Mobile Communications America (MCA) - 911 Communications High Point Police Department

City Council is requested to award a sole source contract to Mobile Communications America (MCA) in the amount of $304,530.95 for a five-year lease to purchase a Vesta 9-1-1 Phone System to update the current 911 Communications Center located in City Hall and outfit its new (primary) 911 Communications Center located at 1730 Westchester Drive and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Approved award of a sole source contract to Mobile Communications America (MCA) in the amount of $304,530.95 for a five-year lease to purchase a Vesta 9-1-1 Phone System to update the current 911 Communications Center located in City Hall and outfit its new (primary) 911 Communication at 1730 Westchester Drive and that the appropriate City official and/or employee be authorized to execute all necessary documents.

A motion was made by Mayor Pro Tem Moore, seconded by Council Member Hudson, that this contract be approved, and the appropriate city official and/or employee be authorized

to execute all necessary documents. The motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

2020-516 **Contract - Sole Source - Mobile Communications America (MCA) - 911 Phone System Supplemental Purchase**

City Council is requested to award a sole source contract to Mobile Communications America (MCA) in the amount of $88,834.42 for the purchase of six (6) supplemental phones from MCA and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Approved award of a sole source contract to Mobile Communications America (MCA) in the amount of $88,834.42 for the purchase of six (6) supplemental phones from MCA and that the appropriate City official and/or employee be authorized to execute all necessary documents.

A motion was made by Mayor Pro Tem Moore, seconded by Council Member Hudson, that this contract be approved, and the appropriate city official and/or employee be authorized to execute all necessary documents. The motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

2020-517 **Contract - Sterling Water Technologies - Corrosion Inhibitor - Ward Water Treatment Plant (WWTP)**

City Council is requested to award a three (3) year contract to Sterling Water Technologies in the amount of $198,987.38 for the purchase of Corrosion Inhibitor for the Ward Water Treatment Plant (WWTP).

Approved award of a three (3) year contract to Sterling Water Technologies in the amount of $198,987.38 for the purchase of Corrosion Inhibitor for the Ward Water Treatment Plant (WWTP).

A motion was made by Mayor Pro Tem Moore, seconded by Council Member Hudson, that this contract be approved, and the appropriate city official and/or employee be authorized to execute all necessary documents. The motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

DRAFT

PUBLIC HEARINGS

Note: Pursuant to adopted legislation regarding remote meetings during a State of Emergency, these public hearings will remain open to allow for the required 24-hour waiting period to receive additional public comments prior to the vote being taken during a Recessed Meeting of City Council on Wednesday, December 23, 2020 at 5:30 p.m.

2020-514 **Public Hearing: Hot Shots Distributing, Inc. - Performance Based Incentives**

Monday, December 21, 2020 at 5:30pm is the date and time established to receive public comments regarding a request for City Council to approve performance based incentives up to the amount of $31,758.00 for Hot Shots Distributing, Inc. and authorize the City Manager to execute a performance agreement with Hot Shots Distributing, Inc. containing benchmarks for the company to achieve and a schedule for the payment of incentives

Sandy Dunbeck, Executive Vice President, High Point Economic Development Corporation extended greetings; and recognized Loren Hill, President, High Point Economic Development Corporation, and Marshall Yandle, Vice President, High Point Economic Development, who were in attendance remotely. Ms. Dunbeck provided a background on Hot Shots Distributing, Inc.; said the company was currently located in Charlotte, NC; founded in 1992 and became known for their first class and fiery products hot sauce products worldwide; the proposed location for the project was on 827 West Green Drive; the building was in the city's Small-Scale Manufacturing and southwest opportunity zones; Hot Shots proposed to invest $565,000 in building upfits; have 20+ positions over a 7 year period; and the average salary would be $49,600. In addition to considering High Point locations; Hot Shots was also considering locations in Tennessee; staff was recommending performance-based incentives of $31,758; incentives consist of $10,758 based upon capital investment and $1,000 per position or $21,000 for job creation; the sources of the monies would be the City's Economic Development Incentive Fund, which is funded by general and electric revenues; said the company was expected to make a decision in the next 30 day; and recognized Loren Hill, President, and Matthew Hill, Vice President (co-owners) to provide a presentation for their project.

Mr. Hill extended greetings; said their company has out grown the current facility located in Charlotte, NC, and they were looking to expand; spoke to his love for North Carolina; said that their products were shipped across the world to resellers; had over 6,000 retail locations; spoke to their donation of hot sauce to the New Mexico State University, Chile Pepper Institute; said the students sold the hot sauce to visitors which supported/funded their pepper research for growing crops. Mr. Hill spoke to future plans of having a commercial kitchen that would add 5-10 small scale manufacturing jobs; to contracting with local chile pepper farmers; to the opportunities of homeownership for current employees, who would relocate; and thanked everyone for their consideration.

Ms. Dunbeck advised that the High Point Economic Development staff recommended authorizing performance-based incentives for the Hot Shots Distributing, Inc., project of up to $31,758; and authorize the city manager to execute a performance agreement with the company containing benchmarks for the company to achieve and a schedule for the payment of such financial incentives.

Council Member Peters thanked Mr. Hill for considering High Point for their location.

Mayor Pro Tem Moore thanked Mr. Hill for his presentation; voiced excitement for the possibilities for High Point.

Mayor Pro Tem Moore asked if there were any questions. Hearing none, he reminded everyone that Council would be taking action on this matter on Wednesday, December 23rd @ 5:30 p.m.

2020-519 **Public Hearing: Proposed System Development Fee**

Monday, December 21, 2020 at 5:30 p.m. is the date and time established to receive public comments regarding a proposed System Development Fee for High Point's Water and Sewer System.

Terry Houk, Public Services Director spoke to the proposed System Development Fee (SDF); said the city currently had frontage and acreage fees for developers to connect to the water and sewer systems that would be replaced by the SDF; Stantec Consulting conducted a SDF study and made a presentation before council during the Special Meetings held on August 3, 2020, and December 7, 2020; a recommendation was made using the combined method for calculating the proposed SDF; the revenues from the SDF could only be used for expansion related capital projects; the 45-day comment period was started on September 11, 2020, and concluded on October 27, 2020; if the resolution was adopted it would have no impact on the FY 2020-21 Budget; and staff is recommending the adoption of a resolution implementing the SDF with an effective date of October 1, 2021.

Judy Stalder, TREBIC 3537 Admiral Drive, High Point recognized the following in attendance remotely to answer any questions: Jim Grdich, Blue Ridge Companies; Scott Wallace, Keystone Group; David Michaels, Windsor Investment; and Marlene Sanford, TREBIC President. Ms. Stalder said that they do not oppose the SDF model; they opposed the increase in the proposed fees; said High Point was a development friendly city; mentioned the option to craft the SDF close to the current fees then phase in the increase; spoke to when the Planning and Development department development fees increased; said it was revised to fit the system in a revenue neutral way; they made the development community aware of the changes; the water and sewer fees doubled in 2016 which was a hit to housing cost; mentioned the question that was asked whether the SDF would be revenue neutral; the answers were yes, and that concerns would be addressed during the public comment period; said the increased fees were not communicated to the development community; the cost of homes would rise causing families to become unqualified financially; referenced a SDF comparison chart with other cities; and answered the following questions asked by council:

1. *Do fees have to increase to adopt the SDF model? Answer: No, the SDF model could be adopted without increasing fees.*
2. *Do you have to wait five years to make any changes to the fees? Answer: No, you may make changes at any time; the five-year timeframe is for the SDF review.*
3. *What is the cost for the consultant to recalculate the fees? Answer: The cost would be less than the increased revenue of one small development.*

Ms. Stalder closed with a request on behalf of the TREBIC members, and the development community for you to take a step back and work with the industry most affected by the

increase in fees; and find a mutually agreeable solution. Ms. Stalder thanked everyone for their time; and noted that the development community felt very strongly that this is the wrong way to go.

Council Member Jones inquired if this request could be tabled for further discussion. Mayor Pro tem Moore replied that council could take that into consideration at the recessed meeting on Wednesday; and provided instructions on submitting public comments.

Mayor Pro Tem Moore asked if there were any questions. Hearing none, he reminded everyone that Council would be taking action on this matter on Wednesday, December 23rd @ 5:30 p.m.

REGULAR AGENDA ITEMS

Note: The public hearing for this matter was held earlier in this meeting; however, action cannot be taken on this matter at tonight's meeting due to the required 24-hour waiting period to receive additional public comments. A vote may be taken on this matter during a Recessed Meeting of City Council on Wednesday, December 23, 2020 at 5:30 p.m. or at a later date.

2020-528 **Resolution- Proposed System Development Fee**

Council is requested to adopt the Resolution Authorizing the High Point City Council to Establish and Adopt System Development Fees Assessed by the Water and Sewer Funds According to the Provisions of GS 162A, "North Carolina Water and Sewer Authorities Act," and that the System Development Fees become effective October 1, 2021.

Note: The public hearing for this matter was held on December 21, 2020 @ 5:30 p.m. Please see comments above regarding the public hearing on this matter.

COMMUNITY DEVELOPMENT COMMITTEE - Council Member Williams, Chair

JoAnne Carlyle, City Attorney advised that these items would remain in pending.

PENDING ITEMS

2020-456 **Ordinance - Demolition of Dwelling - 208 Lawndale Avenue**

Adoption of an ordinance ordering the building inspector to effectuate the demolition of a dwelling located at 208 Lawndale Avenue belonging to Margaret Ann Robbins.

2020-422 **Ordinance - Demolition of Dwelling - 711 Hines Street**

Adoption of an ordinance ordering the building inspector to effectuate the demolition of a dwelling located at 711 Hines Street belonging to Dolores Lobo Martinez, property deed date 7/19/2019, Lis Pendens record 8/27/2018, Previous owner Isa Irina Reyes-Lobo.

PROSPERITY & LIVABILITY COMMITTEE - *Council Member Hudson, Chair*

2020-518 Foxwood Meadows Development Flooding- Egress/Ingress Options

City Council is requested to approve a request from Public Services to pursue survey and engineering design to seek viable solutions to provide egress/ingress options for Foxwood Meadows due to flooding.

Robby Stone, Public Services Assistant Director reported that the Prosperity and Livability Committee was briefed on the Foxwood Meadows flooding issues, and a request to pursue survey and engineering design to seek solutions to provide egress/ingress options; Foxwood meadow was developed in 1967 with no flood damage prevention standards in effect at that time; the area was mapped in 1978 as a flood hazard area; residents in the development did not support the connection for an annexation and zoning request in 2001 for the Williams Grove subdivision, and requested that It be eliminated; the request was honored by council; in 2002 a flood event occurred which led to a connection request to be re-established; due to homes already under construction, the request could not be honored; and options were discussed for preliminary construction with an estimate of $600,000. Staff is requesting approval to pursue survey and engineering design to seek viable solutions to provide egress/ingress options for Foxwood Meadows.

Council Member Holmes asked for an explanation on the engineering study process; and a timeline for completion. Mr. Stone replied and explained the engineering study process; said the property would be surveyed; then the engineering department would work on a design; and that the survey would start within the next few months; and that the engineering design would start around late winter or early spring.

A motion was made by Council Member Hudson, seconded by Council Member Holmes, to move forward with the engineering study for Foxwood Meadows. Following a roll call vote by the Mayor, the motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

GENERAL BUSINESS AGENDA

2020-521 Ordinance - Revisions Establishing Dates & Times for Official Sessions of the High Point City Council

City Council is requested to adopt a Revised Ordinance Establishing Dates and Times for Official Sessions of the High Point City Council reflecting the addition of the April 19 City Council meeting to the 2021 Meeting Schedule.

A motion was made by Mayor Wagner, seconded by Council Member Hudson, to adopt the ordinance with revisions establishing dates and times for official sessions of the High Point City Council. Following a roll call vote by the Mayor, the motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

2020-520 Minutes To Be Approved

Finance Committee; December 3rd @ 4:00 p.m.
Special Meeting of City Council; December 7th @ 3:30 p.m.
Regular Meeting of City Council; December 7th @ 5:30 p.m.
Community Development Committee; December 8th @ 4:00 p.m.
Prosperity & Livability Committee; December 9th @ 9:00 a.m.
Recessed Meeting of City Council; December 9th @ 5:30 p.m.

A motion was made by Mayor Wagner, seconded by Council Member Hudson, to approve the preceding minutes as submitted. Following a roll call vote by the Mayor, the motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner; Mayor Pro Tem Moore; Council Member Johnson; Council Member Jefferson; Council Member Williams; Council Member Peters; Council Member Hudson; Council Member Jones; and Council Member Holmes

ADJOURNMENT

There being no further business to come before Council, at 6:04 p.m., the meeting was recessed to Wednesday, December 23, 2020 at 5:30 p.m. at which time, Council will take action on the public hearing matters that were heard tonight.

Respectfully Submitted,

_____
Jay W. Wagner, Mayor

Attest:

_____
Mary S. Brooks, Deputy City Clerk

DRAFT

CITY OF HIGH POINT
AGENDA ITEM

Title: **Zoning Map Amendment 20-23**
(High Point City Council)

From:	Lee Burnette, Planning & Development Director	**Meeting Date:**	January 19, 2021
Public Hearing:	Yes	**Advertising Date:**	January 6, 2021, and January 13, 2021
Attachments:	A. Staff Report B. Zoning Ordinance	**Advertised By:**	Planning & Development

PURPOSE:
A request by the High Point City Council to rezone 286 properties, totaling approximately 88 acres, as part of the Comprehensive Zoning Map Amendment project. The properties are located within the Chatham Wood Apartment complex (856 Lakecrest Avenue), Foxcroft Townhome development (Rockingham Road/James Court), Windchase Townhome development (Windchase Court), Northbridge Townhome development (Northbridge Drive/Northbridge Court), 608 and the southern portion of 610 James Road, 1221 E. Hartley Drive (Journey Church), 2051, 2097 & 2103 Johnson Street and that portion of the 1875 Eastchester Drive parcel lying along the west side of Johnson Street and at the northwest corner of Johnson Street and E. Hartley Drive.

BACKGROUND:
The Planning and Zoning Commission reviewed this request at their December 8, 2020 regular meeting and took final action when the meeting was reconvened on December 10, 2020. On the date of final action, all members of the Commission were present. Mr. Herbert Shannon, Senior Planner, presented the case and recommended approval of the request as outlined in the staff report.

Speaking on the request:
There were no public comments received.

BUDGET IMPACT:
There is no budget impact.

RECOMMENDATION / ACTION REQUESTED:

A. Staff Recommendation
Staff recommended ***approval*** of this request as outlined in the attached staff report.

B. Planning and Zoning Commission Action

1. The Planning and Zoning Commission recommended ***approval*** of this request, as recommended by staff, by a vote of 9-0.

2. Consistency and Reasonableness Statements

The Planning and Zoning Commission voted 9-0 to approve the following statement:

That Zoning Map Amendment 20-23 is consistent with the City's adopted policy guidance because the proposed zoning map amendments are generally supported by the Moderate Density and Medium Density Residential land use map designations for each of these areas, as contained in the adopted Land Use Plan. Furthermore, the amendments are needed to remove unneeded restrictions on the properties and to remove the conditional use zoning districts, which cannot be amended.

CITY OF HIGH POINT
PLANNING AND DEVELOPMENT DEPARTMENT

STAFF REPORT
ZONING MAP AMENDMENT ZA-20-23
December 8, 2020

Request

A request by the High Point City Council to rezone 286 properties, totaling approximately 88 acres, as part of the Comprehensive Zoning Map Amendment Project. This request focuses on evaluating various townhome and multifamily developments near the intersection of Johnson Street and E. Hartley Drive, and along James Road.

Background

The purpose of the Comprehensive Zoning Map Amendment Project is to review and evaluate the zoning of land throughout the city, identify areas where the zoning is out of sync with the existing use of land or is inconsistent with current land use policy, and propose appropriate changes in zoning for those areas. A primary goal of the project is to remove improper or obsolete zoning districts that may be acting as a barrier to development.

The Comprehensive Zoning Map Amendment Project was initiated in 2017. The City Council initiated this third round of zoning evaluations associated with this project on October 7, 2019, and it consisted of 10 areas of the City containing 13 commercial developments and 43 residential communities. The residential developments under consideration for ZA-20-23 are the last of the 10 areas initiated by the City Council under the third round of the Comprehensive Zoning Map Amendment Project.

Details of Proposal

The following is a summary of affected developments, along with an attached analysis of each area being considered under this Zoning Map Amendment.

From	To	Development/Use	Location
CU RM-16 (CU 00-40)	R-3	608 James Road 610 James Road (southern portion of parcel)	Located along the east side of James Road, approximately 300 feet south of Oakview Road.
CU RM-16 (CU 84-05)	RM-16	Chatham Wood Apartments *(Lakecrest Avenue)* Multifamily development	Located at the southwest corner of Lakecrest Avenue and Johnson Street.
CU RM-16 (CU 84-05)	RM-16	Foxcroft Development *(Rockingham Road/James Court)* Townhome development	Located at the southern terminus of Rockingham Road and at the eastern terminus of James Court.
CU RM-16 (CU 84-05)	RM-16	Windchase Development *(Windchase Court)* Townhome development	Located north of the intersection of E. Hartley Drive and Windchase Court

CU RM-16 (CU 84-05)	RM-16	2103 Johnson Street Oak Hollow Lake property (portion)	City-owned parcels associated with Oak Hollow Lake, located at the northwest corner of Johnson Street and E. Hartley Drive
CU RM-16 (CU 84-05)	RM-16	1221 E. Hartley Drive (Journey Church) 2097 Johnson Street (City of High Point pump station) 2051 Johnson Street (Elizabeth Grant)	Located at the southwest corner of E. Hartley Drive and Johnson Street.
CU RM-16 (CU 98-39)	RM-16	Northbridge Development *(E. Hartley Drive)* Townhome development	Located south of the intersection of E. Hartley Drive and Snider Street.

Analysis

The requested rezoning of these various parcels and multifamily developments is intended to remove outdated and obsolete zoning conditions. These developments were granted their current City of High Point zoning between 1984 to 2000 under the former Development Ordinance, which was replaced by the current Development Ordinance in 2017. The various zoning conditions adopted as a part of conditional use (CU) zoning were established to address land use policies, road improvements and to ensure compatibility with adjacent property. Except for three undeveloped parcels that have limited development potential due to their size and watershed restrictions, and a vacant building at 608 James Road, the various lands under consideration have been developed. The requested rezoning is intended to remove outdated and obsolete zoning conditions, while maintaining the development's base zoning district. See attached maps for further detail.

Consistency with Adopted Policy Guidance

Whether and the extent to which the proposed conditional zoning district is appropriate for its proposed location, and is consistent with the City's adopted policy guidance.

The proposed zoning map amendments are generally supported by the Moderate Density and Medium Density Residential land use map designation for each of these areas, as contained in the adopted Land Use Plan.

Reasonableness/Public Interest:

Why a decision to approve, or to deny, the proposed conditional zoning would be reasonable and in the public interest.

The amendments are needed to remove unneeded restrictions on the properties and to remove the conditional use zoning districts, which cannot be amended.

Recommendations

Staff recommends approval of the following zoning map amendments:

1) Rezone 608 James Road and the southern portion of 610 James Road from a CU RM-16 District to the R-3 District.

2) Rezone the Chatham Woods apartment complex, the Foxcroft townhome development and the Windchase townhome developments from a CU RM-16 District to the RM-16 District.

3) Rezone 2103 Johnson Street and that portion of the Oak Hollow Lake parcel lying west of Johnson Street, from a CU RM-16 District to the RM-16 District.

4) Rezone 1221 E. Hartley Drive, 2097 Johnson Street and 2051 Johnson Street from a CU RM-16 District to the RM-16 District.

5) Rezone the Northbridge townhome development from a CU RM-16 District to the RM-16 District.

Required Action

Planning and Zoning Commission:
Upon making its recommendation, the Planning and Zoning Commission must place in the official record a statement of consistency with the City's Land Use Plan, and any other officially adopted plan that may be applicable. This may be done by adopting the statement(s) as written in this report or with any additions or changes as agreed upon by the Commission, or, if the Commission is in disagreement with the consistency statement(s) in this report, by adoption of its own statement.

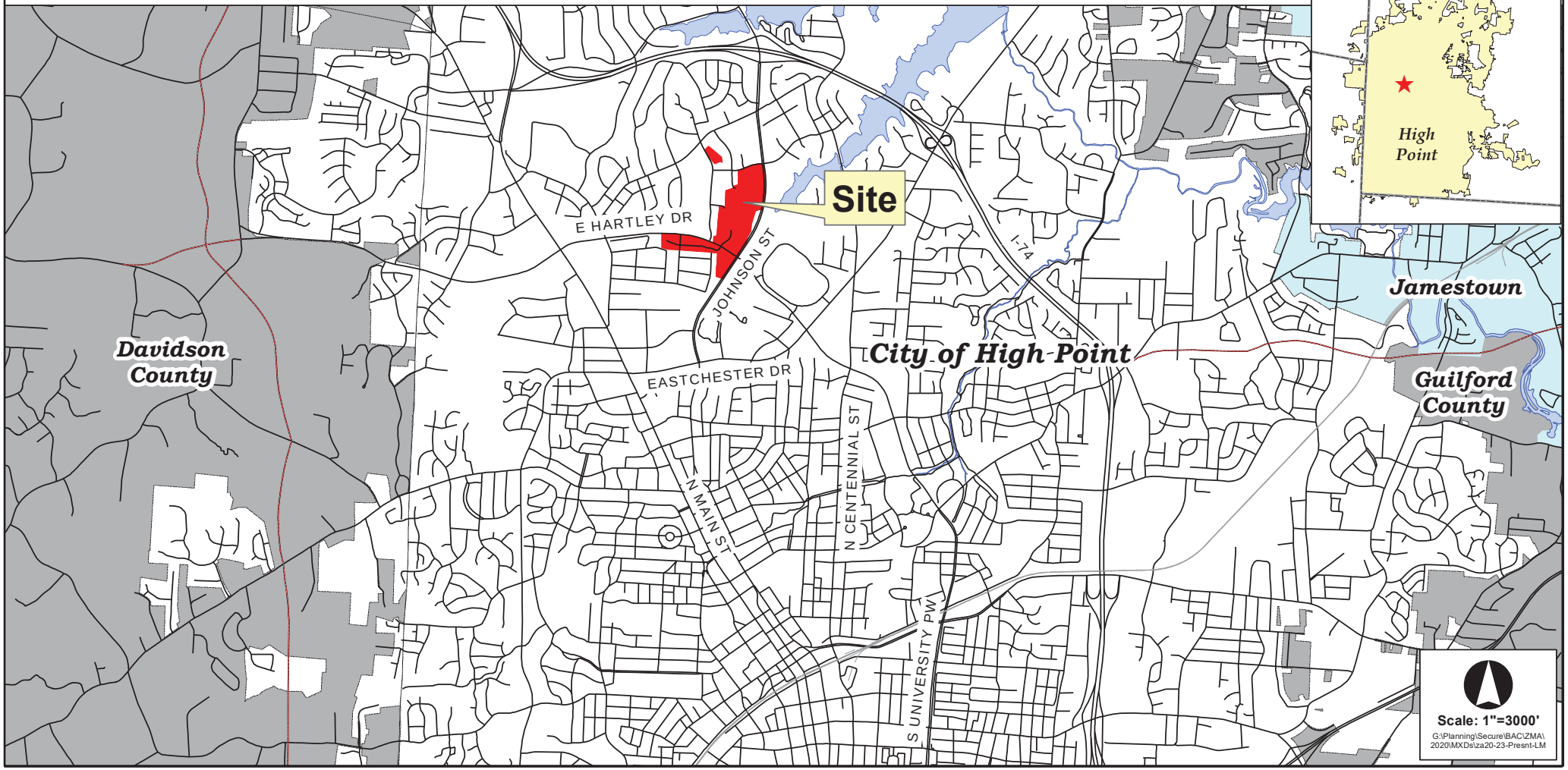
City Council:
Upon rendering its decision in this case, the High Point City Council also must place in the official record a statement of consistency with the City's Land Use Plan and other plans as may be applicable. This may be done by adopting the statement(s) as written in this report, or with any additions or changes as agreed upon by the Council, or, if the Council is in disagreement with the consistency statement(s) in this report, by adoption of its own statement.

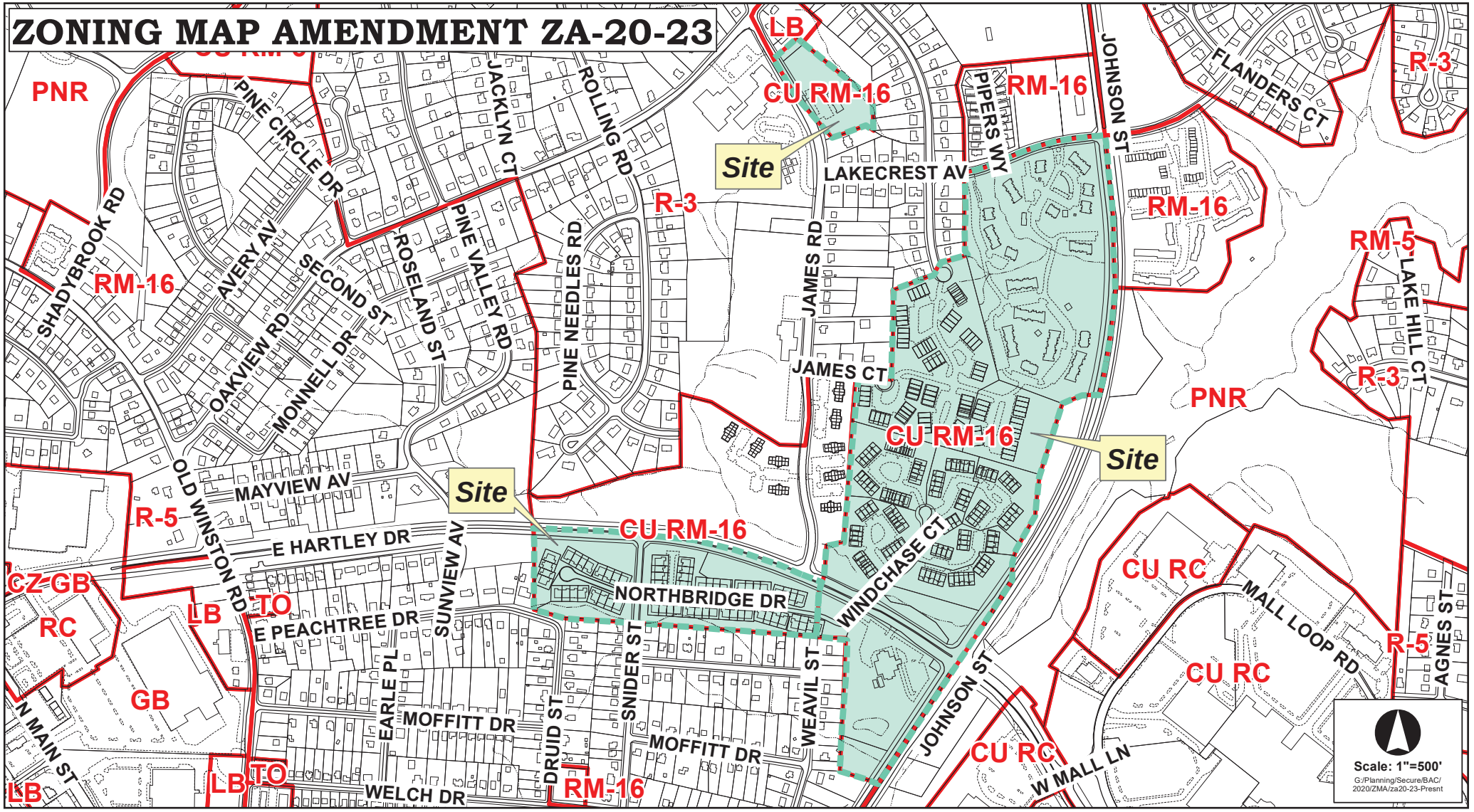
Report Preparation

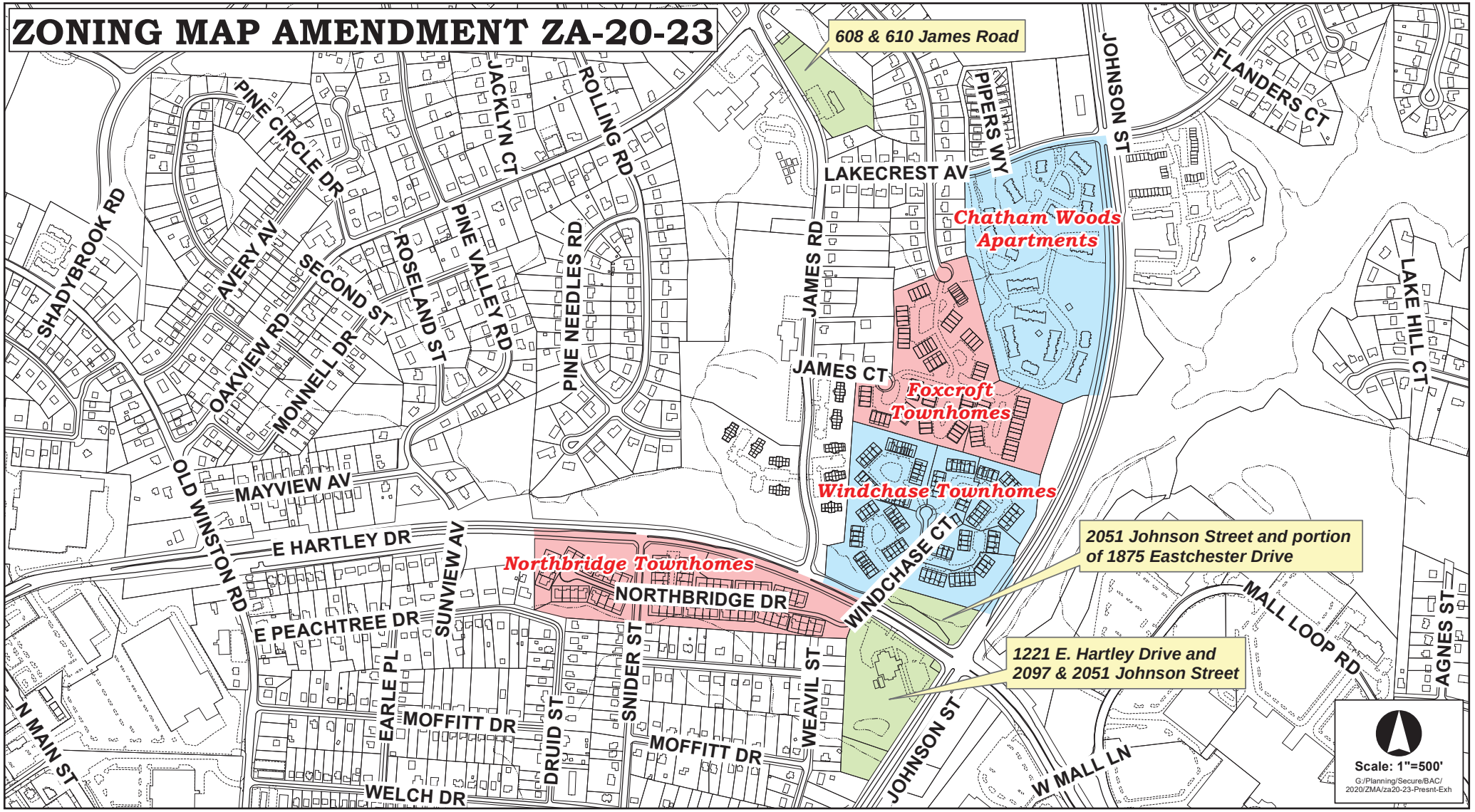
This report was prepared by Planning and Development Department staff member Herbert Shannon Jr. AICP, Senior Planner and reviewed by Chris Andrews AICP, Development Administrator and Lee Burnette AICP, Director.

LOCATION MAP

ZONING MAP AMENDMENT: ZA-20-23
Applicant: City of High Point




ZONING MAP AMENDMENT ZA-20-23
PNR
RM-16
R-3
R-5
LB
CU RM-16
Site
RM-16
R-3
RM-5
PNR
CU RM-16
Site
Site
CU RM-16
CZ-GB
RC
GB
LB
TO
LB
TO
LB
RM-16
CU RC
CU RC
CU RC
R-5
SHADYBROOK RD
PINE CIRCLE DR
JACKLYN CT
ROLLING RD
AVERY AV
SECOND ST
ROSELAND ST
PINE VALLEY RD
OAKVIEW RD
MONNELL DR
PINE NEEDLES RD
JAMES RD
JAMES CT
LAKECREST AV
PIPERS WY
JOHNSON ST
FLANDERS CT
LAKE HILL CT
MAYVIEW AV
OLD WINSTON RD
E HARTLEY DR
SUNVIEW AV
NORTHBRIDGE DR
WINDCHASE CT
E PEACHTREE DR
EARLE PL
MOFFITT DR
SNIDER ST
DRUID ST
WEAVIL ST
MOFFITT DR
JOHNSON ST
MALL LOOP RD
AGNES ST
N MAIN ST
WELCH DR
W MALL LN
Scale: 1"=500'
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ZONING MAP AMENDMENT ZA-20-23
608 & 610 James Road
2051 Johnson Street and portion of 1875 Eastchester Drive
1221 E. Hartley Drive and 2097 & 2051 Johnson Street
Chatham Woods Apartments
Foxcroft Townhomes
Windchase Townhomes
Northbridge Townhomes
LAKECREST AV
JAMES RD
JAMES CT
WINDCHASE CT
NORTHBRIDGE DR
E HARTLEY DR
E PEACHTREE DR
MAYVIEW AV
MOFFITT DR
WELCH DR
JOHNSON ST
W MALL LN
MALL LOOP RD
FLANDERS CT
LAKE HILL CT
AGNES ST
PIPERS WY
JACKLYN CT
ROLLING RD
PINE CIRCLE DR
SHADYBROOK RD
AVERY AV
OAKVIEW RD
MONNELL DR
SECOND ST
ROSELAND ST
PINE VALLEY RD
PINE NEEDLES RD
OLD WINSTON RD
SUNVIEW AV
EARLE PL
DRUID ST
SNIDER ST
WEAVIL ST
N MAIN ST
Scale: 1"=500'
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Conditional Use Permit 20-04
(608 and 610 James Road)

Location: Approximately 3 acres located along the east side of James Road, approximately 300 feet south of Oakview Road.

Current Uses: 610 James Road (vacant building, former daycare center).
608 James Road (portion), undeveloped portion of the abutting commercial site.

Comparison of Current and Proposed Zoning

	Current Zoning	Proposed Zoning
	Conditional Use Residential Multifamily – 16 (CU RM-16) District	Residential Single Family – 3 (R-3) District
Purpose & Intent:	RM-16 District The RM-16 district is established to accommodate a mix of residential development at around 16 units an acre, that is served by public water and sewer. District regulations encourage the development of functioning neighborhoods that include a mix of housing types and a variety of institutional uses. Complimentary uses such as open space, schools, utilities, religious institutions, and recreational facilities are also allowed.	R-3 District: The R-3 district is established to accommodate principally single-family detached dwellings developed at a density of 3 units an acre, in developments served by public water and sewer. Complimentary uses such as open space, schools, utilities, religious institutions, and recreational facilities are also allowed. District regulations discourage any use that interferes with the development of single-family detached dwellings or that is detrimental to the residential nature of the district.
Current Uses:	Vacant building and undeveloped land.	Same
Conditions	Zoning Approval 2000 (CU 20-40) • Allowable uses • Density, building setbacks and architectural design features • Vehicular access and parking • Landscaping • Stormwater Management	None

	Adjacent Zoning	Adjacent Land Use
North:	Limited Business (LB) District	Convenience store with fuel sales
South:	Residential Single Family – 3 (R-3) District	Single family detached dwelling
East:	Residential Single Family – 3 (R-3) District	Single family detached dwelling
West:	Residential Single Family – 3 (R-3) District	Oakview Elementary School

Land Use Plan Classification
The area is designated as follows: • **Moderate-Density Residential:** This classification includes a variety of detached or attached dwellings, generally including single family homes, cluster homes, duplexes and townhouses. Development densities shall range from five to eight dwelling units per gross acre.

Analysis/Recommendation

This 3 acre site was rezoned in 2000 to a Conditional Use Residential Multifamily – 16 (RM-16) District to facilitate the development of an 18-unit townhome development. The larger 2.66-acre lot at 608 James Road, which contains a former daycare center building, was acquired by a church in 2002. During the past 20 years no development has occurred on either lot, and the former daycare center building remains vacant. As ample time has passed to develop the site with no progress, staff recommends rezoning the site back to its former zoning district. The Land Use Plan designates this site as Moderate-Density Residential. If a residential project is proposed in the future that warrants a zoning district other than the R-3 District, then the City could consider a higher density residential district at that time.

Staff recommends approval to rezone this 3.5 acre area from a CU RM-16 District to the R-3 District.

Conditional Use Permit 84-05
(Multifamily development, church and undeveloped parcels)

Location: Lands associated with Conditional Use Permit 84-05 are located along the west side of Johnson Street, between Lakecrest Avenue and E. Hartley Drive, and at the southwest corner of Johnson Street and E. Hartley Drive.

Current Uses: The 62 acres associated with this 1984 zoning request has developed as follows:

Chatham Wood Apartments: An apartment complex located at the southwest corner of Lakecrest Avenue and Johnson Street.

Foxcroft development: A townhome development located along at the southern terminus of Rockingham Road and at the eastern terminus of James Court.

Windchase development: A townhome development located north of the intersection of E. Hartley Drive and Windchase Court.

2103 Johnson Street and Oak Hollow Lake property (portion): Undeveloped lands located at the northwest corner of Johnson Street and E. Hartley Drive.

1221 E. Hartley Drive and 2097 & 2051 Johnson Street: A religious institution (Journey Church), City of High Point pump station and undeveloped parcel located at the southwest corner of E. Hartley Drive and Johnson Street.

Comparison of Current and Proposed Zoning

	Current Zoning	Proposed Zoning
	Conditional Use Residential Multifamily – 16 (CU RM-16) District	Residential Multifamily – 16 (RM-16) District
Purpose & Intent:	RM-16 District The RM-16 district is established to accommodate a mix of residential development at around 16 units an acre, that is served by public water and sewer. District regulations encourage the development of functioning neighborhoods that include a mix of housing types and a variety of institutional uses. Complimentary uses such as open space, schools, utilities, religious institutions, and recreational facilities are also allowed.	RM-16 District: Same
Current Uses:	Permitted	Permitted
Conditions	Zoning Approval 1984 (CU 84-05) • No extension of Rockingham Road • Street improvements (extension of Lakecrest Avenue) • Right-of-way dedication for E. Hartley Drive extension (project completed) • Allowable uses	None

	Adjacent Zoning	Adjacent Land Use
North:	Residential Multifamily – 16 (RM-16) District	Daycare center, church and single family detached dwellings
South:	Residential Single Family – 5 (R-5) District	Single family detached dwellings
East:	Residential Multifamily – 16 (RM-16) District Parks & Natural Resources (PNR) District	Multifamily dwellings and land associated with Oak Hollow Lake
West:	Residential Single Family – 3 (R-5) District Residential Multifamily – 16 (RM-16) District Residential Single Family – 5 (R-5) District	Single family detached dwellings, multifamily dwellings and townhome dwellings

Land Use Plan Classification

The area is designated as follows:

- **Moderate-Density Residential:** This classification includes a variety of detached or attached dwellings, generally including single family homes, cluster homes, duplexes and townhouses. Development densities shall range from five to eight dwelling units per gross acre.
- **Medium-Density Residential:** This classification includes a variety of attached dwellings, generally including higher density townhouses and less land-intensive multi-family housing such as garden apartments. Development densities shall range from eight to sixteen dwellings units per gross acre.

Analysis/Recommendation

Chatham Wood Apartments; Foxcroft Development and Windchase Development

The 53 acres associated with these three developments were part of a larger 62acre zoning request approved in 1984. The northern portion of this area, abutting Lakecrest Avenue, developed with the Chatham Woods apartment complex and the southern half of this area developed with the Foxcroft and Windchase townhome developments. The adopted conditional use permit for this zoning district primarily pertained to road improvements and dedication of right-of-way for the now completed E. Hartley Drive extension. The primary purpose of this rezoning is to remove the conditional use (CU) district as development conditions from the 1984 zoning approval have been met and the developments have been completed.

2103 Johnson Street and Oak Hollow Lake property (portion lying west of Johnson Street).

This 1.8 acre area directly abuts the intersection of E. Hartley Drive and Johnson Street and were part of the 1984 zoning approval for this area. These are City of High Point owned lands associated with Oak Hollow Lake and situated in Tier 3 of the Oak Hollow Lake Watershed Critical Area. The primary purpose of this rezoning is to remove the conditional use (CU) district as development conditions from the 1984 zoning approval, specifically right-of-way dedication for extension of E. Hartley Drive, were met.

1221 E. Hartley Drive (Journey Church), 2097 Johnson Street (City of High Point) and 2051 Johnson Street (Elizabeth Grant)

These parcels lie at the southwest corner of Johnson Street and E. Hartley Drive and consists of a church, City of High Point pump station and an undeveloped parcel at 2051 Johnson Street. These parcels are within Tier 3 of the Oak Hollow Lake Watershed Critical Area. The primary purpose of this rezoning is to remove the conditional use (CU) district as development conditions from the 1984 zoning approval have been met

Staff recommends approval to rezone this 62 acre area from a CU RM-16 District to the RM-16 District.

Conditional Use Permit 98-39
(Northbridge Development)

Location: Lands associated with Conditional Use Permit 98-39, located south of the intersection of E. Hartley Drive and Snider Street.

Current Uses: **Northbridge Development** (townhome development)

Comparison of Current and Proposed Zoning

	Current Zoning	Proposed Zoning
	Conditional Use Residential Multifamily – 16 (CU RM-16) District	Residential Multifamily – 16 (RM-16) District
Purpose & Intent:	RM-16 District The RM-16 district is established to accommodate a mix of residential development at around 16 units an acre, that is served by public water and sewer. District regulations encourage the development of functioning neighborhoods that include a mix of housing types and a variety of institutional uses. Complimentary uses such as open space, schools, utilities, religious institutions, and recreational facilities are also allowed.	RM-16 District: Same
Current Uses:	Permitted	Permitted
Conditions	Zoning Approval 1998 (CU 98-39) • Density • Building height and setback • Right-of-way dedication for E. Hartley Drive extension (project completed) • Vehicular access	None

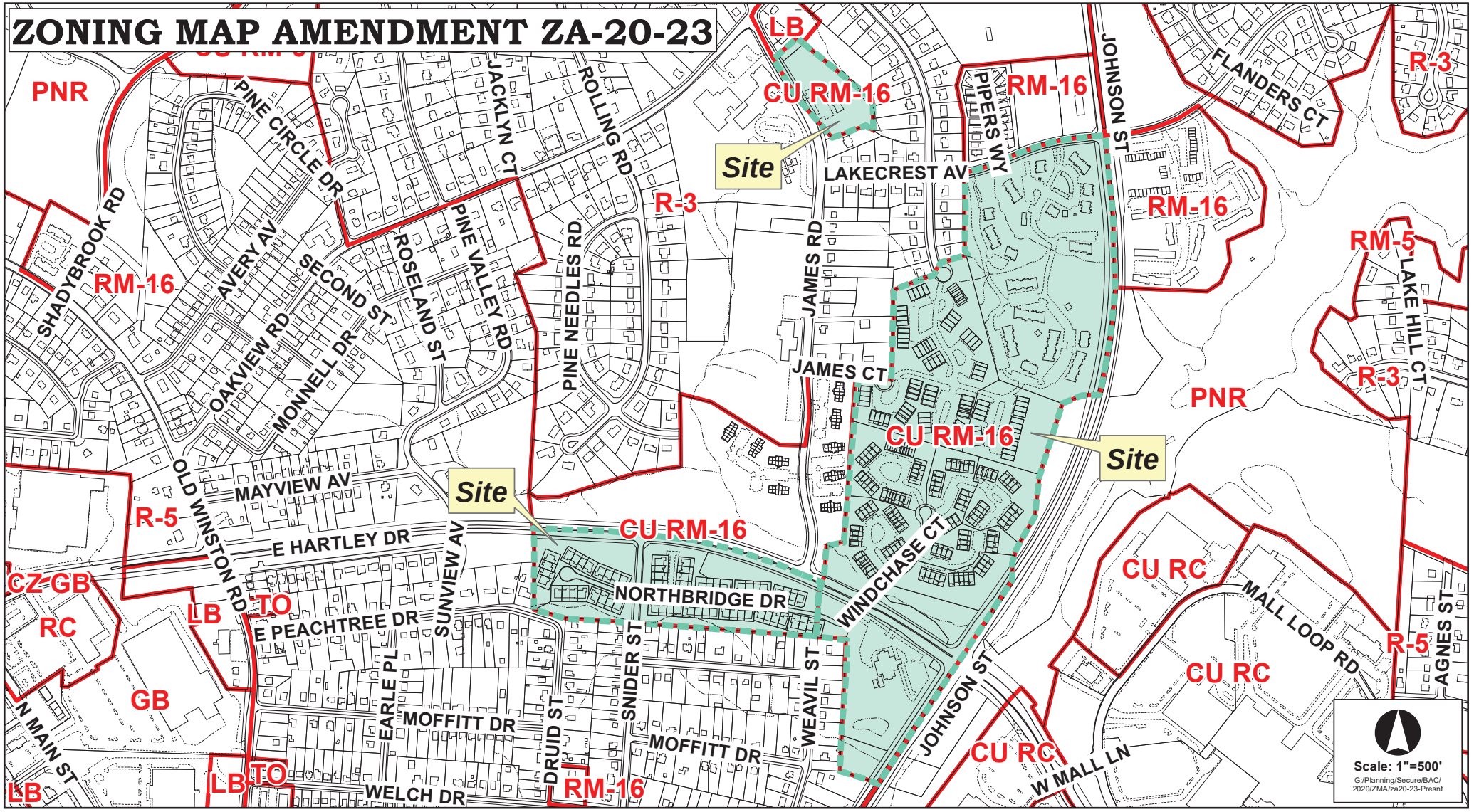
	Adjacent Zoning	Adjacent Land Use
North:	Residential Multifamily – 16 (RM-16) District	Multifamily development (across E. Hartley Drive)
South:	Residential Single Family – 5 (R-5) District	Single family detached dwellings
East:	Residential Multifamily – 16 (RM-16) District	Religious institution
West:	Residential Single Family – 5 (R-5) District	Single family dwellings

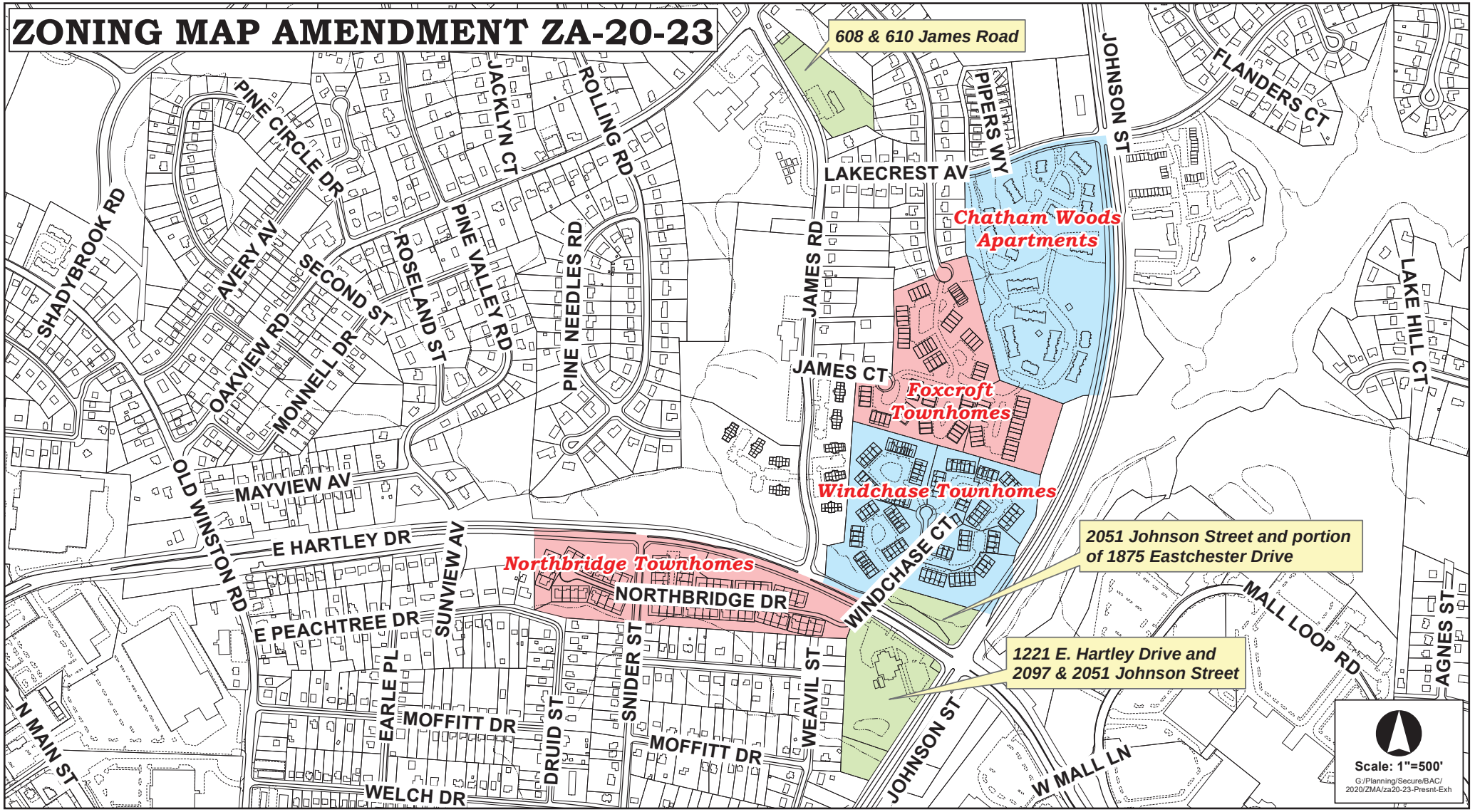
Land Use Plan Classification
The area is designated as follows: • **Medium-Density Residential:** This classification includes a variety of attached dwellings, generally including higher density townhouses and less land-intensive multi-family housing such as garden apartments. Development densities shall range from eight to sixteen dwellings units per gross acre.

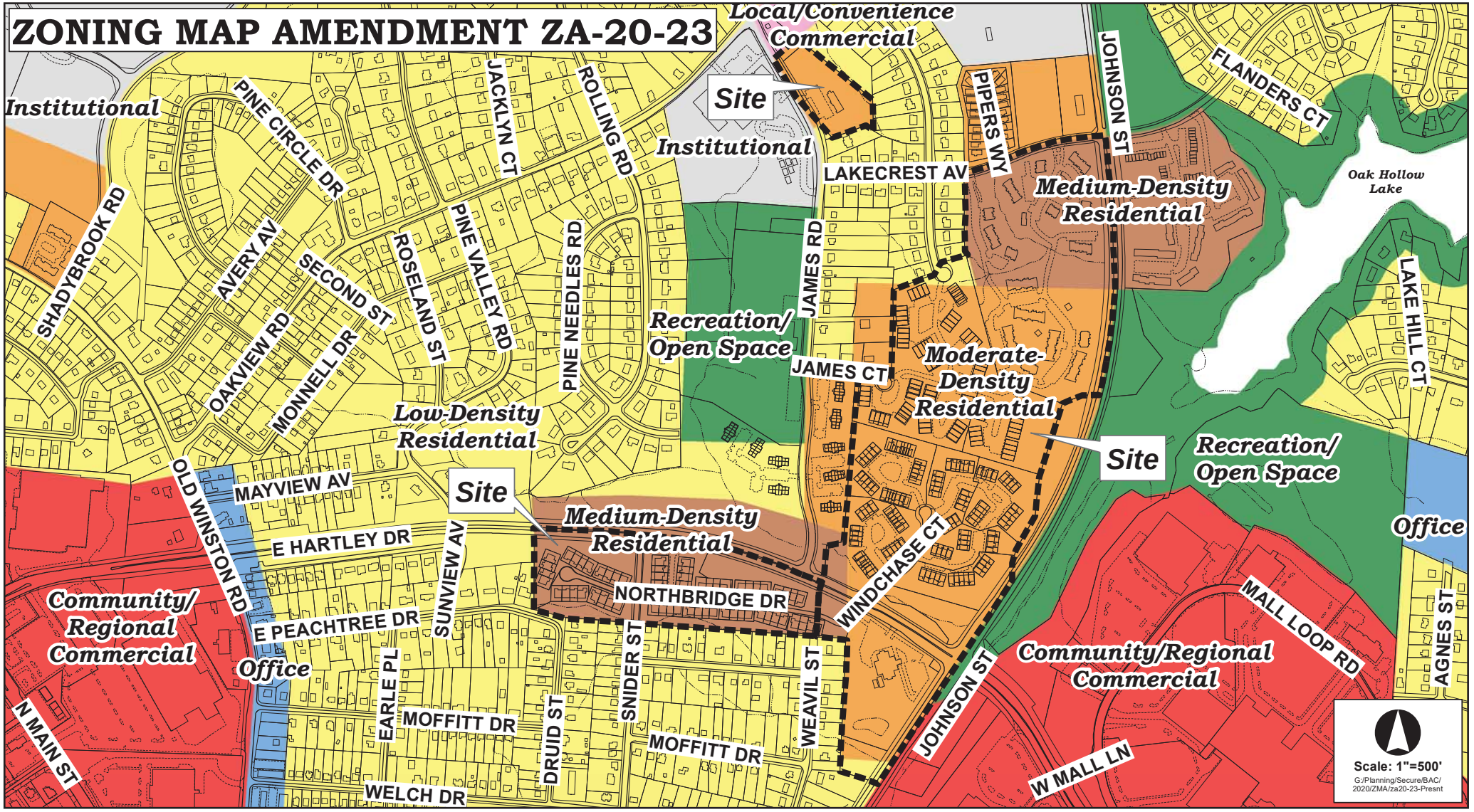
Analysis/Recommendation

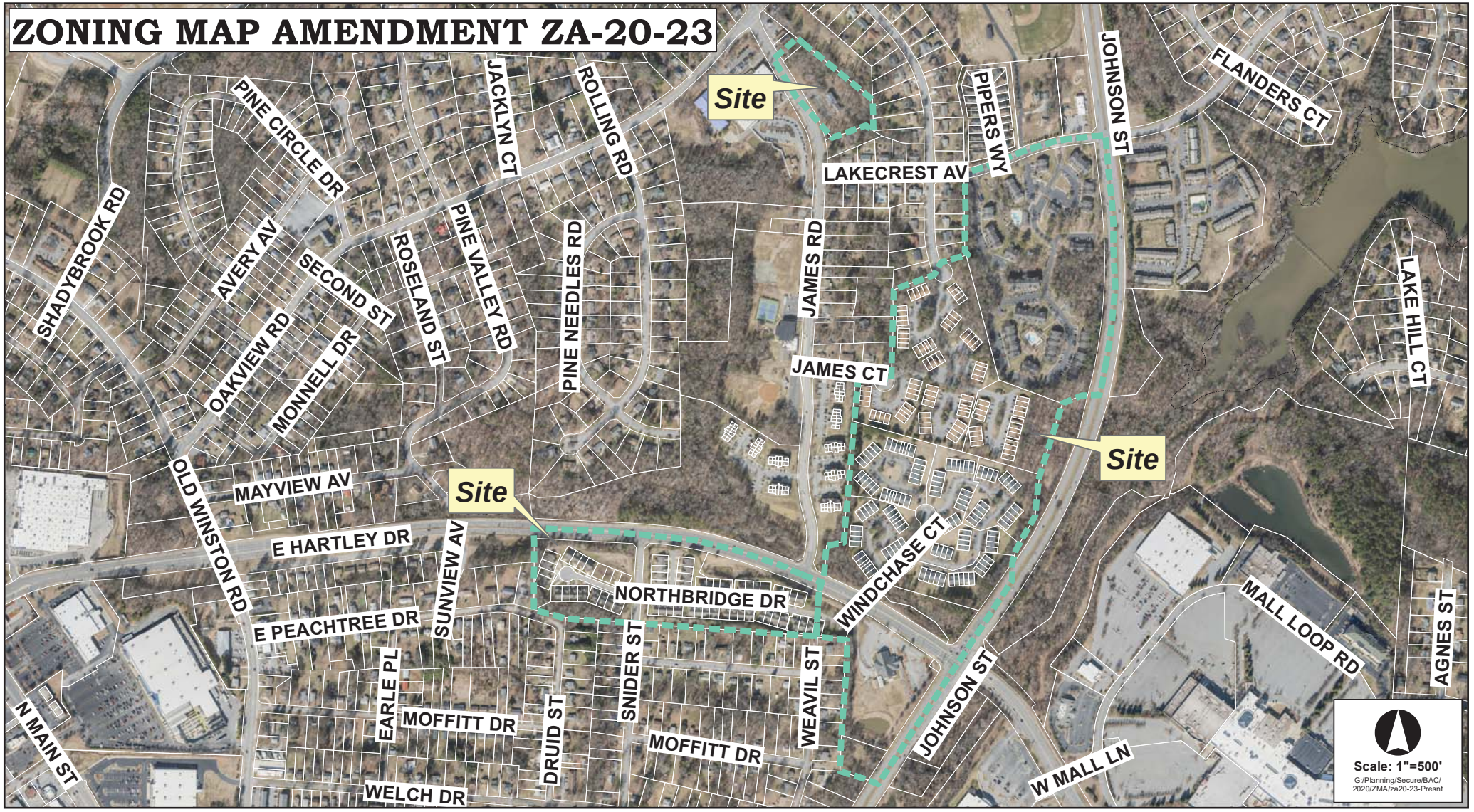
The Northbridge development obtained its current zoning in 1998 and developed as a townhome development. Conditions pertaining to this development were met, or are now governed by the Development Ordinance. The primary purpose of this rezoning is to remove the conditional use (CU) district as development conditions from the 1998 zoning approval have been met and the development has been completed.

Staff recommends rezoning the Northbridge development from the CU RM-16 District to a RM-16 District.


ZONING MAP AMENDMENT ZA-20-23
PNR
RM-16
R-3
R-5
LB
CU RM-16
Site
RM-16
R-3
RM-5
PNR
CU RM-16
Site
Site
CU RM-16
CZ-GB
RC
GB
LB
TO
LB
TO
LB
RM-16
CU RC
CU RC
CU RC
R-5
SHADYBROOK RD
PINE CIRCLE DR
JACKLYN CT
ROLLING RD
AVERY AV
SECOND ST
ROSELAND ST
PINE VALLEY RD
OAKVIEW RD
MONNELL DR
PINE NEEDLES RD
JAMES RD
JAMES CT
LAKECREST AV
PIPERS WY
JOHNSON ST
FLANDERS CT
LAKE HILL CT
MAYVIEW AV
OLD WINSTON RD
E HARTLEY DR
SUNVIEW AV
NORTHBRIDGE DR
WINDCHASE CT
E PEACHTREE DR
EARLE PL
MOFFITT DR
SNIDER ST
DRUID ST
WEAVIL ST
MOFFITT DR
JOHNSON ST
MALL LOOP RD
AGNES ST
N MAIN ST
WELCH DR
W MALL LN
Scale: 1"=500'
G:/Planning/Secure/BAC/2020/ZMA/za20-23-Presnt


ZONING MAP AMENDMENT ZA-20-23
608 & 610 James Road
2051 Johnson Street and portion of 1875 Eastchester Drive
1221 E. Hartley Drive and 2097 & 2051 Johnson Street
Chatham Woods Apartments
Foxcroft Townhomes
Windchase Townhomes
Northbridge Townhomes
LAKECREST AV
JAMES RD
JAMES CT
WINDCHASE CT
NORTHBRIDGE DR
E HARTLEY DR
E PEACHTREE DR
MAYVIEW AV
MOFFITT DR
WELCH DR
JOHNSON ST
W MALL LN
MALL LOOP RD
FLANDERS CT
LAKE HILL CT
AGNES ST
PIPERS WY
JACKLYN CT
ROLLING RD
PINE CIRCLE DR
SHADYBROOK RD
AVERY AV
OAKVIEW RD
MONNELL DR
SECOND ST
ROSELAND ST
PINE VALLEY RD
PINE NEEDLES RD
OLD WINSTON RD
SUNVIEW AV
EARLE PL
DRUID ST
SNIDER ST
WEAVIL ST
N MAIN ST
Scale: 1"=500'
G:/Planning/Secure/BAC/2020/ZMA/za20-23-Presnt-Exh


ZONING MAP AMENDMENT ZA-20-23
Local/Convenience Commercial
Site
Institutional
Institutional
PINE CIRCLE DR
JACKLYN CT
ROLLING RD
PIPERS WY
JOHNSON ST
FLANDERS CT
LAKECREST AV
Medium-Density Residential
Oak Hollow Lake
SHADYBROOK RD
AVERY AV
SECOND ST
ROSELAND ST
PINE VALLEY RD
PINE NEEDLES RD
JAMES RD
LAKE HILL CT
OAKVIEW RD
MONNELL DR
Recreation/ Open Space
JAMES CT
Moderate-Density Residential
Low-Density Residential
Site
Recreation/ Open Space
OLD WINSTON RD
MAYVIEW AV
Site
Medium-Density Residential
Office
E HARTLEY DR
SUNVIEW AV
NORTHBRIDGE DR
WINDCHASE CT
MALL LOOP RD
Community/ Regional Commercial
E PEACHTREE DR
Office
EARLE PL
SNIDER ST
WEAVIL ST
AGNES ST
Community/Regional Commercial
N MAIN ST
MOFFITT DR
DRUID ST
MOFFITT DR
JOHNSON ST
W MALL LN
WELCH DR
Scale: 1"=500'
G:/Planning/Secure/BAC/2020/ZMA/za20-23-Presnt


ZONING MAP AMENDMENT ZA-20-23
Site
Site
Site
PINE CIRCLE DR
JACKLYN CT
ROLLING RD
PIPERS WY
JOHNSON ST
FLANDERS CT
LAKECREST AV
SHADYBROOK RD
AVERY AV
SECOND ST
ROSELAND ST
PINE VALLEY RD
PINE NEEDLES RD
JAMES RD
LAKE HILL CT
OAKVIEW RD
MONNELL DR
JAMES CT
OLD WINSTON RD
MAYVIEW AV
E HARTLEY DR
SUNVIEW AV
NORTHBRIDGE DR
WINDCHASE CT
MALL LOOP RD
AGNES ST
E PEACHTREE DR
EARLE PL
SNIDER ST
WEAVIL ST
JOHNSON ST
N MAIN ST
MOFFITT DR
DRUID ST
MOFFITT DR
W MALL LN
WELCH DR
Scale: 1"=500'
G:/Planning/Secure/BAC/
2020/ZMA/za20-23-Presnt

AN ORDINANCE AMENDING "THE CITY OF HIGH POINT, NORTH CAROLINA DEVELOPMENT ORDINANCE," PURSUANT TO SECTION 2.4.20, ZONING MAP AMENDMENT, OF THE DEVELOPMENT ORDINANCE.

WHEREAS, the City Council of the City of High Point adopted "The City of High Point Development Ordinance" on May 16, 2016 with an effective date of January 1, 2017, and subsequently amended;

WHEREAS, public hearings were held before the Planning and Zoning Commission of the City of High Point on December 8, 2020 and before the City Council of the City of High Point on January 19, 2021 regarding **Zoning Map Amendment Case ZA-20-23 (ZA-20-23)** a proposed amendment to the Official Zoning Map of the "City of High Point Development Ordinance";

WHEREAS, notice of the public hearings were published in the High Point Enterprise on November 29, 2020, for the Planning and Zoning Commission public hearing and on January 6, 2021 and January 13, 2021, for the City Council public hearing pursuant to Chapter 160A-364 of the General Statutes of North Carolina; and

WHEREAS, the proposed amendment was adopted by the City Council of the City of High Point on **January 21, 2021**.

THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HIGH POINT:

SECTION 1

608 James Road and a portion of 610 James Road

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Single Family – 3 (R-3) District**. Approximately 3.5 acres located along the east side of James Road, approximately 300 feet south of Oakview Road. The site is known as Guilford County Tax Parcels 199970 (608 James Road) and a portion of 199982 (southern 45-feet, 608 James Road).

SECTION 2

Chatham Woods Apartment complex

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the Chatham Woods Apartment complex, approximately 19.99 acres, is located at the southwest corner of Lakecrest Avenue and Johnson Street and known as Guilford County Tax Parcel 199972. The property is more specifically described as follows:

Beginning at a ½-inch pipe in the northern margin of Lakecrest Avenue, said point also being the southeast comer of Lot 117 in the Lake Ridge section 1 as recorded in Plat Book 56 Page 104, Guilford County registry, and running thence with the northern right-of-way of Lakecrest Avenue six (6) calls as follows: 1.) with a circular curve to the left having a radius of 652.37' and an arc length of 141.03' (chord bearing N. 73-42-28 E. 140.76') to a ¾-inch pipe 2.) N. 67-30- 50

E. 167.25' to a 1/2 -inch pipe 3.) with a circular curve to the right having a radius of 1,102.14' and arc length of 247.91' (chord bearing N. 73-50-40 E. 247.39') to a ½-inch pipe 4.) N. 81-53-08 E. 58.01' to a ½-inch pipe 5.) N. 83-14-01 E. 85.15' to a ½-inch pipe 6.) N. 38-14-53 E. 28.40' to a ½-inch pipe located on the western right-of-way of Johnson Street; thence along Johnson Street two (2) calls as follows: 1.) S. 06-37-41 E. 385.80' to a ¾-inch pipe 2.) with a circular curve to the right having a radius of 2,856.42, and an arc length of 1,045.90' (chord bearing S. 03-54-38 W. 1,040.07') to a%" pipe; thence leaving said right-of-way with the common line of City of High Point (recorded in Deed Book 1750 Page 137) two (2) calls as follows: 1.) S. 87-53-11 W. 30.02' to a ¾-inch pipe 2.) S. 68-08-00 W. 114.09' to a l" pipe; thence with the common line of Foxcroft Townhomes two (2) calls as follows 1.) N. 69-50-18 W. 359.11' to a ½-inch pipe 2.) N. 14-40-42 W. 686.45' to an iron pin; thence with the common line of Lake Ridge Subdivision (recorded in Plat Book 56 Page 104) lots 112-116 two (2) calls as follows: 1.) N. 24-24-30 W. 22.17' to a.3/4-inch pipe in concrete 2.) N. 00-33-30 W. 443.66' to the point and place of beginning containing. 19.990 acres more or less according to a survey by Don Allen & Associates, PA dated January 14111, 2019, last revised February 4, 2019.

SECTION 3

Foxcroft Townhome Development

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the Foxcroft townhome development, approximately 15.07 acres, is located at the southern terminus of Rockingham Road and at the eastern terminus of James Court. A description of this development is recorded in PB 77 - PG 80; PB82 – PG 2; and in PB 82 – PG 69 of the Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcels 205053, 205054, 205055, 205056, 205057, 205058, 205059, 205060, 205061, 205062, 205063, 205064, 205065, 205066, 205067, 205068, 205069, 205070, 205071, 205072, 205073, 205074, 205075, 205076, 205077, 205078, 205079, 205080, 205081, 205082, 205083, 205084, 205085, 205086, 205087, 205088, 205089, 205090, 205091, 205092, 205093, 205094, 205095, 205096, 205097, 205098, 205099, 205100, 205101, 205102, 205103, 205104, 205105, 205106, 205107, 205108, 205109, 205110, 205111, 205112, 205113, 205114, 205115, 205116, 205117, 205118, 205119, 205120, 205121, 205122, 205124, 205904, 205905, 205906, 205907, 205908, 205909, 205910, 205911, 205912, 205913, 205914, 205915, 205916, 205917, 205918, 205919, 205920, 205921, 205922, 205923, 205924.

SECTION 4

Windchase Townhome Development

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the Windchase townhome development, approximately 18.23 acres, is located north of the intersection of E. Hartley Drive and Windchase Court. A description of this development is recorded in PB 98 - PG 47; PB 96 – PG 107; PB 94 – PG 3; PB 92 - PG 13; PB88 – PG 1; and in PB 85 – PG 109 of the Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcels 206252, 206253, 206254, 206255, 206256, 206257, 206258, 206259, 206260, 206261, 206262, 206263, 206264, 206265, 206266, 206267, 206268, 206269, 206270, 206271, 206272, 206273, 206274, 206275, 206276, 206277, 206278, 206279, 206280,

206281, 206282, 206283, 206284, 206285, 206286, 206287, 206288, 206289, 206290, 206291, 206292, 206293, 206294, 206295, 206296, 206297, 206298, 206299, 206300, 206301, 206302, 206303, 206304, 206305, 206306, 206307, 206309, 206310, 206311, 206312, 206313, 206314, 206315, 206316, 206317, 206318, 206319, 206320, 206321, 206322, 206323, 206324, 206325, 206326, 206327, 206328, 206329, 206330, 206331, 206332, 206333, 206334, 206335, 206336, 206337, 206338, 206339, 206340, 206341, 206342, 206343, 206344, 206345, 206346, 206347, 206348, 206349, 206350, 206351, 206352, 206353, 206354, 206355, 206356, 206357, 206358, 206359, 206360, 206361, 206362, 206363, 206364, 206365, 206366, 206367, 206368, 206369, 206370, 206371, 206372, 206373, 206374, 206375.

SECTION 5

North Bridge Townhome Development

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the North Bridge townhome development, approximately 16.25 acres, is located south of the intersection of E. Hartley Drive and Snider Street. A description of this development is recorded in PB 55 - PG 106; PB 145 – PG 82; PB 140 – PG 130; PB 139 - PG 131; PB 166 – PG 49; and in PB 157 – PG 107 of the Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcels 199994, 199995, 199996, 199997, 199998, 199999, 200000, 200001, 200002, 200003, 200004, 200005, 200006, 200007, 200008, 200009, 200010, 200011, 200012, 200013, 200014, 200015, 200016, 200017, 200018, 200019, 200020, 200021, 200022, 200023, 200024, 200025, 200026, 200027, 200028, 200029, 200030, 200031, 200032, 200033, 200034, 200035, 200036, 200037, 200038, 200039, 200040, 200041, 200042, 200043, 200044, 200045, 200046, 200047, 200048, 200049, 200050, 200051, 200052, 200053, 200054, 200055, 200056, 200057.

SECTION 6

2103 Johnson Street and 1875 Eastchester Drive (portion)

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. These parcels, approximately 1.9 acres, are located at the northwest corner of Johnson Street and E. Hartley Drive, and also known as Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcel 206376, and that portion of Guilford County Tax Parcel 200173 lying west of Johnson Street.

SECTION 7

1221 E. Hartley Drive and 2097 & 2051 Johnson Street

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. These parcels, approximately 11.25 acres, are located at the southwest corner of E. Hartley Drive and Johnson Street. These parcels are also known Guilford County Tax Parcels 199989 and 206308 (1221 E. Hartley Drive and 2097 Johnson Street) which are both depicted on PB 113 PG 139 of the Guilford County Register of Deeds Office, and Guilford County Tax Parcel 218799 (2051 Johnson Street).

SECTION 8

Land dedicated for E. Hartley Drive extension
That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. Approximately 1.81 acres, dedicated for the E. Hartley Drive right-of-way, lying west of the intersection of Johnson Street and E. Hartley Drive intersection.

SECTION 9
Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 10
That all ordinances or parts of ordinances in conflict with the provisions of this ordinance are hereby repealed.

SECTION 11.
This ordinance shall become effective upon the date of adoption.

Adopted by the City Council
City of High Point, North Carolina
The **21st** day of **January, 2021**

By: _____
Jay W. Wagner, Mayor

ATTEST:

_____
Lisa B. Vierling, City Clerk

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Rick Cornwell
719 Gatewood Avenue
High Point, NC 27262

RE: Reappointment- Library Board of Trustees

Dear Rick Cornwell:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Library Board of Trustees. Your appointment will be effective immediately and will expire on October 31,2023.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

Mary S. Brooks, Deputy City Clerk

City of High Point, P.O. 230, 211 South Hamilton Street, High Point, NC 27261 USA
Phone: 336.883.3690 mary.brooks@highpointnc.gov

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Ashley Tillery
1010 Wickliff Avenue
High Point, NC 27262

RE: Reappointment- High Point ABC Board

Dear Ashley Tillery:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the High Point ABC Board. Your appointment will be effective February 8, 2021 and will expire on February 8, 2024.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S. Brooks

Mary S. Brooks, Deputy City Clerk

AN ORDINANCE AMENDING "THE CITY OF HIGH POINT, NORTH CAROLINA DEVELOPMENT ORDINANCE," PURSUANT TO SECTION 2.4.20, ZONING MAP AMENDMENT, OF THE DEVELOPMENT ORDINANCE.

WHEREAS, the City Council of the City of High Point adopted "The City of High Point Development Ordinance" on May 16, 2016 with an effective date of January 1, 2017, and subsequently amended;

WHEREAS, public hearings were held before the Planning and Zoning Commission of the City of High Point on December 8, 2020 and before the City Council of the City of High Point on January 19, 2021 regarding **Zoning Map Amendment Case 20-20 (ZA-20-20)** a proposed amendment to the Official Zoning Map of the "City of High Point Development Ordinance";

WHEREAS, notice of the public hearings were published in the High Point Enterprise on November 29, 2020, for the Planning and Zoning Commission public hearing and on January 6, 2021 and January 13, 2021, for the City Council public hearing pursuant to Chapter 160A-364 of the General Statutes of North Carolina; and

WHEREAS, the proposed amendment was adopted by the City Council of the City of High Point on **March 3, 2021**.

THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HIGH POINT:

SECTION 1

That the Official Zoning Map of the City of High Point be amended to establish the following described area as a: **Conditional Zoning General Business (CZ-B) District.** The property is approximately 3.6 acres, located west of Eastchester Drive and north of Hilton Court (1801 and 1809 Eastchester Drive). The property is also known as Guilford County Tax Parcel 200162 and 200163.

SECTION 2

That the property herein described shall be perpetually bound by the following use(s) authorized and condition(s) imposed, unless subsequently changed or amended as provided for by the Development Ordinance.

Part I. USES:

a) Any principal use of the General Business (GB) District, as listed in the Principal Use Table 4.1.9 of the Development Ordinance, that is also a permitted use in the Office Institutional (OI) District (use must be a permitted principal use in both districts). Development shall be subject to standards of the GB District and the specific conditions listed in this ordinance.

b) The follow General Business (GB) District uses, as listed in the Principal Use Table 4.1.9 of the Development Ordinance, shall also be permitted:

~~i. Convenience store with fuel sales~~ *(delete text - remove this use)*

i. Major Restaurant

ii. Hotels or motels

iii. Microbrewery, microdistillery, or microwinery
iv. Major personal service
v. Major retail sales

Part II. CONDITIONS:

A. Development and Dimensional Standard: ~~Underground fuel storage tanks shall be prohibited~~.*(delete and amend text as follows)* **Automotive and diesel fuel storage tanks shall be prohibited.**

B. Buffering/Undisturbed Area: A minimum 100-foot wide undisturbed buffer shall be retained along the western (rear property line) of the zoning site abutting Guilford County Tax Parcel 200161 (also known as 2214 Hilton Court). All existing trees and vegetation within this undisturbed buffer shall be preserved and supplemented, where necessary, to meet the Type A Perimeter Landscape Yard rate. The property owner shall be permitted to remove unhealthy vegetation and vegetation that may pose a danger to occupants of the rezoning site or abutting parcels. The property owner shall be permitted to prune existing vegetation within the planting yard area in order to maintain the health of the existing vegetation

C. Transportation:

1. Access (Eastchester Drive): Only one point of access shall be permitted from Eastchester Drive. This access point shall be designed to permit a right-in only access from Eastchester Drive and also designed to allow no exiting from the site onto Eastchester Drive.
2. The City of High Point Transportation Director and the North Carolina Department of Transportation (NCDOT) shall approve the exact location and design of all access points and improvements.

SECTION 3
That plans for any development on the property described herein shall be pursued in accordance with this conditional zoning district and shall be submitted to the City of High Point and other approval authorities for review in the same manner as other such plans that are required to be approved by the City of High Point.

SECTION 4
Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 5
That all ordinances or parts of ordinances in conflict with the provisions of this ordinance are hereby repealed.

SECTION 6.
This ordinance shall become effective upon the date of adoption.

Adopted by the City Council
City of High Point, North Carolina
The **xx** day of **xxxxxxxxxxxxx, 2020**

By: _____

Jay W. Wagner, Mayor

ATTEST:

_____

Lisa B. Vierling, City Clerk

Email #30 with attachment

From:	Vesta Kennedy
To:	Public Comment
Subject:	Fwd: BAEA nest map ZA-20-20 NC Wildlife Resources Commission
Date:	Thursday, February 4, 2021 5:08:42 AM
Attachments:	image010.png image009.png image012.png image011.png

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-----Original Message-----
From: Medford, Allison <allison.medford@ncwildlife.org>
To: rollovernclover@aol.com <rollovernclover@aol.com>
Sent: Fri, Jan 29, 2021 9:21 am
Subject: BAEA nest map

Vesta,

Attached is a quick map from the thePoint feature on the BuildHighPoint site. I measured from the center of the parcel of the proposed re-zoning (center because that's roughly where the disturbance would take place, rather than the edge of the parcel) to both the active nest on Oak Hollow Golf Course and the tree in which you have seen eagles roost. Please let me know if you have any questions about the map or about eagle life history or nesting behavior. Please feel free to give my information to the folks you speak to with the City of High Point in case they have any questions.

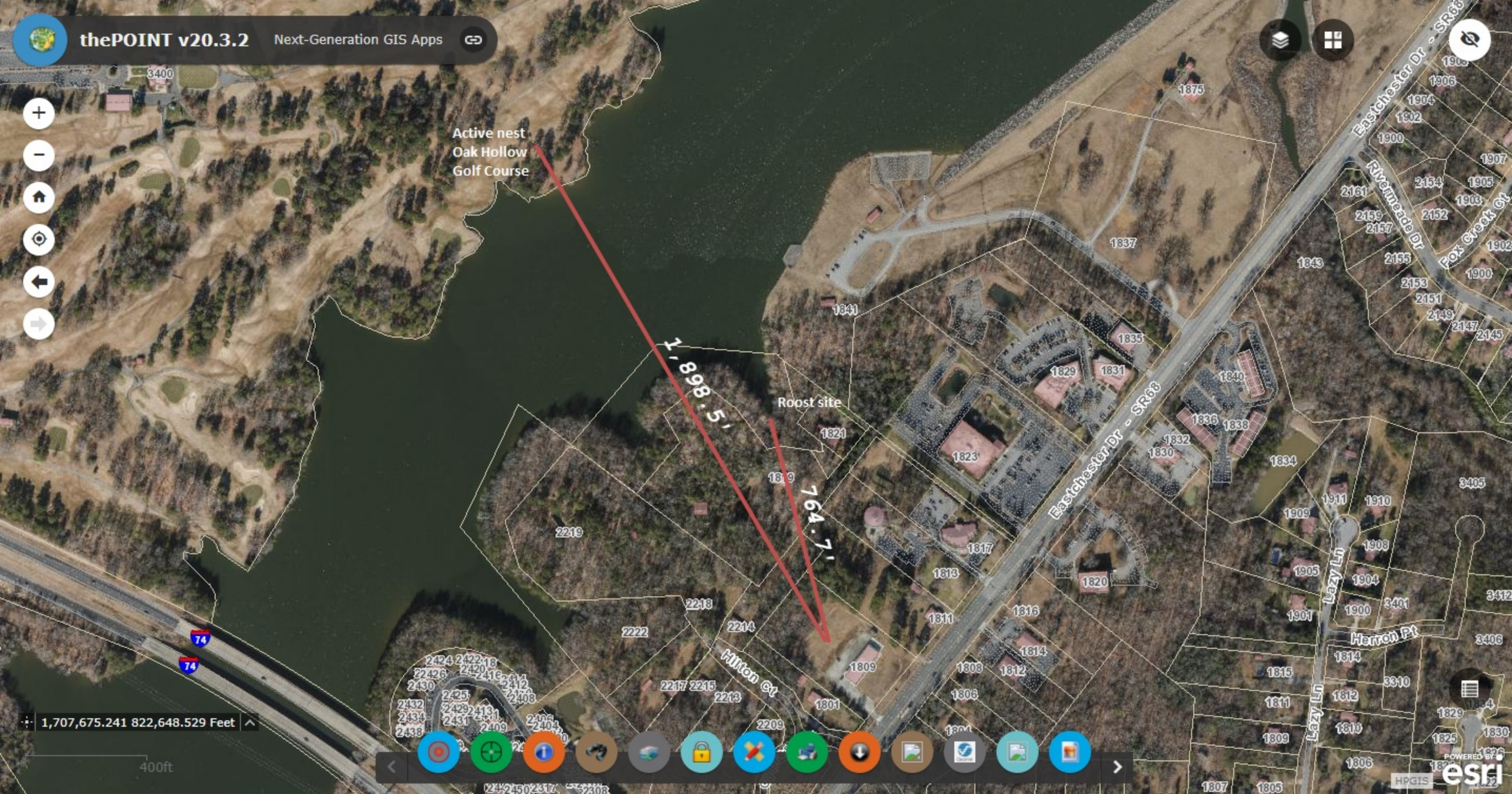
Thanks,
Allison

Allison Medford
Wildlife Diversity Biologist
Piedmont Ecoregion

NC Wildlife Resources Commission
N.C. Wildlife Resources Commission
Mailing Address: 1722 Mail Service Center
Raleigh, North Carolina 27699-1700
office: 910.571.9747 // mobile: 910.975.9393

View the most recent Wildlife Diveristy Program Quarterly Report
ncwildlife.org

Email correspondence to and from this sender is subject to the N.C. Public Records Law and may be disclosed to third parties.


thePOINT v20.3.2
Next-Generation GIS Apps
Active nest
Oak Hollow
Golf Course
1,898.5'
764.7'
Roost site
Eastchester Dr - SR68
Lazy Ln
Herron Pt
Hilton Ct
Rivermeade Dr
Fox Creek Ct
1,707,675.241 822,648.529 Feet
400ft
HPGIS
POWERED BY esri

Email #31 with attachments

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 Eagle Protections
Date:	Thursday, February 4, 2021 11:01:39 AM
Attachments:	NationalBaldEagleManagementGuidelines.pdf distance map on diagonal from back corner of lot.pdf Bald_Eagle_Wildlife_Profile_2018_1.pdf

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Dear Mayor and Town Council,

Good morning.
Attached please find the National Bald Eagle Management Guidelines (published by the US Fish and Wildlife Service), the Bald Eagle Wildlife Profile (North Carolina Wildlife Resources Commission), and pictures of High Point's Oak Hollow eagles; in flight, on the nest, a tree used for roosting while fishing and foraging, and some whitewash (poop) in the water underneath this tree.
Myself, my neighbors, and the lucky citizens that frequent Oak Hollow Golf Course, Festival Park, and The Overlook have been honored and inspired to observe these majestic creatures cohabitating among us. Just as I have felt it my civic duty to learn and pass along all I could about the safety of our drinking water, I have felt the same sense of duty to learn about, call attention to, and defend our eagles and their habitat.
I started making inquiries, and I was told to contact Dick Thomas of The Piedmont Environmental Center.
He told me that a pair of Bald Eagles successfully hatched and fledged two eaglets this summer along the fairway of Hole Eleven on Oak Hollow Golf Course. He too, had observed the pair roosting, hunting and fishing along the cove adjacent to Festival Park. (He also provided two of the pictures attached to this email; one in flight and one on the nest. A huge thank you to him and the PEC!)
I contacted the North Carolina Wildlife Resources Commission and Allison Medford, Wildlife Diversity Biologist Piedmont Ecoregion, put the approximate coordinates of the nest and roost in the database. She explained that field work for eagles usually begins in January, as nests become active. Ms. Medford has been here twice. On January 21st she confirmed the nest on Oak Hollow was active and got exact coordinates, and observed from Festival Park. On January 28th she came and walked the woods where the eagles have been seen hunting and fishing. She found a feather under the roost tree, and observed the flights of an adult and a juvenile. Ms. Medford sent me an email and said for me to feel free to pass along her information, so I will be forwarding that to you. Mr. Thomas of the PEC said he recently observed the two adults in courtship flight. If we take precautions and give consideration to federal guidelines, a promising season may be ahead!

Here are some excerpts from US Fish and Wildlife's publication:

LEGAL PROTECTIONS FOR THE BALD EAGLE

The Guidelines are intended to: (1) Publicize the provisions of the Eagle Act that continue to protect bald eagles, in order to reduce the possibility that people will violate the law, (2) Advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and (3) Encourage additional nonbinding land management practices that benefit bald eagles (see Additional Recommendations section).

The Bald and Golden Eagle Protection Act The Eagle Act (16 U.S.C. 668-668c),
enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

"Disturb'' means:
"Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

A violation of the Act can result in a criminal fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

The Migratory Bird Treaty Act The MBTA (16 U.S.C. 703-712),
prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect." Copies of the Eagle Act and the MBTA are available at: http://permits.fws.gov/ltr/ltr.shtml.

The impact of human activity on nesting bald eagles
During the breeding season, bald eagles are sensitive to a variety of human activities (please refer to the table on page 8; important information)
If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether.

The impact of human activity on foraging and roosting bald eagles
Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles. Where a human activity agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles. The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information. If your activities may disturb roosting or foraging bald eagles, you should contact your local Fish and Wildlife Service Field Office (see page 16) for advice and recommendations for how to avoid such disturbance.

Please refer to Activity - Specific Guidelines starting on page 10
Activities are separated into 8 categories (A – H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity.
Points of interest are:
A and B. regarding the 330/660 foot perimeters for construction, dependent upon topography, height of buildings, and project footprint size. (this site REALLY cuts it close to the roost/hunting tree)
E. Motorized Watercraft Use, limiting area or at least making boaters aware if the Eagles are nesting of the 330 foot buffer
F. Nonmotorized watercraft or human entry, just making canoers, kayakers and golfers aware during breeding season
H. Blasting and other loud, intermittent noises,
Avoid blasting and other activities that produce extremely loud noises within 1/2 mile of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area. This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.

High Point's Fourth of July celebration could be a cause of concern and we possibly need to look for an alternative detonation site? Perhaps we could seek guidance from the biologist on this.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES

1. Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas.
Allowing rezoning along this section of Eastchester Drive would definitely disrupt the Eagles' foraging areas.

2. Locate long-term and permanent water-dependent facilities, such as boat ramps and marinas, away from important eagle foraging areas.
3. Avoid recreational and commercial boating and fishing near critical eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.
4. Do not use explosives within ½ mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the U.S. Fish and Wildlife Service and your state wildlife agency.
5. Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.

ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES

The following are additional management practices that landowners and planners can exercise for added benefit to bald eagles.
1. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within ½ mile from water.

1809 and 1801 Eastchester Drive are certainly within this 1/2 mile (2,640 feet)

boundary. I will be forwarding email from Ms. Medford with her contact information and her measurements from the center of site. attached please find a 409 foot measurement from back edge of site to CWA Tier 1. I also see how close Oak Hollow Lake is going in the direction across Hilton Court. It is easy to see on this visual the proximity of 1811 Eastchester Drive and other businesses to this hunting area.
I am concerned not only for the rezoning and over development of this site, but for the possible domino effect to other landowners along this portion of Eastchester Drive. Will the current roosting and hunting grounds and the possible future nesting grounds of this group of American Bald Eagles be preserved, or destroyed by over development? The choice is yours.

2. Where nests are blown from trees during storms or are otherwise destroyed by the elements, continue to protect the site in the absence of the nest for up to three (3) complete breeding seasons. Many eagles will rebuild the nest and reoccupy the site.
3. To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.
4. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers, and poles. If possible, bury utility lines in important eagle areas.
5. Where bald eagles are likely to nest in human-made structures (e.g., cell phone towers) and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfering with structure performance.
6. Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.
7. Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collision with windows and cars, and other mortality factors.
8. Use pesticides, herbicides, fertilizers, and other chemicals only in accordance with Federal and state laws.

9. Monitor and minimize dispersal of contaminants associated with hazardous waste sites (legal or illegal), permitted releases, and runoff from agricultural areas, especially within watersheds where eagles have shown poor reproduction or where bioaccumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.
Granting this rezoning for the intended use of a gas station with high probabilities of contamination from storm water runoff above ground and Underground Storage Tanks below, would be a travesty. It would not only be hazardous to our citizens, but also to these Eagles, other birds of prey, waterfowl, fish, turtles, frogs, and other wildlife downstream.

Thanks again for your time and dedication!
I hope you have read through all of the US Fish and Wildlife Service's Management Guidelines...lots of fun facts I didn't mention. =)

Vesta Kennedy

Fun Facts: American Bald Eagles don't get their white heads until about 6 years old, and they don't usually mate until 8 or 9! Eagles mate for life. If one should pass away, it can be awhile before they find another compatible mate. The courtship takes some time, and it involves building a new nest or retrofitting an abandoned nest. The male and female each take turns incubating the eggs and feeding their young. The pair work together until the juveniles are able to hunt for themselves.

Attachment to Email #31

NATIONAL BALD EAGLE MANAGEMENT GUIDELINES

U.S. Fish and Wildlife Service

May 2007

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INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The MBTA and the Eagle Act protect bald eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service (Service) developed these National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. The Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act.

The Guidelines are intended to:

(1) Publicize the provisions of the Eagle Act that continue to protect bald eagles, in order to reduce the possibility that people will violate the law,

(2) Advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and

(3) Encourage additional nonbinding land management practices that benefit bald eagles (see Additional Recommendations section).

While the Guidelines include general recommendations for land management practices that will benefit bald eagles, the document is intended primarily as a tool for landowners and planners who seek information and recommendations regarding how to avoid disturbing bald eagles. Many States and some tribal entities have developed state-specific management plans, regulations, and/or guidance for landowners and land managers to protect and enhance bald eagle habitat, and we encourage the continued development and use of these planning tools to benefit bald eagles.

Adherence to the Guidelines herein will benefit individuals, agencies, organizations, and companies by helping them avoid violations of the law. However, the Guidelines themselves are not law. Rather, they are recommendations based on several decades of behavioral observations, science, and conservation measures to avoid or minimize adverse impacts to bald eagles.

The U.S. Fish and Wildlife Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will continue to be sustained. The Service realizes there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts. Although it is not possible to absolve individuals and entities from liability under the Eagle Act or the MBTA, the Service exercises enforcement discretion to focus on those individuals, companies, or agencies that take migratory birds without regard for the consequences of their actions and the law, especially when conservation measures, such as these Guidelines, are available, but have not been implemented. The Service will prioritize its enforcement efforts to focus on those individuals or entities who take bald eagles or their parts, eggs, or nests without implementing appropriate measures recommended by the Guidelines.

The Service intends to pursue the development of regulations that would authorize, under limited circumstances, the use of permits if “take” of an eagle is anticipated but unavoidable. Additionally, if the bald eagle is delisted, the Service intends to provide a regulatory mechanism to honor existing (take) authorizations under the Endangered Species Act (ESA).

During the interim period until the Service completes a rulemaking for permits under the Eagle Act, the Service does not intend to refer for prosecution the incidental “*take*” of any bald eagle under the MBTA or Eagle Act, if such take is in full compliance with the terms and conditions of an incidental take statement issued to the action agency or applicant under the authority of section 7(b)(4) of the ESA or a permit issued under the authority of section 10(a)(1)(B) of the ESA.

The Guidelines are applicable throughout the United States, including Alaska. The primary purpose of these Guidelines is to provide information that will minimize or prevent violations only of *Federal* laws governing bald eagles. In addition to Federal laws, many states and some smaller jurisdictions and tribes have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines. If you are planning activities that may affect bald eagles, we therefore recommend that you contact both your nearest U.S. Fish and Wildlife Service Field Office (see the contact information on p.16) and your state wildlife agency for assistance.

LEGAL PROTECTIONS FOR THE BALD EAGLE

The Bald and Golden Eagle Protection Act

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb’’ means:

> "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

A violation of the Act can result in a criminal fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

The Migratory Bird Treaty Act
The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect."

Copies of the Eagle Act and the MBTA are available at: http://permits.fws.gov/ltr/ltr.shtml.

State laws and regulations
Most states have their own regulations and/or guidelines for bald eagle management. Some states may continue to list the bald eagle as endangered, threatened, or of special concern. If you plan activities that may affect bald eagles, we urge you to familiarize yourself with the regulations and/or guidelines that apply to bald eagles in your state. Your adherence to the Guidelines herein does not ensure that you are in compliance with state laws and regulations because state regulations can be more specific and/or restrictive than these Guidelines.

NATURAL HISTORY OF THE BALD EAGLE

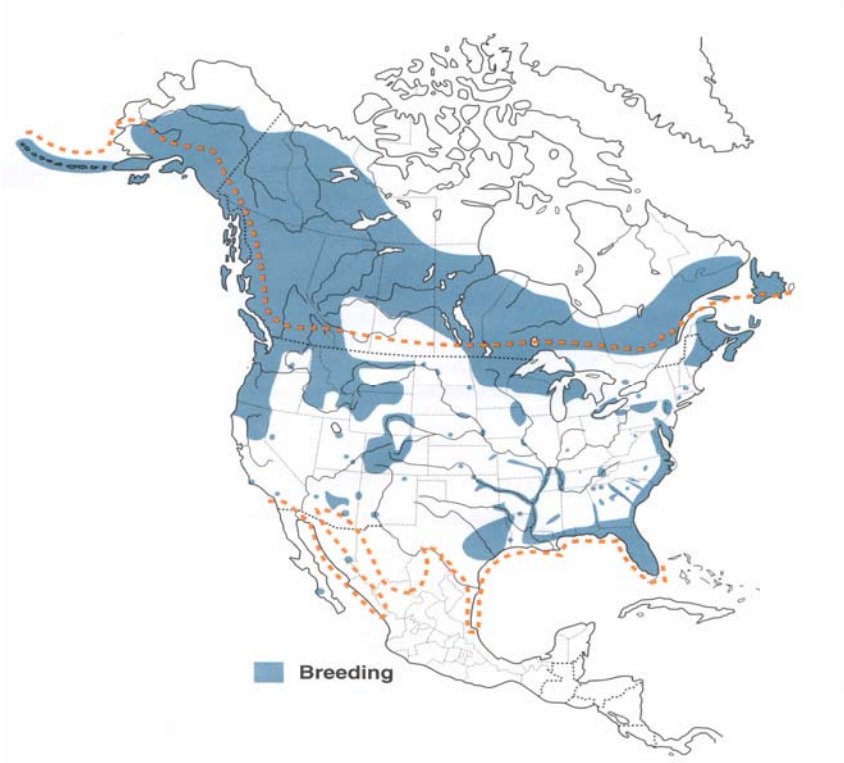
Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. After severely declining in the lower 48 States between the 1870s and the 1970s, bald eagles have rebounded and re-established breeding territories in each of the lower 48 states. The largest North American breeding populations are in Alaska and Canada, but there are also significant bald eagle populations in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, and the Chesapeake Bay region. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. Most eagles that breed at northern latitudes migrate southward during winter, or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at sites where food is abundant and they often roost together communally. In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

Juvenile bald eagles have mottled brown and white plumage, gradually acquiring their dark brown body and distinctive white head and tail as they mature. Bald eagles generally attain adult plumage by 5 years of age. Most are capable of breeding at 4 or 5 years of age, but in healthy populations they may not start breeding until much older. Bald eagles may live 15 to 25 years in the wild. Adults weigh 8 to 14 pounds (occasionally reaching 16 pounds in Alaska) and have wingspans of 5 to 8 feet. Those in the northern range are larger than those in the south, and females are larger than males.

Where do bald eagles nest?

Breeding bald eagles occupy "territories," areas they will typically defend against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests (nests built or maintained by the eagles but not used for nesting in a given year). The Eagle Act prohibits removal or destruction of both active and alternate bald eagle nests. Bald eagles exhibit high nest site fidelity and nesting territories are often used year after year. Some territories are known to have been used continually for over half a century.

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.



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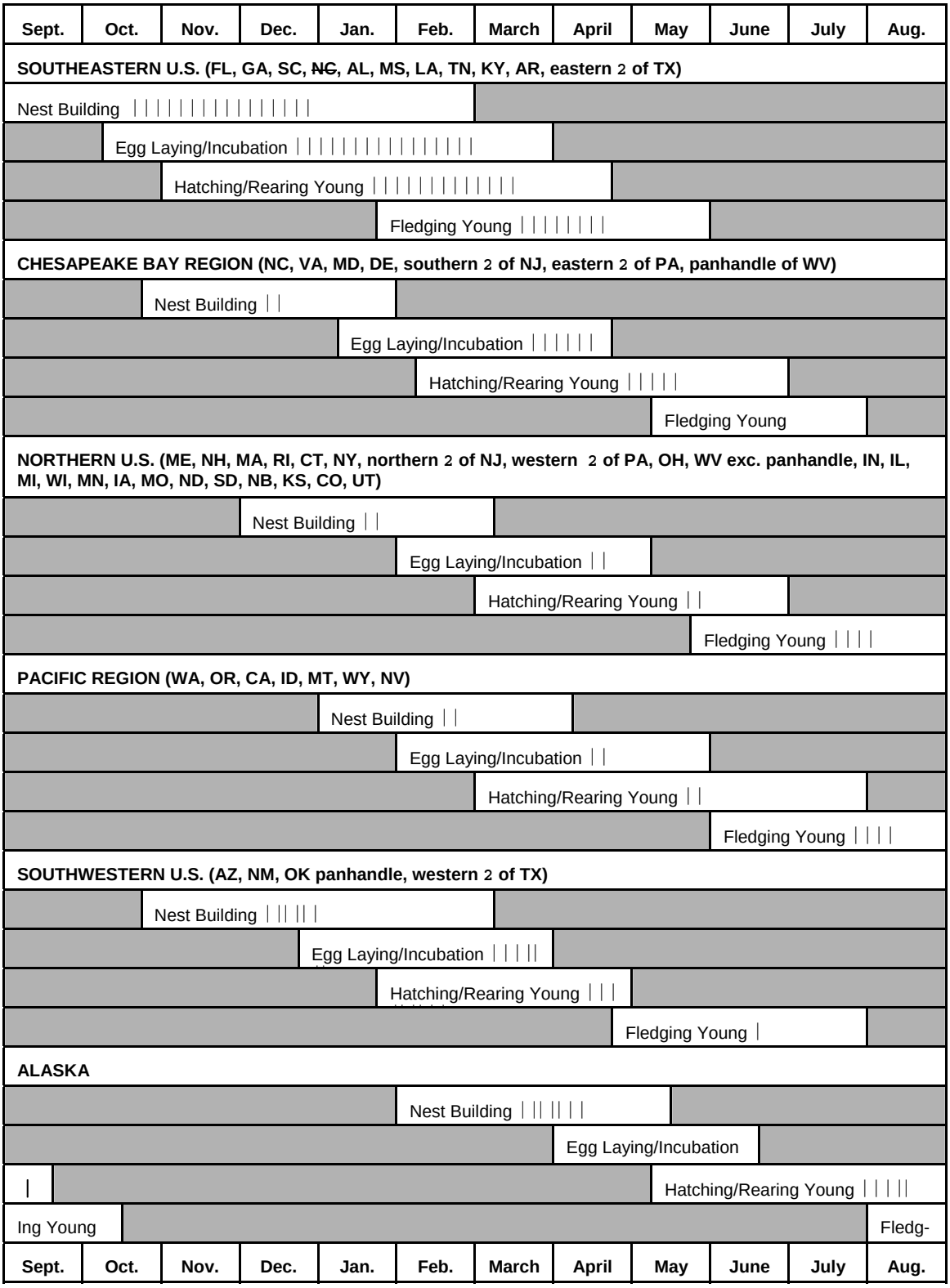
The range of breeding bald eagles in 2000 (shaded areas). This map shows only the larger concentrations of nests; eagles have continued to expand into additional nesting territories in many states. The dotted line represents the bald eagle's wintering range.

When do bald eagles nest?

Nesting activity begins several months before egg-laying. Egg-laying dates vary throughout the U.S., ranging from October in Florida, to late April or even early May in the northern United States. Incubation typically lasts 33-35 days, but can be as long as 40 days. Eaglets make their first unsteady flights about 10 to 12 weeks after hatching, and fledge (leave their nests) within a few days after that first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

The bald eagle breeding season tends to be longer in the southern U.S., and re-nesting following an unsuccessful first nesting attempt is more common there as well. The following table shows the timing of bald eagle breeding seasons in different regions of the country. The table represents the range of time within which the majority of nesting activities occur in each region and does not apply to any specific nesting pair. Because the timing of nesting activities may vary within a given region, you should contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16) and/or your state wildlife conservation agency for more specific information on nesting chronology in your area.

Chronology of typical reproductive activities of bald eagles in the United States.



How many chicks do bald eagles raise?
The number of eagle eggs laid will vary from 1-3, with 1-2 eggs being the most common. Only one eagle egg is laid per day, although not always on successive days. Hatching of young occurs on different days with the result that chicks in the same nest are sometimes of unequal size. The overall national fledging rate is approximately one chick per nest, annually, which results in a healthy expanding population.

What do bald eagles eat?
Bald eagles are opportunistic feeders. Fish comprise much of their diet, but they also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Because they are visual hunters, eagles typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike. Wintering bald eagles often congregate in large numbers along streams to feed on spawning salmon or other fish species, and often gather in large numbers in areas below reservoirs, especially hydropower dams, where fish are abundant. Wintering eagles also take birds from rafts of ducks at reservoirs and rivers, and congregate on melting ice shelves to scavenge dead fish from the current or the soft melting ice. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots.

During the breeding season, adults carry prey to the nest to feed the young. Adults feed their chicks by tearing off pieces of food and holding them to the beaks of the eaglets. After fledging, immature eagles are slow to develop hunting skills, and must learn to locate reliable food sources and master feeding techniques. Young eagles will congregate together, often feeding upon easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays and at landfills.

The impact of human activity on nesting bald eagles
During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in the following table.

Nesting Bald Eagle Sensitivity to Human Activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

The impact of human activity on foraging and roosting bald eagles

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles

from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

Where a human activity agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles. The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information. If your activities may disturb roosting or foraging bald eagles, you should contact your local Fish and Wildlife Service Field Office (see page 16) for advice and recommendations for how to avoid such disturbance.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT NEST SITES

In developing these Guidelines, we relied on existing state and regional bald eagle guidelines, scientific literature on bald eagle disturbance, and recommendations of state and Federal biologists who monitor the impacts of human activity on eagles. Despite these resources, uncertainties remain regarding the effects of many activities on eagles and how eagles in different situations may or may not respond to certain human activities. The Service recognizes this uncertainty and views the collection of better biological data on the response of eagles to disturbance as a high priority. To the extent that resources allow, the Service will continue to collect data on responses of bald eagles to human activities conducted according to the recommendations within these Guidelines to ensure that adequate protection from disturbance is being afforded, and to identify circumstances where the Guidelines might be modified. These data will be used to make future adjustments to the Guidelines.

To avoid disturbing nesting bald eagles, we recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees.

The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in many western states, distance alone must serve as the buffer. Consequently, in open areas, the distance between the activity and the nest may need to be larger than the distances recommended under Categories A and B of these guidelines (pg. 12) if no landscape buffers are present. The height of the nest above the ground may also ameliorate effects of human activities; eagles at higher nests may be less prone to disturbance.

In addition to the physical features of the landscape and nest site, the appropriate size for the distance buffer may vary according to the historical tolerances of eagles to human activities in particular localities, and may also depend on the location of the nest in relation

to feeding and roosting areas used by the eagles. Increased competition for nest sites may lead bald eagles to nest closer to human activity (and other eagles).

Seasonal restrictions can prevent the potential impacts of many shorter-term, obtrusive activities that do not entail landscape alterations (e.g. fireworks, outdoor concerts). In proximity to the nest, these kinds of activities should be conducted only outside the breeding season. For activities that entail both short-term, obtrusive characteristics and more permanent impacts (e.g., building construction), we recommend a combination of both approaches: retaining a landscape buffer *and* observing seasonal restrictions.

For assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, we encourage you to contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16).

Existing Uses

Eagles are unlikely to be disturbed by routine use of roads, homes, and other facilities where such use pre-dates the eagles' successful nesting activity in a given area. Therefore, in most cases *ongoing* existing uses may proceed with the same intensity with little risk of disturbing bald eagles. However, some *intermittent, occasional, or irregular* uses that pre-date eagle nesting in an area may disturb bald eagles. For example: a pair of eagles may begin nesting in an area and subsequently be disturbed by activities associated with an annual outdoor flea market, even though the flea market has been held annually at the same location. In such situations, human activity should be adjusted or relocated to minimize potential impacts on the nesting pair.

ACTIVITY-SPECIFIC GUIDELINES

The following section provides the Service=s management recommendations for avoiding bald eagle disturbance as a result of new or intermittent activities proposed in the vicinity of bald eagle nests. Activities are separated into 8 categories (A – H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity. Activities with similar or comparable impacts are grouped together.

In most cases, impacts will vary based on the visibility of the activity from the eagle nest and the degree to which similar activities are already occurring in proximity to the nest site. Visibility is a factor because, in general, eagles are more prone to disturbance when an activity occurs in full view. For this reason, we recommend that people locate activities farther from the nest structure in areas with open vistas, in contrast to areas where the view is shielded by rolling topography, trees, or other screening factors. The recommendations also take into account the existence of similar activities in the area because the continued presence of nesting bald eagles in the vicinity of the existing activities indicates that the eagles in that area can tolerate a greater degree of human activity than we can generally expect from eagles in areas that experience fewer human impacts. To illustrate how these factors affect the likelihood of disturbing eagles, we have incorporated the recommendations for some activities into a table (categories A and B).

First, determine which category your activity falls into (between categories A – H). If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity represented.

If your activity is under A or B, our recommendations are in table form. The vertical axis shows the degree of visibility of the activity from the nest. The horizontal axis (header row) represents the degree to which similar activities are ongoing in the vicinity of the nest. Locate the row that best describes how visible your activity will be from the eagle nest. Then, choose the column that best describes the degree to which similar activities are ongoing in the vicinity of the eagle nest. The box where the column and row come together contains our management recommendations for how far you should locate your activity from the nest to avoid disturbing the eagles. The numerical distances shown in the tables are the closest the activity should be conducted relative to the nest. In some cases we have included additional recommendations (other than recommended *distance* from the nest) you should follow to help ensure that your activity will not disturb the eagles.

Alternate nests

For activities that entail permanent landscape alterations that may result in bald eagle disturbance, these recommendations apply to both active and alternate bald eagle nests. Disturbance becomes an issue with regard to alternate nests if eagles return for breeding purposes and react to land use changes that occurred while the nest was inactive. The likelihood that an alternate nest will again become active decreases the longer it goes unused. If you plan activities in the vicinity of an alternate bald eagle nest and have information to show that the nest has not been active during the preceding 5 breeding seasons, the recommendations provided in these guidelines for avoiding disturbance around the nest site may no longer be warranted. The nest itself remains protected by other provisions of the Eagle Act, however, and may not be destroyed.

If special circumstances exist that make it unlikely an inactive nest will be reused before 5 years of disuse have passed, and you believe that the probability of reuse is low enough to warrant disregarding the recommendations for avoiding disturbance, you should be prepared to provide all the reasons for your conclusion, including information regarding past use of the nest site. Without sufficient documentation, you should continue to follow these guidelines when conducting activities around the nest site. If we are able to determine that it is unlikely the nest will be reused, we may advise you that the recommendations provided in these guidelines for avoiding disturbance are no longer necessary around that nest site.

This guidance is intended to minimize disturbance, as defined by Federal regulation. In addition to Federal laws, most states and some tribes and smaller jurisdictions have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines.

Temporary Impacts

For activities that have temporary impacts, such as the use of loud machinery, fireworks displays, or summer boating activities, we recommend seasonal restrictions. These types of activities can generally be carried out outside of the breeding season without causing disturbance. The recommended restrictions for these types of activities can be lifted for alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched (depending on the distance between the alternate nest and the active nest).

In general, activities should be kept as far away from nest trees as possible; loud and disruptive activities should be conducted when eagles are not nesting; and activity between the nest and the nearest foraging area should be minimized. If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity addressed, or contact your local U.S. Fish and Wildlife Service Field Office for additional guidance.

If you believe that special circumstances apply to your situation that increase or diminish the likelihood of bald eagle disturbance, or if it is not possible to adhere to the guidelines, you should contact your local Service Field Office for further guidance.

Category A:
Building construction, 1 or 2 story, with project footprint of ½ acre or less.
Construction of roads, trails, canals, power lines, and other linear utilities.
Agriculture and aquaculture – new or expanded operations.
Alteration of shorelines or wetlands.
Installation of docks or moorings.
Water impoundment.

Category B:
Building construction, 3 or more stories.
Building construction, 1 or 2 story, with project footprint of more than ½ acre.
Installation or expansion of marinas with a capacity of 6 or more boats.
Mining and associated activities.
Oil and natural gas drilling and refining and associated activities.

	If there is no similar activity within 1 mile of the nest	***If there is similar activity closer than 1 mile from the nest***
If the activity will be visible from the nest	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
If the activity will not be visible from the nest	Category A: 330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season. Category B: 660 feet.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season.

The numerical distances shown in the table are the closest the activity should be conducted relative to the nest.

Category C. Timber Operations and Forestry Practices

- Avoid clear cutting or removal of overstory trees within 330 feet of the nest at any time.

- Avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the breeding season within 660 feet of the nest. The distance may be decreased to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched.

- Selective thinning and other silviculture management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the breeding season. Precautions such as raking leaves and woody debris from around the nest tree should be taken to prevent crown fire or fire climbing the nest tree. If it is determined that a burn during the breeding season would be beneficial, then, to ensure that no take or disturbance will occur, these activities should be conducted only when neither adult eagles nor young are present at the nest tree (i.e., at the beginning of, or end of, the breeding season, either before the particular nest is active or after the young have fledged from that nest). Appropriate Federal and state biologists should be consulted before any prescribed burning is conducted during the breeding season.

- Avoid construction of log transfer facilities and in-water log storage areas within 330 feet of the nest.

Category D. Off-road vehicle use (including snowmobiles). No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.

Category E. Motorized Watercraft use (including jet skis/personal watercraft). No buffer is necessary around nest sites outside the breeding season. During the breeding season, within 330 feet of the nest, (1) do not operate jet skis (personal watercraft), and (2) avoid concentrations of noisy vessels (e.g., commercial fishing boats and tour boats), except where eagles have demonstrated tolerance for such activity. Other motorized boat traffic passing within 330 feet of the nest should attempt to minimize trips and avoid stopping in the area where feasible, particularly where eagles are unaccustomed to boat traffic. Buffers for airboats should be larger than 330 feet due to the increased noise they generate, combined with their speed, maneuverability, and visibility.

Category F. Non-motorized recreation and human entry (e.g., hiking, camping, fishing, hunting, birdwatching, kayaking, canoeing). No buffer is necessary around nest sites outside the breeding season. If the activity will be visible or highly audible from the nest, maintain a 330-foot buffer during the breeding season, particularly where eagles are unaccustomed to such activity.

Category G. Helicopters and fixed-wing aircraft.
Except for authorized biologists trained in survey techniques, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity.

Category H. Blasting and other loud, intermittent noises.
Avoid blasting and other activities that produce extremely loud noises within 1/2 mile of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area. This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES

1. Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas.

2. Locate long-term and permanent water-dependent facilities, such as boat ramps and marinas, away from important eagle foraging areas.

3. Avoid recreational and commercial boating and fishing near critical eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.

4. Do not use explosives within ½ mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the U.S. Fish and Wildlife Service and your state wildlife agency.

5. Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.

ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES

The following are additional management practices that landowners and planners can exercise for added benefit to bald eagles.

1. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within ½ mile from water.

2. Where nests are blown from trees during storms or are otherwise destroyed by the elements, continue to protect the site in the absence of the nest for up to three (3) complete breeding seasons. Many eagles will rebuild the nest and reoccupy the site.

3. To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.

4. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers, and poles. If possible, bury utility lines in important eagle areas.

5. Where bald eagles are likely to nest in human-made structures (e.g., cell phone towers) and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfering with structure performance.

6. Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.

7. Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collision with windows and cars, and other mortality factors.

8. Use pesticides, herbicides, fertilizers, and other chemicals only in accordance with Federal and state laws.

9. Monitor and minimize dispersal of contaminants associated with hazardous waste sites (legal or illegal), permitted releases, and runoff from agricultural areas, especially within watersheds where eagles have shown poor reproduction or where bioaccumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.

CONTACTS

The following U.S. Fish and Wildlife Service Field Offices provide technical assistance on bald eagle management:

Alabama	Daphne	(251) 441-5181
Alaska	Anchorage	(907) 271-2888
	Fairbanks	(907) 456-0203
	Juneau	(907) 780-1160
Arizona	Phoenix	(602) 242-0210
Arkansas	Conway	(501) 513-4470
California	Arcata	(707) 822-7201
	Barstow	(760) 255-8852
	Carlsbad	(760) 431-9440
	Red Bluff	(530) 527-3043
	Sacramento	(916) 414-6000
	Stockton	(209) 946-6400
	Ventura	(805) 644-1766
	Yreka	(530) 842-5763
Colorado	Lakewood	(303) 275-2370
	Grand Junction	(970) 243-2778
Connecticut	(See New Hampshire)	
Delaware	(See Maryland)	
Florida	Panama City	(850) 769-0552
	Vero Beach	(772) 562-3909
	Jacksonville	(904) 232-2580
Georgia	Athens	(706) 613-9493
	Brunswick	(912) 265-9336
	Columbus	(706) 544-6428
Idaho	Boise	(208) 378-5243
	Chubbuck	(208) 237-6975
Illinois/Iowa	Rock Island	(309) 757-5800
Indiana	Bloomington	(812) 334-4261
Kansas	Manhattan	(785) 539-3474
Kentucky	Frankfort	(502) 695-0468
Louisiana	Lafayette	(337) 291-3100
Maine	Old Town	(207) 827-5938
Maryland	Annapolis	(410) 573-4573
Massachusetts	(See New Hampshire)	
Michigan	East Lansing	(517) 351-2555
Minnesota	Bloomington	(612) 725-3548
Mississippi	Jackson	(601) 965-4900
Missouri	Columbia	(573) 234-2132
Montana	Helena	(405) 449-5225
Nebraska	Grand Island	(308) 382-6468
Nevada	Las Vegas	(702) 515-5230
	Reno	(775) 861-6300
New Hampshire	Concord	(603) 223-2541
New Jersey	Pleasantville	(609) 646-9310
New Mexico	Albuquerque	(505) 346-2525
New York	Cortland	(607) 753-9334
	Long Island	(631) 776-1401
North Carolina	Raleigh	(919) 856-4520
	Asheville	(828) 258-3939
North Dakota	Bismarck	(701) 250-4481
Ohio	Reynoldsburg	(614) 469-6923
Oklahoma	Tulsa	(918) 581-7458
Oregon	Bend	(541) 383-7146
	Klamath Falls	(541) 885-8481
	La Grande	(541) 962-8584
	Newport	(541) 867-4558
	Portland	(503) 231-6179
	Roseburg	(541) 957-3474
Pennsylvania	State College	(814) 234-4090
Rhode Island	(See New Hampshire)	
South Carolina	Charleston	(843) 727-4707
South Dakota	Pierre	(605) 224-8693
Tennessee	Cookeville	(931) 528-6481
Texas	Clear Lake	(281) 286-8282
Utah	West Valley City	(801) 975-3330
Vermont	(See New Hampshire)	
Virginia	Gloucester	(804) 693-6694
Washington	Lacey	(306) 753-9440
	Spokane	(509) 891-6839
	Wenatchee	(509) 665-3508
West Virginia	Elkins	(304) 636-6586
Wisconsin	New Franken	(920) 866-1725
Wyoming	Cheyenne	(307) 772-2374
	Cody	(307) 578-5939

National Office
U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 North Fairfax Drive, MBSP-4107
Arlington, VA 22203-1610
(703) 358-1714
http://www.fws.gov/migratorybirds

State Agencies

To contact a state wildlife agency, visit the Association of Fish & Wildlife Agencies' website at http://www.fishwildlife.org/where_us.html

GLOSSARY

The definitions below apply to these National Bald Eagle Management Guidelines:

Communal roost sites – Areas where bald eagles gather and perch overnight – and sometimes during the day in the event of inclement weather. Communal roost sites are usually in large trees (live or dead) that are relatively sheltered from wind and are generally in close proximity to foraging areas. These roosts may also serve a social purpose for pair bond formation and communication among eagles. Many roost sites are used year after year.

Disturb – To agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

Fledge – To leave the nest and begin flying. For bald eagles, this normally occurs at 10-12 weeks of age.

Fledgling – A juvenile bald eagle that has taken the first flight from the nest but is not yet independent.

Foraging area – An area where eagles feed, typically near open water such as rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant, or in areas with little or no water (i.e., rangelands, barren land, tundra, suburban areas, etc.) where other prey species (e.g., rabbit, rodents) or carrion (such as at landfills) are abundant.

Landscape buffer – A natural or human-made landscape feature that screens eagles from human activity (e.g., strip of trees, hill, cliff, berm, sound wall).

Nest – A structure built, maintained, or used by bald eagles for the purpose of reproduction. An **active** nest is a nest that is attended (built, maintained or used) by a pair of bald eagles during a given breeding season, whether or not eggs are laid. An **alternate** nest is a nest that is not used for breeding by eagles during a given breeding season.

Nest abandonment – Nest abandonment occurs when adult eagles desert or stop attending a nest and do not subsequently return and successfully raise young in that nest for the duration of a breeding season. Nest abandonment can be caused by altering habitat near a nest, even if the alteration occurs prior to the breeding season. Whether the eagles migrate during the non-breeding season, or remain in the area throughout the non-breeding season, nest abandonment can occur at any point between the time the eagles return to the nesting site for the breeding season and the time when all progeny from the breeding season have

dispersed.

Project footprint – The area of land (and water) that will be permanently altered for a development project, including access roads.

Similar scope – In the vicinity of a bald eagle nest, an existing activity is of similar scope to a new activity where the types of impacts to bald eagles are similar in nature, and the impacts of the existing activity are of the same or greater magnitude than the impacts of the potential new activity. Examples: (1) An existing single-story home 200 feet from a nest is similar in scope to an additional single-story home 200 feet from the nest; (2) An existing multi-story, multi-family dwelling 150 feet from a nest has impacts of a greater magnitude than a potential new single-family home 200 feet from the nest; (3) One existing single-family home 200 feet from the nest has impacts of a lesser magnitude than three single-family homes 200 feet from the nest; (4) an existing single-family home 200 feet from a communal roost has impacts of a lesser magnitude than a single-family home 300 feet from the roost but 40 feet from the eagles' foraging area. The existing activities in examples (1) and (2) are of similar scope, while the existing activities in example (3) and (4) are not.

Vegetative buffer – An area surrounding a bald eagle nest that is wholly or largely covered by forest, vegetation, or other natural ecological characteristics, and separates the nest from human activities.

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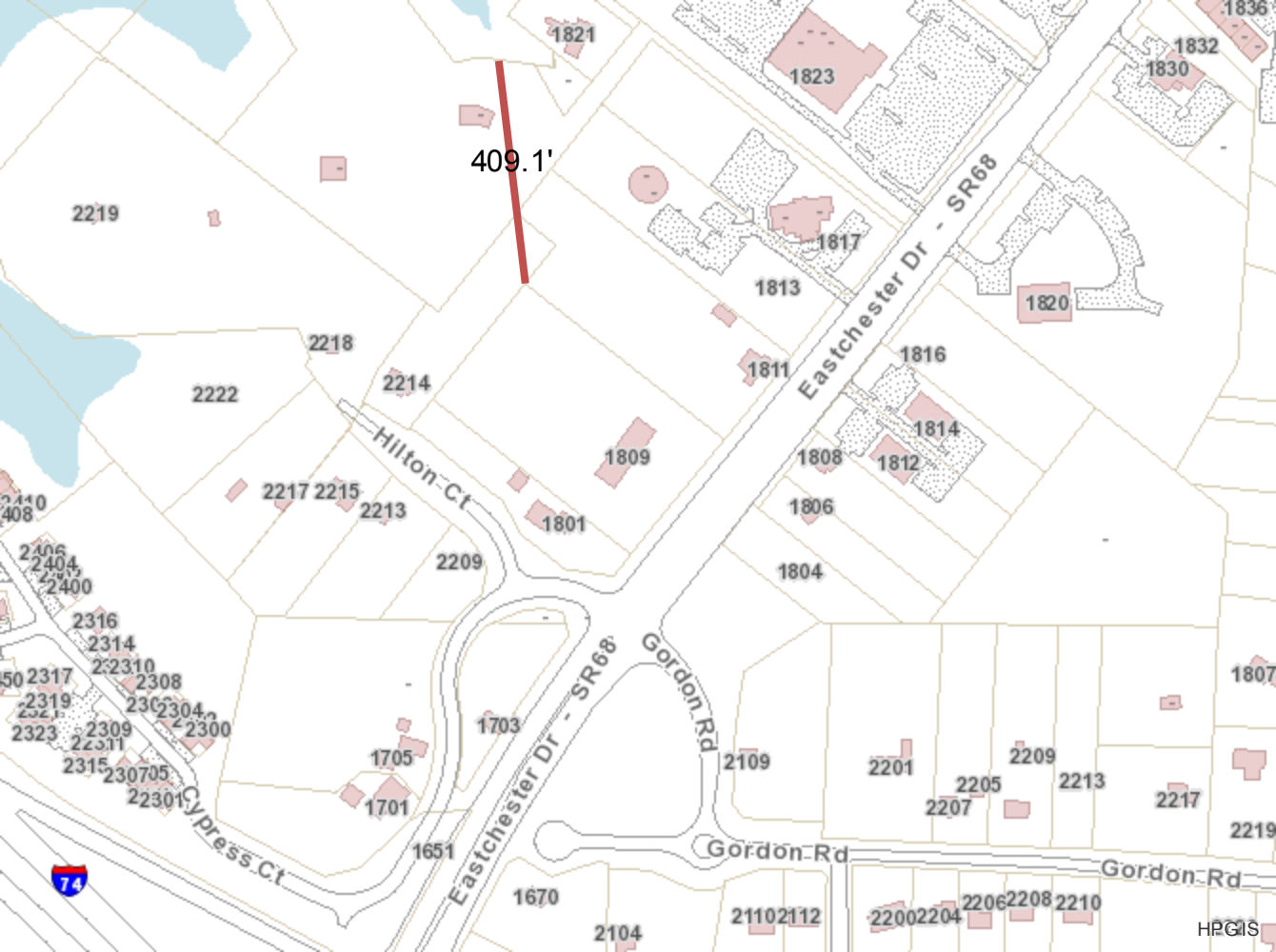
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Attachment to Email #31


409.1'
1821
1823
1836
1832
1830
2219
1817
1813
1820
Eastchester Dr - SR68
1816
1811
2218
2214
2222
1814
1809
1808
1812
Hilton Ct
2217
2215
2213
1806
1801
1804
2209
2316
2314
2310
2308
2317
2319
2304
2300
2323
2309
2315
1705
1703
1701
2109
2201
2209
2205
2213
2207
2217
1807
2219
Cypress Ct
1651
Gordon Rd
1670
2104
2112
2206
2208
2210
2204
74
HPGIS

Attachment to Email #31

Bald Eagle

North Carolina Wildlife Profiles



USFWS

Bald Eagle

(Haliaeetus leucocephalus)

Celebrated as the national symbol of the United States since 1872, the bald eagle was once listed as an endangered species. Benjamin Franklin accused the bird of "bad moral character" because of its habits of stealing fish from ospreys and scavenging carrion. *Haliaeetus leucocephalus* means "sea eagle with a white head." Like other sea eagles, the bald eagle lives near water and relies on powerful wings and talons to scavenge fish, its main source of food. Once endangered by pesticides and hunting, the bald eagle has made a stunning comeback and was removed from the Endangered Species List in 2007.

Description

One of the largest raptors in North America, the bald eagle weighs 8 to 13 pounds; the female is larger than the male. The wingspan may be 7 or 8 feet across, and the bird's body can stretch 3 feet from beak to tail. Juveniles are uniformly dark brown or mottled, with dark beaks, talons and eyes. In flight, the underside of the juvenile's wings may be streaked or mottled with white feathers. The bald eagle isn't "bald"; its name comes from the white feathers over the entire head. After four to five years, the birds achieve full adult plumage and coloring: a brilliant white head, neck and tail; bright yellow beak and feet; and pale yellow eyes. Bald eagles hold their wings flat when soaring high in the sky, unlike vultures and other large birds whose wings make a slight vee.

History and Status

As far back as 1700, explorer John Lawson found bald eagles plentiful along North Carolina waterways but divided them into two species, the "eagle bald"(bald meaning white) and the "eagle gray," which was actually the juvenile of the species. Settlers and bounty hunters shot and trapped great numbers of the birds, and by the end of the 19th century the bald eagle population had declined throughout North America. In 1940 Congress passed the Bald Eagle Act, protecting the bird from further destruction. Still, populations plummeted in the 1940s and '50s after the pesticide DDT was introduced. The chemical accumulated in the food chain of eagles and other birds, resulting in thin eggshells that cracked when the parents attempted to brood their eggs. Once DDT was banned, bald eagles started slowly repopulating suitable habitats near lakes, rivers and sounds.

Habitats & Habits

The bald eagle prefers habitat near lakes, large rivers, and shorelines of sounds and bays. The bird requires tall, isolated trees for perching and nesting. Its large wings

Once listed as an endangered species, the bald eagle is now found throughout the state.

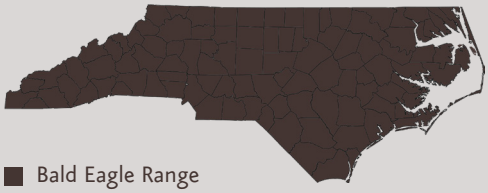


Adult bald eagle (Photo: Mark Buckler)

Range and Distribution

Native only to North America, the bald eagle was once abundant in both the East and West, from Canada to the Gulf Coast. Once extirpated from much of its range, it has now made a comeback on its own and through reintroduction programs in some states, including North Carolina. Bald eagles are found across the state, mainly near large bodies of water. They are a common sight at Jordan and Falls lakes in the Piedmont and at Lake Mattamuskeet in Hyde County.

Range Map



Bald Eagle Range

Habitats & Habits (continued)

are adapted for catching late-morning and midday thermal updrafts, which give a high-altitude vantage point for seeking out and scavenging fish and other foods. Opportunistic by nature, the eagle is fond of stealing food from ospreys and other birds, and it scavenges the shoreline for dead or dying fish, as well as plucking them live from the water. In winter, when food is scarce, bald eagles consume a wider variety of prey, including water birds, rabbits and carrion. The bald eagle needs a tall, living tree for its huge nest, preferably a tree with a stout vee or several branches making a sturdy crotch. Nests are up to 8 feet wide and 20 feet deep, made of sticks and lined with grasses. Pairs often return and layer new nest material over the old from year to year, with the nest growing in size over time.

NCWRC & Human Interactions

In 1982, the N.C. Wildlife Resources Commission began a "hacking" program, which involved raising eagles in captivity and reintroducing them in the wild. Young eagles were released near Lake Mattamuskeet in Hyde County. Commission biologists monitored the juveniles and in 1984, North Carolina's first post-DDT wild bald eagle nest was documented 7 miles from the lake.

While Commission biologists no longer raise eagles and release them, they do continue to monitor and identify the locations of new bald eagle nests and provide technical guidance to landowners about how to protect bald eagles and their nesting sites. In most circumstances, biologists are able to work with these landowners to protect the eagle nesting sites without substantially interfering with the landowners' objectives. They also meet with timber companies to discuss logging operations around eagle nests.

These days people enjoy watching the bald eagle's soaring flight near non-breeding roosts at Piedmont lakes and near the coast. Because of their similar size and habits, ospreys are often mistaken for bald eagles by casual observers. Unlike ospreys, however, bald eagles usually build their nests far away from boat traffic or human habitation. Despite the eagle's comeback in North Carolina, its population will be limited by the number of suitable roosting and nesting sites and the availability of fish, but we can expect the population to continue to grow for many years.

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Credits
Originally written by Marjorie Hudson, updated by David Allen, NCWRC 2018

Wild Facts

Classification
Class: Aves
Order: Falconiformes

Average Size
Body: Up to 3 feet long, beak to tail
Wingspan: 7 to 8 feet
Weight: 8 to 13 pounds

Food
Bald eagles feed on fish, turtles, waterbirds, small mammals and carrion. They usually scavenge sick or dying prey but will take food from other birds if they can.

Breeding/Young
Pairs mate, nest and raise young. Breeding occurs in winter and young fledge in spring. Both parents incubate the eggs and feed the young. In North Carolina adult pairs may migrate together in the summer, or stay near the nesting territory year round. Eagles produce one to three eggs, and if food is plentiful, all may survive to fledge. In North Carolina, nesting begins in January. Eggs hatch after 30 to 40 days incubation. Parents take turns brooding, guarding and feeding young. Nestlings fledge in about 11 weeks.

Life Expectancy
Up to 20 years


Bald eagle chicks (Photo: USFWS)


Juvenile bald eagle (Photo: Melissa McGaw/NCWRC)









End of Email #31 with attachments

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Dev Bhandari
4403 Gower Ct.
High Point, NC 27265

RE: Reappointment- Human Relations Commission

Dear Dev Bhandari:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Human Relations Commission. Your appointment will be effective immediately and will expire on November 1, 2022.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

Mary S. Brooks, Deputy City Clerk

PUBLIC COMMENTS

Zoning Map Amendment 20-20

(1809 Eastchester Drive)

Public Hearing before City Council set for January 19, 2021
Continued to February 15, 2021 (at request of applicant)
Continued to March 1, 2021 (to allow applicant time to submit additional conditions offered at the February 15th meeting in writing)

Lisa Vierling

From: Robb Jolly <robb@ngfs.org>
Sent: Thursday, December 3, 2020 2:35 PM
To: Thaddeus Juszczak
Subject: Opposed to Rezoning Case #2020, 1809 Eastchester Dr.

December 1, 2020

To the members of High Point City Council and the Planning & Zoning Commission:

I'm writing as a concerned citizen and neighbor to express my opposition to the proposed rezoning of two properties on the corner of Eastchester Dr. and Cypress Ct. As an owner of property adjacent to these lots, I have many personal concerns about the negative effects that such a change would bring to my family's quality of life; however, these concerns are not limited to my own, for they also resonate with many of our commercial and residential neighbors, and could potentially affect a large number of High Point's citizens due to the properties' proximity to the Oak Hollow Lake watershed.

Before detailing my fears about what this rezoning change and subsequent development would do to our neighborhood and this area of High Point, **I want to implore the members of the Planning and Zoning Commission and the City Council NOT to recommend or allow this rezoning change to happen, as it goes against the following recommendations which are detailed in the City's Land Use Assessment for the area** (Oct. 30, 2020):

- p.4, **Transportation:** *In order to maintain the safe and efficient transportation functionality of the corridor, direct access points need to be limited. Whenever possible, access should always be taken from side streets, therefore, lot consolidation is encouraged. When additional or direct access to Eastchester Drive is necessary, then a lot frontage of 350 feet will be needed to accommodate a driveway, the side yard offset and distance from intersection, or deceleration lane, whichever is applicable.*
- p.5, **Commercial Development:** *In order to continue to preserve areas in between these large commercial nodes [i.e. Eastchester/Wendover and Eastchester/Main St. intersections] for other uses, to manage traffic, and to protect the gateway qualities of the corridor,* ***it is important not to allow commercial uses to expand along the entire corridor. While the interchange at I-74 may seem like a good location for commercial development to occur, there are constraints and concerns that should be considered.*** *The area in and around the interchange is narrow, so it does not offer large areas for development; it is constrained by the lake to the west and by established neighborhoods to the east; and it is impacted by the development restrictions of the Oak Hollow Lake WCA.*
- p. 6, **General Recommendations:**
  - *The Land Use Plan designation for a majority of the study area is recommended to remain as Office with some minor changes [See Map 4: Land Use Recommendations]. There is an opportunity to add a small area of Local/Convenience Commercial at the southeast quadrant of the interchange (Area 6) to accommodate some limited commercial uses.… For development to happen in this area, it will require land assembly to manage impacts, coordinate access, and maximize development potential under the watershed development restrictions. If these requirements can be achieved, then a policy change can be considered to accommodate low to moderate intensity retail and personal service uses that are typically allowed in the Limited Business (LB) district, such as a convenience store with fuel sales.*

- ***High intensity commercial uses traditionally found in the Community/Regional Commercial land use category, such as drive-through restaurants and large commercial shopping centers, are not supported within the study area*** *due to continued policy concerns about the protection of the city's water supply; the safe and efficient transportation functionality of the Eastchester Drive corridor; the protection of adjacent neighborhoods; and the protection of the scenic corridor gateway into the city.*

- pp. 7-8, **Area 3 Specific Recommendations** (see Map 4)**:** *If the area remains in the critical area, then smaller office uses along the Eastchester Drive frontage would likely be the extent of its development potential....the surrounding area is more significantly constrained with stringent watershed restrictions, topographic constraints, controlled access and a classified stream that makes it infeasible for commercial development in the surrounding area.* ***Therefore, in order to maintain the consistency in character of this section of the gateway corridor, Area 3 should remain in the Office land use category.***

As far as personal and neighborhood concerns, I believe firmly that if the two lots in question are rezoned to allow the development of a gas station, convenience store and drive-through restaurant, it will have the following negative effects on the area:

- **Increased traffic, congestion, and accidents**
- **Increased noise, light pollution, and crime**
- **Increased environmental harm to drinking water (as runoff from gas spills, oil and other contaminants will inevitably flow into Oak Hollow or City Lake reservoirs)**
- **Increase in the likelihood that similar lots in the area will be rezoned to allow this type of high-intensity land use, which will further decrease the quality of life for our neighborhood, and continue the cycle of negative impacts mentioned above**

In summary, our neighborhood and our access to and from our house has already been negatively affected greatly by the long and drawn out construction project around the Eastchester Dr/I-74 interchange, and the above concerns--some personal, but many expressed by members of our city government who researched and authored the Land Use Recommendations--make it clear that changing the zoning of these two lots to allow for the development of a gas station, convenience store and drive-through restaurant is a BAD IDEA on all fronts.

I ask each of you to consider how you would feel if you and your family lived on land adjacent to these lots, as I believe that would lead you NOT to support or recommend this rezoning proposal. **At the very least, I believe that both the High Point City Council and the Planning & Zoning Commision should advocate for waiting until the Land Use Assessment Recommendations are passed before taking action on such an important piece of our city's land, infrastructure, and ecosystem.**

Sincerely,
Robb Jolly

--
Robb Jolly
Technology Specialist
New Garden Friends School
www.ngfs.org / (336) 299-0964

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

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Lisa Vierling

From: Stacey Jolly <bigredjolly@gmail.com>
Sent: Thursday, December 3, 2020 3:36 PM
To: Lee Burnette; Build HighPoint
Cc: Lisa Vierling
Subject: Case #2020, 1809 Eastchester Drive
Attachments: Comments about rezoning case 2020 and possible development.docx

Dear Mayor Wagner, Planning and Zoning and City Council members,

I hope you all had a wonderful holiday and found some time to relax. I have a new appreciation for the job that you do. Thank you for taking the time to read my emails. I appreciate the responses that I have gotten and the conversations that I have had with some of you. We are truly all in this together. Thank you in advance for reading through the comments from concerned citizens that I have attached to this email. As you know, we have started a petition concerning the possible rezoning and potential commercial, high-intensity use of the 1809 Eastchester Drive property. Attached you will find 150 or so comments from concerned citizens regarding this situation. They are exact, brief and the opinions of those most greatly affected by this development, as well as your constituents.

I would like to express my concern about the timing of the December 8th public hearing. After attending the Land Assessment Use Zoom meeting, and hearing and having carefully read the assessment, I am questioning why the 1809 rezoning issue should not be continued until after the next Land Assessment Meeting takes place in January? It seems imprudent to vote on this given the knowledge behind recommendations of the Land Assessment to keep Area 3 as is, zoned for office/institutional use. Heidi did a good job of explaining the calendar situation, but even with those circumstances, why would we push forward with this December 8th rezoning meeting before the Land Assessment is finalized, especially given the Land Assessment's recommendations that would continue to protect the scenic corridor, watershed, reduce traffic congestion / accidents and protect the safety of the communities in this area? It feels a little short-sighted to move forward with this rezoning meeting, especially given that the stakes are high for polluting our watershed, increasing traffic accidents in an area that is already riddled with accidents and increasing crime rates in our community. We have 5 gas stations and 5 car washes within a 3 mile radius of 1809 Eastchester, just on the same road. There are many more if we go in either of the other 2 directions. Do we need 6 gas stations and 6 car washes in this 3 mile radius, especially considering the 6th ones will be built directly on our watershed and by the most dangerous intersection on Eastchester? (If you would like to see how many accidents we have had in a mile radius of this location for a particular amount of time, please visit this website,High Point PD | Police to Citizen - Home enter the address, time frame and click on accidents.)

We have done some research on underground gas tanks, state and federal regulations and codes regarding those, as well as the gas stations in the triad that have already leaked and/or leached into our groundwater. We will be sharing our research and sources with you as soon as possible. Suffice it to say, it is in everybody's best interest to prevent water pollution from parking lot run-off and underground gas tanks by not building in a location where those things would flow into City Lake on on one side (with no retention pond to filter the run-off due to this area sitting in a flood zone, i.e. Foxwood Meadows) and probable leaks and leeching from underground tanks heading towards Oak Hollow.

I am sure many of you travel Eastchester frequently and you know how congested and dangerous the area by I-74 can be. This past Saturday, in the middle of the day, I was trying to make a left turn in my driveway (1821 Eastchester) coming from I-74, and a car behind me did not see that I had stopped and was waiting for that moment to make a left turn. In order to not hit me, she veered around me to the left and ended up meeting on-coming traffic head-on (since there is no turning lane in this stretch and the construction is not projected to be finished until September 2021). It was frightening and luckily no one was hurt, but there were screeching tires,lots of smoke and an instant of pure panic for all involved or watching. This is currently our daily reality on this stretch of Eastchester. It is risky, terrifying at times, and always nerve wracking trying to make a left turn in this area. Please consider how this affects the existing businesses and communities in our area. By allowing this area to be rezoned for high intensity/commercial use, this problem will only grow tenfold.

Again, thank you for your careful consideration of ALL aspects of this possible rezoning. We are not against development in any way. But there is a place for everything, and this is not the place for a gas station, car wash, convenience store and fast food restaurant, and the recommendation by the Land Assessment Use supports this as well.. As you can read in the atttached comments, many people share this view. Thank you for your time and thank you for the work you do to protect us and help keep High Point a great place to live.

Sincerely,

Stacey Stackhouse Jolly

Lisa Vierling

From: Stacey Jolly <bigredjolly@gmail.com>
Sent: Thursday, December 3, 2020 3:48 PM
To: Lee Burnette; Lisa Vierling; Build HighPoint; Terry Venable; Ray Wheatley; Thaddeus Juszczak; Tom Kirkman; Angela McGill; Alex Moore; Mark Morgan; Joan Swift; Mark Walsh
Subject: Case #2020, 1809 Eastchester Drive

Hi all,

I hope you are doing well. I want to share a video that was made that very succinctly summarizes many of the community's concerns about the possible rezoning of 1809 Eastchester Drive. Thank you for taking just a few minutes to watch.

Save High Point Water - YouTube

All the best,

Stacey S. Jolly

Lisa Vierling

From: Elisa Cameron <elisacameron24@gmail.com>
Sent: Thursday, December 3, 2020 9:57 PM
To: JoAnne Carlyle; Lee Burnette; Lisa Vierling; Herbert Shannon Jr; Build HighPoint; Thaddeus Juszczak; Tom Kirkman; Angela McGill; Alex Moore; Mark Morgan; Joan Swift; Terry Venable; Mark Walsh; Ray Wheatley
Cc: Tim Tucker; Stacey Jolly
Subject: High Point Resident Apposed to Zoning Change/Case #2020, 1809 Eastchester Dr.
Attachments: Eastchester and I-74 Land Use Assessment Document.pdf; City of High Point Land Use Study PowerPoint Presentation.pdf

Hi Everyone,

I wanted to reach out to you as stewards of our city of High Point, and voice my concerns prior to the December 8th Planning and Zoning Committee meeting in which a rezoning request will be considered for 1809 Eastchester, near the 74 Interchange.

Firstly, I feel as if my rights as a citizen of High Point are being denied given the fact that the signs advertising this rezoning meeting say "Public", but the public is not actually allowed to be heard at the Dec 8th meeting. But the committee *is allowing the developer/consultant* that is requesting this rezoning to speak and be heard! Our rebuttal and concerns to information presented by the developer can only be made in writing which seem completely unfair to the general public. This takes away the process by which citizens can use their voice, it invalidates the process and we are left with a 24 hour window to respond in writing which is not the same as being audibly heard. We should be able to speak passionately and be heard as well. As with other meetings during this unusual time (COVID limitations), there are ways to conduct meetings virtually so that all concerned parties have a chance to be heard. This is the only fair way to do a meeting with such an important change request on the line. Or postpone the meeting until it can be made a truly "public" meeting in which residents of High Point can attend in person and be heard.

I would like to move on to my concerns and the implications of allowing a rezoning in this area.

Overly Congested Area of Eastchester

I live in Waterfront which is "ground zero" to the area that would be put at risk if this rezoning is approved and this developer is allowed to move forward with his plan to build a gas station/fast food restaurant/car wash. I experience on a daily basis the traffic that exists at the Cypress Court stop light and the backup that is created by the I-74 Interchange. It is inconceivable that anyone would think that adding a large business near that interchange would be safe for drivers trying to maneuver in that overly congested area.

Underground Gas Tanks LEAK

I'm sure this developer and his consultant will say whatever they have to in order to get this project approved so they can start building and make a buck. But you have to ask yourself, "is this the right location for a business such as this"? The waste from a restaurant, car wash detergent and chemicals, and the potential of underground tanks leaking toxic chemicals into our ground soil and making their way to our lake seems like a very high risk! There are countless situations across the country in which these underground fuel tanks have leaked and destroyed water sources. If this rezoning is approved and they are able to proceed, this business will be sitting just yards from one of HIgh Point's main watersheds. Tanks will outlive their lives, they will deteriorate, what about the underground mishaps that we cannot know about until it is too late? Tanks will leak! It's not a matter of **if**, but a matter of **when**. Do we need to take this risk so close to our water? There are so many other sites in High Point that would be better suited for this business.

Recent Land Use Assessment of This Area

The City of High Point has just completed a Land Use Assessment of this area and are waiting for it to be adopted. In the report they make it very clear that the Watershed regulations have a direct impact on the developability of this area. (report attached) I urge all of you to read this assessment thoroughly to get a sense of the limitations needed for this area. If this rezoning request is approved, it will be in complete opposition of what the Assessment done by the City of High Point has deemed necessary for this area of Eastchester. This report should be taken into consideration when this rezoning is considered! Heidi Galanti can be reached with any questions about the Land Use Assessment.
Heidi Galanti
Phone: 336-883-3328
Email: heidi.galanti@highpointnc.gov

Desired Vision for our City and the Gateway Corridor of Eastchester?
What is the vision for High Point? Beautification along the corridor? Do we really want a big gas station right off the I-74 Interchange? There are 5 Gas Stations within a 3 mile radius of this site. Do we really **"need"** another Gas Station on Eastchester?

Thank you!
Elisa Cameron
2311 Cypress Ct.
High Point, NC 27265
336-682-8892
https://www.savehighpointwater.com/
https://www.ipetitions.com/petition/save-high-point-water

Lisa Vierling

From: Robb Jolly <robb@ngfs.org>
Sent: Wednesday, December 9, 2020 12:39 PM
To: Build HighPoint
Subject: Rezoning Case #2020, 1809 Eastchester Dr.

Dear members of the Planning and Zoning Commission,

Please see my initial thoughts following the meeting last night. And thank you in advance for giving them your serious consideration.

Mr. Terrell would like you to believe that everything is based on planning from 1985. This is simply not true. High Point has invested in a new Land Use Plan in 2020, in which they do not recommend rezoning this plot. This hearing was simply scheduled before it was possible for the City Council to vote on the new Land Use recommendations. That does not mean everything was based on 1985 planning. In fact if anything, we know that the traffic has increased and that we have a better understanding today of how the watersheds work.

He would also like you to believe that it is not up to Planning and Zoning to protect Oak Hollow Lake. True, if the project moves forward they will have to meet state and federal regulations, but the very existence and purpose of a Planning and Zoning Commission is to make the best possible decision about land use for the city of HIgh Point **for both now and the future.**

Questions about grading the lot so the runoff flows towards City Lake:

- 1) Does this mean that all the oil and gas spilled onto semi-impermeable surfaces will flow onto Eastchester Dr. every time it rains, creating slick and hazardous conditions on a stretch of road which is already extremely busy?

- 2) Will the runoff flow into the classified stream which originates directly across the street from this property? What are the environmental effects of this?

- 3) Will it flow into the flood zone on the east side of Eastchester?

Before any approval is granted, the city (and not the developer) should request an engineering plan to show how these things will be mitigated.

As for tank leaks, undoubtedly technology is getting better, but just as the engineer explained at the end of his statement, when fuel mixes change (i.e. a greater use of ethanol) this can lead to tank problems, hence the 2015 revisions. Looking ahead, we know that car companies are working on electric and hydrogen cars. Is this property a place where we want fuel tanks buried for 30-50 years?

No one has dealt with the question of leaching through concrete. Just because this is not regulated now does not mean that we will not find it to be problematic on the apex of our two watersheds in the future.

Concerning the traffic:

- 1) If the study was conducted in 2020, of course traffic was down, but we know that traffic will increase as soon as the pandemic ends , even if some people continue to work at home. This is a vital corridor and over the next 30-50 years it will continue to be used at higher and higher levels.

- 2) It simply does not make sense to say that traffic will not increase. Who would go to the cost of developing a gas station, fast food restaurant and convenience store if you thought it was not going to

attract any customers? A right turn lane off of Eastchester is problematic for many reasons. Entering and exiting from Hilton Court will also back up traffic at this critical light, creating a backup in the northbound left hand turn lane and an issue with traffic merging right to enter the highway when going southbound. I am sure that the traffic study commissioned by the developer did not find a problem with this, but then they are being paid by the developer, the study was done when traffic was probably at a 25 year low due to Covid, and they will not be personally involved in this snarl up in the future.

- 3) If your goal is to pull people off of I-74 in hope that they will go shopping and patronize other High Point businesses, wouldn't it be better to make them drive into town a mile or so for gas? Then they can see the signs for Chicos, Talbotts etc, and maybe even Target. If anything, placing a gas station here will make sure that they neither need to patronize High Point stores nor the retail establishments farther up Wendover. If your goal is to provide a convenience to people who are just passing through, they can get gas at Greensboro Rd. (1.5 miles down the road), as there are already at least 2 established gas stations and fast food there.

As for the question of neighborhoods. There are neighborhoods to the south and east of the proposed development and they will all be impacted by increased traffic especially at rush hour.

There is a lot of available office space in High Point. Sadly this is true, but converting these two properties to high-intensity commercial spaces will not solve that problem. However, the spaces could be used to put in a nice restaurant or other amenity (library, tech center, community center, design studios, art gallery) that would make people want to move their residences and offices to HIgh Point. City planning is complicated, as I am sure you all know. When people are considering where they want to live and work, they want clean water, manageable traffic, a critical mass of expertise, and amenities such as parks, YMCAs, gyms, restaurants, decent shopping, good schools, etc. This is the only piece of this section of the scenic gateway that can be used to announce who HIgh Point really is.

Drive throughs vs. upscale restaurants:
We live in exceptional times. Millions of restaurants around the US do not have drive through windows but they have pivoted to take out, delivery and outdoor dining. It would be shortsighted to rezone these lots on the basis of the current pandemic, especially since we have at least 2 vaccines that are likely to bring it under control before these structures could even be built.

Of course, it is not up to the City to pick winners and losers, but it is up to the city to plan how it will use its limited land resources. The best cities are the ones that use the power of zoning to create a plan for the city, rather than letting developers build with no regard to the overall plan.

Sincerely,

Robb Jolly
1821 Eastchester Dr.

--
Robb Jolly
Technology Specialist
New Garden Friends School
www.ngfs.org / (336) 299-0964



New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

Lisa Vierling

From: Jane Dawson <jdawson1013@gmail.com>
Sent: Tuesday, December 8, 2020 9:14 PM
To: Public Comment
Subject: Proposed Zoning Request for intersection @ Eastchester & Cypress Ct

Hello,
I'm a 20+ year homeowner @ Waterfront the townhouse community on Cypress Ct & listened to the Zoning Committee meeting. Thank you for the opportunity to comment. I assure you there are no residents here who'd consider having a convenience store/gas station/carwash/restaurant as our neighbor a positive. It's already harrowing to turn left on Cypress Ct. when coming from Westchester. We currently have to cross 2 congested lanes of traffic; the thought of adding another lane for right turns coming from the other direction @ rush hour is a nightmare.

Jane Dawson
2300 Cypress Ct
High Point, NC 27265
336 899-6939

Lisa Vierling

From: voicemail@northstateip.net
Sent: Thursday, December 10, 2020 11:47 AM
To: Public Comment
Cc: Public Comment
Subject: Voice Message Attached 3366865893
Attachments: 3366865893_20201210_114652.wav

Time: Dec 10, 2020 11:46:52 AM
Click attachment to listen to Voice Message

Voicemail (Anonymous)
336-686-5893
Thursday, December 10, 2020 11:47 a.m.
[00.40 duration]
Zoning Map Amendment 20-20

Transcript

Yes, I just wanted to make a quick comment on the development up on Eastchester of a new gas station going in close t the watershed. Eastchester's already backed up with traffic. I don't think we need another gas station close to the watershed. Water is being tested in that lake already. So, we're just going to monitor it and make sure everything stays the same. We just wanted to let you know that we are against development of any further gas stations close to the watershed in High Point. Thank you.

[end of voicemail]

Lisa Vierling

From: Jane Dawson <jdawson1013@gmail.com>
Sent: Tuesday, December 8, 2020 9:14 PM
To: Public Comment
Subject: Proposed Zoning Request for intersection @ Eastchester & Cypress Ct

Hello,
I'm a 20+ year homeowner @ Waterfront the townhouse community on Cypress Ct & listened to the Zoning Committee meeting. Thank you for the opportunity to comment. I assure you there are no residents here who'd consider having a convenience store/gas station/carwash/restaurant as our neighbor a positive. It's already harrowing to turn left on Cypress Ct. when coming from Westchester. We currently have to cross 2 congested lanes of traffic; the thought of adding another lane for right turns coming from the other direction @ rush hour is a nightmare.

Jane Dawson
2300 Cypress Ct
High Point, NC 27265
336 899-6939

ZMA 20-20

December 17, 2020

Dear High Point City Council,

I am writing in regards to the proposal from the Blue Ridge development company to rezone 3.6 acres near Oak Hollow Lake in order to construct a convenience store with gas pumps. As you know, the Planning and Zoning Commission voted 9-0 against this proposal, primarily because the underground gasoline tanks could pose a serious threat to High Point's drinking water supply from Oak Hollow Lake.

Although the developer has made environmental regulation assurances, there are still far too many factors involved that come with no guarantees. Then why take the risk on something that is so important? What if something in the design were not quite right? What if some of the tanks were to develop an undetected leak? (we all know it has happened before with other tanks) What's going on 20 feet below the ground that we are unaware of? How would these tanks and lines hold up over time?

What about weight and pressure, moisture, corrosion and deterioration, temperature changes, or even the natural shifting of the earth underground?

Given all this, I firmly believe that potentially endangering thousands of High Point citizens is certainly NOT worth adding one more gas station to our city's landscape. I therefore strongly urge you to deny this request and assure the safety of High Point's drinking water supply. Thank you.

Sincerely,
Mark Drews
High Point citizen since 1998

From: Stacey Jolly
To: Public Comment
Subject: ZA - Case 20-20, 1809 Eastchester Drive
Date: Friday, January 8, 2021 4:51:38 PM

January 7, 2021

Dear Mayor Wagner and City Council,

I hope you all had a wonderful holiday! I am writing regarding the 1809 Eastchester rezoning request that will be discussed at the January 19th meeting. I am asking that you please consider the following points concerning the rezoning request and proposed development.

1.CITY and STATE STUDIES and REPORTS -The traffic is already treacherous in this area and adding a high intensity development at this location will only make it worse. The TIA report regarding this stretch is not recommending an Eastchester access with a stacking lane for this proposed development. NC DOT is not in favor of this type of development in this area. Even without the Eastchester access, if the proposed development is limited to just Cyprus Court access, how will this not affect traffic at an already troubling intersection that the NC DOT has spent countless tax dollars to correct? Many of the citizens in the surrounding neighborhoods and in High Point, do NOT want this sort of development at this particular location. (Please see our 560+ signatures and 170+ comments in our petition that oppose this development at www.savehighpointwater.com).

2. TRAFFIC - The Eastchester I-74/Land Use Assessment that was just recently updated and the council has been briefed on, states the need to retain the Office land use designation because of concern that **commercial uses would hinder the efficiency of the interchange and possibly lead to the spread of commercial uses in the area,** making this a two pronged problem. People in this area are already plagued with traffic problems. We don't want any more. Making a left turn on Eastchester in this area is taking your life into your own hands. The number of accidents in this stretch is staggering and can be seen in the police2citizen website. The residents and people who work in and travel through this area daily have been so hopeful about the new and improved traffic pattern at the I-74 interchange. Wouldn't it be counter intuitive to allow this proposal at this location? The people want the safest, smoothest travel as possible in this area. That is more important to us than another generic fast food restaurant and gas station.

From the updated Eastchester I-74 Land Use Assessment:,

"High intensity commercial uses traditionally found in the Community/Regional Commercial land use category, such as drive-through restaurants and large commercial shopping centers, are not supported within the study area due to continued policy concerns about **the protection of the city's water supply; the safe and efficient transportation functionality of the Eastchester Drive corridor; the protection of adjacent neighborhoods; and the protection of the scenic corridor gateway into the city."**

3. DOMINO EFFECT - Planning and Zoning voted 9-0 against this, some commissioners were concerned with the "domino effect" of rezoning which could possibly lead to the spread of high intensity / commercial uses in the area. If you allow one to rezone how do you say no to others? This would clearly go against the Eastchester I-74/Land Use Assessment and what

many of the citizens who live and work in this area want.

4. WATER SAFETY - No one believes that our city officials would ever allow underground tanks to be put in without following every code and regulation. Even following all required regulations for grading to flow into the GWA and for the secure installment of underground storage tanks, does not mean we should not worry about the future of those tanks contaminating our watershed and groundwater runoff contributing to additional flooding into Foxwood Meadows. Vesta Kennedy has shared research from 2015 by the EPA, about how the increased ethanol in gas is causing more rapid deterioration of underground storage tanks. This would be in Tier 2 and 3 (and dangerously close to Tier 1) of the watershed, and even though there is already a precedent for gas stations in tier 3, does that cancel out the research? As one commissioner from PnZ pointed out, "…history of underground storage tanks gets amended because things go wrong. Contents of fuel change. Society discovers these things through major accidents." The citizens who know about this potential development are worried about protecting our watershed and our environment (again, please refer to comments in the petition). The updated land assessment expresses this concern as well.

1809 Eastchester is Area 3 in the city maps, below is the recommendation from the land assessment.

"While the development potential of Area 3 increases if property is graded so that it is subject to the City Lake GWA standards, the surrounding area is more significantly **constrained with stringent watershed restrictions, topographic constraints, controlled access and a classified stream that makes it infeasible for commercial development in the surrounding area.** Therefore, in order to maintain the consistency in character of this section of the gateway corridor, Area 3 should remain in the Office land use category. As previously stated, the OI district now allows for a wider variety of uses that offer additional development opportunities along this corridor while still adhering to the long-standing land use policies of this gateway corridor. The current zoning is R-3 and Conditional Use Office Institutional (CU-OI)."

5. NEED - Do we need another gas station, car wash, fast food restaurant and convenience store in this area? As previously mentioned in earlier letters, we are in no short supply of gas stations in this area or along this stretch of I-74 (according to Apple Maps and GPS, from this address there are **20 gas stations in a 3 mile radius**). While interstate commerce is important, there are other locations that have been approved for this type of development, not far from the I-74 interchange (and not 100 meters from Oak Hollow Lake). Let's not forget the multiple gas stations on Main Street and a short distance in either direction from the interchange on Eastchester.

6. CITIZEN SAFETY - The folks that live in this area are concerned that a 24/7 gas station, etc. would increase crime in our communities in and around the neighborhoods off of Gordon Rd., the Timberlake community, the Foxwood Meadows community, the apartments in the area, Waterfront Town Homes and Lake Point Condos. These are very real concerns for us and we have seen how crime can grow out of developments like this. Of course this is out of the developer's hands, but it is not out of your hands. The need to feel safe in our communities is greater than the need for a 21st gas station/convenience store, or a 6th car wash in 3 miles and another generic fast food restaurant with a drive thru. Please consider the safety of the taxpayers, both the small businesses and the families, that live and work in these areas.

7. YOUR FOOTPRINT - Your job as our elected officials is your legacy in many ways. I ask you to consider what footprint you want to leave in High Point. Wouldn't it be wonderful to encourage some sort of development with lasting character alongside our parks and open space/recreation areas that shows who High Point is? Wouldn't it be prudent to be more innovative with what we allow to be built in this area and focus on the long term profit and representation of our city? It seems to me we have enough problematic and/or abandoned gas stations that were built with the best of intentions at one point, but look at them now. There is a price to be paid for the short-term gains they offered as they now are eye-sores and some require extensive and costly cleanups. No doubt gas station revenue could be lucrative in the short term, but can we look at the big picture and think about other developments that could be just as lucrative and have more desirable long-term gains and sustainability? I, and many others, believe this is possible if you help make it so. We can and should use our most vital gateways to announce who we are and who we intend to be. That requires not rezoning a piece of land, that multiple studies conducted by the state and city say shouldn't be rezoned anyway, only for short term gain.

Many of us are opposed to this proposed development in this particular location for all of the above reasons. If we didn't love High Point and care about the well-being of our communities and water, we wouldn't be reaching out to you for your support. We are NOT antidevelopment or antigrowth; we just feel like 1809 Eastchester is not the place for this particular type of proposed development.

Thank you for the work you do for HIgh Point and the citizens of High Point!

All the best,

Stacey Stackhouse Jolly

From: Stacey Jolly
To: Public Comment
Subject: ZA Case # 20-20
Date: Tuesday, January 12, 2021 3:49:51 PM

Save High Point Water - YouTube

Dear Mayor Wagner and City Council members,

Thank you in advance for watching this video that expresses community concern about the possible rezoning of 1809 Eastchester Drive which if approved would allow for a proposed development of a gas station,convenience store, car wash, and fast food restaurant with a drive thru.

All the best,

Stacey Stackhouse Jolly

From:	Caroline
To:	Public Comment
Subject:	ZA - Case 20-20, 1809 Eastchester Drive
Date:	Tuesday, January 12, 2021 8:33:32 PM

Dear Mayor Wagner and City Council Members:

There are many good reasons to oppose the rezoning of 1809 Eastchester, but I will cite the two I believe are most critical:

1.The water contamination from run-off and the possibility of leakage from deterioration of underground tanks is a risk we don't dare take.

2. The rezoning for high-traffic business will not stop with just one business. All the money spent and work done to relieve traffic congestion at the intersection of Eastchester and I-74 will come to nought. You want people to visit our new development downtown. Don't make it difficult for them to get there.

Yours truly,

Caroline McGuinn

From: Lee Ann Patterson
To: Public Comment
Subject: Letter to City Council regarding proposed zoning changes for 1809 Eastchester Dr
Date: Wednesday, January 13, 2021 9:06:50 PM

Dear High Point City Council,

Thank you for your service to our community and your careful consideration of this issue. We are writing to express our deep concern about the proposed development of 1809 Eastchester Ave. It has come to our attention that a developer is petitioning the City of High Point for this property to be rezoned to allow a gas station, car wash, convenience store, and a fast food restaurant to be placed on this parcel. This request is in contradiction to the unanimous ruling of the Planning and Zoning Commission in early December that upheld the original zoning plan recommended by the new 2020 Land Use Plan for High Point. This plan calls for the existing zoning (ie residential and light commercial - small office buildings), to be maintained in light of the traffic and environmental issues that are unique to this parcel. As our elected officials, you have the power to help determine what High Point will look like in the future. This is an awesome and important responsibility and we urge you to consider the following points.

The Gateway to High Point

There are plenty of gas stations, fast food restaurants and even car washes within a two-mile radius of this location. So the bottom line is that these "conveniences" are not needed by the residents and commuters who use Highway 68. However, this location sits at the Gateway to High Point along the very important and highly travelled corridor between High Point and Greensboro. It presents a unique opportunity for High Point to identify and announce who they want to be in the next 20-50 years and that could be done in a way that is consistent with the current zoning.

There are sadly many "has been " mill towns in NC. Many of them have been reduced to a series of fast food restaurants and gas stations. However, this does not need to be the case. With careful city planning and the wise use of land, a mayor, city council, and planning and zoning commission can reframe the future of a medium sized town. This will take time and hard work but it will pay off in ways that no gas station will ever be able to do. Many cities have been forced to redefine themselves in light of economic changes. Some have succeeded (Buffalo, Detroit, Pittsburgh) but many have given in to the expediency of a small amount of increased tax revenue. This does not have to

be High Point's fate. This parcel of land sits at the very nexus of the Golden Triangle and is roughly equidistant to UNCG, Winston Salem State, Wake Forest, High Point University and Guilford. Why not put something that represents the future of High Point at its gateway such as the Hurt Hub for Innovation in Davidson http://hurthub.davidson.edu that connects entrepreneurs, community partners, and local universities or a Design Center which focuses on innovative furniture and textile design? The possibilities are endless and should not be limited to gas stations and convenience stores. Using our most vital city gateways to announce that we are a city that embraces innovation and entrepreneurship sends a message that High Point can and will redefine itself as an important center of commerce for the next 50 years. Or you could just allow another gas station and car wash to go in.

The Domino Effect

The developer is asking for a single zoning exemption. He is from Charlotte and is not concerned about how this may affect other property owners or residents along 68. But if you allow this development to go in, will you not be forced to allow other property owners along this stretch of 68 who are tax paying citizens and High Point voters to also be granted zoning exemptions which will be in direct contradiction to the 2020 Land Use Plan you have just commissioned? It is a slippery slope. And there are real hazards and costs to one exemption which will only be multiplied if others are also allowed zoning exemptions. (More about this below)

Traffic at the Intersection of US 68 and I 74/US 311

The proposed site of development is approximately ¼ mile north of the NC 68/ US 311 interchange. This is an extremely dangerous section of road. According to the NC68/ US 311 Interchange study prepared for the City of High Point by HNTB North Carolina, PC in March 2009, There were approximately 50,000 AADT (Annual average daily traffic) north of 311 and 40,000 AADT south. **The study predicted that by 2035 there would be 85,000 AADT north** of and 65,000 south. That represents approximately a 70% increase in the number of cars travelling over this stretch of road daily. Although the numbers are somewhat down because of the current pandemic, these numbers will surely jump up again as soon as everyone is vaccinated in the not too distant future. In short, the traffic along the stretch of road from the Oak Hollow dam to I-74/ US 311 is bad and likely to get worse over the next 15 years.

It is already nearly impossible to turn left (west) while travelling north on 68 at this point and having to cross over traffic from the west side of Eastchester to continue north is very dangerous because of the amount and speed of traffic coming up the hill by the reservoir. In fact, local businesses have posted signs advising their clientele to only turn right when leaving their locations and merging onto Eastchester. The developer has proposed that this site be accessed from the soon to be renamed Hilton Court. This small neighborhood road was never intended to carry this much traffic and it will cause immense congestion at the light for people turning left and it will make it extremely difficult to merge onto 74 from 68 south. The NC DOT has spent millions of dollars to rework these intersections to decrease congestion and improve safety. Rezoning this area for commercial enterprises will encourage additional cars to flow in from US 74 and will involve a constant crossing over of traffic in a very short distance that will negate much of the work done over the last few years to address this situation. Imagine the crazy congestion that will also occur if adjoining parcels are also rezoned. With all due respect, this is really just a recipe for frustration and congestion.

High Point's Water Supply

As you know this site sits at the apex of two watersheds, the one to the west flows into Oak Hollow Lake and the one to the east flows into the west fork of the Deep River and directly into City Lake. It is also in a 100 year flood plain. Placing a gas station and car wash here could have a serious and very deleterious effect on the city's water supply. We are all aware of the many problems other communities have had with leaking underground tanks and the great expense incurred to remedy these problems frequently to no avail. Although underground tank technology is improving as the developer will no doubt argue, there is no guarantee that overtime these tanks will not leak. Underground leaks are always serious but not as serious as they are when the leaks flow directly into the water supply. Benzene, toluene, ethylbenzene and xylenes, collectively known as the BTEX compounds, are the most hazardous chemicals found in petroleum. Benzene-contaminated water has been proven to cause cancer, as does water contaminated by methyl tertiary butyl ether, which is added to gasoline to make it burn cleaner. As Myron Mehlman from the Icahn School of Medicine at Mount Sinai notes "Human epidemiologic studies show important increases in cancers of the kidney, stomach, brain, pancreas, prostate, lung, and skin as well as hematopoietic and lymphatic leukemias as a result of exposure to gasoline, its components, and its vapors."[1] Underground tanks can leak because of deterioration over time, faulty hook ups and

monitoring systems, and underground shifts.

Underground storage tanks are not the only problem however. Markus Hilpert, a senior scientist and an associate professor in the Department of Health Science at Johns Hopkins Bloomberg School of Public Health noted that gasoline spills don't evaporate as quickly as originally assumed thereby either permeating the concrete or being washed by water or rain into storm sewers. Over time this can add up to a substantial amount of gasoline. He also stated that the move towards large gas stations with multiple pumps that sell 10 times the amount of gas sold in traditional stations will exacerbate this problem.[2] Gas stations like Sheetz advertise that they have an abundant number of pumps so you don't have to wait. To date, regulators have not been able to address the problem of surface saturation and run off.

Finally, car washes also present a problem to the groundwater. Many soaps contain harmful chemicals that degrade water quality. The pollution problem is only compounded when the soapy water is mixed with the grime, dirt and grease removed from a vehicle. The water runoff must inevitably go somewhere and it usually goes into a storm drain. As the EPA notes, water that goes into storm drains is not treated and flows directly into lakes, streams, and rivers. Whether the water flows east or west from this point it will end up in your water supply. The developer will tell you that they will grade the site so that the water flows towards City Lake. Does that mean that all of these carcinogenic compounds in the surface water will flow directly into the neighborhood on the East side of 68, a neighborhood that is already suffering from constant flooding? Also will this grading and the inevitable run off create a slick and hazardous situation on the most heavily trafficked part of 68 itself every time it rains?

The voice of the People

Over 560 voters and taxpayers in High Point have signed a petition saying that they do not want to risk their water supply so that a developer from Charlotte can build a gas station and car wash that we don't need. The developer will still own the land and he can use it in any way that accords with the zoning regulations. We are not anti- development. We just believe that the zoning recommendations established by our own Land Use Plan and Planning and Zoning Commission were fully researched and developed after careful consideration of many factors and should be upheld by the City Council.

Recreational and Open Space

The planning and Zoning Commission has recommended that the land behind 1809 Eastchester be bought by the city when it becomes available and that it be designated as recreational and open space to protect the Oak Hollow watershed. If you allow a gas station, convenience store and fast food restaurant to be placed on 1809 Eastchester now, it will be there for 50 years and it will border the city's open space and recreational land. Is this a good idea? Why not use the land for a library, museum, innovation center or something else that will benefit the city rather than just become an ugly problem? If you do decide to move forward with this project however, I would encourage you to require the developer to surround the entire property with an 8 foot concrete wall (rather than simply a 100 foot green space) for the sake of the current residents and to protect future city land from noise and light pollution and criminal activity.

I also urge you to review the DOT traffic report for this area and see how many of the accidents along this corridor already involve alcohol and drug abuse. While it is not your responsibility to prevent legal adults from drinking, it is your duty to protect innocent citizens using your roadways and open and recreational spaces by using your power to zone so that alcohol is not readily available in high traffic areas. In addition, gas stations and convenience stores are notorious for attracting criminal activity ranging from robberies to drug dealing and even homicides by nature of the fact that they are open late into the night. The Sheetz on South Main was closed in November 2019 to protect the safety of its customers and employees. Most of the crimes that occurred there were related to panhandling and drug overdoses. Admittedly, not all gas stations have a similarly high rate of crime but placing this development in an area which is currently zoned for offices and single family residences may unnecessarily expose these law abiding citizens to a transient population of criminals given its central location between High Point and Greensboro and Winston Salem and Kernersville. It would fall on the already overworked High Point police to address these issues. Please keep in mind that this land will most probably border city land in the future if you follow the city's Land Use Plan. So while it is a problem for residents now, it will be a problem for the city of High Point in the future.

Serving the community of High Point as an elected official is a huge responsibility. I am assuming that you ran for this office because you care about all the citizens of High Point and the future of the town itself even though

at times it may seem like a thankless job. **We are grateful for your service to the community**. And in that light, we ask that you carefully consider exactly who would benefit from rezoning this parcel of land keeping in mind that it sits at the Gateway to High Point, the present traffic issues, potential water issues, the impact on already established neighborhoods, and the future possibilities for open and recreational space. And most of all, please think about how your leadership in all the big and small ways can help revitalize this town for the next 50 years. Your decisions now will be your legacy. Will it be one that really benefits the city and its residents now and in the future or just another gas station, fast food restaurant, and convenience store?

With sincerest thanks for your kind attention,

Lee Ann Patterson and Dan Stackhouse
Concerned Citizens and Owners (through inheritance) of 2214 Hilton Court

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[1] Melman, Myron. "Dangerous and cancer-causing properties of products and chemicals in the oil refining and petrochemical industry: VIII. Health effects of motor fuels: Carcinogenicity of gasoline—Scientific update." Journal of Environmental Research 1992.

[2] Hilpert, Markus. "Infiltration and Evaporation of Small Hydrocarbon Gas Spills at Gas Stations." Journal of Contaminant Hydrology, 2014.

From: Robb Jolly
To: Public Comment
Subject: Opposed to Zoning Map Amendment 20-20, 1809 Eastchester Dr.
Date: Thursday, January 14, 2021 10:02:22 AM

January 14, 2020

To the members of High Point City Council:

I'm writing as a concerned citizen and neighbor to express my opposition to the proposed rezoning of two properties on the corner of Eastchester Dr. and Cypress Ct. As an owner of property adjacent to these lots, I have many personal concerns about the negative effects that such a change would bring to my family's quality of life; however these concerns are not limited to my own, for they also resonate with many of our commercial and residential neighbors, and could potentially affect a large number of High Point citizens due to the properties' proximity to the Oak Hollow Lake watershed.

As you are aware, on Dec. 10, 2020 the Planning and Zoning Commission voted 9-0 AGAINST recommending this rezoning application, which I believe sends a strong message to the City Council about the dangers and concerns which they feel accompany this rezoning request.

Before detailing my fears about what this rezoning change and subsequent development would do to our neighborhood and this area of High Point, **I want to implore the members of the City Council to vote AGAINST this rezoning change, as it goes against the following recommendations that are put forth in the City's Land Use Assessment for the area** (Oct. 30, 2020):

- p.4, **Transportation:** *In order to maintain the safe and efficient transportation functionality of the corridor, direct access points need to be limited. Whenever possible, access should always be taken from side streets, therefore, lot consolidation is encouraged. When additional or direct access to Eastchester Drive is necessary, then a lot frontage of 350 feet will be needed to accommodate a driveway, the side yard offset and distance from intersection, or deceleration lane, whichever is applicable.*

- p.5, **Commercial Development:** *In order to continue to preserve areas in between these large commercial nodes [i.e. Eastchester/Wendover and Eastchester/Main St.] for other uses, to manage traffic, and to protect the gateway qualities of the corridor,* ***it is important not to allow commercial uses to expand along the entire corridor. While the interchange at I-74 may seem like a good location for commercial development to occur, there are constraints and concerns that should be considered****. The area in*

and around the interchange is narrow, so it does not offer large areas for development; it is constrained by the lake to the west and by established neighborhoods to the east; and it is impacted by the development restrictions of the Oak Hollow Lake WCA.

- p. 6, **General Recommendations:**

  - *The Land Use Plan designation for a majority of the study area is recommended to remain as Office with some minor changes [See Map 4: Land Use Recommendations]. There is an opportunity to add a small area of Local/Convenience Commercial at the southeast quadrant of the interchange (Area 6) to accommodate some limited commercial uses.… For development to happen in this area, it will require land assembly to manage impacts, coordinate access, and maximize development potential under the watershed development restrictions. If these requirements can be achieved, then a policy change can be considered to accommodate low to moderate intensity retail and personal service uses that are typically allowed in the Limited Business (LB) district, such as a convenience store with fuel sales.*

  - ***High intensity commercial uses traditionally found in the Community/Regional Commercial land use category, such as drive-through restaurants and large commercial shopping centers, are not supported within the study area** due to continued policy concerns about the protection of the city's water supply; the safe and efficient transportation functionality of the Eastchester Drive corridor; the protection of adjacent neighborhoods; and the protection of the scenic corridor gateway into the city.*

- pp. 7-8, **Area 3 Specific Recommendations** (see map)**:** *If the area remains in the critical area, then smaller office uses along the Eastchester Drive frontage would likely be the extent of its development potential....the surrounding area is more significantly constrained with stringent watershed restrictions, topographic constraints, controlled access and a classified stream that makes it infeasible for commercial development in the surrounding area.* ***Therefore, in order to maintain the consistency in character of this section of the gateway corridor, Area 3 should remain in the Office land use category.***

As far as personal and neighborhood concerns, I feel that if the two lots in question are rezoned to allow the development of a gas station, convenience store and drive-through restaurant, it will have the following negative effects on the area:

- **Increased traffic, congestion, and accidents**
- **Increased noise, light pollution, and crime**
- **Increased environmental harm to drinking water, as runoff from gas spills, oil and other contaminants inevitably flows into Oak Hollow or City Lake reservoirs**
- **Increase in the likelihood that similar lots in the area will be rezoned to allow this type of high-intensity land use, which will further decrease the quality of life for our neighborhood, and continue the cycle of negative impacts mentioned above**

In summary, our neighborhood and our access to and from our house has already been negatively affected greatly by the long and drawn out construction project around the Eastchester Dr/I-74 interchange, and the above concerns--some personal, but many expressed by members of our city government who researched and authored the Land Use Recommendations--make it clear that changing the zoning of these two lots to allow for the development of a gas station, convenience store and drive-through restaurant is a BAD IDEA on all fronts.

I ask each of you to consider how you would feel if you and your family lived on land adjacent to these lots, as I believe that would lead you to vote AGAINST this rezoning proposal. **At the very least, I believe that the City Council should advocate for waiting until the Land Use Assessment Recommendations are passed before taking action on such an important piece of our city's land, infrastructure, and ecosystem.**

Sincerely,
Robb Jolly

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Robb Jolly
Technology Specialist
New Garden Friends School
www.ngfs.org / (336) 299-0964

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

From: Stacey Jolly
To: Public Comment
Subject: ZA case #20-20
Date: Thursday, January 14, 2021 5:42:25 PM

Dear Mayor Wagner and City Council,

As you know this situation has been weighing on my heart for a multitude of reasons. I must share two more thoughts. As the mother of a new teenage driver, I am understandably worried about her being an inexperienced driver, but even more so with the traffic situation on Eastchester near the I-74 interchange. She travels this area multiple times, every day to go to her high school, her dance studio, etc.. We live very close to the interchange. I have witnessed so many accidents on this stretch, some fender benders, others requiring a trip in an ambulance to the hospital. I have seen the jaws of life carving people out of their cars and I have seen cars crumpled up like a ball of paper, all due to accidents along this stretch of Eastchester. Not long ago, I, myself, was the second car in a 4 car pile up, where the first 3 cars slammed on brakes and did not hit each other, only to be slammed into by a 4th car that never braked. That accident required 6 months of physical therapy to correct my back injury. Who is to say that many of these accidents don't happen due to the drivers own negligence, but regardless, this is an incredibly treacherous road to travel on, and has been for many years. Of course this is out of the developers hands, but you can do something about this by not allowing a multitude of high intensity businesses to occupy this lot. It is my understanding that NCDOT has spent roughly $18 million out of the $22.5 million allotted for this redesign project.and it looks like there is a ways to go before they are completed. NCDOT did not design this upgrade with an additional right turn lane going into the proposed development. They have clearly stated they are against it.. I am asking you to please consider the people that travel this road every day. Please think about the safety of our citizens. I simply do not see how allowing a development of this magnitude at 1809 Eastchester could NOT affect traffic in this area, a problem that the NCDOT has spent millions of dollars to try and alleviate.

Which brings me to the last thing I have for now; we know and understand how much Blue Ridge Companies has contributed to High Point. Who doesn't love the Palladium and the shops there? I am grateful for what they do and bring to us. So this is not about who the developer is; it's about WHAT the proposed development is and WHERE it is being proposed. What I have seen of BRC developments, they offer great entertainment and living opportunities, but another gas station, convenience store, car wash and generic fast food restaurant are neither great entertainment or great living opportunities.They are in fact, developments that could potentially create a myriad of greater problems in the long run, which many of the landowners and citizens in this area have already expressed in their letters. This is not what we need and not what the surrounding communities in this area want in this location. Wouldn't a charming restaurant or cool microbrewery or something along those lines be a greater asset than a 21st gas station in a 3 mile radius?

As always, thank you for your time and attention.

All the best,

Stacey Stackhouse Jolly

Voicemail (Anonymous)
336-689-0123
Sunday, January 17th @ 4:05 p.m.
[00.38 in duration]
Zoning map Amendment 20-20

Hello City Council Members.

Please when you vote on the Eastchester new development, please, please, please consider our watershed. That traffic out there is horrendous now. We do not need more gas stations, nor do we need fast food places, but we do need control of traffic.

Thank you so very much for your kind, kind consideration.

[end of voicemail transcript]

From: Jolly, Stacey S
To: Public Comment
Subject: ZA Case #20-20, 1809 Eastchester Drive
Date: Tuesday, January 19, 2021 2:24:18 PM
Attachments: Outlook-ypsh0k5v.png
Outlook-qqdytn1d.png
Outlook-3vgiunci.png

Dear Mayor Wagner and Council Members,

As of January 18th, these screen shots show you the number of car accidents, arrests and incidents that have happened in a 1-mile radius of 1809 Eastchester Drive. This information comes from the https://p2c.highpointnc.gov/Home webpage. The amount of car accidents is astounding (one accident every 3 days - just in this area), and I worry how a development of this magnitude in this location would not cause more accidents and diminish the millions of dollars the NCDOT has invested into making this area safer and easier to travel. This coupled with the crime that already exists in this area is scary. Gas stations, especially 24/7 gas stations incubate crime, especially when the sun goes down. Then the domino effect of allowing this request to be rezoned to general business / high intensity causes real concern for other landowners in the area to follow suit. How will you say no to others if you say yes to this? What will our Eastchester corridor look like then? This goes against everything the updated I-74 and Eastchester Land Assessment, the NC DOT and the most recent TIA report has recommended. And of course, the concern for putting gas tanks that close to our drinking water has many citizens upset as seen in the petition comments. Tanks leak, they leach, that is why they put a tank within a tank now. Mistakes we had to learn the hard way from the past. What will have to be done next when that stops working? We are talking about 100 meters from our watershed.

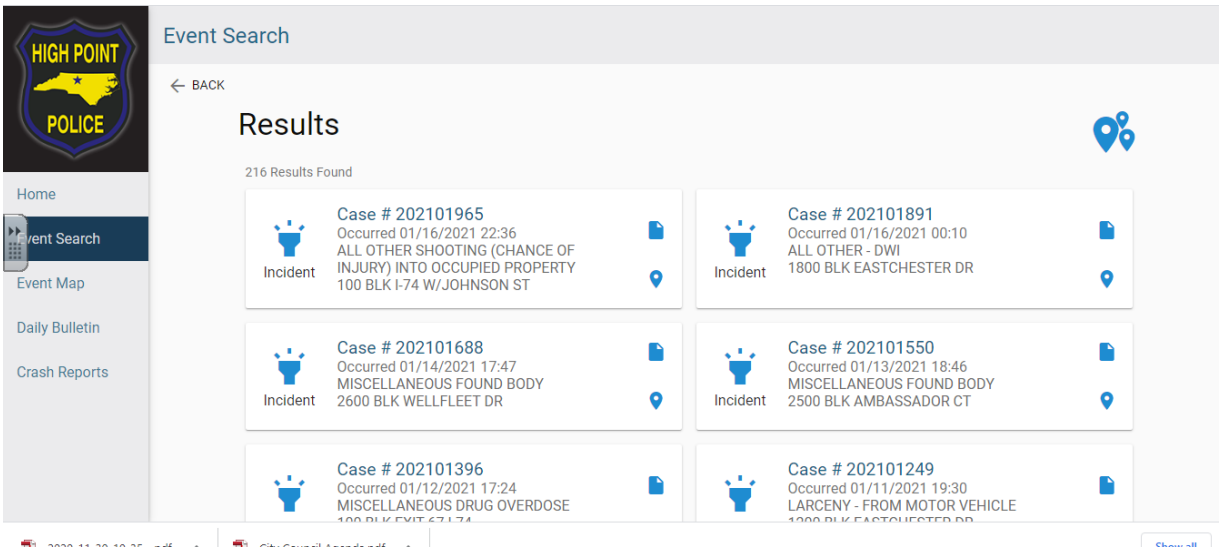
Many of us believe that water pollution and citizen safety should never be the price of prosperity.

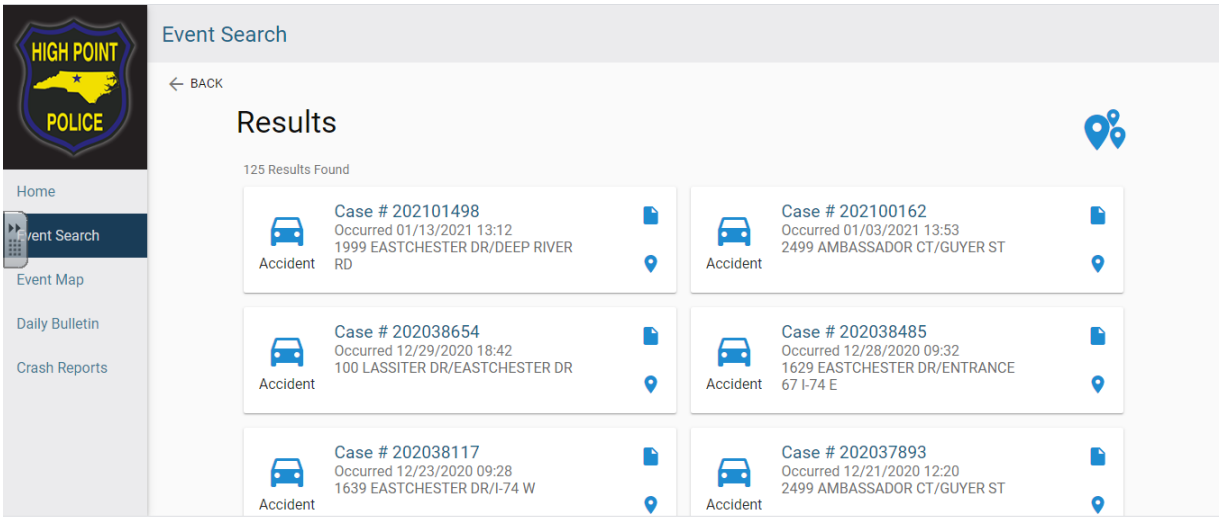
216 incidents, 125 car accidents and 116 arrests in the past 365 days, all within a 1-mile radius of 1809 Eastchester.

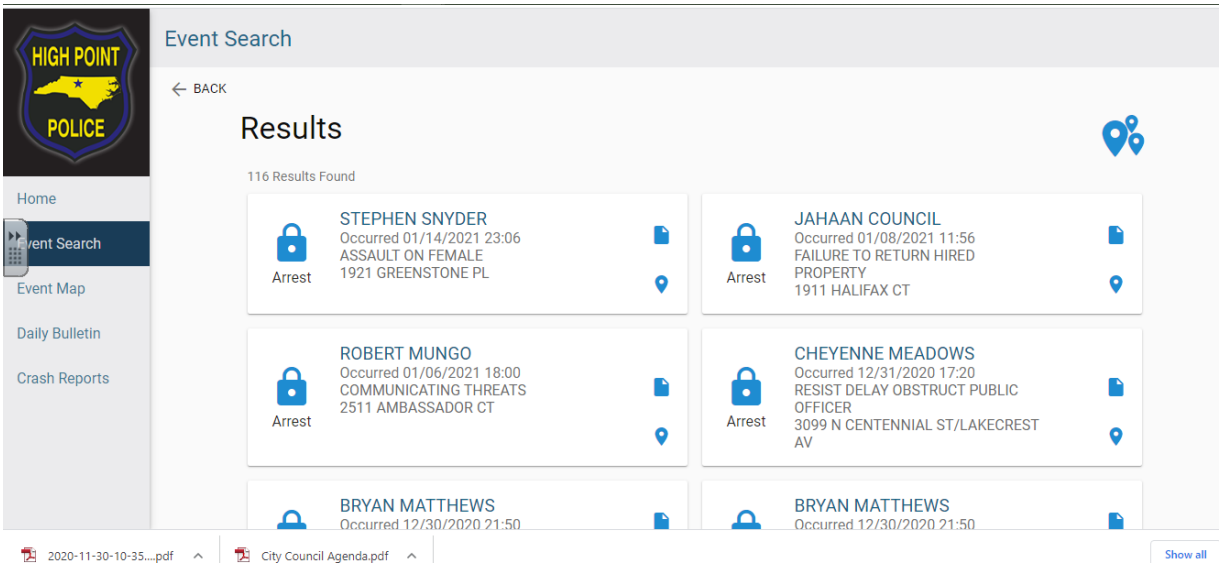
Thank you again for all you do!

Stacey Stackhouse Jolly
ESL Teacher
Chair of the School Improvement Team
R.J. Reynolds High School
301 N. Hawthorne Road
Winston-Salem, NC 27104
(336)703.4145

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HIGH POINT POLICE
Event Search
BACK
Results
216 Results Found
Home
Event Search
Event Map
Daily Bulletin
Crash Reports
Incident
Case # 202101965
Occurred 01/16/2021 22:36
ALL OTHER SHOOTING (CHANCE OF INJURY) INTO OCCUPIED PROPERTY
100 BLK I-74 W/JOHNSON ST
Incident
Case # 202101891
Occurred 01/16/2021 00:10
ALL OTHER - DWI
1800 BLK EASTCHESTER DR
Incident
Case # 202101688
Occurred 01/14/2021 17:47
MISCELLANEOUS FOUND BODY
2600 BLK WELLFLEET DR
Incident
Case # 202101550
Occurred 01/13/2021 18:46
MISCELLANEOUS FOUND BODY
2500 BLK AMBASSADOR CT
Case # 202101396
Occurred 01/12/2021 17:24
MISCELLANEOUS DRUG OVERDOSE
Case # 202101249
Occurred 01/11/2021 19:30
LARCENY - FROM MOTOR VEHICLE


HIGH POINT POLICE
Event Search
BACK
Results
125 Results Found
Home
Event Search
Event Map
Daily Bulletin
Crash Reports
Accident
Case # 202101498
Occurred 01/13/2021 13:12
1999 EASTCHESTER DR/DEEP RIVER RD
Accident
Case # 202100162
Occurred 01/03/2021 13:53
2499 AMBASSADOR CT/GUYER ST
Accident
Case # 202038654
Occurred 12/29/2020 18:42
100 LASSITER DR/EASTCHESTER DR
Accident
Case # 202038485
Occurred 12/28/2020 09:32
1629 EASTCHESTER DR/ENTRANCE 67 I-74 E
Accident
Case # 202038117
Occurred 12/23/2020 09:28
1639 EASTCHESTER DR/I-74 W
Accident
Case # 202037893
Occurred 12/21/2020 12:20
2499 AMBASSADOR CT/GUYER ST
2020-11-30-10-35....pdf
City Council Agenda.pdf
Show all


HIGH POINT POLICE
Event Search
BACK
Results
116 Results Found
Home
Event Search
Event Map
Daily Bulletin
Crash Reports
Arrest
STEPHEN SNYDER
Occurred 01/14/2021 23:06
ASSAULT ON FEMALE
1921 GREENSTONE PL
Arrest
JAHAAN COUNCIL
Occurred 01/08/2021 11:56
FAILURE TO RETURN HIRED PROPERTY
1911 HALIFAX CT
Arrest
ROBERT MUNGO
Occurred 01/06/2021 18:00
COMMUNICATING THREATS
2511 AMBASSADOR CT
Arrest
CHEYENNE MEADOWS
Occurred 12/31/2020 17:20
RESIST DELAY OBSTRUCT PUBLIC OFFICER
3099 N CENTENNIAL ST/LAKECREST AV
BRYAN MATTHEWS
Occurred 12/30/2020 21:50
BRYAN MATTHEWS
Occurred 12/30/2020 21:50
2020-11-30-10-35....pdf
City Council Agenda.pdf
Show all

Voicemail (Susie McCaskill)
919-264-4835
Tuesday, January 19th @ 6:36 p.m.
[01:06 in duration]
Zoning Map Amendment 20-20

Hi.

I'm calling in regards to the rezoning on Eastchester Drive in High Point, North Carolina. This is Susie McCaskill calling and I am very, very much opposed to rezoning that area for commercial. You do not need to have a potential gas station with underlying water tanks leaking into the water supply of High Point. I see absolutely no reason whatsoever to have that rezoned commercial at that location. That hill and that road is a nightmare as it is and now you're talking about more traffic. It's so dangerous out there. It seems to me like there could be a better location with not three roads coming in together at the same point and people driving very fast. It is a huge accident waiting to happen which is going to cause lawsuits. Please, please consider not allowing that area to be rezoned as commercial.

Thank you.

[end of voicemail transcript]

Voicemail (Scott Blevins)
336-689-6749
Wednesday, January 20th @ 4:44 a.m.
[00.40 in duration]
Zoning Map Amendment 20-20

My name is Scott Blevins and I live close by the 2809 Eastchester where you're getting ready to vote on a Sheetz gas station. The last thing we need in High Point is another Sheetz gas station or a gas station period. And the very last thing we need to do is to put it on our drinking water in the watershed. I will make sure that everybody that votes for this to go through that I make sure I vote against come the next election. I will get the paperwork to see who all voted for it and I don't care if you're a Republican, Democrat, or Independent, if you vote for it, I will vote against you. Do not mess up High Point's watershed.

[end of voicemail transcript]

Voicemail (Suzie Wilson)
336-862-5115
Wednesday, January 20th @ 11:11 a.m.
[00.21 in duration]
Zoning Map Amendment 20-20

Hi.

I'm leaving a voicemail because I am against the rezoning of 1809 Eastchester Drive. I'm a High Point citizen. My name is Suzie Wilson and I would like to just make that comment.

Thank you.

[end of voicemail transcript]

Voicemail (Anonymous)
336-491-2888
Wednesday, January 20th @ 2:14 p.m.
[00.20 in duration]
Zoning Map Amendment 20-20

Yes, I'd like to voice my word about the new gas station going in at Oak Hollow Mall. I want to vote against that. Again, vote against putting something that will affect our drinking water.

Thank you.

[end of voicemail transcript]

Voicemail (Anonymous)
336-8804459
Wednesday, January 20, 2021 @ 4:22 p.m.
[00:11 in duration]
Zoning Map Amendment 20-20

Yes, I'm saying I'm against the rezoning at the 1809 Eastchester Drive location. I'm against rezoning. Thank you.

[end of voicemail transcript]

Lisa Vierling

From: Jolly, Stacey S <ssjolly@wsfcs.k12.nc.us>
Sent: Friday, January 29, 2021 12:36 PM
To: Public Comment
Subject: ZA Case # 20-20, 1809 Eastchester Drive
Attachments: NYT Headline.jpg

Hello Mayor Wagner and City Council members,

I hope you all are doing well and staying healthy. I want to share one of the New York Time's headlines from yesterday (see attachment). I found it very interesting that in the near future, one of the biggest car companies in the USA is phasing out gasoline-powered cars and trucks by 2035. This will surely result in other huge car companies doing the same in order to compete with them. Again, this information reaffirms the belief that many of the citizens of High Point hold to be true, we do not need or want more gas stations and especially ones built in a location where they could negatively impact both of our watersheds, and safe travels on Eastchester. Eventually, all of these gas stations are going to require very costly cleanup. Underground storage tanks for gas stations can gravely contaminate ground water and they contribute to contamination of surface water, as seen in the studies that Vesta Kennedy has shared with you and what you already know to be real scenarios in High Point. Why would we add a 21st gas station in this 3 mile-radius when the future is going in the opposite direction?

Please do not allow this land to be rezoned which would allow for yet another gas station, especially given that the future need for fossil fuels is growing more questionable by the day.

As always, thank you for your time, consideration given to this matter, and the job you do.

All the best,

Stacey Stackhouse Jolly
ESL Teacher
Chair of the School Improvement Team
R.J. Reynolds High School
301 N. Hawthorne Road
Winston-Salem, NC 27104
(336)703.4145

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The New York Times

BREAKING NEWS

General Motors said it planned to phase out gasoline-powered cars and trucks and sell only vehicles that had zero emissions by 2035.

Thursday, January 28, 2021 2:13 PM EST

The move is a seismic shift by one of the world's largest automakers that makes billions of dollars today from gas-guzzling pickup trucks and sport-utility vehicles, and it could put pressure on competitors around the world to make similar commitments.

It could also embolden President Biden and other elected officials to push for even more aggressive policies to fight climate change, as leaders could point to the decision as evidence that big businesses are ready to transition away from fossil fuels.

From: Jolly, Stacey S
To: Public Comment
Subject: ZA #20-20, Eastchester Drive
Date: Thursday, February 11, 2021 5:31:33 PM

February 11th, 2021

Dear Mayer Wagner and City Council,

I am asking that you please consider the below points when it comes time to vote on the rezoning of case 20-20, on Eastchester Drive.

- No environmental studies have been done to see how this would affect the water, air, and surrounding nature. Given that right behind this lot we have eagles that are nesting on our watershed, it seems more prudent than ever to have some environmental studies regarding the multiple potential impacts this project may have.
- This project is inconsistent with the move away from fossil fuel vehicles toward alternative fuel vehicles. Please refer to the article I shared with from the NY Times stating that GM is phasing out gasoline powered cars in the next decade. Please, no more gas stations that will require costly clean-up.
- If you say yes to this rezoning, what will you tell other offices in the area that ask to rezone? This could be setting a very dangerous precedence in an environmentally fragile area. The domino effect of this could destroy what the gateway corridor is meant to be. I-74 / Eastchester Land Use Assessment is opposed to this sort of rezoning as well as the Planning and Zoning commission.
- Light pollution / noise pollution with a 24/7 operation will disrupt surrounding environment and neighborhoods. I know they will install special lights, but please drive by the 7-11 in Jamestown after dark to get an idea about the light pollution.
- The traffic will increase in this area, which will result in more accidents. Reports from the TIA and NCDOT state their opposition to the additional right turn lane, and Cypress Court simply cannot handle the extra flow of traffic. The stoplight will back up so much that the $18-22 millions worth of work by the NCDOT to improve this area will be for naught.
- The contamination of ground water from underground storage tanks, which all prove to be fallible at some point in time, creates a precarious situation being that close to our watershed. 108,000 citizens in High Point depend on clean drinking water. This project affects both of our watersheds.

- Adding more impervious surfaces in this area will contribute to the flooding problems that already exists at Foxwood Meadows, as well as more runoff pollution.
- Increased runoff and contamination of surface water will flow into tributaries of the East Fork river which will flow unchecked into City Lake.
- Will the monitoring of storm water measures and underground storage tanks be adequate? Who is in charge of this?
- We are not antidevelopment on any level; we do not support this development in this location. We are asking you to not support this development in this location.
- Please refer to the 190 comments on the petition at www.savehighpointwater.com to see what

citizens think about this. 580+ citizens have also spoken with their signature.

- Thank you for making the hard decisions to grow High Point in the best ways possible while keeping the citizens of High Point safe. I very much appreciate you and the job you do.

All the best,

Stacey Stackhouse Jolly
ESL Teacher
Chair of the School Improvement Team
R.J. Reynolds High School
301 N. Hawthorne Road
Winston-Salem, NC 27104
(336)703.4145

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Voicemail (unidentified caller)
336-847-5301
Friday, February 12th @ 4:00 p.m.
[00.45 in duration]
Zoning map Amendment 20-20

Hi.

I am calling to voice my opposition to the rezoning of 1809 Eastchester Drive, Zoning Case 20-20. It has come to my attention that a developer wants to build a gas station, fast food restaurant, car wash, convenience store on this lot. I'm very, very much opposed to this, period. The traffic on Eastchester is a disaster. How in the world can we handle more traffic. Above ground tanks, underground tanks with a gas station that close to our water shed is dangerous, period.

Please vote NO against the rezoning for 1809 Eastchester Drive.

Thank you.

[end of voicemail transcript]

Voicemail (unidentified citizen)
336-858-2121
Friday, February 12th @ 4:32 p.m.
[01.06 in duration]
Zoning Map Amendment 20-20

Hello City Council.

This is a concerned citizen. I have caught wind that you're having another meeting in regards to the gas station, car wash, fast food restaurant going up on Eastchester, which is already a death trap. I think it's very, very important that y'all realize that our city does not need that. We do not need to go down this road and I heard that they were trying to go around it by way of putting the underground gas tanks above ground. Okay, that's just as asinine as [inaudible]. It's not needed. We don't need it. Put it somewhere else. Put it in an area that you're trying to revitalize or build up. It can't take another thing on that road. Eastchester needs to be left alone. Listen to your citizens. The greed has to stop.

Thank you.

[end of voicemail transcript]

Voicemail (unidentified citizen)
336-862-2898
Friday, February 12th @ 4:47 p.m.
[00.36 in duration]
Zoning Map Amendment 20-20

Yes. The citizens of High Point want clean drinking water. Do not allow a gas station to be built at 1809 Eastchester Drive. The traffic in this area is terrible already and this road cannot handle it. We deserve clean drinking water in High Point. Above ground tanks are just as dangerous as below ground tanks.

Please say No to the rezoning of 1809 Eastchester Drive.

Thank you.

[end of voicemail transcript]

Voicemail (Daisy)
336-882-2002
Friday, February 12th @ 5:37 p.m.
[00.22 in duration]
Zoning Map Amendment 20-20

Hello. My name is Daisy. I'm calling in regards to the Case 20-20 to rezone the 1809 Eastchester property. Please consider the water safety and the people's safety in High Point. The traffic is awful.

Please do not vote for this rezoning.

Thank you.

[end of voicemail transcript]

From:	Rhonda Hunt
To:	Public Comment
Subject:	Please Vote No on #2020 Development on Eastchester
Date:	Friday, February 12, 2021 5:56:56 PM

Dear City Council Members,

Please vote **no** on the proposed rezoning of 1809 Eastchester Drive, Cypress Court location of a service station/fast food/car wash.

I was shocked to hear that it was even being considered. The Department of Transportation has spent years trying to alleviate the traffic in this area. This will only tie up traffic even more. I have lived in Waterfront Townhome Community for over 15 years, and turning into my neighborhood is dangerous. Traffic is moving at high speeds all throughout the day and evening. This extra business would create a nightmare.

I worry about another issue this could produce, as well. Specifically our clean water supply. It is just too close to the watershed. The development of this site could cause water pollution and contaminate our drinking supplies. This would be very irresponsible.

I urge you to vote no to this rezoning change.
Thank you for your time and attention to this matter.
Rhonda Hunt
2315 Cypress Ct.
High Point

From: Schelle Nicholson
To: Public Comment
Subject: ZA Case #2020, Eastchester
Date: Friday, February 12, 2021 7:09:25 PM

February 10, 2021

Dear Mayor Wagner and City Council,

I have been following the rezoning case #2020 regarding 1809 Eastchester Drive. I travel this stretch of Eastchester Drive daily. As a concerned citizen of High Point, I would like to share my opinions about this, as well as some questions.

1. Why would we allow a developer to build a gas station this close to our watershed? Gasoline spills and leaks will happen, and proposed measures continually prove they do not contain such spills effectively. Groundwater and surface water cleanup will be complicated and costly.

2. Who will monitor for groundwater pollution? Who will be monitoring the underground tanks? It is my understanding we already have a quite few leaking underground storage tanks in High Point from various defunct gas stations. Do we really need more? We know it only takes a small leak to have dramatic negative impacts on groundwater and streams, and in this case, those negative impacts will directly affect our watersheds. We must safeguard our drinking water. Doesn't most of this land sit the in the critical tiers of our watershed?

3. This will negatively impact the already terrible traffic in this area. We do not need this. Have you traveled this road when people are commuting to and from work? It is dangerous and risky. Adding a development in this location will only add to the problem. How can they even get a carwash, gas station and store, and fast-food restaurant on a lot this size? This would only make traffic that much troubling in this area. It is dangerous enough traveling in this area.

4. The increased runoff from the site (volume /flooding, and contamination) will flow almost directly into Foxwood Meadows. The residents of that neighborhood deserve to be protected the best way possible. Allowing this land to be rezoned for this development is not protecting your citizens and especially the ones who reside in Foxwood Meadows.

5. The extensive amount of paved or impervious surface and the associated runoff, in conjunction with the high volume of traffic, will deposit high levels of sediment, toxic chemicals, heavy metals and other pollutants into our waterways and drinking water. Storm water controls and measures are more than likely not adequate in this location and will produce negative impacts, regardless of the amount of engineering.

6. Potential environmental impacts from parking lot run-off and large underground tanks holding thousands and thousands of gallons of gasoline, all of which would sit in a critical area of our watershed is like playing Russian roulette with our drinking water. Protect us please.

Thank you for taking the time to read my letter. I am very concerned but do believe that the citizens of High Point and their safety will take precedence over another gas station and fast food restaurant.

Sincerely,

Schelle Nicholson

Stacey Jolly
ESL Teacher
R.J. Reynolds High School
301 N. Hawthorne Road
Winston-Salem, NC 27104
(336)703.4145

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...

[Message clipped] View entire message

From: Jacob Stephenson
To: Public Comment
Subject: PLEASE VOTE NO ON #2020 DEVELOPMENT ON EASTCHESTER DRIVE
Date: Friday, February 12, 2021 7:15:03 PM

Please do not place a gas station here. The congestion is already bad enough. There are gas stations that are within approximately half a mile. The costs / congestion outweighs any benefit.
- Jake Stephenson

--
Jake Stephenson

https://fuelforyourdrive.wordpress.com/
(336) 937 1192

4411 Spring Meadow Place
Jamestown NC 27282

From:	Patricia Sanford
To:	Public Comment
Subject:	Please vote no on #2020 intersection Eastchester and Cypress Court
Date:	Saturday, February 13, 2021 11:48:27 AM

Please vote no in this proposal. It is way too close to our lake and the intersection is already a hazard with traffic entering and exiting the highway and from Waterfront.

Sent from my iPhone

From: jbrewer48
To: Public Comment
Subject: PLEASE VOTE NO ON #2020 DEVELOPMENT ON EASTCHESTER DRIVE
Date: Saturday, February 13, 2021 8:17:46 PM

To Whom It May Concern:

As a Realtor I am usually very excited by and happy to support development within High Point, but I CANNOT support this. We need responsible growth and development and this proposal is neither. Not only is this proposal a threat to our city's water supply, the location is already overly congested and just cannot support a project that will make congestion worse. Please VOTE NO!

Thank you for your consideration!

Jenny
Jenny Brewer - REALTOR
Keller Williams Realty
mobile - 336-847-2197
jennybrewer@kw.com
jennybrewerhomes.com

From: Helen Wheeler
To: Public Comment
Subject: OPPOSITION TO DEVELOPMENT (#2020) on Eastchester Drive
Date: Saturday, February 13, 2021 11:03:15 PM

I vote NO TO #2020 Developent on Eastchester Drive High Point NC
H Wheeler
High Point Resident and Voter

From:	Glenn McVicker
To:	Public Comment
Subject:	PLEASE VOTE NO ON #2020 DEVELOPMENT ON EASTCHESTER DRIVE
Date:	Sunday, February 14, 2021 10:22:46 AM

Changing the zoning to allow a gas station-convenience store-carwash at the Cypress/Hilton Court intersection of Eastchester Drive will constitute **spot zoning in its most negative fashion:**

A small area/lot inconsistent with the surrounding residential area

Primarily only for the benefit and personal gain of the lot owner

Dangerous and intrusive to the lot's residential neighbors

Increased danger to motorists at an already busy intersection in a residential neighborhood

Potentially an environmental hazard to the city's watershed

Detrimental to surrounding residential property values

Clearly, no greater good will come from this type of aggressive and intrusive self-serving spot zoning request.

Please vote NO.

Respectfully,

Glenn P. McVicker and Sherry R. White, Homeowners
2410 Cypress Court
High Point, NC 27265

gpmcvicker@gmail.com
336-804-0131

From: Hamp McCall
To: Public Comment
Subject: PLEASE VOTE NO ON #2020 DEVELOPMENT ON EASTCHESTER DRIVE
Date: Sunday, February 14, 2021 12:49:23 PM

To Whom it May Concern,

I respectfully ask the Council to vote no to Development #2020 on Eastchester Drive for three reasons:

1. The probability of contamination to the reservoir from waste water from a car wash is too high.

2. Above ground gas tanks at the busy intersection of Cypress Court-Hilton are potentially a disaster waiting to happen especially if spills occur while filling those tanks. And spills will occur.

3. The property values of the Waterfront/Cypress Court/Hilton Drive communities are sure to fall given the increased traffic, noise and driving confusion of entering and exiting the Cypress Ct/Waterfont community.
Not to mention the stray cars that will be accidentally entering those communities trying to exit the car wash or convenience store and make a wrong turn.

Respectfully,

Hamp McCall

From: Mike Hill
To: Public Comment
Subject: Please VOTE NO on #2020 Development on Eastchester Drive
Date: Sunday, February 14, 2021 8:00:23 PM

The planning details of the commercial development project proposal for the Eastchester Drive at Gordon Road location show how passing that decision would be tempting fate at best by GAMBLING on more than just the safety of High Point's water supply, but that of every region down stream from Oak Hollow Lake as well. I feel you are already aware of those details and how these aquifer's are already in enough trouble without this threatening that even further. I'm urging you to please VOTE NO on #2020 Development on Eastchester Drive Project.

From: Sandee Sledge
To: Public Comment
Subject: Please vote no on 2020 expansion on Eastchester
Date: Sunday, February 14, 2021 9:37:05 PM

Living in the Waterfront community I am very concerned about the potential rezoning of Eastchester and Cypress Ct
In addition to the crazy traffic already in that area, there is the potential problem with our water supply. PLEASE DO LET THIS HAPPEN TO HIGH POINT
--

From: King, Melinda
To: Public Comment
Subject: OPPOSITION TO DEVELOPMENT (#2020) on Eastchester Drive
Date: Monday, February 15, 2021 9:34:44 AM

Good Morning,

As the Construction Engineer for the City of Greensboro, I can tell you that rezoning this lot to allow anything other than an office building would create major impacts not only to our neighborhood but the Eastchester corridor. This intersection that has yet to be completed, was not designed for the type of traffic that would be seen by a gas station or convenience store. You will finish a road widening project only to create a large traffic congestion area. I oppose this rezoning for a plethora of reasons, but I think the mayor and Council need to consider the impacts to the residents that have lived through almost two years of construction that will not be finished for at least six more months to turn around and create congestion greater than has ever been seen at that intersection. I can only imagine the number of accidents that will occur there as well. It is already an accident ridden corridor.

Thank you,
Melinda

Melinda King, PE
Melinda.King@greensboro-nc.gov
Construction Engineer
Engineering & Inspections
City of Greensboro
O: 336-373-2372 C: 336-804-9301 F: 336-373-4537
611 Homeland Ave.
PO Box 3146, Greensboro, NC 27402-3146
www.greensboro-nc.gov

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Please note that email sent to and from this address is subject
to the North Carolina Public Records Law and may be disclosed to third parties.

Voicemail (Lee Ann Stackhouse Patterson)
650-224-2285
Monday, February 15th @ 11:09 a.m.
[01.07 in duration]
Zoning map Amendment 20-20

Hi.

My name is Lee Ann Stackhouse Patterson and I own property Hilton Court and I'm calling to ask you to vote NO on the Rezoning Request 20-20 to rezone 1809 Eastchester Drive. There are several reasons why, but we don't need another gas station and whether or not they put the tanks underground or above ground is not going to actually affect whether or not the tanks leak into the water supply. But, more than anything, it's not going to do anything to improve the traffic in the area to add a convenience store, gas station, and a fast food restaurant. So, we know that you can get all of these things that you need within a two-mile radius and we're asking you to maintain the gateway of High Point, protect the neighborhoods, the people, and keep the traffic to the already crazy amount that it is without adding any more.

Thank you so much for your service to High Point and please vote NO.

Thank you. Bye Bye.

[end of voicemail transcript]

Lisa Vierling

From: Robb Jolly <robb@ngfs.org>
Sent: Monday, February 15, 2021 10:33 AM
To: Public Comment
Subject: additional public comments opposed to Zoning Map Amendment 20-20, 1809 Eastchester Dr.

Dear Member of High Point City Council,
Attached please find additional comments that have been added to the petition against this rezoning amendment since the January Council meeting. Signatures now number 583 with 190 comments.

On a personal note, I would briefly like to respond to a claim made by BRC's lawyer at the original Planning & Zoning meeting. He stated that the development property could not be seen from our property at 1821 Eastchester Dr. and vice-versa. I would like to assure everyone on the City Council that not only can we see through the trees to this property and beyond it, so that cars traveling on Eastchester are visible from our front porch, but we can also clearly hear the Crossfit training sounds (talking, yelling, grunting, weights clanging) that emanate from the gym currently located on the property. So why would we not be able to hear & see cars and large quantities of people as they pull into/out of a gas station/drive-thru restaurant/convenient store/carwash at the same location, occasionally slamming doors, honking horns, blasting music and yelling to each other?

BRC's lawyer ridiculed the idea of a "neighborhood" surrounding the proposed development property, but I assure you, if this high-intensity nightmare is allowed to be built at this location, it will not be him or the developers who have to deal with the negative impacts that accompany it. Those will be thrust upon my family and our neighbors' families, as well as the other small businesses that surround this already-congested and dangerous intersection.

Thank you for the work that you do to represent the citizens of High Point. I urge each one of you to vote AGAINST allowing such an egregious rezoning application as this to pass.

Thank you,
Robb Jolly
1821 Eastchester Dr.

COMMENTS

LaDonna Watts Jan 23, 2021

This area is already too congested, so why add to the problem? And why have any risk to our water supply when there are many other suitable locations?

Daniel Jennings Jan 20, 2021

Please do not allow this to harm our drinking water or wildlife. There are plenty of other locations not near our water sources.
Everyone needs to watch the movie " Dark Water" and that will show you about who's NOT looking out for our drinking water. Only the public can protect us from Corporations greed.

Angie Bowman-Stephenson Jan 19, 2021

Save our water.

Jacob Stephenson Jan 19, 2021

Clean water should be number ONE on EVERYONE'S list!

Jan Meadows Jan 19, 2021

Please listen to the people. After all, you do work for us!!!!!

David Bannister Jan 19, 2021

Deny this rezoning, it is far too close to Oak Hollow lake to be safe. In addition traffic at this point is already a problem a high volume of traffic added by a station and restaurant will greatly increase the problem.
Vote no!

Robert Jones Jan 19, 2021

Please protect our water supply.

Chris Gorrell Jan 19, 2021

There are already plenty of gas stations, car washes, and convenience stores in High Point. It is more important to protect out environment.

Sandy Underwood Jan 19, 2021

We do not need another gas station in High Point. What we need is clean affordable water for the (high) taxes we pay to live in this city.

Kristina Perkins Jan 18, 2021

I am against developing the land surrounding the High Point water supply. Water is life!

--

Robb Jolly
Technology Specialist
New Garden Friends School
www.ngfs.org / (336) 299-0964

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From:	Elisa Cameron
To:	Public Comment
Subject:	PLEASE VOTE NO ON #2020 DEVELOPMENT ON EASTCHESTER DRIVE
Date:	Monday, February 15, 2021 11:30:06 AM

Good Morning,

My email is in reference to the proposed zoning change that would free the way for the development of a combination gas station/car wash/fast food facility at the Cypress/Gordon/hwy 68 intersection.

For years this area has been zoned appropriately for good reason. Limited structures that present potential hazards to our watershed is only one important reason to limit large business development in this area.

The most immediate danger is the congestion and overflow of traffic on HWY 68 as it approaches the 311/74 interchange. This intersection, even with the roadwork already being done to help relieve the congestion, is just not enough. If a huge business is added at the stop light right before that intersection, it would create an even more dangerous thoroughfare for travelers on 68, and make getting out of the neighboring housing developments and small businesses virtually impossible.

And now I understand that the developer is pitching above ground fuel tanks instead of underground for this business. I can't help but think that would be every bit as dangerous as underground tanks, just in a different way. This is not an industrial area of the city and above ground tanks certainly give that impression.

I am so proud of our city and want others to see that pride when they exit 311/74 after crossing over our beautiful Oak Hollow Lake. The site of well kept neighborhoods/houses and small businesses, versus one more unneeded gas station (with Above Ground fuel tanks no less) seems like an easy decision to me.

Please keep this area safe and beautiful by voting no to this proposal.

Thank you!
Elisa Cameron
2311 Cypress Ct.
High Point, NC 27265

From: Janis Stephenson
To: Public Comment
Subject: PLEASE VOTE “NO” ON #2020 DEVELOPMENT ON EASTCHESTER
Date: Monday, February 15, 2021 12:20:47 PM

All of you have a very significant and important issue coming up for a vote today which will negatively impact not only a HUGE number of area home owners, but is a serious threat to High Point’s WATER SUPPLY and would INCREASE the congestion on Eastchester at the I-74/311 access.
Please also consider that the Eastchester Corridor brings ALL of our visitors from the airport via Hwy. 68 as well as from Wendover Ave. / Greensboro. Do you really want to be part of ruining the first impression they get of our City? For the most part, there are now pleasing housing and professional buildings, small shopping areas and restaurants along that route. There is also the Jesse Washburn Memorial Water Dam and lovely, much used City park beside which yet another unwanted, undesirable, unnecessary gas station/car wash/food & snack center wishes to squeeze into a small plot between there and the affected homes.
PLEASE consider the residents and upscale businesses who have long-standing investments in this area and who contribute to making High Point a city we can be proud of and which attracts others of like mind.
All of you voting today can be a part of that by supporting your citizens, not some out-of-state chain who is interested in only THEIR profit and would put a gas station on every corner (and they are well on their way to doing that)!
PLEASE DO WHAT IS BEST FOR YOUR CITY AND RESIDENTS BY VOTING “NO”! THANK YOU!!!

Voicemail (unidentified citizen)
919-931-9472
Monday, February 15th @ 2:11 p.m.
[00.47 in duration]
Zoning map Amendment 20-20

Hi.

I am a concerned citizen of High Point and I would just like to state my opinion that I am hoping that the board will vote NO on 20-20, the 20-20 bill. I do not think we need another gas station on our watershed and I am hoping that a lot of consideration and thought will be put into this before deciding to move forward with it. We have way too many gas stations in this town that are closed up and there's a chance that the same thing will happen at the same location. And, so, in my opinion, it is not a good idea and I'm hoping that you guys will see it the same way.

Thank you.

[end of voicemail transcript]

Voicemail (Robert Schmetting
919 201 0775
Monday, February 15th @ 3:05 p.m.
[00.52 in duration]
Zoning Map Amendment 20-20

Hi.

My name is Robert Schmetting and I am calling about Zoning Amendment 20-20. It's come to my attention that a developer is looking to build a gas station and car wash within the critical watershed area of Oak Hollow Lake and I am deeply concerned about this type of development being so close to Oak Hollow Lake and being the critical watershed area, Critical Area 2 and Critical Area 3 according to the map. I'm a bit surprised that this development could move forward and if there is a need for a travel service center of this type in that area, that it seems to be on the east side of Eastchester away from the watershed would be a more appropriate location.

Thank you.

[end of voicemail transcript]

From:	Tim Tucker
To:	Public Comment
Subject:	PLEASE VOTE NO ON # 2020 EASTCHESTER DRIVE DEVELOPMENT
Date:	Monday, February 15, 2021 3:17:14 PM

We don't need another gas station, convenience store or car wash in High Point, and we certainly don't need one at one of the busiest and congested intersections in the city.

I am concerned about..

- Increased traffic and congestion on Eastchester Drive
- Noise and light pollution.
- Possible danger to our water source
- Increased crime.
- Lack of necessity

I understand that the applicant (BRC) has modified their proposal by suggesting that there gas storage tanks be installed ABOVE GROUND and I am incredulous. I haven't seen a gas station with above ground tanks in thirty years. Such an installation would be unsightly to say the least, and would still have dangerous potential.

Please heed....

1. The findings of the city's LAND USE STUDY.
2. The 9-0 vote AGAINST this proposal by the PNZ.
3. The nearly 600 residents who have signed a petition against this proposal. (Please read their comments)

https://www.ipetitions.com/petition/save-high-point-water

We will be listening to the meeting tonight. Thank you.
--

Best Regards,

Tim Tucker

336-883-2801 (Office)

336-847-7211 (Cell)

Take a look at our portfolio! Click here....

From: Bryan Williams
To: Public Comment
Subject: #2020 Eastchester Development
Date: Monday, February 15, 2021 3:23:31 PM

I would like to vote NO on the #2020 Eastchester development proposal at the corner of Eastchester and Hilton. A large gas station/convenience store would create a traffic nightmare in what is already an extremely busy intersection area.

Thank you,
Bryan Williams

#17

Lisa Vierling

From: Robb Jolly <robb@ngfs.org>
Sent: Monday, February 15, 2021 3:48 PM
To: Public Comment
Subject: Re: additional public comments opposed to Zoning Map Amendment 20-20, 1809 Eastchester Dr.

Hi,
If possible, could you confirm that you received this email sent this morning & that it will be added to the comments for tonight's agenda?
Thanks, - Robb Jolly

On Mon, Feb 15, 2021 at 10:32 AM Robb Jolly <robb@ngfs.org> wrote:

> Dear Member of High Point City Council,
> Attached please find additional comments that have been added to the petition against this rezoning amendment since the January Council meeting. Signatures now number 583 with 190 comments.
>
> On a personal note, I would briefly like to respond to a claim made by BRC's lawyer at the original Planning & Zoning meeting. He stated that the development property could not be seen from our property at 1821 Eastchester Dr. and vice-versa. I would like to assure everyone on the City Council that not only can we see through the trees to this property and beyond it, so that cars traveling on Eastchester are visible from our front porch, but we can also clearly hear the Crossfit training sounds (talking, yelling, grunting, weights clanging) that emanate from the gym currently located on the property. So why would we not be able to hear & see cars and large quantities of people as they pull into/out of a gas station/drive-thru restaurant/convenient store/carwash at the same location, occasionally slamming doors, honking horns, blasting music and yelling to each other?
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> BRC's lawyer ridiculed the idea of a "neighborhood" surrounding the proposed development property, but I assure you, if this high-intensity nightmare is allowed to be built at this location, it will not be him or the developers who have to deal with the negative impacts that accompany it. Those will be thrust upon my family and our neighbors' families, as well as the other small businesses that surround this already-congested and dangerous intersection.
>
> Thank you for the work that you do to represent the citizens of High Point. I urge each one of you to vote AGAINST allowing such an egregious rezoning application as this to pass.
>
> Thank you,
> Robb Jolly
> 1821 Eastchester Dr.

COMMENTS

LaDonna Watts Jan 23, 2021

This area is already too congested, so why add to the problem? And why have any risk to our water supply when there are many other suitable locations?

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Vote no!

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Kristina Perkins Jan 18, 2021

I am against developing the land surrounding the High Point water supply. Water is life!

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Robb Jolly
Technology Specialist
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--
Robb Jolly
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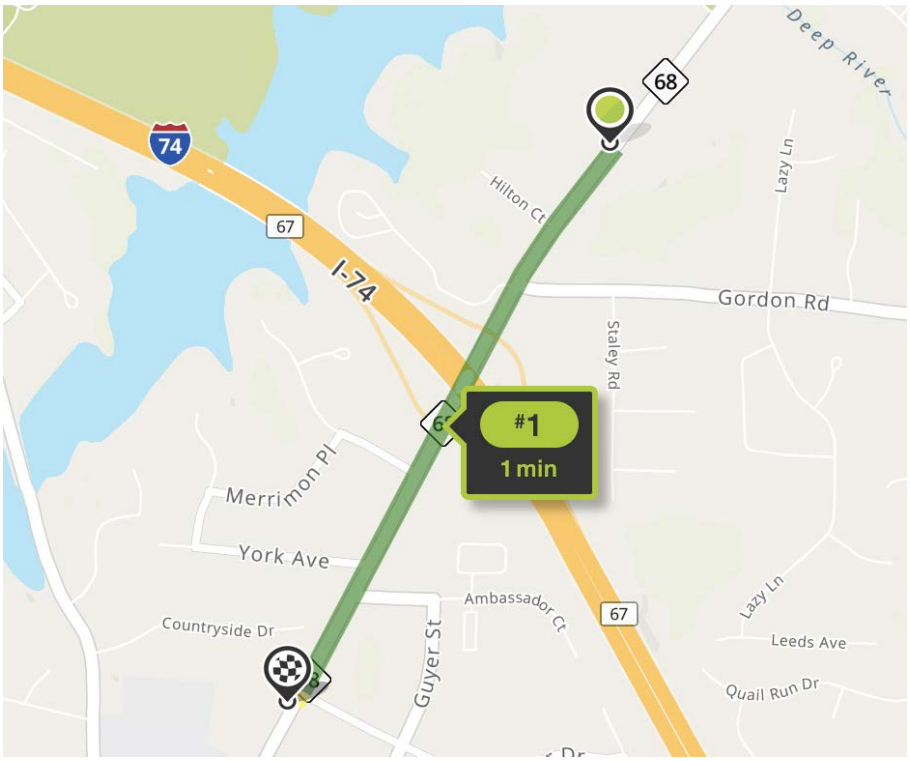
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From: Heather Shaw
To: Public Comment
Subject: NOOOOOOO on #2020 Development on Eastchester Dr.
Date: Monday, February 15, 2021 4:24:19 PM
Attachments: image.png

I have opposed this ridiculous plan since I was made aware of its existence. There are many things I take issue with regarding this plan:

1. It is already dangerous and challenging turning into my parents' neighborhood, The Waterfront, at the Gordon Rd light. Even with the new left turn added to the light rotation, there is so much construction and lane redirecting that I have been in near-miss and near-fatal accidents trying to get in and out of the neighborhood. ****Adding a gas station will only add to the challenges or navigating that small area by increasing traffic, increasing the number of vehicles waiting to turn into and out of the station, and causing yet another traffic situation near the 311 exchange that already backs up during parts of the day to the point I can't turn into the neighborhood. BAD IDEA!!!! Try driving from Kelly's Marathon GAS STATION at 1232 Eastchester to Berky Orthodontics at 1813 Eastchester someday at rush hour without the gas station and experience the challenges and dangers without navigating additional vehicles trying to turn in and out of a gas station. Please explain to me, as a tax paying citizen who has to navigate this mess, WHY we NEED another GAS STATION in this small 0.6 mile area???? I have provided you with a visual between the GAS STATION that already exists and the area you want to place another GAS STATION! I need an explanation



2. I have issues with building a gas station right at our WATER SOURCE! I don't care if the tanks are above ground or underground. Research has shown that gas stations, whether through leaks, runs off or damage, fuel and other chemical associated with gas stations seep

into the ground water. BAD IDEA!!! Once that happen to our water source...WE ARE SCREWED! You CAN NOT reverse the damage!

Those two reasons alone should make you STOP and think LONG and HARD about this decision before it creates yet another set of issues that you could have AVOIDED!

The pandemic has been enough to deal with this past year..... please don't create a long-term environmental issue and another dangerous traffic situation!

Heather Ward

From:	TONY FICKEN
To:	Public Comment
Subject:	ZA Case # 20-20, 1809 Eastchester Drive
Date:	Friday, February 19, 2021 9:57:43 AM

To Mayor Wagner and City Council members,

My name is Tony Ficken. I live at 2309 Cypress Ct. in High Point. The purpose of this message is to provide feedback to the rezoning request for the property noted above.

Living at this address for the past 6 years, I was hopeful to see NCDOT working on the expansion of the overpass, as well as the redirecting of the traffic pattern exiting and entering the 74/311 bypass. My wife and I are hopeful because of the traffic concerns when turning into Hilton Ct from Eastchester Blvd. Sitting at a stop light waiting for a break in the traffic to cross onto Hilton Ct. but also witnessing several car accidents at this location.

We are sending this note to make our voice heard by you Mr. Mayor and the City Council to not allow any rezoning for this property. The current owner of the property was aware of the zoning when they purchased the property. I am sure property developers purchase land all the time thinking they will just ask to have the property rezoned. Then they can build whatever brings the highest dollar. Developers do not care about the neighbors, land, or the impact their development will have on the environment (nature/animals). It is the job of the local government to listen to the community to make the best discussion for everyone, including the developer.

The developer can build whatever they want if it fits into the guidelines for the current zoning requirements. Thank you for your service to our community and reading this message.

Tony Ficken / 336-382-8030

From: betty.bowan@gmail.com
To: Public Comment
Subject: VOTE "NO" ON # 2020 EASTCHESTER DEVELOPMENT
Date: Monday, February 22, 2021 5:02:51 PM

Dear Sir or Madam,

I am a citizen of North High Point. This area where the developer is asking for the property to be rezoned to build a fast food restaurant there is already very congested with traffic coming from both sides of High Point as well as traffic coming from 311/I-74. I have concerns regarding any left turns in this area. There cannot be any type of left turns when DOT has changed the way 311/I-74 entrances are from 68 (Eastchester). My opinion would be that any restaurant going in that area would need a third right lane for people to turn into the restaurant coming from South High Point. In addition, there would be need for a U-turn lane to allow people coming from North High Point to get to this restaurant safely. I am not sure if the our City Counsel is looking into these particular issues that would come up if the restaurant was put in here at this location. Before a restaurant could be built, the road would have to be taken care of first.

If there are any questions, I can be reached at betty.bowan@gmail.com or at 336.307.9582.

Have a fantastic day!

Best Regards,

Betty J. Bowan

From:	Ann Sankewitsch
To:	Public Comment
Cc:	Ann Sankewitsch; Michael Sankewitsch
Subject:	Fast Food Restaurant/Eastchester Dr. & Gordon Rd.
Date:	Monday, February 22, 2021 5:31:25 PM

As a homeowner and taxpayer in High Point, I do not want to have a fast food restaurant at or near the intersection of Eastchester Dr. and Gordon Rd. This intersection is dangerous enough as it is, adding a fast food restaurant will only increase the accidents that occur on a regular basis.

Sincerely,

Ann Sankewitsch

From: Debbie Darby
To: Public Comment
Subject: Vote NO on #2020 Eastchester development
Date: Monday, February 22, 2021 5:35:49 PM

Vote NO, this is dangerous traffic situation already with confusion on enter and exit ramps. Accidents every week. Don’t need yet another fast food establishment here!

Sent from my iPhone

From: Sandee Sledge
To: Public Comment
Subject: Zoning Eastchester & Cypress Court
Date: Monday, February 22, 2021 6:20:20 PM

Please consider you vote on allowing any commercial retail business at this intersection. At any given time, it is very dangerous to make a left turn on to Cypress Court. This is evidenced by all of the car parts found in that intersection. This is one of the most congested areas in High Point with the new construction on Hwy 74 and with the lanes being very narrow and cars plowing through red lights, it is really a dangerous area. I would encourage each of you to travel that area especially between 4 & 6:00 and consider if you would like to be the one dealing with this on a daily basis. Any more traffic from a drive through restaurant or hotel is unthinkable. Also added to the mix are those who missed getting on 74 and want to make a U Turn at the stoplight.
Having to get through the intersection quickly due to traffic while finding cars putting on brakes to make the U Turn is AWFUL. Please also consider a
"NO U TURN SIGN" at that intersection.

I hope you will listen to those of us who take the time and are concerned enough to write.

Thank you.

Sandee Sledge
Homeowner, Waterfront
Property Manager – Benjamin James Properties, LLC

Sent from Mail for Windows 10

From:	Ray Meadows
To:	Public Comment
Subject:	VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date:	Monday, February 22, 2021 7:07:24 PM

No on this please. Too much traffic in an area that is already a nightmare.

Sent from my iPhone

From:	Greta Bambalis
To:	Public Comment
Subject:	Highway 68 Construction
Date:	Monday, February 22, 2021 7:59:34 PM

Please vote against any construction in the 68 I-74 Area. This area is already a nightmare to try to get through and certainly does not need any added congestion. I'm still trying to figure out how I am ever going to get into and out of my dentists office.

Thanks,
Greta Bambalis

Sent from my iPhone

From:	Jacob Stephenson
To:	Public Comment
Subject:	RE: Development at Cypress Ct / Hilton Drive / Gordon Rd
Date:	Monday, February 22, 2021 8:45:19 PM

Regarding your vote Next Monday, March 1st, the HP City Council on a rezoning request from a developer who wishes to build a fast food restaurant on the property presently occupied by the old Crossfit Gym, right above the intersection at Cypress Ct. Hilton Drive and Gordon:

Please vote NO.

Congestion there is already as a peak and redistribution of lanes has done nothing to assuage the increasing traffic. Adding more (when there was is a McDonalds less than half a mile away in just about either direction is not needed. The area residents already have a difficult time with congestion. Please do not make an intersection that is already struggling with traffic from Eastchester, 311 and 74 even worse.

Thank you,
Jake Stephenson
4411 Spring Meadow Pl, Jamestown, NC 27282

presently occupied by the old Crossfit Gym, right above the intersection at Cypress Ct. Hilton Drive and Gordon Road. Do you want to see a McDonalds there? This is already one of the most dangerous and congested stretches of road in High Point and this will only make it worse. This will bring traffic in from both directions of Eastchester plus the I-74 corridor. Those traveling south from Winston-Salem side will have to make TWO LEFT TURNS to get across the bridge and into the restaurant! Does this sound good to you? If not, please contact the city council by emailing them at..

--

Jake Stephenson

https://fuelforyourdrive.wordpress.com/
(336) 937 1192

4411 Spring Meadow Place
Jamestown NC 27282

From:	Carolyn Elliott
To:	Public Comment
Subject:	VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date:	Monday, February 22, 2021 8:57:14 PM

I AM OPPOSED TO THE REZONING OF THE SECTION OF EASTCHESTER NEAR 311 & GORDON ROAD.

This area has two stop lights on either side of the 311 / 68 overpass as well as a stop light where GORDON ROAD enters EASTCHESTER DRIVE.

Traffic is backed up along this area going in both directions. The addition of fast food as well as gas stations will only add to more congestion.

I UNDERSTAND THE CLOVERLEAF PATTERN WHERE 311 FEED INTO EASTCHESTER, as a means of better traffic flow.

I DO NOT UNDERSTAND WHY A TRAFFIC CIRCLE HAS BEEN PLACED GORDON ROAD when a simple curve would be easier to use.

I HAVE SEEN SEVERAL OCCASIONS WHEN NEAR ACCIDENTS HAVE HAPPENED THERE.
POOR DESIGN FOR THIS AREA.

C. ELLIOTT

Sent from my iPhone

From: Jaclyn Tennant
To: Public Comment
Subject: Rezoning
Date: Monday, February 22, 2021 9:48:32 PM

Hello city councilmen,

I am against the proposed rezoning of the land at the intersection of Eastchester and Gordon. Please keep in mind the wishes of the citizens of High Point when you vote.

Thank you,
Jaclyn Tennant, PhD

Sent from my iPhone

From: Sherry Lawson
To: Public Comment
Subject: VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date: Monday, February 22, 2021 9:51:39 PM

I beg of you, please vote no to the request to build a restaurant in the Eastchester /I-74 corridor. I live in Timberlake and we have suffered enough with the ever on-going construction at this intersection. There are already accidents out there every day. I hear the fire trucks go out of Ambassador Ct. many times a day. I can't imagine adding anything else through this area that requires anyone turning anywhere.

I was under the impression after your vote on the first zoning request that Planning and Zoning had stated that the existing zoning did not include this type of commercial development as part of a long established plan for this gateway entrance into High Point. When the construction is complete, this area can return to the attractive corridor it was before. Please limit this type of development to the areas around Main St., Centennial St. and Skeet Club as originally zoned.

Thank you for your consideration.

Respectfully,
Sherry Lawson

Sent from my iPad

From:	Chris Gorrell
To:	Public Comment
Subject:	New McDonald"s on Eastchester
Date:	Monday, February 22, 2021 9:53:08 PM

I am writing to voice my opposition to a new McDonald's at Eastchester and Gordon Roads. That area is already a nightmare to try to get through any time of day. Plus, we already have plenty of fast food restaurants in High Point. I think it is unnecessary and would add to an already present traffic problem.

Please consider voting against this proposition.

Thank you.

Christine Gorrell
532 Gatewood Ave
High Point, NC 27262

From:	Mike Coles
To:	Public Comment
Subject:	Vote "No" on March 1
Date:	Tuesday, February 23, 2021 7:01:56 AM

I oppose the requested rezoning at the intersection of Cypress Court and Gordon Road. I recently purchased a home in the area and that decision was based on several factors. One was the relatively easy access Eastchester provides without being overly congested. Adding a fast food restaurant to that area increases congestion without increasing overall benefits. Worse, fast food represents low wage jobs, food that causes public health challenges, and a business model that causes environmental impacts (trash, litter, food waste, and pests) that far outlast any hope for increased tax revenue.

Please vote "No" to any development there that does not support a long-term, "one health" vision for our city.

Thank you.

Mike Coles

From: Teresa Kirby
To: Public Comment
Date: Tuesday, February 23, 2021 7:17:19 AM

There are already plenty of local restaurants that have failed or are barely hanging on. We do not need another restaurant on Eastchester. That intersection and area is already congested and with the high traffic and new traffic patterns, there are too many wrecks there daily as it is. Please do not let the developer come in and build another unnecessary restaurant in an area that does not need it, nor can sustain it.

Teresa Kirby
1912 Greenstone Pl, High Point, NC 27265
336-687-1907

From:	Melinda King
To:	Public Comment
Subject:	Rezoning a Hilton Dr
Date:	Tuesday, February 23, 2021 11:12:40 AM

Good Morning,
I received an email from Stalder regarding the change in the rezoning request for the property at the intersection of Hilton Dr and Eastchester. My largest concern regarding this potential rezoning is the traffic that a drive thru type restaurant would create; however, I also have concerns as to how this would fit into the overall Eastchester Corridor development plan. It is my understanding that the desire for this corridor is to have limited visual impacts in this area. Between Wendover and Johnson St. most buildings are set back from the property lines quite a distance and are limited to businesses not restaurants and drive thrus. If they have those, they are set back quite far from the sight distance of the general observer thus creating a more attractive corridor. I can only imagine what a fast food restaurant would visually look like at that location. Add in the limited access to this property and you have a traffic nightmare as well. I don't see how the current zoning needs to be amended at this point given the location, type of property and surrounding areas.

From: Karen OHair
To: Public Comment
Subject: NO Fast Food
Date: Tuesday, February 23, 2021 12:14:25 PM

Please do NOT allow a fast food restaurant to be situated at corner of Gordon Rd & Eastchester. Area is already way too congested!

Karen OHair

Sent from my iPhone

From: James Manuel
To: Public Comment
Subject: MacDonald"s Restaurant
Date: Tuesday, February 23, 2021 1:41:23 PM

Dear Zoning Commission,
Why would you approve a fast food business at the current location of the old Crossfit Gym. That area is so congested already and has been the scene of many near accidents. There is a MacDonalds very close by at the Oak Hollow Mall. Please reconsider! This makes no sense.

James Manuel
2940 Logbridge Rd
High Point

From: Lorrie Kapsar
To: Public Comment
Subject: Traffic
Date: Tuesday, February 23, 2021 4:30:55 PM

There would be more congestion at the intersection at Gordon road if you allow the developers to build a fast food restaurant there. The road construction isn't even finished and there is major traffic tie ups there now . I see no need for a fast food restaurant at this intersection when down the road is many restaurants already in either direction . Finish the road construction project first before deciding what to put on the property . Don't add to the traffic problem.

From:	Rhonda Hunt
To:	Public Comment
Subject:	Opposed to zoning change
Date:	Wednesday, February 24, 2021 5:04:22 AM

Please vote NO to the rezoning of the land at Cypress Court/Gordon Road intersection. The traffic is horrendous there. It is practically impossible to make a left turn onto Cypress Court much of the day. A fast food restaurant would increase traffic and create more problems. The PNZ voted against this proposal in December, and I implore Council to do the same.

Respectfully,
Rhonda Hunt

From:	L Locke
To:	Public Comment
Subject:	Vote No on 2020 Eastchester Development
Date:	Wednesday, February 24, 2021 10:06:29 AM

I vote no – we do not need a McDonalds or any other fast food in this area. It is already too congested in this area and will only create more traffic problems.

Lori Locke

From:	Barbara Hemphill
To:	Public Comment
Subject:	VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date:	Wednesday, February 24, 2021 10:13:11 AM

Vote “no” on 2020 Eastchester Development! Absolutely “no” to a fast food restaurant or any other type of commercial business in that area! Too much traffic congestion! Stop overbuilding!

Sent from my iPhone

From: van locke
To: Public Comment
Subject: VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date: Wednesday, February 24, 2021 10:29:32 AM

Dear High Point,
Please, Please do not allow a fast food joint to open at this intersection, for this or any future request. Please close all requests for such types of businesses: fast food, restaurant, mini mart, gas station, grocery store.

The intersection of HWY 311/ HWY 68 is being renovated to allows for increased traffic and to make it move smoothly, faster and without automobile or pedestrian accidents. The addition of ANY business so close to the intersection means significant increases of frequent stops, slow turning, additional stoplights, wrecks & increased times for travel of those trying to get to jobs in High Point or to Greensboro—it will affect traffic in both directions.

A fast food joint will also attract people who will toss their trash in the parking lot and on the street. Go to busy intersections with bridges and stoplights on both sides—you will see what the the final entrance to our city will look like as visitors and employees enter our city.

Oak Hollow Lake & the City Golf course will see pollution. How?—there are two entrances to the lake on Hwy 68. It will be easy to grab a meal, go to the lake and then toss the bag, cup, napkins and straws out before they leave. Wind and rain will blow much of this down to the lake. Much will float over to the Golf course and will also surely float towards the expensive lake homes for all to see.

The entire HWY 68 corridor to High Point is slowly but surely turning into the same as High Point Rd., where it became impossible to travel. It also reduced home values along the entire route, meaning it became an undesirable place to live for potential home buyers—especially affluent buyers. High Point needs investment, but a fast food place does not serve High Point, only it's owners. These types of businesses rolls through employees by design. We need businesses that offer employment to a larger group of employees, offering better wages and benefits.

Please deny the request.

Sincerely,
Van Locke

From: Jolly, Stacey S
To: Public Comment
Subject: ZA Case #20-20
Date: Wednesday, February 24, 2021 5:15:20 PM

February 24th, 2021

Dear Mayor Wagner and City Council,

First, thank you for your patience with the many angles of this rezoning request. I know we have sent you a lot of information, facts and shared our many concerns via letters, calls and the petition signatures and comments. THANK YOU for taking the time to investigate all angles of this complex situation. You have built an important trust between decision-makers and those that the decisions affect and that is much appreciated. Second, we are all grateful that fuel tanks have been removed from this proposal. I appreciate that both the developer, and likely you too, agree that this is no place for fuel tanks. Third, we are grateful for the 100-foot buffer the developer is going to include in the plans, and upon further research we found that this is required according to the last rezoning document from the 1809 property. This is found in the Conditional Use Permit, Rezoning Case 89-22. It states, *"A minimum 100-foot-wide buffer yard shall be installed along the rear property line. Existing natural vegetation shall be retained wherever possible."* Even with no fuel tanks, and them being consistent with the rezoning case 89-22 requirements with the 100-foot buffer, there are still significant concerns that must be addressed.

- This type of zoning is inconsistent with the area, please protect adjacent neighborhoods and offices from incompatible development. There ARE neighbors *(no matter the condition of their homes*) and neighborhoods very close by that will be affected by this, Waterfront Condos, Gordon road neighborhood, Foxwood Meadows, Lake Front Condos, etc.
- The domino effect is real; it has already begun with other properties on the other side of Foxwood Meadows. Are we going to allow our corridor to be the next Wendover? How do you say yes to some requests and no to others?
- How will the property owner prepare a storm water / runoff-water quality control plan due to the increased impervious surface? How will this affect Foxwood Meadows?
- Can the post development quantity of storm water run-off possibly equal the predevelopment quantity that is one of the state and local regulations/requirements?
- Traffic resulting from a fast-food restaurant with a drive thru, which would certainly be more than a hotel or microbrewery, is still a substantial amount of ***added*** traffic to this congested area. How can it not be? $22-million worth of tax dollars are being spent to alleviate this problem. Since this rezoning issue has been going on since October, the Davenport study was more than likely done when there was less traffic anyway due to COVID restrictions and people working from home. What will it look like in a post COVID era?
- 1801 Eastchester is currently zoned R-3; this is a huge change for this lot. R-3 to general business zoning are worlds apart.
- Have you considered the amount of crime that happens around hotels/motels? Unfortunately, we have many vacant to almost vacant hotels up the road on Highway 68

and sadly, there are others that serve as drug dens. Isn't it fair to say we have concerns about this when it would sit in our neighborhoods and community?

- Why more fast food? Can't we do better than that? What will your footprint be?
- This is both a subjective and an objective case. Either way, this IS yours to decide. You are the elected Mayor and City Council, and as our local branch of government, we are depending on you to safeguard the citizens, uphold the local and state policies regarding land use, and protect our communities.
- We all want the developer to get their return on their investment, there is no ill wish here for me, but my question is this, is it your job to see that they get their return on investment? BRC has done some great things in and for High Point and I'm sure nobody wants to burn any bridges as we are grateful for the wonderful entertainment and retail businesses they have provided us. But please consider, one more time**, is this the right project for this location given the many potential negative impacts it will likely have**? Why must the communities surrounding this possible rezoning pay the price for helping them get their return on their investment?

Thank you! I know you are dedicated to people who work tremendously hard for us and the well-being of High Point. We appreciate you!

All the best,

Stacey Stackhouse Jolly
ESL Teacher
Chair of the School Improvemnt Team
R.J. Reynolds High School
301 N. Hawthorne Road
Winston-Salem, NC 27104
(336)703.4145

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Voicemail (Debbie)
336-972-4402
Thursday, February 25th @ 9:36 a.m.
[00.49 in duration]
Zoning Map Amendment 20-20

Yes, I want to register my comments as voting NO for the development 20-20 at Eastchester. This is the proposed fast-food restaurant at the Cypress intersection. There are way too many accidents. There's way too much congestion. We don't need another fast-food place here in High Point. Can we not have some decent businesses locate? I am very much against this and hope to be able to come to the meeting to voice my opinion.

My name is Debbie. My number is 336-972-4402.

Thank you.

[end of voicemail transcript]

From: David Smith
To: Public Comment
Subject: Gordon Rd @ Eastchester
Date: Thursday, February 25, 2021 8:54:10 PM

I would like to request that the Zoning request to build a fast food restaurant on this property be denied. At least until the road construction is completed and it can be determined that this would not further complicate an existing traffic issue/problem area. As a resident in the adjoining neighborhood, it is currently VERY difficult to proceed through this intersection. Please don't make it worse/more dangerous.
Thank you,
Dave Smith
1915 Hickswood Rd, High Point, NC 27265

From:	betsypegram30
To:	Public Comment
Subject:	Opposition for Plans for fast food restaurant
Date:	Thursday, February 25, 2021 8:55:47 PM

I would like for the zoning to build a fast food restaurant on Eastchester at Gordon Rd be denied. Traffic at this intersection is already congested and dangerous. Development will add to the volume of traffic and gridlock at this intersection. As a resident of Cypress Court it is already very difficult getting in and out of the neighborhood.
Sincerely,
Betsy Pegram

Sent from my T-Mobile 4G LTE Device

From: Robb Jolly
To: Public Comment
Subject: Please VOTE NO on Zoning Map Amendment 20-20, 1801/1809 Eastchester Dr.
Date: Friday, February 26, 2021 3:43:27 PM

26 February, 2021

Dear City Council members,

I'm writing again to voice my opposition to Rezoning proposal 20-20, which pertains to the two properties at 1801 and 1809 Eastchester Dr. Please consider the following points, which I feel compelled to make after the rushed and incomplete presentation by the developer's consultant and lawyer at your last meeting:

- **The smaller piece of land** (1801 Eastchester Dr.) **is currently zoned residential, so approving zoning for CZ-GB would leapfrog it 2 steps further than where it is now.** No one has talked about this or acknowledged that it would be a huge change for this piece of property.

- The developer's consultant acts like this rezoning is needed to make the bigger property at 1809 Eastchester Dr. look better than the "ugly metal building that's there now," but the developers can already tear that down and build something new under existing CU- OI zoning.

- The consultant stated in her most recent letter that "because a convenience store with fuel sales generates more traffic than other proposed uses, there will be less traffic associated with the revised re quest"...**BUT this obscures the fact that there would STILL be substantially MORE traffic than what is currently found with the Crossfit property and the house on the residential lot.**

- Grading the properties so that they drain south into City Lake watershed **(i.e. going against the natural flow of the land) is analogous to the developer's attempt to go against the existing zoning of these properties (as well as that of the surrounding area) in order to force approval of rezoning** on 2 parcels which would make them **out of character** with all the adjacent properties (which are either zoned for Residential or CU-OI).

- **Some thoughts about the specific uses in the developer's latest proposal:**

    - Drive-thru restaurant: their whole ethos is built on the "turn & burn" concept of serving as many people as possible, as fast as possible, **therefore an integral part of their business plan is to maximize car traffic** to their location.

    - Hotel/motel: **more traffic, meet-ups, & ALL the possible activities that go along with this type of establishment.**

Microbrewery: **we had one 1mi. away** (Liberty Steakhouse at Oak Hollow Mall) **and it closed. So why would we want or need another one right here, where there are no other similar businesses around it?**

- **Any one of these projects** would result in **more traffic, more congestion, more pavement, more ugly parking lots, and of course, more impervious surfaces; to build 2 or 3 of them on the same properties just seems careless and ill-advised.**

- **Even though the developer now says fuel sales will not be included in their proposal, how can it be guaranteed that future owners of the land will not be able to put fuel tanks on this property?** Couldn't future owners also petition the City Council to allow fuel sales down the road? **If so, then saying NO to this rezoning request NOW would seem to be a step in the right direction towards preventing that undesirable possibility in the future.**
- **During COVID these meetings greatly advantage the developers and disadvantage the citizens of High Point**: the developer can present (even if they are not prepared or have late/incomplete information), they may bring in guest "experts" to speak, and they and their guests can answer questions; while the citizens of High Point can only listen (but not participate) via YouTube and may only make their concerns known via public comment emails or voicemail messages, **all of which are shared with the developers prior to the meeting.**

In closing, I understand that the developer wants to maximize their profit; however, I don't believe that the City Council's focus should be on making sure that the developer's ROI is recouped. The residents in this area of High Point and beyond have made it clear that they don't want a drive-thru restaurant or other huge, intensive businesses here. I also trust the City wants to do what's best for the residents and the City itself--**so why not vote AGAINST this rezoning, as that would still allow the developers to build whatever they want within the current CU-OI zoning regulations?** They can already build a restaurant (without drive-thru). They can build any number of different types of offices there. They can tear down the house on the residential lot & either build a new one or sell the lot alone, or they could sell the house and lot as they are.

Please vote NO on this rezoning request, so that we can keep this intersection of High Point and yes, **my neighborhood**, from becoming even more hazardous and congested than it already is.

Thank you for your service to the city, and thank you for considering these concerns.

Sincerely,

Robb Jolly
1821 Eastchester Dr.

--
Robb Jolly
Technology Specialist
New Garden Friends School
www.ngfs.org / (336) 299-0964

New Garden Friends School seeks to be an inclusive, innovative educational community guided by Quaker beliefs and committed to honoring and developing each person's gifts.

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From:	Ron Money
To:	Public Comment
Subject:	The intersection of Cypress Ct and Eastchester Drive,
Date:	Saturday, February 27, 2021 9:39:19 AM

Next Monday, March 1st, the HP City Council will vote on a rezoning request from a developer who wishes to build a fast food restaurant on the property presently occupied by the old Crossfit Gym, right above the intersection at Cypress Ct. Hilton Drive and Gordon Road. This is already one of the most dangerous and congested stretches of road in High Point and this will only make it worse. This will bring traffic in from both directions of Eastchester plus the I-74 corridor. Those traveling south from the Winston-Salem side will have to make TWO LEFT TURNS to get across the bridge and into the restaurant! This is not a good idea?

Also, traffic is backing up on the off ramp almost to 311 during rush hours. The two lights there are too close together to any more traffic. If you add more stops on and turn off East Chester, it will become a headache for the city of High Point, not to mention frustration for motorists. Please reconsider and vote no for this project.

Thank you for your thoughtful consideration in this matter.

Ronny Money

From:	Margaret Money
To:	Public Comment
Subject:	The intersection of Cypress Ct and Eastchester Drive,
Date:	Saturday, February 27, 2021 9:46:30 AM

Next Monday, March 1st, the HP City Council will vote on a rezoning request from a developer who wishes to build a fast food restaurant on the property presently occupied by the old Crossfit Gym, right above the intersection at Cypress Ct. Hilton Drive and Gordon Road. This is already one of the most dangerous and congested stretches of road in High Point and this will only make it worse. This will bring traffic in from both directions of Eastchester plus the I-74 corridor. Those traveling south from the Winston-Salem side will have to make TWO LEFT TURNS to get across the bridge and into the restaurant! This is not a good idea?

Also, traffic is backing up on the off ramp almost to 311 during rush hours. The two lights there are too close together to any more traffic. If you add more stops on and turn off East Chester, it will become a headache for the city of High Point, not to mention frustration for motorists. Please reconsider and vote no for this project.

Thank you for your thoughtful consideration in this matter.

--
Margaret Money

From:	Jane Dawson
To:	Public Comment
Subject:	Objection to Re-Zoning Request
Date:	Sunday, February 28, 2021 8:17:46 AM

Dear HP City Council Members -

I'm writing again to request denial of the rezoning request for the area at the intersection of Cypress Court & Eastchester. I'm a homeowner & have lived at Waterfront for 22+ years. Due to growth in the area and the addition then currently ongoing project of reworking entrances/exits to I-74, this area is so busy at "rush hour" that it involves waiting thru at least 2 stoplights to get off I-74 and onto Eastchester regardless of whether turning right or lef. Even with a stoplight at the Cypress/Eastchester, I have to rely on eye contact and a wave from a driver stopped at the light to ensure that it's really safe to turn right. It's often completely blocked so I'd have nowhere to go even if someone were to let me pull out. Driving NE on Eastchester is the same story: at predictable times of day it's almost impossible to turn left on Cypress Court. There's not a separate left turn light so it always involves only one car at a time getting thru after the light has already turned red and you're sure no one else is going to "make a run for it".

Council Members, our community has been more than patient with changes & growth to our City and we applaud it, but our entrance has been reworked 3 times with multi-year construction projects. Because of its proximity to I-74, this will NEVER be an area where travelers can get on & off the Interstate either quickly or easily. Please don't make it worse by allowing this rezoning proposal to be approved; the area is already bursting at the seams.

Thank you -

Jane Dawson
2300 Cypress Court
336/899-6939

From: Tim Riddell
To: Public Comment
Subject: Case 20-20
Date: Sunday, February 28, 2021 3:47:28 PM

To Whom it May Concern:

I currently own 2304 Cypress Ct in High Point. I am opposed to the proposed development at the corner of Eastchester Drive and Cypress Ct. This proposed development is not needed. We already have several fast food restaurants within 2 miles of that area. In my opinion, the extra traffic would cause more accidents in this area.

Thank you

From:	Glenn McVicker
To:	Public Comment
Subject:	VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date:	Sunday, February 28, 2021 6:19:47 PM

In North Carolina, spot zoning is illegal. This request is a perfect example of why spot zoning is illegal:

Spot zoning that is for the benefit of one person's property solely for personal gain and not to benefit the immediate neighborhood is illegal.

For spot zoning to be valid, it must be established that there is public benefit for doing so. This request, that only allows personal gain at the expense of the neighborhood, is thus invalid.

The intrusive nature of the planned spot-zoning use creates an additional traffic hazard at one of the city's busiest intersections.

Along with the real threat of reduced property values for nearby lots and neighbors, the request has no benefit to the public – this spot zoning only benefits the one lot owner.

Clearly, no greater good will come from this type of aggressive and intrusive self-serving spot-zoning request.

Please vote NO.

Respectfully,

Glenn P. McVicker and Sherry R. White, Homeowners
2410 Cypress Court
High Point, NC 27265

gpmcvicker@gmail.com
336-804-0131

From: Theda Hale
To: Public Comment
Subject: VOTE NO ON # 2020 EASTCHESTER DEVELOPMENT
Date: Sunday, February 28, 2021 7:23:40 PM

From: Lee Ann Patterson
To: Public Comment
Subject: Re: Zoning Map Amendment 20-20
Date: Sunday, February 28, 2021 9:29:56 PM

Feb. 28, 2021

Dear Mayor Wagner and City Council Members,

Thank you very much for your attention to the many public concerns regarding the amendment to the zoning map of 20-20. After the last meeting, I would like to make just a few brief comments. First, I would like to thank the developer for agreeing not to place a gas station on the site. I do believe this is the best and safest decision for the community water supply. Secondly, I am not against planned development. I think the idea of a micro brewery, a fine dining establishment, or a small boutique hotel strategically located between High Point and Greensboro could be beneficial to the community at large.

However, I do take issue with the idea of a fast food restaurant for the following reasons:

1) It will undoubtedly increase the traffic at this particular hub. While it may, or may not, increase the overall traffic on 68, it will increase congestion on this part of the road despite what the overall traffic analysis might indicate. (And honestly, it seems likely to increase overall traffic especially if they put a sign on the highway). Let's assume that there are 40-60 people a day arriving at or leaving the current Crossfit establishment. In order to turn a profit on any new food establishment with a window, this will have to increase to someplace between 500-1000 a day. With or without a right turn lane (which they seem determined to hold on to), think about how this will increase congestion at the stoplight on Hilton Court, in the left turn lanes, and on the freeway entrance and exit ramps.

2) This is still the Gateway to High Point. Is this establishment necessary to the community? Is this the best use of this property from the perspective of the city? I would argue that it is not given the close proximity of several fast food restaurants in High Point and 1.5-2 miles up the road at the intersection of 68 and Wendover.

3) I think the domino effect is not only possible but extremely likely. There are

at least two other properties that are adjacent to this lot that would have every right to seek rezoning if you approve this. The developer would have you believe that this would not be allowed under the current Land Use Plan. But, neither is his proposed establishment. And yet, here we all are considering it. And how will you answer that when the time comes? Please recall that the Planning and Zoning Commission voted 9-0 not to rezone these properties.

4) From a tax revenue point of view, it should be noted that allowing zoning exemptions often has a negative impact on the property value of both offices and residential communities. In fact, this may cause your overall net tax revenues to decrease while simultaneously irritating voters, residents, and current office owners. If you refuse to rezone the two office buildings adjacent to this lot, their property values will most likely decrease. Also, if the traffic worsens, the property values of residential neighborhoods in the area may also decrease. This is particularly true of the neighborhood off Gordon Road but could extend to neighborhoods to the north and south of 74 depending on how bad the traffic back up is.

As Richard Gsottschneider, (president of RKG Associates, Inc., real estate, planning and economic consulting firm with a national practice working with both public and private sector clients. The firm has offices in Durham, New Hampshire and Alexandria, Virginia.) notes:

"It is generally accepted by economic development professionals and municipal officials that new real estate development will not only enhance the economic base of the community, but that it will also expand the tax base. The purpose of this article is to show that this is not always the case, and that new developments, if not properly planned, can in aggregate have a negative impact on the tax base…

Many municipalities seem to forget about their existing tax base and infrastructure. Older neighborhoods, shopping centers, and industrial areas are allowed to "exist," but public policy and funding is directed to new development or possibly downtown revitalization. Yet even if these new developments are extremely successful, they seldom contribute more than one or two percent to the tax base. Meanwhile, the existing tax base in the rest of the municipality declines."

From Understanding the tax base consequences of local economic development programs, Gsottschneider, Richard K

5) Finally, The developer will be either attracting new clients which will

increase the traffic or they will be creating a substitution effect whereby consumers simply shift their purchases from one fast food restaurant in High Point to another thereby creating a new burden on existing businesses, or most likely both will occur.

For all of these reasons, I ask that you deny this request for a zoning exemption and stick to the 2020 Land Use Plan and the decision of the Planning and Zoning Commission.

Many thanks for your careful consideration.

Sincerely,

Lee Ann Patterson

From: jbrewer48
To: Public Comment
Subject: Eastchester/Cypress/Hilton/GordonRd
Date: Sunday, February 28, 2021 10:49:13 PM

To Whom It May Concern:

It is my understanding that the developer has amended their original proposal eliminating their request for rezoning to allow a gas station/ fast food to just a fast food restaurant. While I am relieved that the issues with underground tanks are no longer at play, I still have reservations due to the level of existing congestion on Eastchester particularly in this stretch. I really do see adding a fast food restaurant with a drive though as a train wreck in the making. I understand where some may think building one just off the 74 is a great idea and convenient, but access is not easy, so I disagree. This stretch of Eastchester has 2 stoplights that are needed, but yet too close together and creates horrible and dangerous driving conditions anytime, but particularly at peak times. High Point has plenty of Fast Food, just look at Main Street and further down Eastchester in the Palladium area, another one is not needed. The existing zoning allows for a restaurant, if I understand correctly, so the developer could put a restaurant in should they choose. This area is occupied primarily by offices and that still seems best use.

From what I read in the paper there are going to be additional housing and apartments going in further down Eastchester that will only add to the already horrible congestion. High Point has done such a wonderful job reinventing the uptown and downtown areas. Responsible growth needs to continue and I just don't believe a fast food restaurant in the busiest section of Eastchester is it.

Thank you for your consideration.

Best regards,
Jenny
Jenny Brewer - REALTOR
Keller Williams Realty
mobile - 336-847-2197
jennybrewer@kw.com
jennybrewerhomes.com

From: John Stranieri
To: Public Comment
Subject: ZA Case #20-20
Date: Monday, March 1, 2021 9:13:27 AM

I have thought about this case that the city council will be considering today to allow a fast food restaurant to be built at Cypress Ct. and Eastchester Drive. I believe this would be a very bad mistake. This is a very congested traffic area and is prone to accidents. A business that has a high volume of in and out traffic like McDonalds would be disastrous.

Please vote No, do not allow this to happen!!
Thank you.

John Stranieri
1722 Chickadee Point, High Point, NC 27262
336-889-1970

From: Jessica Kennedy Mayer
To: Public Comment
Subject: Gordon Rd and Eastchester
Date: Monday, March 1, 2021 9:53:56 AM

You've got to be kidding me if you're trying to build fast food or anything in that area. It's ridiculously congested as it is with the I-74 corridor there and all the stoplights. Please for once consider the people and not a developer's greed (yes, greed because it's not in the best interest of the city or people). There are tons of restaurants, fast food and otherwise, in either direction within a 5-10 mile radius. Adding another there would only serve to increase traffic, frustrated drivers, and accidents. Leave that area alone and let people try to commute without adding issues. The roadwork is not even completed yet and it causes enough issue.

Best,
Jessica Mayer

From: Janis Stephenson
To: Public Comment
Subject: VOTE NO to BRC's Rezoning Request/Eastchester
Date: Monday, March 1, 2021 12:17:49 PM

To: Mayor Wagner & City Council

Once again the same developer with no interest in what is best now or in the future for High Point is pushing to change our rezoning laws to accommodate their agenda and now wish to put a fast-food (McDonald's ?) on Eastchester Dr. within yards of the I-74 access currently under construction and the Gordon Rd. & Cypress Court intersection. The Eastchester corridor is already the most heavily used and traffic congested in our city and it appears it will be strained even more to accommodate the two projects that the City Commissioners endorsed last Thursday for Eastchester and another on Gordon Rd.

It seems a moot point for you to EVEN CONSIDER rezoning for an unnecessary, unwanted fast-food restaurant/drive-thru and all the problems that would bring. Please remember this area backs up to our City Lake water supply and our lovely and much used City Park. Please don't let
this area become a blight on our City. ALL OF YOU ARE CHARGED WITH THE FUTURE OF OUR CITY AND WE ARE PLACING OUR TRUST IN YOU TO TAKE CARE OF IT!

Thanking you in advance for serving our city and its residents.

From: Mike Hill
To: Public Comment
Subject: STILL opposed to #2020 Eastchester development
Date: Monday, March 1, 2021 1:02:39 PM

Based on the latest changes to the #2020 Eastchester development proposal, nothing mentioned (yet) seems geared to prevent high traffic commercial-type businesses from occupying that location causing even more traffic congestion, vehicle accidents, and all the litter and toxic chemical run off that's certain to threaten Oak Hollow Lake & Deep River even further "IF" those enterprises are allowed to be built there. Once again I would urge you to VOTE NO on this #2020 Eastchester project.

From: Bryan Williams
To: Public Comment
Subject: Eastchester & Hilton Road Development
Date: Monday, March 1, 2021 2:45:40 PM

Dear High Point City,

I would like to express my opposition to the proposed rezoning of the property at the corner of Eastchester and Hilton Road. This is an extremely congested corridor and the addition of another high traffic business such as a fast food restaurant or gas station will create a major traffic problem in that area. Please say NO to to this development.

Thank you,
Bryan Williams

From: Donald C Barrett
To: Public Comment
Subject: ZA Case # 20 - 20
Date: Monday, March 1, 2021 5:58:28 PM

I would firmly oppose and discourage the introduction of any retail development on the sight proposed for this rezoning if it creates further traffic congestion. This brief strip on Eastchester, which is already heavily committed to a role as vestibule to I - 74 and as a joining point to Easetchester for countless residential communities bordering the area, already has it's work cut out for it.. A fast food operation will distract and slow traffic by adding additional entry and exit traffic to the normal flow ,as well as add to lane crossings, which will be difficult to safely service. This is one critical spot in HP that I believe we need keep as stress free as possible to take care of the high volume of community and visitor travel it already serves. because of its role. in accessing the airport and it's proximity to HPU.

End of Comments

Planning & Development
Development Services Division

March 2, 2021

BRC Spirit LLC and BRC Spirit II LLC
5826 Samet Drive, Suite 105
High Point, NC 27265

Subject: **Denial of Zoning Map Amendment Case ZA-20-20**

Dear Sirs:

At their February 15 & 17, 2021 and March 1, 2021 public hearings, the High Point City Council considered the following request:

> ***Zoning Map Amendment 20-20:*** *A request by BRC Spirit LLC and BRC Spirit II LLC to rezone approximately 3.6 acres from the Residential Single Family - 3 (R-3) District and a Conditional Use Office Institutional (CU-OI) District to a Conditional Zoning General Business (CZ-GB) District. The site is located west of Eastchester Drive and north of Hilton Court, and addressed as 1801 and 1809 Eastchester Drive.*

This Zoning Map Amendment request received a recommendation of denial from the Planning & Zoning Commission; thus, it requires a 2/3's majority vote from City Council to be approved. Because this request **did not** receive a 2/3's majority vote for approval from the High Point City Council, it is officially denied.

Should you have any questions regarding the Council's decision, please feel free to contact me at 883-3309.

Sincerely,

Herbert K. Shannon, Jr., AICP
Senior Planner

cc: Judy Stalder
PO Box 5581
High Point NC 27262

Tom Terrell
Fox Rothschild LLP
230 N Elm Street, Suite 1200
Greensboro, NC 27401

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Stacy Jones
2372 Rockland Circle
High Point, NC 27265

RE: Reappointment- Human Relations Commission

Dear Stacy Jones:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Human Relations Commission. Your appointment will be effective immediately and will expire on November 1, 2022.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

Mary S. Brooks, Deputy City Clerk

CITY OF HIGH POINT
AGENDA ITEM

Title: Public Hearing - Amendment to City Charter for Consistent Reference to Four (4) Year Terms

From: JoAnne Carlyle, City Attorney

Public Hearing: Yes

Attachments: Ordinance Amendment
Public Hearing Notice

Meeting Date: Tuesday, January 19, 2021

Advertising Date: January 6, 2021

Advertised By: High Point Enterprise

Purpose/Background:
On December 7, 2020 Council adopted a Resolution of Intent for the purpose of amending *Article II, Mayor and Council, **Section 2.2** Council; number; terms of office, and **Section 2.3** Mayor; term of office, duties of the City Charter of the City of High Point* to make those Sections consistent with other Charter references in Article III Elections, Section 3.1- Method of election, Section 3.1 which would clarify that the terms of office for the Mayor and City Council are four (4) year terms. As part of the process, Council must hold a public hearing on the matter, prior to a final vote and adoption.
Following the public hearing, but not earlier than the next regular meeting of the Council and not later than 60 days from the date of the hearing, Council may adopt an ordinance to implement the amendments.

Budget Impact:
N/A

Recommendation:
Council is requested to hold a public hearing regarding the adoption of an Ordinance Amending Article II, Sections 2.2 and 2.3 of the Charter of the City of High Point, to reflect the terms of office for the Mayor and Council as four (4) year terms which is consistent with Article III, Section 3.1 of the City Charter of the City of High Point.

AN ORDINANCE AMENDING ARTICLE II, SECTION 2.2 COUNCIL; NUMBER; TERMS OF OFFICE AND SECTION 2.3 MAYOR; TERM OF OFFICE; DUTIES OF THE CHARTER OF THE CITY OF HIGH POINT TO IMPLEMENT FOUR-YEAR TERMS FOR THE MEMBERS OF THE CITY COUNCIL

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of High Point that Article II, Section 2.2 Council; number; terms of office and Section 2.3 Mayor; term of office; duties of the Charter of the City of High Point is amended as follows:

Sec. 2.2. – Council, number; terms of office.

The council shall be composed of eight (8) members, each of whom shall be elected by the qualified voters of the city to serve for a term of ~~two~~ four (~~2~~4) years in the manner provided by Article III of this charter and the North Carolina General Statutes.

Sec. 2.3 – Mayor; term of office; duties.

(a) The mayor shall be elected by the qualified voters of the city to serve for a term of ~~two~~ four (~~2~~4) years, in the manner provided by Article III of this charter.

(b) The mayor shall preside at meetings of the council and shall have the power to vote on all questions before the council. The mayor shall be the official head and spokesman of the city in acts of ceremony and shall represent the city in matters of governmental affairs.

Adopted this the 19th day of January, 2021.

_____
Mayor Jay W. Wagner

ATTEST:

_____
Lisa B. Vierling, City Clerk

AFFP
NOTICE OF PUBLIC HEARING

Affidavit of Publication

STATE OF NORTH CAROLINA } SS
COUNTY OF GUILFORD }

Kimberly Cook, being duly sworn, says:

That she is the billing clerk of the The High Point Enterprise, a daily newspaper of general circulation, printed and published in High Point, Guilford County, North Carolina; that the publication, a copy of which is attached hereto, was published in the said newspaper on

January 06, 2021

That said newspaper was regularly issued and circulated on those dates.
SIGNED:

Kimberly Cook
the billing clerk

Subscribed to and sworn to me this 6th day of January 2021.

Barbara M Daniels
Barbara M Daniels, Notary, Guilford County, North Carolina
My commission expires: February 01, 2022

30145612 30922948

CITY OF HP CITY MANAGER
PO BOX 230
HIGH POINT, NC 27261

BARBARA M DANIELS NOTARY PUBLIC GUILFORD COUNTY, NC

NOTICE OF PUBLIC HEARING

Take notice that the High Point City Council will hold a public hearing on Monday, January 19, 2021, at 5:30 p.m. in the City Council Chambers, 211 South Hamilton Street, High Point, NC 27261 for an Ordinance Amending Article II, Mayor and Council, Section 2.2 Council; number; terms of office, and Section 2.3 Mayor; term of office, duties of the City Charter of the City of High Point to correct the language regarding term limits from two years to four years, making it consistent with the language in Article III- Elections, Article 3.1 Method of Election of the City of High Point Charter.

In order to maintain the health, safety, and well-being of our residents, staff, and the City Council, this meeting will be conducted electronically. As part of the City of High Point's COVID-19 mitigation efforts, in-person attendance will not be allowed at this meeting. Instead, the meeting will be live-streamed. Once the City Council is in session on January 19, 2021 at 5:30 p.m., please visit HYPERLINK "http://www.HighPointNC.gov/VirtualPublicMeeting" www.HighPointNC.gov/VirtualPublicMeeting to listen to the meeting.

Public comments can be submitted by:
1. Calling 336-883-3522 and leaving a message, or by
2. Emailing written comments to HYPERLINK "mailto:publiccomment@highpointnc.gov" publiccomment@highpointnc.gov, or by
3. Dropping written comments off in the City of High Point's utility payment drop-boxes located in the Green Drive and the Commerce Avenue parking on both sides of the Municipal Building located at 211 S. Hamilton Street.
4. Comments submitted should be identified as AMENDMENT TO CITY CHARTER FOR CONSISTENT REFERENCE TO FOUR YEAR TERMS

In accordance with recently adopted legislation regarding public hearings at remote meetings, after the public hearing is held, the required 24-hour waiting period will be open before a vote can be taken on this matter. During that time, the public can submit any additional comments on the subject matter for the public hearing.

Please note that the deadline for submitting comments for public hearings will be 24 hours after the public hearing is held by the City Council.

Questions? Please contact the City Clerk's Office at 336-883-3536 or 336-883-3690.

Lisa B. Vierling
High Point City Clerk

Jan. 6, 2021

Vesta Kennedy Emails #18 - #22

Email #18

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 Statements of facts, New STIRA guidelines and excerpts, NCLUST fund reference and web address
Date:	Thursday, January 14, 2021 1:43:38 PM
Attachments:	STIRA-Guidelines-Chg-10-2020 (1).pdf

Dear Mayor and Town Council,

Attached please find new STIRA guidelines updated November, 2020.

Below I took excerpts from the guidelines defining what they are and their purpose, and pertaining to special instructions when a UST is closed or updated with new tanks, in a site that has a high water table. (which the site at 1809 or 1801 most certainly does). The EPA recognizes that these are fragile areas which need special procedures. The **Critical Watershed NC class IV of Oak Hollow Lake deserves our protection.** There is a lot of good information within the attached document in full. I hope you have the time to look through.

"The purpose of the Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement (or STIRA), hereafter referred to as the “STIRA Guidelines”, is to provide procedures for performing site checks for regulated UST systems, to investigate suspected releases of petroleum and hazardous substances, and to provide guidance for performing and reporting initial response and abatement actions. Releases covered by this document include petroleum USTs, hazardous substance USTs and petroleum non-USTs. Petroleum non-UST releases can include surface spills, releases from aboveground storage tanks (ASTs), and releases from associated conduits and piping."

3.7.4 Closure of USTs in Areas with High Water Tables

Where groundwater is encountered in the excavation from which the UST or USTs have been removed or at the base of closed-in-place USTs, the procedures below must be performed. (This does not include perched water, or surface runoff that temporarily collects within a tank basin, but rather only those tank installations that intersect the water table.

1) Soil samples must be collected in the sidewalls of the excavation immediately above the water table. One sample must be collected at a minimum interval of 10 linear feet around the perimeter of the excavation with a minimum of one sample per sidewall;

2) Where possible, soil samples must also be collected underneath associated product lines, dispensers, containment sumps, fill ports/spill buckets, and any other areas where contamination is suspected or observed, as described under 3.7.6; and

3) A permanent monitoring well, constructed according to 15A NCAC 02C Well Construction Standards, must be installed in the pit or, if that is not technically possible, as close as possible to and within 5 feet of the UST(s) in a downgradient direction. A groundwater sample must be collected and analyzed as specified in Tables 5 and 7. Pit water grab samples will not be accepted.

3.7.6 Sampling Under Product Lines, Dispensers or Dispenser Islands, and Fill Ports or Spill Buckets during UST Closure or Change-in-Service

For sampling under product lines (including lines under dispenser islands) the procedures listed below must be performed:

1) The product lines must be completely exposed prior to sampling (This procedure is not required for site checks.);

2) Samples must be collected **no deeper than 2 feet into the native soil** beneath the product lines;

3) A minimum of one sample must be collected for each 10 linear foot interval along a line (and if the line is less than 10 feet in length, one sample still is required);

4) Samples must be collected at all fittings, especially joints, or wherever there is heightened potential for a release, and at all locations where staining is present or where contamination is suspected;

5) Samples are required under product lines even if it is planned that the lines remain for use with replacement UST(s).

For sampling under dispensers, the procedures listed below must be performed:

1) The dispenser piping must be completely exposed prior to sampling (This procedure is not required for site checks.);

2) Samples must be collected **no deeper than 2 feet** into the native soil directly below each individual dispenser; 24

3) Samples must be collected **no deeper than 2 feet** into the native soil directly **below all couplings, pumps, and containment sumps, or wherever there is heightened potential for a release**, and at all locations where staining is present or where contamination is suspected;

4) Samples are required under dispensers even if it is planned that the dispensers remain for use with replacement UST(s).

For sampling under containment sumps, fill ports, spill buckets, or any other near-surface fixtures, or shallow areas where contamination is suspected, the procedures described below must be performed:

1) Samples must be collected **no deeper than 2 feet** into the native soil directly below containment structures and other areas where contamination is suspected or observed.

2) Samples must be taken from directly below the piping that enters the sump and beneath any defective area of the sump.

3) If the containment sump is sitting directly on the tank, thereby preventing collection of samples under the sump, then samples must be collected along the perimeter of the sump within one foot of the sump.

4) In addition, samples must be collected from any area where contamination is observed. This includes samples for suspected releases in the shallow soils overlying any part of the UST system if there is evidence of an overfill or other surface release.

When only the product lines or the dispensers of a UST system are being replaced, soil samples are not required unless evidence of a release is observed.

When groundwater or bedrock is encountered in the trench or pit in which product lines, dispensers, or sumps are or were located or when the incident manager determines that soil assessment is not adequate to determine the presence of a release, a monitoring well must be installed and sampled as described in 3.7.4 above.

At this point I would like to point out that IF the developer is granted his rezoning request to facilitate the construction of a gas station/convenience store, car wash and a high intensity fast food restaurant, despite the **FACTS** that this request is not in keeping with:

1) Zoning and Planning staff AND Commission (9-0) recommendations
2) High Point's Land Use Plan
3) The recent I-74/Eastchester Dr Land Use Assessment which council has been briefed on
4) This land use is unlike any of those surrounding it

then; continuation of FACTS:

5)The requestee (developer) will not be held accountable and responsible for any above ground or below ground leaks, spills and releases of petroleum. The buyer will ONLY BE HELD ACCOUNTABLE FOR SITE CLEANUP, and if they follow the guidelines, then the NC Trust Fund **reimburses** them.(see web address below) The North Carolina Leaking Underground Storage Tank Trust Fund monies come from License and Permit Fees, 1/32 of NC Gas Tax, and Federal funds.

6)The clean up of our water supply falls to 108,000 + High Point citizens...**WHY** should citizens be fiscally responsible and have to shoulder this burden, just so the developer can make the most bang for his buck on this site?

7)At least 2 more major issues need to be addressed-Point of discharge requirements regarding stormwaters and surface waters, and the fact that because the site will be graded to drain to the General Watershed Area of High Point City Lake , FEDERAL ACTS, STATE STATUTES, AND CITY ORDINANCES and PROCEDURES regarding Groundwater, the Water Table, and Critical Watershed Areas, GET TO BE IGNORED. More to follow on these issues.

Thank you so much for your time, hard work and dedication to our city,
Vesta Kennedy

https://deq.nc.gov/about/divisions/waste-management/ust/trust-fund

Attachments to Email #18

GUIDELINES FOR SITE CHECKS, TANK CLOSURE, AND INITIAL RESPONSE AND ABATEMENT

PETROLEUM AND HAZARDOUS SUBSTANCE UST RELEASES

PETROLEUM NON-UST RELEASES

UST Section

North Carolina Department of Environmental Quality

Division of Waste Management

November 16, 2020 Version

Change 10 – 2020

DRAFT

Index of Changes

Document Title and Revised Pages	Version Date	Change Date	Change Number
Guidelines for Assessment and Corrective Action for UST Releases *(current version)*	July 15, 2008	October 1, 2012	Change 2
Guidelines for Sampling *(current version)*	July 15, 2008	May 1, 2012	Change 2
Guidelines for Ex Situ Petroleum Contaminated Soil Remediation *(current version)*	August 23, 2012		
Guidelines for Initial Response and Abatement, Assessment, and Corrective Action for Non-UST Releases of Petroleum *(current version)*	July 1, 2012		
Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases	March 1, 2007		
Pages i to 81			
Pages iii, iv, 9, 10, 11, 14, 15, 19, 23-26, 37-41, 71-73, 81, 82, 84(del)		July 1, 2007	Change 1
Title Page, iii, vi, vii-viii, 1, 6, 8, 11, 13, 15, 18, 20, 22, 24, 25, 28, 30, 31-39, 40, 45, 59, 85, 88-93, 94, 95		July 15, 2008	Change 2
Pages 21, 24, 31-34, 38-39		December 1, 2008	Change 3
Title Page, iii-ix, 1-3, 28, 31-36, 37-50, 52-79, 83-87, 93-100		August 1, 2012	Change 4
Title Page, 37-50		December 1, 2013	Change 5
DRAFT FOR PUBLIC COMMENT - Changes in Text, Figures, Tables, and Appendices		*March 1, 2017*	*Draft 6*
Comprehensive Changes in Text, Figures, Tables, and Appendices		May 1, 2017	Change 6
Title Page, Page 49, Figure 5		July 7, 2017	Change 7
Title Page, ix, 32, 33, 112, 113 (*Changes per Amendments to 15A NCAC 2T)*		January 9, 2018	Change 8
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5. 20-Day Report
6. UST Closure Report (following UST-12 format) and Site Investigation Report for Permanent Closure or Change-in-Service of UST (UST-2 Form)
7. Site Investigation Report for Permanent Closure or Change-in-Service of UST
8. Initial Abatement Action (Site Check, UST Closure with UST-2 Form, Excavation, Post-Excavation Soil Contamination Assessment) Report
9. 45-Day Report (For non-petroleum UST releases only)
10. Free Product Recovery Report
11. Free Product Recovery System Specification Report
12. Initial Site Assessment Report (For non-UST petroleum releases only)
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Appendix H - Aquifer Testing

Appendix I - Notices of Residual Petroleum

Appendix J. Development of Maximum Soil Contaminant Concentrations

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Definitions

Action Level: the concentration of a contaminant that if exceeded will require further regulatory action such as sampling, cleanup or monitoring. Action Levels may be screening values as well as regulatory levels. Screening analyses used as surrogate against regulatory standards may trigger exceedance of an Action Level if more comprehensive sampling information is not available.

Aquifer: a permeable body of rock or sediment that stores and transmits groundwater in sufficient quantity to supply wells or springs.

Bedrock: any consolidated rock which is encountered in the place in which it was formed or deposited and which cannot be readily excavated without the use of explosives or heavy rock cutting equipment. (15A NCAC 02L.0102) Bedrock generally underlies soil or other unconsolidated, superficial material.

Cleanup Level: the concentration of a contaminant at which *no* further cleanup actions are required based on the risk of harm posed by the contaminant.

Closure: activities conducted during the permanent removal (or abandonment) of underground storage tank systems and not inclusive of abatement or corrective actions, or remediation.

Commercial Underground Storage Tank: any tank or tank system, including any connected piping, containing petroleum products, where at least ten percent (10%) of the total system volume (including both tanks and piping) is buried beneath the surface of the ground, excluding any systems exempted in North Carolina General Statute (NCGS) 143-215.94A(2).

Confining Layer: a layer having very low hydraulic conductivity, in relationship to adjacent stratigraphic units, that restricts the movement of water into and out of an aquifer (e.g., dense, unfractured clay).

Confirmed Release: a release for which an analytical result for sampled media shows any contaminant level above the Method Detection Limit.

Contaminant: any substance occurring in concentrations which exceed the groundwater quality standards specified in 15A NCAC 02L.0202.

De Minimis Concentration: amount of a regulated substance which does not exceed one percent (1%) of the capacity of the tank, excluding piping and vent lines (15A NCAC 02N.0203).

Department: the North Carolina Department of Environmental Quality.

Discharge: a release (See also Release).

Division: the Division of Waste Management.

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Ex Situ Soil: soil that has been excavated.

Free Product: free-phase petroleum, also known as liquid-phase hydrocarbon or phase-separated hydrocarbon (See also NAPL).

Gross Contamination Levels (GCLs): levels of groundwater contamination for any contaminant (except ethylene dibromide, benzene and the aliphatic and aromatic carbon fraction classes) that exceed 50 percent of the solubility of the contaminant at 25 degrees Celsius or 1,000 times the groundwater quality standard or interim groundwater quality standard established in 15A NCAC 02L .0202, whichever is lower: and levels of groundwater contamination for ethylene dibromide and benzene that exceed 1,000 times the federal drinking water standard set out in 40 CFR 141.

Groundwater: those waters occurring in the subsurface under saturated conditions.

Hazardous Substance: a hazardous substance defined in Section 101 (14) of the Comprehensive Environmental Response Compensation and Liability (CERCLA) Act of 1980 (but not including any substances regulated as a hazardous waste under RCRA Subtitle C or any mixture of such substances and petroleum).

Hazardous Waste: discarded material which, due to its quantity, concentration, or physical or chemical characteristics, may cause or significantly contribute to an increase in mortality, irreversible or incapacitating reversible illness, or pose a substantial threat or potential hazard to human health or the environment when improperly treated, stored, transported, disposed or otherwise managed (Federal regulations define a waste as a hazardous waste if it exhibits a characteristic of a hazardous waste (40 CFR 261.20 through 261.24); has been listed as hazardous (40 CFR 261.31 through 261.33); or is a mixture containing a listed hazardous waste and a non-hazardous solid waste (unless the mixture is specifically excluded or no longer exhibits any of the characteristics of a hazardous waste).

In Situ Soil: soil or fill material that is in the ground and has not been disturbed.

Land Application: the process of remediating contaminated soil by spreading soil over land. Land application may include remediating soil by natural biological methods, enhanced biological methods, or volatilization.

Maximum Soil Contaminant Concentration (MSCC): the concentration of a soil contaminant at which no further cleanup actions are required based upon the risk of harm posed by the contaminant.

Method Detection Limit (MDL): the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte (40 CFR 136 Appendix B).

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Maximum Extent Practicable (MEP): the limits of available technology and the practical and technical limits on an owner or operator of an underground storage tank to conduct assessment and cleanup activities that are protective of human health and the environment in response to a discharge of petroleum to the environment.

Minimum Reporting Limit (MRL): the minimum reporting limit that must be achieved by laboratories for target analyte results submitted to the UST Section; it is a reporting limit established by the UST Section for the target analytes required for each approved analytical method as an alternative to the detection limit indicated in the method description and is listed for each analyte in the ***Guidelines for Sampling***.

NAPL: also known as "free product". A non-aqueous phase liquid (i.e., not dissolved in water) which may be present within the subsurface at a measurable thickness greater than or equal to 0.01 of a foot (approximately 1/8 inch), as a sheen on surface water, or accumulating as a liquid on an exposed surface. Depending on the density of the liquid in relation to water, the NAPL may be further described as 'Light' (LNAPL) or 'Dense" (DNAPL).

Non-Commercial Underground Storage Tank: any tank or tank system, including any connected piping, containing petroleum products, where at least ten percent (10%) of the total system volume (including both tanks and piping) is buried beneath the surface of the ground, that is *not* included within the Commercial UST classification, and excluding any systems exempted in North Carolina General Statute (NCGS) 143-215.94A(7) .

Operator: Per § 143-215.94OO "Primary operator" means a person having primary responsibility for the daily on-site operation and maintenance of an underground storage tank system.

Petroleum or Petroleum Product: crude oil or any fraction thereof which is liquid at standard conditions of temperature (60 degrees Fahrenheit) and pressure (14.7 pounds per square inch absolute), but excluding substances defined as a hazardous substance in Section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.

Petroleum Contaminated Soil or Soil Containing Petroleum Products: any soil that has been exposed to petroleum products because of any emission, spillage, leakage, pumping, pouring, emptying, or dumping of petroleum products onto or beneath the land surface and that exhibits characteristics or concentrations of typical petroleum product constituents in quantities that exceed the soil-to-groundwater MSCC or the residential MSCC, whichever is lower, as established by 15A NCAC 02L .0411.

Practical Quantitation Limit (PQL): the lowest concentration of a given material that can be reliably achieved among laboratories within specified limits of precision and accuracy by a given analytical method during routine laboratory analysis.

Receptor: any human, plant or animal, structure or surface water body that is or has the potential to be adversely effected by the release or migration of contaminants.

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Release: any spilling, leaking, emitting, discharging, escaping, leaching or disposing into groundwater, surface water or subsurface soils. (Refer to statutes and regulations relevant to UST releases or to AST and surface releases.)

Responsible Party (RP): a UST owner, UST operator, and/or landowner seeking reimbursement from the State Trust Fund, or any person who is responsible for a discharge or release of petroleum or a hazardous substance. (Refer to statutes and regulations relevant to UST releases or to AST releases and spills.)

Smear Zone: the zone around a source area where LNAPL has been 'smeared' across different soil horizons due to water table fluctuations, with some LNAPL remaining trapped in pore spaces beneath the historic high water table.

Soil (or Regolith): a general term for the fragmental and unconsolidated geological material of highly varied character that nearly everywhere forms the surface of the land and overlies or covers bedrock. It includes rock debris of all kinds, volcanic ash, glacial till, alluvium, loess and eolian deposits, and vegetal accumulations.

Soil Scientist: an individual who is a Certified Professional in Soils through the NCRCPS (N.C. Registry of Certified Professionals in Soils) or a Certified Professional Soil Scientist or Soil Specialist by ARCPACS (American Registry of Certified Professionals in Agronomy, Crops and Soils) or a Registered Professional Soil Scientist by NSCSS (the National Society of Consulting Soil Scientist) or can provide documentation that he/she meets the minimum education and experience requirements for certification or registration by one or more of the organizations named in this Subparagraph or upon approval by the Director, an individual with a demonstrated knowledge of soil science.(***15A NCAC 2T .0103(38***)).

Source Area: point of release or discharge. The term 'secondary source area' refers to any zone of NAPL-impacted soil that continues to release contaminants in the subsurface.

Surface Water: all waters of the state as defined in North Carolina General Statute (NCGS) 143-215.77 Article 21A, except for underground waters, such that "waters" shall mean any stream, river, creek, brook, run, canal, swamp, lake, sound, tidal estuary, bay, reservoir, waterway, wetlands or any other body or accumulation of water, surface or underground, public or private, natural or artificial, which is contained within, flows through, or borders upon this State, or any portion thereof, including those portions of the Atlantic Ocean over which this State has jurisdiction.

Total Petroleum Hydrocarbons (TPH): a measure of hydrocarbon compounds grouped by the amount of carbon (C) in each, called carbon fractions. EPA Method 8015C provides C6-C10 alkanes labeled as Gasoline Range Organics (GRO) and C10-C28 alkanes labeled as Diesel Range Organics (DRO). The UST Section currently uses 50 micrograms per kilogram (mg/kg) for GRO and 100 mg/kg for DRO as surrogate thresholds for screening against the applicable soil standards. Note that TPH data are only used for screening and cannot supersede constituent-specific analytical results.

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Transmissivity: the rate of groundwater flow through a one unit width over the entire saturated thickness of a hydrogeologic unit, describing the ability of that unit to produce groundwater as a volume per day per unit width.

Underground Storage Tank (UST): any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground (For a full definition, see 15A NCAC 02N .0203.).

Unrestricted Use Standards: land use restrictions for a property contaminated by a petroleum release are not required when soil contaminant concentrations are below residential maximum contaminant concentrations and groundwater contaminant concentrations are below the 2L groundwater standards.

Used Oil: means any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.

UST System: an underground storage tank, connected underground piping, underground ancillary equipment, and containment system, if any.

Waste Oil: a generic term for oil that has been contaminated with substances that may or may not be hazardous. Any used oil or waste oil spill from a non-UST stored generator, transporter, recycler, etc. would fall under the jurisdiction of the Hazardous Waste Section if determined to be hazardous.

Water Table: the surface of the saturated zone (phreatic zone) below which all interconnected voids are filled with water and at which the pressure is atmospheric.

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Acronyms

AFVR Aggressive Fluid - Vapor Recovery

ASC Accelerated Site Characterization

AST Aboveground Storage Tank

ASTM American Society for Testing and Materials

CAP Corrective Action Plan

CAS Chemical Abstracts Service Number

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

CFR Code of Federal Regulations

CPT Cone Penetrometer/Penetration Test

CSA Comprehensive Site Assessment

DEQ Department of Environmental Quality

DPP Direct-Push Platform

DWR Division of Water Resources

DWM Division of Waste Management

EDB Ethylene Dibromide (1,2 Dibromoethane)

EPA The Environmental Protection Agency

FID Flame Ionization Detector

GCL Gross Contamination Level

HCl Hydrochloric Acid

HNO_3 Nitric Acid

HPT Hydraulic Profiling Tool

IAA Initial Abatement Action

IAR Initial Site Assessment Report

IATA International Air Transport Association

ITRC Interstate Technology & Regulatory Council

L.G. Licensed Geologist

LUR Land Use Restrictions

LIF Laser-Induced Fluorescence (Direct Push)

LSA Limited Site Assessment

LUST Leaking Underground Storage Tank

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MADEP Massachusetts Department of Environmental Protection

MDL Method Detection Limit

MIP Membrane Interface Probe

MMPE Mobile Multi-Phase Extraction

MRL Minimum Reporting Limit

MSCC Maximum Soil Contaminant Concentration

MNA Monitored Natural Attenuation

NAPL Non-Aqueous Phase Liquid

NC North Carolina

NCAC North Carolina Administrative Code

NCDA&CS North Carolina Department of Agriculture & Consumer Services

NCGS North Carolina General Statutes

NCS Notice of Contaminated Site

NFA No Further Action

NORR Notice of Regulatory Requirements

NOV Notice of Violation

NPDES National Pollutant Discharge Elimination System

NRP Notice of Residual Petroleum

OPHSCA Oil Pollution and Hazardous Substances Control Act of 1978

PAH Polycyclic Aromatic Hydrocarbon

PCB Polychlorinated Biphenyl

P.E. Professional Engineer

PID Photoionization Detector

POTW Publicly Owned Treatment Works

PQL Practical Quantitation Limit

PVI Petroleum Vapor Intrusion

QA/QC Quality Assurance/Quality Control

RCRA Resource Conservation and Recovery Act

ROD Record of Decision

RRD Reasonable Rate Document

SAR Soil Assessment Report

SCR/SCR Soil Cleanup Report/Site Closure Request

SM Standard Method

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STIRA Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases

STF State Trust Fund

SVE Soil Vapor Extraction

SVOC Semi-Volatile Organic Compounds

SW Solid Waste

TCLP Toxicity Characteristic Leaching Procedure (EPA Method SW-846 1311)

TOC Total Organic Carbon

TPH Total Petroleum Hydrocarbons

TPH-DRO Total Petroleum Hydrocarbons - Diesel Range Organics

TPH-GRO Total Petroleum Hydrocarbons - Gasoline Range Organics

UST Underground Storage Tank

UVF Ultraviolet Fluorescence

USGS United States Geological Survey

VOA Volatile Organic Analysis

VOC Volatile Organic Compounds

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GUIDELINES FOR SITE CHECKS, TANK CLOSURE, AND INITIAL RESPONSE AND ABATEMENT

1.0 Introduction

1.1 Purpose of the Guidelines

The purpose of the ***Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement*** *(or* ***STIRA)***, hereafter referred to as the "***STIRA Guidelines****", i*s to provide procedures for performing site checks for regulated UST systems, to investigate suspected releases of petroleum and hazardous substances, and to provide guidance for performing and reporting initial response and abatement actions. Releases covered by this document include petroleum USTs, hazardous substance USTs and petroleum non-USTs. Petroleum non-UST releases can include surface spills, releases from aboveground storage tanks (ASTs), and releases from associated conduits and piping.

This document replaces all previous guidance documents issued by the UST Section pertaining to initial response and abatement actions for regulated, unregulated, non-petroleum UST systems and non-UST petroleum releases. Any release discovered from a UST system during closure, during site check, or by other means must be initially addressed with initial response and abatement actions in accordance with this document and then, if further assessment is required, addressed in accordance with the ***Assessment Guidelines*** and ***Corrective Action Guidelines****,* current versions.

All work performed pursuant to these ***Guidelines*** which involves site assessment, interpretation of subsurface geologic conditions, or preparation of corrective action plans or which requires detailed technical knowledge of site conditions must be performed by persons, firms, and corporations licensed by the North Carolina State Board of Professional Engineers or the North Carolina State Board of Licensed Geologists, as required under **15A NCAC 02L .0103(e)**. Furthermore, the title pages of the ***20-Day Report*** and the ***Initial Abatement Action Report*** required by these ***Guidelines*** must display the seal and signature of the certified Professional Engineer or Licensed Geologist and the name and corporate certification number of the firm or corporation, as applicable.

The guidelines do not imply or guarantee Trust Fund eligibility and/or reimbursement or in any way supersede any requirement of pre-approval.

Emergency actions should be taken as soon as a release is discovered, the following documents may be helpful:

- If initial release abatement efforts cannot restore the site to pre-release conditions, the assessment described in the ***Assessment Guidelines*** must be considered as the next step. The ***Assessment Guidelines*** assists tank owners, tank operators, landowners, and other 'responsible parties' in understanding the process of evaluating releases to meet the applicable statutes and administrative rules. Releases covered by ***Assessment Guideline***s include petroleum USTs, hazardous substance USTs and petroleum non-UST releases. Petroleum non-UST releases can include surface spills, releases from aboveground storage tanks (ASTs), and releases from associated conduits and piping.

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- If contamination remains above the goals established by the risk identified during assessment activities, corrective action must be considered the next step. The ***Corrective Action Guidelines*** assist tank owners, tank operators, landowners, and other responsible parties in understanding the process of remediating releases to meet the applicable statutes and administrative rules. Releases covered by the ***Corrective Action Guidelines*** include petroleum USTs, hazardous substance USTs and petroleum non-UST releases. Petroleum non-UST releases can include surface spills, releases from aboveground storage tanks (ASTs), and releases from associated conduits and piping. The ***Corrective Action Guidelines*** describe methods and procedures for performing corrective action procedures and tasks to reduce the levels of petroleum or other contamination and characterizing the risk posed to human health and the environment.

Electronic versions of all guidelines developed by the UST Section are available for download from the Division of Waste Management – Underground Storage Tank Section web site at https://deq.nc.gov/about/divisions/waste-management/ust. Questions concerning the information presented in this document should be directed to the UST Section Central Office at 919-707-8200. Questions concerning a specific site should be directed to the UST Section regional office that is responsible for the county in which the site is located. The address, telephone number, of the central office and each regional office are provided on the Corrective Action Branch Map and can be found at the following website: https://deq.nc.gov/about/divisions/waste-management/ust/corrective-action

Note: Throughout this document, comments related to the North Carolina Commercial Leaking Petroleum Underground Storage Tank Cleanup Fund (State Trust Fund) will be enclosed in boxed text, such as this. If State Trust Fund reimbursement is anticipated for any work related to a leaking Commercial UST, the parties concerned should be aware of all policies and procedures that pertain to the State Trust Fund to insure reimbursement eligibility.

Information related to the scope-of-work of tasks that may be required to be performed in accordance with the regulations and up to the maximum rates allowed for these tasks is provided in the current version of the Reasonable Rate Document, which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents.

The State Trust Fund is authorized under Chapter 143, Article 21A, Part 2a of the North Carolina General Statutes, and is regulated under Title 15A of the North Carolina Administrative Code, Subchapter 2P. State Trust Funds may be used only for the cleanup of commercial leaking petroleum USTs. Furthermore, some costs incurred for cleanup of leaking petroleum USTs may not be reimbursable, as described in the most current version of the Task Scope-of-Work Document.

Owners or operators applying for participation in the State Trust Fund are cautioned that all required annual operating fees must be paid in full before any release is discovered, or reimbursement will not be available for any cleanup or third-party liability expense incurred in response to a release from that UST system (even if all outstanding fees are subsequently paid). Questions related to eligibility and reimbursement should be directed to the Trust Fund Branch at 919-707-8200.

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1.2 Statutory and Regulatory Background

The Department of Environmental Quality (DEQ or Department) has the authority to regulate the response to a petroleum releases, and does so through the Underground Storage Tank (UST) Section of the Department's Division of Waste Management (DWM). This regulatory authority and the responsible party's obligations to address a petroleum release are defined in Title 15A of the North Carolina Administrative Code (NCAC), under Subchapters 02L and 15A NCAC 02N. In addition to petroleum releases, the UST Section is tasked with overseeing remediation of releases from hazardous substance UST systems 40 CFR § 280.60 and §143-215.78 Oil pollution control program. These NC General Statutes state that the Department shall establish an oil pollution control program for the administration of this Article (Article 21A. Oil Pollution and Hazardous Substances Control). The rules establish criteria and standards that include the requirements and procedures for permanently closing UST systems, investigating suspected releases, and performing initial response and abatement actions for petroleum UST, petroleum non-UST and non-petroleum UST releases.

The Oil Pollution and Hazardous Substance Control Act (OPHSCA, G.S. § 143-215.94A(10)) defines the term **'***petroleum*' or *'petroleum product'* as being crude oil or any fraction of crude oil that is a liquid at standard temperatures and pressures, including blended motor fuels that include alcohol, and excluding anything that would be defined as a 'hazardous substance' covered under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980, (*or *CERCLA,)* or a 'hazardous waste' covered under the *Resource Conservation and Recovery Act of 1976*, (or *RCRA*).

The term '*oil*' is defined by **OPHSCA** (G.S. § 143-215.77(8)) as any type of oil or 'liquid hydrocarbon' commonly used as fuel for motor vehicles or heating, oil used for lubrication, oil refuse and sludges, and petroleum-related products, by-products, or mixtures with other substances, etc.

If the substance released is not naturally occurring (or is naturally occurring but exceeds the naturally occurring standard), it must comply with the assessment and corrective action requirements of 15A NCAC 02L .0106.

Petroleum releases from USTs and other non-UST sources are governed by the North Carolina Environmental Management Commission (EMC) per the OPHSCA, as incorporated in Article 21A of Chapter 143 of the North Carolina General Statutes (G.S. § 143-215.75 through § 143-215.104AA.) A flowchart of requirements for UST petroleum releases is included as **Figure 1**. A flowchart of requirements for Non-UST releases of petroleum is included as **Figure 2**.

1.3 Regulated USTs vs. Non-Regulated USTs

This document provides guidance relevant to both regulated USTs and non-regulated USTs for any closure or site check activity through the initial abatement of a release. The term "regulated UST" is defined and distinguished from "non-regulated UST". A "regulated UST" is any underground tank containing regulated substances, as defined in 15A NCAC 02N, specifically petroleum (including but not limited to gasoline, diesel and used/waste oil) or a hazardous

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substance (including halogenated or non-halogenated solvents, a list called the Consolidated List of Lists can be found on the web page https://www.epa.gov/epcra under the Most Requested Documents to help identify these substances).

USTs which constitute exceptions to this definition are considered "non-regulated USTs" and include, among others:

- USTs containing heating oil that is used on the premises where stored.
- Farm or residential motor-fuel USTs (such as those containing gasoline or diesel fuel) that hold 1,100 gallons or less in capacity. (*To be considered exempt from the regulations, both farm and residential tanks must be 1,100 gallons or less in capacity and not be used for commercial (e.g., resale, delivery fleets, etc.) purposes. USTs located on farm or residential property which are used for fuel resale or for other commercial purposes are regulated.*)
- USTs that hold under 110 gallons in capacity.

The difference between regulated and non-regulated USTs is clarified further under the definition of UST in **15A NCAC 02N .0203**, and examples of regulated and non-regulated USTs are presented in Appendix C.

1.4 Commercial USTs vs. Noncommercial USTs

Tanks are further designated as either "commercial" or "noncommercial". A "commercial UST" is defined in North Carolina General Statute (NCGS) **143-215.94A(2)** as all USTs containing petroleum with the exception of a few specific types of tanks. The exceptions include, but are not limited to, the following:

- Farm or residential motor-fuel USTs (such as those containing gasoline or diesel fuel) that hold 1,100 gallons or less in capacity and are used for non-commercial purposes.
- USTs of 1,100 gallons or less in capacity containing heating oil that is used on the premises where stored.
- USTs of more than 1,100 gallons in capacity containing heating oil that is used on the premises where stored by four or fewer households.
- Flow-through process tanks.
- Storage tanks situated in an underground area if the storage tank is situated upon or above the surface of the floor.

A "noncommercial" tank is defined in **NCGS 143-215.94A(7),** which restates some exemptions from the commercial definition, such as septic tanks, surface lagoons, storm water collection systems, etc.

The regulated/non-regulated alignment is matched in the commercial/noncommercial designations in many cases. According to the exception lists within each set of definitions, all regulated petroleum tanks must also be *commercial* tanks, while all *noncommercial* petroleum tanks must also be defined as non-regulated tanks. Some UST systems, such as some very large heating oil USTs, may be excluded from the regulated UST definition, while satisfying the commercial UST definition, representing a *non-regulated commercial* UST. While non-regulated, commercial

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tanks do not have to comply with some of the construction and monitoring requirements listed in **15A NCAC 02N**, there are other requirement that do apply to these USTs in that rule as well as in **NCGS 143-215.94C**. There are no conditions that provide for a *noncommercial regulated* UST.

The difference between commercial and noncommercial USTs is clarified further under the definitions of these two terms in **NCGS 143-215.94A(2)** and **(7),** respectively.

1.5 Hazardous substance UST Releases Overview

Hazardous substance UST releases are subject to the initial response and abatement, assessment and corrective action requirements of both **15A NCAC 02N .0700** and **15A NCAC 02L .0106.** The responsible party for a hazardous substance UST release is required to:

- Submit a **UST-61 - 24-Hour Release and UST Leak Reporting Form** to report the release;
- Prepare and submit at 14-days a **Free Product Recovery Report,** if necessary;
- Prepare and submit a **20-Day Report** to report progress of initial actions;
- Prepare and submit a **45-Day Report** to report preliminary assessment and receptor information;
- Prepare and submit a **Comprehensive Site Assessment (CSA) Report** and
- Prepare and implement a **Corrective Action Plan (CAP)** to address contamination.

(See **Appendix A** for report formats).

If cleanup is achieved the responsible party may request a No Further Action determination at any point. The most stringent cleanup levels may apply to hazardous substance releases (even if comingled with a petroleum UST release). Therefore, groundwater contaminated by hazardous substance releases should be cleaned up to the groundwater quality standards in **15A NCAC 02L .0202** and soil should be cleaned up to levels protective of groundwater quality, the soil to groundwater maximum soil contaminant concentrations (MSCCs).

However, in accordance with Session Law 2015-286, risk-based remediation is available for hazardous substance releases based upon the amendments to **G.S. § 130A-310** (https://deq.nc.gov/permits-regulations/risk-based-remediation/statutes-and-rules). Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. In addition to DEQ's Underground Storage Tank, Dry Cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs, risk-based remediation can now be considered in all DEQ environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. Any responsible party seeking to conduct risk-based assessment and cleanup efforts at hazardous substance sites should follow the guidance offered by the Department at: https://deq.nc.gov/permits-regulations/risk-based-remediation.

Other state agencies also responsible for overseeing remediation of these types of releases are provided in **Appendix F**.

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The assessment and corrective actions required for regulated hazardous substance UST releases and for non-regulated non-petroleum UST releases are similar. A single flowchart summarizing the regulatory requirement for both regulated and nonregulated non-petroleum UST releases is presented in **Figure 3.**

1.6 Non-regulated non-petroleum UST Releases

Non-regulated, non-petroleum UST releases are subject to the initial response and abatement requirements of **15A NCAC 02L .0106**. Non-regulated non-petroleum UST releases (e.g., alcohol, vegetable oil, or propylene glycol UST releases) are subject, if the substance released is not naturally occurring (or is naturally occurring but exceeds the naturally occurring standard), to comply with the site assessment and corrective action requirements of **15A NCAC 02L .0106**. The responsible parties must take immediate action to terminate and control the release, mitigate any hazards resulting from exposure to the pollutants or from fire, explosion, or vapors; determine and remove, treat, or control primary and secondary pollution sources. The responsible party is required to perform assessment and submit a contamination assessment and to submit and implement corrective action to address contamination. More detailed guidance for action at non-regulated non-petroleum UST releases is not provided as such guidance is contaminant specific. The responsible party should contact the Corrective Action Branch of the UST Section for specific guidance. Some non-regulated non-petroleum UST releases (e.g., hazardous waste UST releases) do not fall under the regulatory authority of the UST Section; **Appendix F** provides a list of the appropriate agencies to contact.

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2.0 UST Site Check Guidelines for Regulated UST Systems

A site check is required if a release from a regulated UST system has been suspected or confirmed, at the site or nearby, by the presence of the regulated substance as free product, dissolved product, or vapor detected in soils, sewer and utility lines, surface water, groundwater, etc.; by unusual operating conditions of the system itself; or by leak detection and/or tightness testing results, in accordance with **15A NCAC 02N .0601** and **.0603,** and **.0701** through **.0704.** A site check is also required if a spill or overfill is known to have occurred at the site. A site check may be directed in accordance with **15A NCAC 02N .0602**, if the UST system is suspected to be the source of a release that is discovered off site.

2.1 Site Check Description

The site check assessment procedure requires sampling where contamination is observed or is most likely to be present at the site. The scope of assessment therefore includes the soil surrounding the entire UST system, and the groundwater within the immediate area. The sampling procedure requires the same sampling protocol required for UST closure. The sampling protocol must consider the nature of the stored substance, the type of initial alarm or cause for suspicion, the type of backfill, the depth to groundwater, and any other factors appropriate for identifying the presence and source of the release.

Site check activities are required of owners and operators of UST systems in any of the circumstances described below if:

1) evidence of a release is present at the UST site or is found offsite and may be related to a release at the UST site:
    a. such evidence includes, but is not limited to, the discovery of the presence of regulated substances (such as dissolved product, free product, or vapors) in soils, basements, sewer or utility lines, and nearby surface water and groundwater.
    b. **this applies even where tightness test results for the UST system are within acceptable parameters;**
2) the applied method of leak detection indicates a suspected release and a follow-up tightness test confirms that result; and/or
3) a spill or overfill of a regulated substance has occurred.

If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

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2.2 Site Check Requirements

In accordance with **Title 15A NCAC 02N .0703** and **.0704**, site check procedures must include:

1. soil samples collected around the perimeter of a single UST or around the perimeter of a set of USTs in a single pit, according to the sampling procedure described in Item #1 of **3.7.2:** Removal of UST(s) underlain by a concrete pad;
2. one soil sample collected in native soils under any catchment basin at the fill port for each UST, as described in 3.7.6, to document overfills;
3. soil samples collected in native soils underneath associated product lines, dispensers, containment sumps, turbine pumps or turbine containment sumps, and other areas where contamination is suspected or observed, as described in Section 3.7.6.

Note that for #2 and #3 above the following applies:

- ***If a component is in direct contact with gravel fill and not soil fill material, soil samples must be collected from native soil beneath the gravel fill.***
- ***In the case of fill port catchment basins (i.e., spill buckets, see Figure 2), when gravel fill and not soil fill material is beneath the basin, a groundwater monitoring well must be installed as close to and downgradient of the spill bucket, if possible. A groundwater sample must be collected and submitted for laboratory analysis, and***

  For Spill buckets and other areas requiring groundwater samples: Drilling should not exceed more than 30 feet below the bottom of the source area or area of over-excavation (whichever is deeper) without evidence of unsaturated zone soil contamination (e.g., 30 feet below the deepest unsaturated soil contamination) with no more than 20-foot screen into the water table. If groundwater is not encountered 30 feet below the deepest unsaturated soil contamination, then a groundwater sample may not be necessary. Evidence of soil contamination may include one or more of the following; observation, UVF, PID, and/or olfactory which must be confirmed through TPH testing (UVF or Laboratory Analyses). If the responsible party elects to sample the source area monitoring well soil samples for contaminant specific constituents, then only unsaturated soil samples should be analyzed for contaminant specific constituents.
- ***If groundwater is not initially present in the monitoring well, check the monitoring wells a week or more after drilling to confirm the presence of groundwater for sampling. If groundwater is not present at 40 feet, an unsaturated soil sample can be taken below the base of the gravel angled underneath the UST. The borehole should be logged and soil samples taken for TPH analyses every 5 to 10 feet as required for source area wells and other analytes as appropriate. Drilling should continue to a depth of 30 feet below the deepest unsaturated soil contamination***
- ***In the case of components that intersect the water table, that are installed on bedrock, surrounded by gravel fill, and/or where required by the UST Section based on other site-specific data, a permanent monitoring well, constructed according to Title 15A NCAC 02C, Well Construction Standards, must be installed as close as possible to and within 5 feet of the (part of the) UST system***

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with the (suspected) release in a downgradient direction, and a groundwater sample must be collected and analyzed as specified in Tables 4 and 8.

4. soil samples analyzed by TPH-equivalent methods (EPA 8015 GRO and/or, 'Typing' UVF for GRO, MADEP VPH: GRO Range, 'Typing' UVF for DRO) as described in **Table 3**. Groundwater samples must be analyzed for constituent-specific petroleum and metals analyses, as described in **Table 5.** Groundwater samples must also be analyzed for ethanol, oxygenates, and associated degradation products.

Please note that it may not be necessary to collect samples from around the entire system, as indicated in items 1-3 above, if the area of the suspected release is known and localized.

When onsite screening via 'Typing' UVF is not available during emergency situations at releases where Trust Fund reimbursement is anticipated, the increased costs for a twenty-four hour turn-around for laboratory analysis of closure and site check samples must be pre-approved.

Analytical costs are to be based only on the soil and groundwater samples required to be taken by the guidelines.

If the results of the site check indicate that:

- soil contamination does *not* equal or exceed the action levels currently set at 50 mg/kg TPH GRO or 100 mg/kg TPH DRO for petroleum (or where tested, *such as for regulated hazardous substances,* does not exceed the soil-to-groundwater MSCC. Contact the UST Section Central Office if no MSCC is established),
- groundwater contamination does *not* equal or exceed the groundwater quality standard established in **15A NCAC 02L .0202**, and
- NAPL is not present,

then the results must be reported to the UST Section in a ***Site Check Report*** (see **Appendix A**).

The ***Site Check Report*** must be submitted to the appropriate regional office of the Corrective Action Branch of the UST Section (as well as a separate copy to the Permits and Inspections Branch, if the site check was required by a UST inspector). The ***Site Check Report*** must be received by the UST Section within 30 days of the receipt of the ***Notice of Regulatory Requirements*** or the ***Notice of Violation***. If the removal of all or part of the UST system was necessary to allow access for site check sampling, then the required UST closure report elements (***UST-12 Format*** with a ***UST-2A*** or ***UST-2B Form***, **Appendix A**) should be submitted as part of the ***Site Check Report***. The reporting requirements are described in Section 8.0, and the outline of the ***Site Check Report*** format is presented in **Appendix A**. If the three conditions above are confirmed, then no further action will be required.

If the results of the site check indicate that:

- soil contamination does equal or exceed the action levels currently set at 50 mg/kg TPH GRO or 100 mg/kg TPH DRO for petroleum (or where tested, *such as for regulated hazardous substances*, soil contamination equals or exceeds the soil-to-groundwater MSCCs. Contact the UST Section Central Office if no MSCC is established*)*,

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- groundwater contamination does equal or exceed any 02L groundwater quality standards, or
- free product is present,

then **initial response and abatement actions, including excavation of contaminated soil, are required.** A flowchart illustrating the requirements for releases discovered during site checks is presented as **Figure 1**.

Initial response actions which are required include submittal of a ***Form UST-61 - 24-Hour Release and Reporting Form*** (Appendix A) to the UST Section within 24 hours following discovery of the release; action to stop the release; and identification and mitigation of hazards from exposure to pollutants.

Per NCGS 143-215.94B(b)8, State Trust Fund reimbursement may be available for investigative costs if a site investigation is required by the Department to determine if a release has occurred. This statute excludes coverage of routine leak detection procedures that are required by statute or rule. Accordingly, reimbursement is not available for costs incurred for routine leak detection investigations by the tank owner or operator where required by rule under 15A NCAC 02N .0601 following evidence of an on-site release. However, reimbursement of some or all investigation costs may be available for a tank owner or operator who is directed by the Department to perform a leak detection investigation under 15A NCAC 02N .0602 following the discovery of off-site contamination that appears to be related to a potential on-site release.

Where reimbursement is anticipated, any discovery of a new release during an eligible Site Check would transition into the Initial Abatement Action phase, and any findings would be reported within the subsequent Initial Abatement Action Report.

Additionally, please note that a failure to locate and repair or remove a leaking component or system may jeopardize future access to the State Trust Fund, or require cost recovery for prior reimbursements, if the presence of an ongoing release results in an increase in cleanup costs.

Please refer to the current version of the Reasonable Rate Document (available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for more information about reimbursement.

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3.0 UST Closure

3.1 Regulated UST Closure Requirements

Regulated USTs

Closure activities performed during the permanent removal of all regulated USTs (petroleum and hazardous substance USTs) must be conducted in accordance with the UST closure requirements provided in **15A NCAC 02N .0800**. These requirements incorporate the federal underground storage tank requirements by reference in accordance with **NCGS 150B-14(c)**.

3.2 Installation of New or Replacement UST Systems in Former UST System Locations

New or replacement USTs, piping, or dispensers should not be installed in a former UST system location until it has been demonstrated, based on sampling procedures and concentration limits established in this section, that all soil contaminated in exceedance of the lower of the soil-to-groundwater or residential MSCCs has been removed from that area.
In accordance with 15A NCAC 02N .0901(h), UST systems or UST system components may not be installed or replaced in areas where they will be in contact with contaminated soil or free product. Failure to excavate the contaminated soil prior to installing a new or replacement UST system component may result in the required removal of the new or replacement UST system in order to excavate the contaminated soil. For installation guidance please contact the Permits and Inspection Branch of the UST Section.
Where State Trust Fund reimbursement of an initial abatement or corrective action excavation is anticipated, the preapproved or claimed excavation volume and/or dimensions cannot be expanded or adjusted for the purpose of obtaining a margin of clean soils as required for the installation of a new UST system.

3.3 Non-Regulated UST Closure Requirements

Most of the UST closure requirements applicable to regulated USTs are not applicable to non-regulated USTs. Non-regulated petroleum USTs (e.g., heating oil USTs) are not required to be removed from the ground or closed by any specific procedure.

- For **non-regulated, commercial USTs**, soil or groundwater samples are not required at the time of closure UNLESS a release is suspected or has been confirmed. However, if a Notice of No Further Action is required, soil samples must be collected and submitted to the Department for review. For purposes of changing the status of a commercial UST that is registered with the state from current to permanently closed and terminating assessment of annual tank fees, a UST-2 form must be submitted to the Permits & Inspection Branch showing that the UST was removed or closed in place (filled with an inert substance).
- For **non-regulated noncommercial USTs,** soil and groundwater samples are not required at the time of closure. Initial abatement of suspected releases from tanks will only be necessary where explicitly directed by the Department based on an evaluation of the risk posed by the release (see Section 6.0 for additional details on this topic.).

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- For **non-regulated non-petroleum USTs (e.g., alcohol, vegetable oil, or propylene glycol USTs, etc.),** soil or groundwater samples are not required at the time of closure UNLESS a release is suspected or has been confirmed (see Section 6.0 for additional details on this topic).

3.4 UST Closure (and Change-in-Service) Guidelines for Regulated UST Systems

Per **15A NCAC 02N .0802 and .0803** the procedure to close a regulated UST system consists of:

1) Pre-closure notifications;
2) Cleaning, removal, and disposal of any liquids and sludge present in the system;
3) Removal and disposal of the system itself (or filling with an inert solid material, if in-place closure has been approved by the Department)
4) Collection and analysis of soil and/or groundwater samples to determine the presence or absence of a release; and
5) Reporting of the results.

If no release is indicated by the results and there is no other evidence of release, then no further action will be required. If a release is determined, then initial response and abatement actions, including excavation of contaminated soil, are required. Flowcharts illustrating UST closure and initial release response and abatement actions for regulated petroleum USTs (**Figure 3**) and for regulated hazardous substance USTs (**Figure 6**).

A change-in-service or closure notification is required when (see UST-3 form which can be found in **Appendix A**):

- the continued use of a UST system that was previously used to store a regulated substance that is modified to store a non-regulated substance;
- closure by removal or approved in-place closure of a system;

Converting a non-regulated UST system to a regulated UST system an upgrade or replacement of any component of the system requires bringing existing systems into compliance with current standards. The Permits and Inspection Branch should be contacted for additional information.

Changes-in-service are allowed only if no release is found during the site assessment. For example, an owner or operator of a UST system that stores ethylene glycol, a regulated substance used for de-icing airplanes, wants to change the use of the UST system to store propylene glycol, a non-regulated substance also used for de-icing airplanes. This is considered a change-in-service. In this case, to complete a change-in-service, tank owners and operators must follow the same procedures as for an in-place permanent closure of a regulated UST system (including all notifications and reporting, emptying and cleaning the UST system, and conducting a site assessment), except that the UST system is not filled with an inert substance but with a non-regulated substance.

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If a release is discovered, then initial response and abatement actions must be completed, which may require UST system repair or removal per **15A NCAC 02N .0501**. Flowcharts illustrating a change-in-service and initial release response and abatement actions for regulated petroleum USTs (**Figure 3**) and for regulated hazardous substance USTs (**Figure 6**).

Please note that, if any portion of a tank system (except the vent or fill lines, and dispensers) is visible above the ground surface or is inside a floored vault, and the system has not already been evaluated by UST Section staff, the responsible party must notify the appropriate UST Section regional office to determine if the tank meets the definition of a UST (see above) prior to any activities being conducted under the UST program. Failure to properly classify a tank before removal may result in cleanup requirements defaulting to those applicable for aboveground storage tanks, and could lead to a denial of access to the State Trust Fund.

Please refer to the current version of the Reasonable Rate Document (available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for more information about reimbursement.

Per NCGS 143-215.94B(d)(2) and 15A NCAC 02P .0402(b)(1) and (b)(2), costs associated with the removal or replacement/repair of any UST system, component, or contents, would not be eligible for reimbursement. State Trust Fund coverage at closure is limited only to assessment costs (e.g., necessary sampling to document the presence or extent of a petroleum release).

The assessment of a new release would qualify for potential reimbursement of the necessary sampling and analytical costs, as part of the required initial abatement actions. A new release would also be defined by any sampling that discovers a petroleum release above detection limits for that method even if below the applicable action limit or closure standards. In this latter case, no abatement or cleanup would be required, therefore only the sampling, analytical, and report costs would be potentially eligible for reimbursement.

The use of closure samples to assess a known prior release in the same area as the tank closure efforts may also be eligible, but only if preapproved. Please note that the sample locations and methods necessary for the assessment of the known release may not necessarily match those methods or locations described as appropriate for UST system closure sampling described below, and should be discussed with the UST Section regional office managing that existing site.

If no release is detected, then none of the costs associated with the removal event would be eligible for reimbursement (including sampling) except where system closure was performed in lieu of a site check directed by the Department per 15A NCAC 02N .0602 (see Section 4.3).

To expedite activities during emergency situations at releases where Trust Fund reimbursement is anticipated, the increased costs for a twenty-four hour turn-around for laboratory analysis of closure and site check samples must be pre-approved, but only where onsite screening via 'Typing' UVF is not available.

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3.5 Pre-Closure Actions

Before closure (or a change-in-service) of a regulated UST is initiated, the responsible party must contact the local fire marshal and/or local county or municipality for special closure or permit requirements. Effective January 1, 2021, the responsible party must also file a ***UST-3 Form - Notice of Intent: UST Permanent Closure or Change-in-Service*** (**Appendix A**) with the appropriate UST Section regional office 30 days before closure activities begin. Until January 1, 2021, when a professional engineer (P.E.) or licensed geologist (L.G.) is supervising the closure, the ***UST-3 Form*** may be submitted at least five working days before the UST closure.

The responsible party also **must** submit a separate copy of the ***UST-3 Form*** to the Permits and Inspection Branch at the UST Section Central Office, or directly to the appropriate UST system inspector, if known.

Additionally, if any portion of the UST system scheduled to be closed is located within what is already known to be an area of contamination, and State Trust Fund reimbursement is anticipated for the removal of any contamination associated with the pre-existing release, formal preapproval must be obtained for the excavation of soil in the proposed corrective action footprint, separate from any ineligible tank removal area footprint, prior to the start of any work onsite.

3.6 Cleaning, Removal, and Disposal of USTs and Associated Piping and Dispensers

To close a regulated UST system, the responsible party first must clean the tank and remove all liquids and accumulated sludge.

A regulated UST system (including tanks, associated piping and dispensers) must be closed by removal. In-place closure of USTs associated with a release though filling with an inert solid material may be conducted only with the written approval of the UST Section confirming that system components and associated release are determined to be inaccessible (e.g., the leaking UST and associated contaminated soils are located partly or wholly under substantial structures or some other unique situation exists preventing removal of a UST). In some cases, such as where a UST is close to the foundation of a permanent structure, a person closing a UST may be requested to submit a structural engineer determination that UST removal could damage the foundation.

If a UST is replaced with a new UST, the existing piping and dispensers may continue to be used only if the piping and dispensers meet all applicable requirements of **15A NCAC 02N .0900** and if closure soil samples collected from those areas in accordance with Section 3.7.6 indicate that no contaminants are present at concentrations equal to or in excess of 50 mg/kg TPH GRO or 100 mg/kg TPH DRO

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(or above soil-to-groundwater MSCCs for hazardous substances). If contamination is present under the piping or dispensers, the old piping and dispensers should be removed and replaced.

During UST closure activities, the responsible party must ensure that all USTs are rendered non-hazardous prior to removal from the site and are properly disposed according to all local, state or federal requirements. All product, water and sludge generated during the closure activities must be properly stored, labeled, transported, and disposed as well. Tanks that are disposed in fields or unpermitted dumping sites, or that are otherwise improperly discarded, may leak petroleum products and sludge into the environment, and are in violation of 15A NCAC 13B .0201 (Disposal of Solid Waste at a permitted facility) and OPHSCA, as incorporated in Article 21A of Chapter 143 of the North Carolina General Statutes (G.S. § 143-215.75 through § 143-215.104AA). UST, product, water, and sludge manifests must be submitted to the Department as part of the closure report (see **Appendix A**). The responsible party will be held liable for the cleanup of any environmental damage that occurs from improperly disposed UST components, and such work would not be eligible for State Trust Fund reimbursement.

Individuals performing tank closure activities should adhere to the cleaning, removal, and safety procedures provided in the most recent versions of the following documents:

- **American Petroleum Institute**
  - Recommended Practice 1604, *Removal and Disposal of Used Underground Petroleum Storage Tanks*.
  - Standard 2015, *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*.
  - Publication 2217A, *Guidelines for Work in Inert Confined Spaces in the Petroleum and Petrochemical Industry.*
  - Publication 2219, *Safe Operating Guidelines for Vacuum Trucks in Petroleum Service*.
  - Recommended Practice 2003, *Protection Against Ignition Arising Out of Static, Lightening and Stray Currents.*
- **National Fire Protection Agency (NFPA)**
  - 70B, *Electrical Equipment Maintenance.*
  - 326, *Safe Entry of Underground Storage Tanks*.
  - 327, *Standard Procedure for Cleaning or Safeguarding Small tanks and Containers*.
- **The National Institute for Occupational Safety and Health**,
  - *Criteria for a Recommended Standard: Working in Confined Spaces*.
- **Occupational Safety and Health Administration**
  - 29 Code of Federal Regulations Part 1910 (Occupational Safety and Health Standards).

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Please remember that, as described above, State Trust Fund reimbursement for the removal or replacement/repair of any UST system, component, or contents is prohibited by statute and rule. For any costs associated with any assessment or corrective action (i.e., excavation) of contamination associated with a pre-existing release, formal preapproval must be obtained for the excavation soil in the proposed corrective action footprint, separate from any ineligible tank removal area footprint, prior to the start of any work onsite (See Section 5.0 and Section 7.)

Where a new release is discovered during tank closure, assessment and initial abatement actions must be taken as defined in the remainder of this Section, and in Sections 6 and 7 below. This also applies for any surface spill or overfill release discovered in the shallow soils, including those in soils located immediately above any system component.

3.7 Regulated UST Closure (and Change-in-Service) Assessment Requirements

Before permanent closure (or a change in service) of regulated USTs is completed, owners and operators must assess the UST site for the presence of a release where contamination is most likely to be present. Therefore, the scope of assessment is inclusive of the soil surrounding the entire UST system (the tank, connected piping, dispensers, and containment system) and of the groundwater in particular circumstances where soil assessment is inadequate or not otherwise possible. Soil samples must be collected in non-gravel backfills beneath spill buckets or in "native" soils beneath all other UST system components.

The assessment procedure to be performed is determined by the method selected for UST closure (removal of USTs, removal of USTs underlain by a concrete pad, or in-place closure of USTs) or by hydrogeological conditions encountered at the closure site.

Pursuant to NCGS 143-215.94E, if evidence of a release is detected, reasonable efforts should be made to **remove** contamination and restore the condition of the property in that area to pre-release conditions**.**

3.7.1 Closure by Removal of USTs

Where closure by removal of USTs has been performed, the procedures listed below must be performed:

1) Soil samples must be collected underneath all product lines, dispensers, containment sumps, fill port/spill buckets, and any other areas where contamination is suspected or observed, as described under 3.7.6. (Note: This includes areas of suspected surface spills immediately beneath any removed paving or other surface cover (asphalt, concrete, etc.))
2) After the tank(s) have been removed, and before excavating any deeper, samples must be collected from the excavation pit directly beneath the mid-line location of the former tank. The number of samples required depends on the length (longest dimension) of the tank. These samples should be collected at evenly spaced intervals along the length of the tank, no deeper than two feet into the native soil, as follows:

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Less than 6 feet	----------	1 sample
6 to 20 feet	----------	2 samples
>20 to 30 feet	----------	3 samples
>30 to 40 feet	----------	4 samples
>40 to 50 feet	----------	5 samples
Greater than 50 feet	----------	1 sample per 10 ft. of tank length

3) The UST Section may direct that a permanent monitoring well, constructed according to **15A NCAC 02C** Well Construction Standards, be installed in the pit or, if that is not technically possible, as close as possible to and within 5 feet of the UST(s) in a downgradient direction (and/or under product lines, dispensers, or other areas), and that a groundwater sample be collected and analyzed as specified in Tables 4 and 8, if the soil assessment procedure described in items 1 and 2 above is determined by the incident manager or compliance inspector to be inadequate to measure for the presence of a release at a particular site. (See 3.7.4 and 3.7.5 below for information on high water table or bedrock tank sites, respectively.)

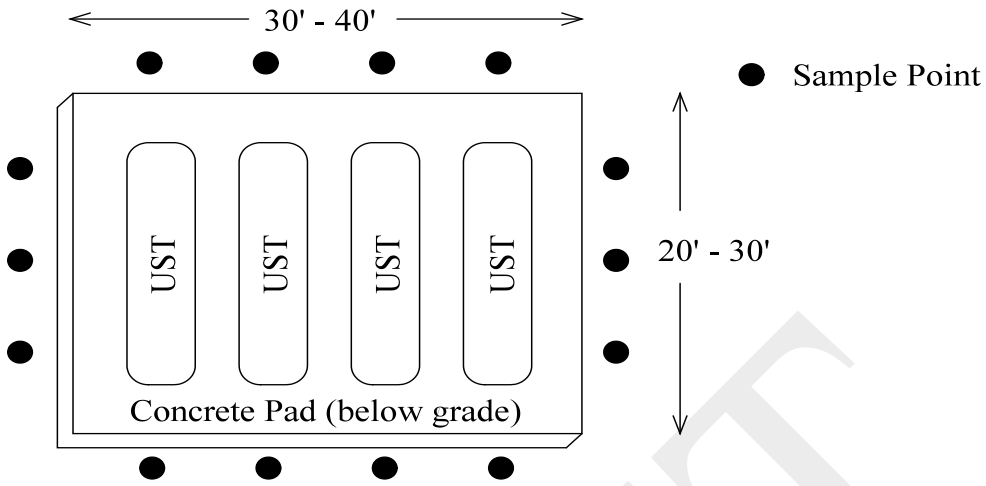
3.7.2 Closure by Removal of UST(s) Underlain by Concrete Pad

Where closure by removal of UST(s) underlain by a concrete pad is performed, the procedures listed below must be performed:

1) Soil samples must be collected along the outside edge of the concrete pad, within 3 feet of the pad and no deeper than 2 feet into the native soil below the bottom level of the pad, around the full perimeter of the pad. The minimum number of samples required per side around the perimeter of the concrete pad, is as follows:

Less than 6 feet	----------	1 sample
6 to 20 feet	----------	2 samples
>20 to 30 feet	----------	3 samples
>30 to 40 feet	----------	4 samples
>40 to 50 feet	----------	5 samples
Greater than 50 feet	----------	1 sample per 10 feet of pad length

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2) Soil samples must also be collected underneath associated product lines, dispensers, containment sumps, and areas where contamination is suspected or observed, as described under 3.7.5; and

3) To verify that no contamination is present under the center of the pad, either a sample must be collected no deeper than 2 feet under the center of the pad; or a permanent monitoring well, constructed according to **15A NCAC 02C** Well Construction Standards, must be installed as close as possible to and within 5 feet of the concrete pad in a downgradient direction, and a groundwater sample must be collected and analyzed as specified in Tables 4 and 8.

3.7.3 In-Place Closure (or Change-in-Service) of USTs

The UST Section may provide written approval for in-place closure of USTs after receipt of a sealed statement from a professional engineer licensed to make structural determinations that the assessment and cleanup of the release will not require system removal, or that system removal would otherwise be unreasonable or impracticable. Only those USTs which are determined to be inaccessible (i.e., located under or in close proximity to substantial structures such as buildings) will be approved for in-place closure. Note that non-structural items such as dispenser islands or canopies do not constitute substantial structures for these purposes.

However, proper in-place closure (or change-in-service) must include the following procedures:

1) Soil samples must be collected around the perimeter of a single UST or around the perimeter of a set of USTs in a single pit, according to the sampling requirements described above in 3.7.2, Closure by Removal of UST(s) Underlain by Concrete Pad. Samples must be collected less than 3 feet from the UST(s) at the depth of the tank bottom or no deeper than 2 feet into the native soil below the depth of the tank bottom;

2) One sample must be collected beneath the fill port/spill bucket of each UST to document overfills. No sample is required when pea gravel is present beneath the spill bucket;

3) Soil samples must also be collected underneath all associated product lines, dispensers, containment sumps, and any other areas where contamination is suspected or observed, as

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described under 3.7.6 (Note: This includes areas of suspected surface spills immediately beneath any removed paving or other surface cover (asphalt, concrete, etc.));

4) A permanent monitoring well, constructed according to **15A NCAC 02C** Well Construction Standards, must be installed as close as possible to and within 5 feet of the UST(s) in a downgradient direction, and a groundwater sample must be collected and analyzed as specified in **Tables 7** and **9;** and
5) The tank must be thoroughly cleaned, according to the guidance in Section 5.2 and filled with an inert, solid material.

The practice of boring through the bottom of a tank that is to be closed in-place in order to facilitate sampling directly under the UST is hazardous. If this procedure is performed, all applicable safety measures should be observed, subject to compliance with all federal, state and local requirements, and with approval of the local fire marshal.

For UST components located beneath substantial, permanent structures, in-place closure may be approved by the UST Section based on the potential for in situ remediation of those inaccessible areas.

3.7.4 Closure of USTs in Areas with High Water Tables

Where groundwater is encountered in the excavation from which the UST or USTs have been removed or at the base of closed-in-place USTs, the procedures below must be performed. *(This does not include perched water, or surface runoff that temporarily collects within a tank basin, but rather only those tank installations that intersect the water table.)*

1) Soil samples must be collected in the sidewalls of the excavation immediately above the water table. One sample must be collected at a minimum interval of 10 linear feet around the perimeter of the excavation with a minimum of one sample per sidewall;
2) Where possible, soil samples must also be collected underneath associated product lines, dispensers, containment sumps, fill ports/spill buckets, and any other areas where contamination is suspected or observed, as described under 3.7.6; and
3) A permanent monitoring well, constructed according to **15A NCAC 02C** Well Construction Standards, must be installed in the pit or, if that is not technically possible, as close as possible to and within 5 feet of the UST(s) in a downgradient direction. A groundwater sample must be collected and analyzed as specified in Tables 5 and 7. *Pit water grab samples will not be accepted.*

3.7.5 Closure of USTs Located in or on Bedrock

When tanks are located in or on bedrock, the procedures below must be performed:

1) After the tank(s) have been removed, samples of backfill or of "native" soil must be collected in the excavation pit beneath the mid-line location of the former tank, from the interface between soil and rock. The number of samples required depends on the length longest dimension) of the tank. These samples should be collected at evenly spaced intervals along the length of the tank, as follows:

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Less than 6 feet	----------	1 sample
6 to 20 feet	----------	2 samples
>20 to 30 feet	----------	3 samples
>30 to 40 feet	----------	4 samples
>40 to 50 feet	----------	5 samples
Greater than 50 feet	----------	1 sample per 10 ft. of tank length

2) Soil samples must also be collected underneath associated product lines, dispensers, containment sumps, fill ports/spill buckets, and any other areas where contamination is suspected or observed, as described in 3.7.6; and
3) A permanent monitoring well, constructed according to **15A NCAC 02C** Well Construction Standards, must be installed in the pit or, if that is not technically possible, as close as possible to and within 5 feet of the UST(s) in a downgradient direction, and a groundwater sample collected and analyzed as specified in Tables 7 and 9. Contact the UST Section Regional Office for further guidance when drilling in competent bedrock if uppermost groundwater is *not* encountered within 50 feet total depth.,

3.7.6 Sampling Under Product Lines, Dispensers or Dispenser Islands, and Fill Ports or Spill Buckets during UST Closure or Change-in-Service

For sampling under product lines (including lines under dispenser islands) the procedures listed below must be performed:

1) The product lines must be completely exposed prior to sampling *(This procedure is not required for site checks.)*;
2) Samples must be collected **no deeper than 2 feet** into the native soil beneath the product lines;
3) A minimum of one sample must be collected for each 10 linear foot interval along a line (and if the line is less than 10 feet in length, one sample still is required);
4) Samples must be collected at all fittings, especially joints, or wherever there is heightened potential for a release, and at all locations where staining is present or where contamination is suspected;
5) Samples are required under product lines even if it is planned that the lines remain for use with replacement UST(s).

For sampling under dispensers, the procedures listed below must be performed:

1) The dispenser piping must be completely exposed prior to sampling *(This procedure is not required for site checks.)*;
2) Samples must be collected **no deeper than 2 feet** into the native soil directly below each individual dispenser;

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3) Samples must be collected **no deeper than 2 feet** into the native soil directly below all couplings, pumps, and containment sumps, or wherever there is heightened potential for a release, and at all locations where staining is present or where contamination is suspected;
4) Samples are required under dispensers even if it is planned that the dispensers remain for use with replacement UST(s).

For sampling under containment sumps, fill ports, spill buckets, or any other near-surface fixtures, or shallow areas where contamination is suspected, the procedures described below must be performed:

1) Samples must be collected **no deeper than 2 feet** into the native soil directly below containment structures and other areas where contamination is suspected or observed.
2) Samples must be taken from directly below the piping that enters the sump and beneath any defective area of the sump.
3) If the containment sump is sitting directly on the tank, thereby preventing collection of samples under the sump, then samples must be collected along the perimeter of the sump within one foot of the sump.
4) ***In addition, samples must be collected from any area where contamination is observed.*** This includes samples for suspected releases in the shallow soils overlying any part of the UST system if there is evidence of an overfill or other surface release.

When only the product lines or the dispensers of a UST system are being replaced, soil samples are not required unless evidence of a release is observed.

When groundwater or bedrock is encountered in the trench or pit in which product lines, dispensers, or sumps are or were located or when the incident manager determines that soil assessment is not adequate to determine the presence of a release, a monitoring well must be installed and sampled as described in 3.7.4 above.

3.8 Reporting of Regulated UST Closure Assessment Results

Regulated Petroleum USTs: Following the closure of a regulated commercial petroleum UST system, where:

- soil contamination in the closure samples does *not* equal or exceed the current action levels of 50 mg/kg TPH GRO or 100 mg/kg TPH DRO (*or, where tested, the soil-to-groundwater MSCCs, or the PQL if no MSCC is established)*,
- neither groundwater nor bedrock was encountered in the excavation, or
- if groundwater or bedrock were encountered, that groundwater samples collected from one or more monitoring wells installed within the source area do *not* exceed any 2L groundwater quality standards,

then, **within 30 days** a ***UST Closure Report*** following the ***UST-12*** format, and a ***UST-2 Form - Site Investigation Report for Permanent Closure or Change-in-Service of USTs, Version A*** *or* ***B*** (Appendix A), must be completed and submitted to the appropriate regional office of the Corrective Action Branch of the UST Section.

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However, if, based on the results of closure sampling:

- soil contamination does equal or exceed the current action levels of 50 mg/kg TPH GRO or 100 mg/kg TPH DRO for petroleum (*or, where tested, soil contamination equals or exceeds the soil-to-groundwater MSCCs, or the PQL if no MSCC is established)*,
- groundwater contamination exceeds the 2L standards, or
- NAPL is present,

then, **within 90 days** of discovery of the release, an ***Initial Abatement Action Report*** (Appendix A), must be submitted instead. The ***Initial Abatement Action Report*** incorporates the requirements of the ***UST Closure Report***, as previously described, and also presents post-excavation soil assessment information required under **15A NCAC 02L .0404(3)** to demonstrate the extent to which the contaminated soil has been removed.

Note: *Whenever a regulated or commercial UST closure is reported to the Corrective Action Branch, a separate copy of the report and* ***UST-2A*** *or* ***UST-2B Form must be submitted*** *to the proper UST System inspector for the system location, or directly to the Permits and Inspection Branch in the UST Section Central Office.*

This is necessary for the permit status for that system to be changed to "permanently closed" so no additional permit fees for that system are incurred by the tank owner.

To locate the proper inspector for the UST system, please refer to the UST Inspector Assignments Map (available in electronic format at this address: https://deq.nc.gov/about/divisions/waste-management/ust/pib) or by contacting the UST Section Permits and Inspection Branch at 919-707-8200.

Regulated Hazardous Substance USTs: Following the closure of a regulated hazardous substance UST system, where:

- soil contamination in the closure samples does *not* equal or exceed the applicable soil-to-groundwater MSCCs (*or the PQL if no MSCC is established for a contaminant*),
- neither groundwater nor bedrock was encountered in the excavation, or
- if groundwater or bedrock encountered, that groundwater samples collected from one or more monitoring wells installed within the source area do *not* exceed any 2L groundwater quality standards,

then, **within 30 days** a ***UST Closure Report*** following the ***UST-12*** format, and a ***UST-2 Form - Site Investigation Report for Permanent Closure or Change-in-Service of USTs, Version A*** *or* ***B*** (Appendix A), must be completed and submitted to the appropriate regional office of the Corrective Action Branch of the UST Section (as well as a separate copy to the Permits and Inspections Branch, if required by a UST inspector).

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However, if, based on the results of closure sampling:

- soil contamination does equal or exceed any soil-to-groundwater MSCC (*or the PQL if no MSCC is established)*,
- groundwater contamination exceeds the 2L standards, or
- NAPL is present,

then, **within 45 days** of discovery of the release a ***45-Day Report*** (***Guidelines for Assessment and Corrective Action for UST Releases***, current version) must be submitted instead.

Note: *Whenever a regulated or commercial UST closure is reported to the Corrective Action Branch, a separate copy of the report and* ***UST-2A*** *or* ***UST-2B Form*** ***must be submitted*** *to the proper UST System inspector for the system location, or directly to the Permits and Inspection Branch in the UST Section Central Office.*

This is necessary in part so the permit status for the system will be changed to "permanently closed" so no additional permit fees for that system are incurred by the tank owner.

To locate the proper inspector for the UST system, please refer to the UST Inspector Assignments Map (available in electronic format at this address: https://deq.nc.gov/about/divisions/waste-management/ust/pib) or by contacting the UST Section Permits and Inspection Branch at 919-707-8200.

3.9 Non-Regulated Petroleum UST Closure Assessment Requirements

Non-regulated petroleum USTs are not required to be removed from the ground or closed by any specific procedure.

Non-regulated Commercial USTs: For a non-regulated, commercial UST, soil or groundwater samples are not required at closure UNLESS a release is suspected or has been confirmed.

However, if a release *is* discovered from a non-regulated commercial petroleum UST system, tank removal and soil and groundwater assessment requirements stipulated in Section 3.0 for regulated UST closure *do* apply, as do initial response and abatement action requirements, including excavation (Sections 5). See **Figure 4** for a flowchart illustrating initial response and abatement action requirements in the case of a non-regulated commercial release.

Non-regulated Noncommercial UST: For non-regulated noncommercial UST, tank removal and confirmation sampling are not required except where explicitly directed by the Department based on an evaluation of the risk posed by the suspected release.

If a tank owner chooses to pursue a ***No Further Action*** determination without any deed recordation or land use restrictions, where there is no formal requirement to do so, then voluntary sampling during closure should follow the recommended sampling guidance in Section 3.7 (or contact the applicable regional office of the Corrective Action Branch of the UST Section for guidance.)

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4.0 Initial Response and Abatement Actions

4.1 Initial Response and Abatement Requirements

Regulated USTs

- For **regulated, commercial petroleum USTs (e.g., gasoline or diesel USTs, etc**.), the responsible party is required to comply with the release response requirements of **15A NCAC 02N .0702**, **.0703**, and **.0705**, and **15A NCAC 02L .0404(1)**, and thus perform specific initial response and initial abatement actions, including excavation of contaminated soil (see Section 6.0 for additional details).
- For **regulated hazardous substance USTs (e.g., halogenated solvent USTs, etc.),** the responsible party is required to comply with the release response requirements of **15A NCAC 02N .0702, .0703,** and **.0705,** and thus to perform specific initial response and initial abatement actions, including excavation of contaminated soil.

Non-Regulated USTs:

- For **non-regulated, commercial petroleum USTs (e.g., large heating oil USTs)**, the responsible party is required to comply with the release response requirements of **15A NCAC 02N .0702, .0703,** and **.0705**, and **15A NCAC 02L .0404(1**), and thus perform specific initial response and initial abatement actions, including excavation of contaminated soil.

- For **non-regulated noncommercial petroleum USTs (e.g., home heating oil USTs)**, the responsible party is required to take action to address any emergency condition, such as vapor, fire, or explosion hazards, or imminent threats to public health, safety, welfare, or the environment. However, the responsible party is not required to comply with the initial response and initial abatement action requirements of **15A NCAC 02N .0702**, **.0703**, and **.0705**, and **15A NCAC 02L .0404(1)**, unless specifically directed to by the Department based upon the risk posed by the release.
- For **non-regulated non-petroleum USTs (e.g., alcohol, vegetable oil, or propylene glycol UST releases, etc.),** the responsible party is required, if the substance is not naturally occurring (or is naturally occurring but exceeds the naturally-occurring background standard), to comply with the release response requirements of **15A NCAC 02L .0106**, and thus perform initial response and initial abatement actions.

  More specific procedural guidance is not presented in this document as the composition and properties of non-regulated non-petroleum substances vary widely. Therefore, for releases from non-regulated non-petroleum USTs the responsible party should contact the Corrective Action Branch of the UST Section for site specific guidance at (919) 707-8200. Some non-regulated non-petroleum UST releases (e.g., hazardous waste UST releases) do not fall under the authority of the UST Section; these releases must be referred to the appropriate agency (see **Appendix F**). *A flowchart illustrating the requirements for releases from non-regulated non-petroleum USTs is presented as* ***Figure 6****.*

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Please note that the process of denaturing certain stored non-petroleum products (such as ethanol or other alcohol fuels, etc.) by adding a volume of petroleum may alter the classification of the UST system. For these denatured product tanks, the responsible party should contact the Corrective Action Branch of the UST Section for site specific guidance at (919) 707-8200.

4.2 Initial Response Actions

Regulated and Non-regulated Commercial USTs: For discharges and releases from regulated (petroleum or hazardous substance) USTs and non-regulated commercial USTs, the responsible party must comply with the release response requirements of **15A NCAC 02N .0702** and/or **15A NCAC 02L .0404(a) within 24 hours** of the discovery of a release. Actions must be taken to prevent the recurrence of the emergency condition which may include actions to repair any leaking components, drain and temporarily close the affected UST, or permanently close the UST (in-place or by removal).

Non-regulated Noncommercial USTs: For discharges and releases from non-regulated noncommercial USTs, the responsible party is required to comply with the reporting requirements **15A NCAC 02L .0404(b)** within 24 hours of discovery of a release and to take such action as determined by the Department to be necessary to protect public health, safety, and welfare, and the environment, and to mitigate any fire, explosion, or vapor hazard. Actions must be taken to prevent the recurrence of the emergency condition which may include actions to repair any leaking components, drain and temporarily close the affected UST, or permanently close the UST (in-place or by removal).

Petroleum releases from non-UST sources: For petroleum discharges and releases from aboveground storage tanks and other non-UST sources, the responsible party must comply with the release response requirements of **15A NCAC 02L .0504(1) within 24 hours** of the discovery of the release.

If State Trust Fund reimbursement is anticipated for any potentially-eligible emergency response actions (such as explosion abatement, product recovery, etc.) associated with a release from a commercial UST, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page available at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information regarding eligibility and documentation requirements related to the emergency response.

To expedite activities during emergency situations at releases where Trust Fund reimbursement is anticipated, the increased costs for a twenty-four hour turn-around for laboratory analysis of closure and site check samples must be pre-approved, but only where onsite screening via 'Typing' UVF is not available.

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4.2.1 24-Hour Release Report

This notification is required for *all* UST releases and non-UST petroleum releases, including those where the release was ultimately remediated in full or was detected at concentrations that were below the applicable TPH Action Levels or applicable MSCCs.

Regulated and Non-regulated Commercial USTs: Following the discovery of any evidence of a release (including odor or vapor, free product, stained soil, analytical data indicating contamination of soil or groundwater, etc.) from any commercial UST system, the suspected release must be reported to the UST Section **within 24 hours**, per **15A NCAC 02N .0601**. The responsible party for a UST release must complete *Form UST-61 - 24-Hour Release and UST Leak Reporting Form* (Appendix A) and submit the form to the appropriate regional office of the Corrective Action Branch of the UST Section (as well as a separate copy to the Permits and Inspections Branch as well, if the investigation was initiated by a UST inspector) by mail, fax, courier, or email (or transmit the information by phone if other methods are unavailable) **within 24 hours** of release discovery.

Non-regulated Noncommercial USTs: Following the discovery of any evidence of a release (including odor or vapor, free product, stained soil, analytical data indicating contamination of soil or groundwater, etc.) from a noncommercial UST system, the suspected release must be reported to the UST Section **within 24 hours**, per **15A NCAC 02L .0404(b)**. The responsible party must complete *Form UST-61 - 24-Hour Release and UST Leak Reporting Form* (Appendix A) and submit the form to the appropriate regional office of the Corrective Action Branch of the UST Section by mail, fax, courier, or email (or transmit the information by phone if other methods are unavailable) **within 24** hours of release discovery.

Petroleum releases from non-UST sources: Following the discovery of any evidence of a petroleum release (including odor or vapor, free product, stained soil, analytical data indicating contamination of soil or groundwater, etc.) from any AST system or other source (i.e., all types and classifications) the suspected release must be reported to the UST Section **within 24 hours**, per **15A NCAC 02L .0504(1)**. The responsible party for a non-UST petroleum release must complete *Form UST-62 - 24-Hour Notice of Discharge Form* (**Appendix A**) and submit the form to the appropriate regional office of the Corrective Action Branch of the UST Section by mail, fax, courier, or email (or transmit the information by phone if other methods are unavailable) **within 24** hours of release discovery.

4.2.2 Action to Prevent Further Release

To prevent any further release of the substance from the UST system to the environment, the responsible party must take the following steps **within 24 hours** of release discovery:

- shut down the operation of all or part of the system;
- remove the substance from the system;
- repair, replace, or remove all or part of the system; and
- perform any other action deemed effective.

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The responsible party for a release from a regulated UST (petroleum/commercial and hazardous substance), a non-regulated commercial UST, or a petroleum release from ASTs or other non-UST source must immediately undertake an investigation to confirm the presence of any environmental contamination and determine the precise source of the release, if not previously determined by a site check, closure assessment, or other means. No initial abatement is required for a release from a non-regulated noncommercial UST, except for actions necessary to abate an emergency condition or where directed by the Department based on the risk posed by the site.

4.2.3 Identification and Mitigation of Hazards from Exposure to Pollutants

The responsible party must take immediate action to identify and mitigate hazards resulting from exposure to pollutants. For discharges and releases from regulated USTs and non-regulated commercial petroleum USTs, any water supply wells, surface water bodies, utility lines, basements, and other potential receptors must be identified and sampled where the potential for impact by the release represents an immediate risk to human health and/or the environment. For non-regulated noncommercial USTs, the Department must be informed of any known or suspected receptors in the area when the release is reported, and will direct any necessary sampling required based on an evaluation of the potential risk posed by the release.

If a receptor is found to be impacted by the release, then the responsible party for any UST system (i.e., all types and classifications) must act at once to mitigate that impact. For example, if contaminants from a UST release are found in a water supply well at concentrations which exceed the groundwater quality standards and/or Maximum Contaminant Levels (MCLs), then the sampling results **must be sent immediately** to the appropriate regional office of the UST Section and, **within 24 hours, an emergency alternate water supply must be provided to the well user by the responsible party** as a necessary mitigation of an exposure hazard under **15A NCAC 02L .0106(b)**. Additional temporary or permanent solutions may be required following an evaluation of the health risk posed by the detected contaminant concentrations.

If NAPL is found standing or running across the ground surface, or the surface of a body of water, or weeping from a vertical wall, then efforts must be made **within 24 hours** to control and recover that NAPL.

A secondary deductible applies to any State Trust Fund claims related to third-party injuries, damages, or loss of normal use of property, per NCGS 143-215.94B(b)(5) and 15A NCAC 02P .0403. The loss of normal use of a water supply, due to any detected impact to that well, is considered applicable under this category whether damages are calculated in a formal settlement or incurred within the structure provided by the State Trust Fund for alternate water supplies. Please be aware that a failure to provide alternate water to an impacted well user in a timely manner may result in the Department providing the alternate water and seeking cost recovery for the expense.

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4.2.4 Identification and Mitigation of Fire, Explosion, and Vapor Hazards

The responsible party for all UST types and any non-UST petroleum release must take immediate action to identify and mitigate fire, vapor, and explosion hazards posed by vapors or free product which have migrated from the UST system into utility lines, vaults, basements, or other subsurface features. The local Fire Department should be contacted if explosive conditions or a risk of fire are suspected. The local Fire Department (or regional HAZMAT Response Team) should be contacted if there is evidence of a concentrated vapor exposure risk.

Screening and testing for petroleum vapor intrusion (PVI) risk in adjacent structures may be addressed as presented the Interstate Technology and Regulatory Council (ITRC) guidance on the topic entitled: Petroleum Vapor Intrusion: Fundamentals of Screening, Investigation, and Management, dated October 2014 (available at http://www.itrcweb.org/PetroleumVI-Guidance/).

4.3 Initial Abatement Actions

For discharges and releases from regulated (petroleum/commercial and hazardous substance) USTs and non-regulated commercial petroleum USTs, the responsible party is required to comply with the initial abatement requirements of **15A NCAC 02L .0404(1)** and/or **15A NCAC 02N .0703 and .0705**.

For discharges and releases from non-regulated noncommercial (petroleum) USTs, no immediate action or initial abatement actions are required **with the exception** of the emergency conditions described in Section 4.2 unless specifically directed by the Department based on the site risk.

Initial abatement actions include:

- determination of the source of the release (if not previously identified);
- investigation and removal of free product;
- continued mitigation and monitoring of fire, explosion, and vapor hazards;
- remediation of hazards posed by exposed contaminated soil;
- submittal of a ***20-Day Report and Initial Abatement Report*** **(**Appendix A) to the UST Section; and
- excavation of contaminated soil to the maximum extent possible (**Section 5**), followed by confirmation sampling as described in **Section 7.0** and in **Table 3**.

If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents for information about reimbursement.

Please note that proper initial abatement efforts associated with a new release at a site with no prior release are exempted from preapproval as an emergency response action under 15A NCAC 02P .0402(b)(9).

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If a site has a pre-existing release, initial abatement is not considered to be an emergency response and therefore must receive preapproval based on known site conditions to remain eligible for reimbursement.

Additionally, work conducted at a new release that extends beyond the 90-day initial abatement reporting deadline may not be considered an emergency, and may require preapproval to remain eligible for reimbursement.

4.3.1 Completion of Investigation to Confirm Presence of Environmental Contamination and Determine Source of Release

The responsible party for regulated USTs and non-regulated commercial USTs must complete the investigation to confirm the presence of, and/or determine the precise source of, the release, if those determinations *have not been* accomplished during any site check, initial response, or closure assessment. The responsible party must measure for the presence of a release wherever soil or groundwater contamination is likely to be present. Releases from non-regulated noncommercial systems do not require confirmatory sampling, and site risk may be evaluated based on visual, olfactory (odor), or field screening via handheld vapor monitors.

4.3.2 Investigation and Recovery of Free Product

Regulated and Non-regulated Commercial USTs: Upon release discovery, where required by **15A NCAC 02N .0703(1),** the responsible party for regulated and non-regulated commercial USTs must investigate to determine the possible presence of NAPL and, if NAPL is discovered, begin recovery within 14 days. Following the initial NAPL recovery event and the subsequent ***Free Product Recovery Report***, the responsible party must investigate to determine the type, thickness, rate of recovery, and lateral extent of NAPL; evaluate relevant hydrogeological factors and potential receptors; and submit the results in a report describing the free product recovery system specifications ***(If State Trust Fund reimbursement is anticipated, see below)***.

In this report, the responsible party must evaluate recovery system options and propose a recovery plan which incorporates the most appropriate option. The recovery plan should be designed to minimize the spread of contamination and treat, discharge, and dispose of NAPL in compliance with all applicable regulations. The objectives of the plan should be to halt migration and to remove NAPL to the maximum extent practicable, usually to a thickness of less than 0.01 foot (~1/8 inch). The report should conclude with a schedule for the NAPL recovery plan which includes implementation, attainment of NAPL recovery progress milestones, and submittal of progress reports.

The responsible party must continue any recovery of NAPL, and implement the NAPL recovery plan in strict accordance with the proposed schedule upon approval of the plan by the Department. The responsible party must continue to execute the plan, simultaneously with all other required abatement, assessment, cleanup, and reporting activities, until NAPL has been removed or until the plan is superseded by the Corrective Action Plan. The responsible party is required to handle flammable product safely and competently in order to prevent fire or explosion. (See Section 6.0 for a discussion of reports.)

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Non-regulated Noncommercial USTs: The responsible party for a non-regulated noncommercial UST must act to control and recover any NAPL causing an emergency condition (including ponding or running across the ground surface, impacting a surface water body, or weeping from a vertical wall or floor) **within 24 hours** of discovery. Except where directed by the Department based upon other evidence related to incident risk, there is no requirement for the responsible party for a nonregulated noncommercial UST to install wells or otherwise investigate for the presence of NAPL below the ground surface.

However, if measurable NAPL greater than 1/8 of an inch in thickness (0.01 feet) is found in a monitoring well or in an excavation below the water table, and the location of that discovery is within 30 feet of the boundary with an adjacent property owned by someone other than the responsible party, then an emergency response to the NAPL is required to protect the neighboring third-party property owner. (*Note that any impact to a water supply well from a non-regulated noncommercial UST release constitutes an emergency that must be addressed immediately, whether it results in the presence of NAPL or dissolved-phase contamination.)*

Non-UST Petroleum Releases: The responsible party for a non-UST petroleum release must act to control and recover any petroleum contamination causing an emergency condition (including ponding or running across the ground surface, contaminating a surface water body, or weeping from a vertical wall) **within 24 hours** of discovery. Except where directed by the Department based upon other evidence related to incident risk, there is no requirement for the responsible party for a non-UST petroleum release to install wells or otherwise investigate for the presence of NAPL below the ground surface.

However, if measurable NAPL greater than 1/8 of an inch in thickness (0.01feet) is found in a monitoring well or in an excavation below the water table, and the location of that discovery is within one year of travel to a downgradient water supply well on an adjacent property then an emergency response to the NAPL is required to protect the property owner. (*Note that any impact to a water supply well from a non-UST petroleum release constitutes an emergency that must be addressed immediately, whether it results from either the presence of NAPL or dissolved-phase contamination.)*

If State Trust Fund reimbursement is anticipated, please refer to Section 2.0 Free Product Vapor Recovery Systems in the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

Please note that an initial NAPL recovery event may qualify as an emergency response (as defined in the Reasonable Rate Document) that is exempt from the preapproval requirements, where following the procedures described above. However, subsequent events will require preapproval as corrective actions to remain conditionally eligible for reimbursement.

An emergency response is also specified in Section 2.0 of the current version of the Reasonable Rate Document described above.

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4.3.3 Continued Mitigation and Monitoring of Fire, Explosion, and Vapor Hazards

The responsible party for *all* UST system types and non-UST petroleum releases, must continue to mitigate and monitor any fire, explosion, and vapor hazards posed by free product or by vapors which have migrated into structures, as described in 4.2.4 above.

4.3.4 Remediation of Hazards Posed by Exposed Contaminated Soil

Regulated and Non-Regulated Commercial USTs: The responsible party for regulated USTs and non-regulated commercial USTs must remedy hazards posed by contaminated soils exposed by assessment or excavation activities. Contaminated soil must be treated and disposed in compliance with state and local requirements. Refer to **Appendix E** for guidance on disposal of contaminated soil from excavations.

Non-Regulated Noncommercial USTs: Although the responsible party for non-regulated noncommercial USTs is not required to perform any initial abatement actions except where directed by the Department based on the risk posed by the site, any petroleum contaminated soil generated by any assessment or cleanup action must be treated and disposed in compliance with state and local requirements.

Non-UST Petroleum Releases: The responsible party must remedy hazards posed by contaminated soils exposed by assessment or excavation activities. Contaminated soil must be treated and disposed in compliance with state and local requirements. Refer to **Appendix E** for guidance on disposal of contaminated soil from excavations.

If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

Please note that proper initial abatement efforts associated with a new release at a site with no prior release are exempted from preapproval as an emergency response action under 15A NCAC 02P .0402(b)(9).

If a site has a pre-existing release, initial abatement is not considered to be an emergency response and therefore must receive preapproval based on known site conditions to remain eligible for reimbursement.

Additionally, work conducted at a new release that extends beyond the 90-day initial abatement reporting deadline may not be considered an emergency, and may require preapproval to remain eligible for reimbursement.

Please also note that, as described in Section 3.6 above, any costs associated with tank removal are not eligible for reimbursement, including any costs to remove surface cover (e.g., asphalt or concrete, etc.) and overburden soils to access the tank system. Where a suspected surface spill or overfill in the shallow subsurface is discovered following the removal of surface cover for any purpose (including in preparation for tank removals) actions must be taken to assess

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and, where necessary, to abate that release in the same manner as any other suspected release (i.e., those soils may represent a shallow secondary source that requires abatement, and would no longer represent 'overburden' associated with an ineligible tank removal.)

4.3.5 Reporting

The final results of the initial abatement actions for a petroleum release (with no preexisting releases on site) must be reported in an ***Initial Abatement Action Report*** (Appendix A), which must be submitted to the UST Section within 90 days following discovery of the release. *(The final results of the initial abatement actions for a hazardous substance release must be reported in a **45-Day Report**, the requirements for which are addressed in the current version of the UST Section Assessment Guidelines; the **45-Day Report** must be submitted within 45 days following discovery of the release.)*

The ***24-Hour Report***, the ***20-Day-Report***, and the ***Initial Abatement Action Report*** *(or the **45-*** Day Report, for a hazardous substance release) must be submitted to appropriate regional office of the Corrective Action Branch of the UST Section (as well as a separate copy to the Permits and Inspections Branch, if required by a UST inspector). If it was necessary to remove all or part of the UST system to allow access for site check sampling and/or excavation, then the required UST closure report elements (UST-12 Format with a UST-2A or UST-2B Form, **Appendix A**) should be submitted as part of the ***Initial Abatement Action Report.*** The reporting requirements are described in Section 6.0, and the outline of the format is presented in **Appendix A**.

If the ***Initial Abatement Action Report*** for a petroleum release shows that post-excavation:

- soil contamination does *not* exceed the lower of the soil-to-groundwater or residential maximum soil contaminant concentrations (MSCCs),
- neither groundwater nor bedrock was encountered in the excavation, and
- where assessed, groundwater samples collected from one or more monitoring wells installed within the source area do *not* exceed any 2L groundwater quality standards,

then no further action will be required.

However, if there are no prior releases on site and the ***Initial Abatement Action Report*** indicates that post-excavation:

- soil contamination does equal or exceed the lower of the soil-to-groundwater or residential MSCCs following excavation to the maximum extent practicable,
- either groundwater or bedrock was encountered, *and* groundwater contamination was not assessed or
- groundwater contamination does equal or exceed the 2L groundwater quality standards,

then the responsible party must perform further assessment and submit a ***Limited Site Assessment Report*** within 120 days of the discovery of the release. The ***Limited Site Assessment Report*** format is presented in the *UST Section Assessment Guidelines;* current version.

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However, if there are prior releases on site and the ***sampling results*** indicate that:

- soil contamination does equal or exceed the lower of the soil-to-groundwater or residential MSCCs following excavation to the maximum extent practicable,
- either groundwater or bedrock was encountered, *and* groundwater contamination was not assessed or
- groundwater contamination does equal or exceed the 2L groundwater quality standards,

then the risk of the site will determine the next actions.

4.3.6 Submittal of 20-Day Report

The responsible party for regulated USTs and non-regulated commercial USTs, and non-UST petroleum releases must submit a ***20-Day Report*** (**Appendix A**) summarizing the initial abatement actions that were performed **within 20 days** following release confirmation to the appropriate regional office of the Corrective Action Branch of the UST Section (and to the Permits and Inspections Branch, if the investigation was initiated by a UST inspector). This report should be included in the initial abatement report if possible.

The responsible party for non-regulated noncommercial USTs is not required to perform any initial abatement actions or additional reporting (including the 20-Day Report) except where directed by the Department based on the risk posed by the site.

4.3.7 Submittal of 45-Day Report (for hazardous substance USTs)

The responsible party for regulated, hazardous substance USTs must prepare and submit a 45-Day Report to the appropriate regional office within 45 days of confirmation of a release. This report documents the results of the free product investigation, a receptor survey and initial site characterization activities. The priority ranking of a non-petroleum UST release will be based on the information in this report.

An extension of the 45-day deadline may be granted upon written request with sufficient documentation. Per 15A NCAC 02N .0704, the Department may consider the following factors:

1. the extent to which the request for additional time is due to factors outside of the control of the tank owner or operator;
2. the previous history of the tank owner or operator submitting the report in complying with deadlines established under the rules;
3. the technical complications associated with an initial site characterization; and
4. the necessity for action to eliminate an imminent threat to public health or the environment.

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5.0 Excavation of Contaminated Soil Following Petroleum and Hazardous Substances Releases

The following guidance related to initial excavation efforts is required of a responsible party for regulated USTs, non-regulated commercial USTs, and non-UST petroleum releases, and hazardous substance UST releases.

This guidance may be used by a responsible party for non-regulated noncommercial USTs, if additional work is required due to an emergency condition or to address the risk associated with a release determined by the Department to be 'High' risk, and/or the responsible party does not wish record a land use restriction on the deed for incident closure.

5.1 Excavation of Contaminated Soil

The responsible party must comply with the initial abatement requirements in **15A NCAC 02L .0106(f)(2)** and **(4)** which necessitate the removal, treatment, or control of secondary pollution sources, such as contaminated soils, which would be potential continuing sources of contaminants to the groundwater, and the requirements in **15A NCAC 02L .0404 and .0504** and **15A NCAC 02N .0703**, which require the prevention of further migration of the released substance into surrounding soils and groundwater.

5.1.1 Requirements for Excavation

Initial abatement excavation actions should be conducted for each source of a newly-detected release on the site where contaminant concentrations exceed the applicable TPH action level (or constituent-specific standard, if analyzed). Please note that this includes shallow contaminated soils located above any portion of the UST system where the source of contamination is potentially a leaking system component (such as a spill bucket, dispenser, containment sump, etc.) or surface spills from the operation of the UST system (vehicle fueling spills or tank overfills, etc.) as well as smear-zone soils where shallow water table fluctuations have washed NAPL up into the shallow soil. Initial abatement excavation needs to be conducted within the 90-day initial abatement period. However please see the next section for information on excavation limitations.

Upon determining that a new release at a site (where the risk has not been previously determined and with no previous releases) has been detected, soil excavation must commence when soil contaminant concentrations are equal to or greater than the current action levels or appropriate MSCCs. The soil samples must be analyzed by the approved (or equivalent) methods listed in Table 3. The current TPH action levels are:

- 50 mg/kg TPH GRO, or
- 100 mg/kg TPH DRO.

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If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

Please note that proper initial abatement efforts associated with a new release are exempted from preapproval as an emergency response action under 15A NCAC 02P .0402(b)(9). However, for a site with a pre-existing release initial abatement actions are considered to be corrective action efforts and are not exempted by this rule, and must therefore be preapproved as representing a necessary, cost-effective cleanup strategy to remain conditionally eligible for reimbursement. Additionally, work conducted beyond the 90-day initial abatement reporting deadline may not be considered an emergency, and may require preapproval as assessment or corrective actions to remain eligible for reimbursement.

If State Trust Fund reimbursement is anticipated for the hauling/treatment/disposal of excavated contaminated soil, soil samples must be collected from the soil waste stream in accordance with the requirements in the current version of the Reasonable Rate Document.

[This sampling may be required at the request of a disposal facility or to document the total contaminated soil volume for State Trust Fund Reimbursement, and should follow guidance provided by either of those entities, whichever is directing the work.]

5.1.2 Limitations to Excavation

At the initial abatement stage, the responsible party should attempt to remove all contaminated soil that is accessible. Excavation should cease in any direction in which clean soil or bedrock is encountered or in which excavation would threaten to harm a substantial structure, and generally should cease in the vertical direction when groundwater is encountered.

(Note: Excavation into shallow groundwater to abate contamination trapped within the smear zone may be appropriate under certain circumstances. Complications related to proper handling and containment for loading and hauling, and authorization as a reasonable abatement strategy where State Trust Fund reimbursement is anticipated, should be addressed before excavating into the water table.)

Excerpt from the 2020 REASONABLE & NECESSARY TASK SCOPE OF WORK DOCUMENT

***A. Pre-approval not required**. For initial abatement of a new release at a site with no prior release or risk assessment in which the USTs are being permanently removed and are not being replaced, the over-excavation should be limited to the lesser of:*

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1) all soils above MSCCs as defined by the 2T screening limits of 50 ppb TPH-GRO and 100 ppb TPH-DRO, as determined by laboratory or on-site laboratory analysis, safely removed in any accessible direction.

2) the point where it is reasonably determined that residual soils cannot feasibly be removed due to obstructions, access issues, or lack of cost-effectiveness; or

3) in the case in which no pre-assessment has been conducted, one of the following thresholds is reached without additional authorization obtained:

a. 100 tons of soil per 10,000 gallons of UST volume has been removed.

b. up to an additional 50% of the total tons of soil removed in part (a) with written Incident Manager authorization based on field screening from a lab or mobile lab (UVF, Mobile GC, etc.) indicating a reasonable likelihood of clean closure (even if clean closure is ultimately not obtained within the allowed limit); or

c. a formally preapproved amount greater than the sum of part (a) and (b) total tons is reached following Incident Manager and Trust Fund Branch staff preapproval of additional soils based on field screening from a lab or mobile lab indicating a reasonable likelihood of clean closure (even if clean closure is not ultimately obtained within the preapproved limit).

d. In the case where pre-assessment has been conducted, the pre-approved amount.

B. Pre-approval required. *For initial abatement of a new, isolated release at a site with a risk assessment for a prior, non-commingled release elsewhere onsite where the USTs are being permanently closed or do not impede the excavation, the over-excavation should be limited as follows:*

1) High or Intermediate Risk – Same as with the new release above. For Option 3(b), (c) or (d), the Incident Manager (and Trust Fund Branch staff) will consider the known site risk and previous release status when evaluating a request for additional excavation.

2) Low Risk – Unless the new release results in an increase in site risk, no initial abatement excavation is necessary under risk-based closure standards. Soils necessary to remove the USTs that are more than the 2T standard and cannot be placed back into the excavation will be allowed transport and disposal only.

C. Pre-approval required. *For initial abatement of a new, commingled release at a site with a risk assessment for the prior release where the USTs are being permanently closed or do not impede the excavation, the over-excavation should be limited as follows:*

1) High or Intermediate Risk – Same as with the new release above. For Option 3(b), (c) or (d), the Incident Manager (and Trust Fund Branch staff) will consider the known site risk and previous release status when evaluating a request for additional excavation.

2) Low Risk – Unless the new release results in an increase in site risk, no initial abatement excavation is necessary under risk-based closure standards. Soils necessary to remove the USTs

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that are more than the 2T standard and cannot be placed back into the excavation will be allowed transport and disposal only

D. Pre-approval required. For any release more than 90 days from the discovery of the release: No initial abatement is eligible as the 90-day reporting window from Title 15A NCAC 02L .0404(3) has expired. Any excavation would require preapproval as a corrective action ...

5.1.3 Sampling during and at Completion of Excavation

The licensed individual responsible for an excavation should use proper judgement to ensure that only the minimum amount of soil necessary to abate the release is removed, or otherwise determine that abatement is infeasible, regardless of whether State Trust Fund reimbursement is anticipated or not.

As releases usually migrate vertically downward from the source of the release, excavation should normally be directed vertically downward from the source area, and widened only to allow for proper benching or stabilization. Clean stockpiles generated from slope or benching efforts must be segregated for reuse as backfill. During over-excavation, any type of sample screening to segregate clean and contaminated stockpiles may be used at the discretion of the licensed individual (See the note below and in 5.2.2 above for State Trust Fund screening requirements for contaminated soils).

5.1.4 Sampling: Over-Excavation following Site Checks or Regulated Commercial UST Closure

If the results for any site check or closure sample equal or exceed 50 mg/kg TPH GRO or 100 mg/kg TPH DRO (or, where tested, the soil-to-groundwater MSCCs then excavation of the contaminated soil in the unsaturated zone (and, where applicable, accessible areas of the smear zone) followed by the collection of confirmatory samples, is required.

For post-excavation confirmation sampling, soil samples must be collected from the sidewalls and from the base of the excavation and analyzed using risk-based methods (commonly current versions of EPA 8260 and/or 8270 and MADEP VPH and/or EPH) as directed in **Table 3**. A sample must be collected from a location on each sidewall of the excavation where contamination is most likely to be present. The sample(s) collected from the base of the excavation must be collected directly underneath the location(s) of each highly contaminated site check or closure sample(s). If, following tank (or line) removal, several distinct areas of contaminated soil are found within a large, four-sided tank pit (or in a long, four-sided product line trench), four sidewall samples and **a representative number of base samples** should be collected from the subsequent over-excavation of that pit (or trench) and analyzed by the methods appropriate to the contamination at each location. A set of post-excavation confirmation samples must be collected from each excavation at the site. If there are several excavations, then a separate set of samples is required **from each excavation**.

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During the over-excavation of contamination from a regulated petroleum UST release, if groundwater or bedrock is encountered, then groundwater sampling is necessary. A monitoring well must be installed in the source area and the results included in the ***Initial Abatement Action Report***. If multiple source areas exist, the need for multiple monitoring wells should be evaluated.

Please note that a failure to assess groundwater where bedrock or groundwater was encountered during an Initial Abatement Action excavation may lead to a denial of reimbursement for the Limited Site Assessment.

> ***If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.***
>
> ***For Trust Fund reimbursement, field screening using mobile lab technologies is required to justify authorization or preapproval of any initial abatement excavation beyond the initial eligible volume limits.***
>
> ***Additionally, TPH must be collected from the waste stream at appropriate intervals to document the claimed soil disposal volume accurately represents the volume of contaminated soil that required removal and disposal. Alternatively, mobile lab field screening (or prescreening) results may be substituted for TPH for this purpose. Please contact the UST Section Trust Fund Branch at 919-707-8200 for additional information.***

5.1.5 Post-Excavation Reporting and Actions

At the completion of excavation and **within 90 days** of the date of release discovery, the responsible party must submit an ***Initial Abatement Action Report*** to the appropriate regional office of the Corrective Action Branch of the UST Section (and to the Permits and Inspections Branch, if the investigation was initiated by a UST inspector). The reporting requirements are described in **Section 6.0** and the outline of the report format is presented in Appendix A.

The purpose of the ***Initial Abatement Action Report*** is to report and describe all initial abatement actions performed, including the over-excavation process and the post-excavation soil contamination assessment.

The discharge or release can be classified as Low risk and no further action will be required, if the ***Initial Abatement Action Report*** demonstrates that:

- Soil contamination in samples from the remaining unsaturated soil in the sidewalls and at the base of the excavation does not equal or exceed the soil-to-groundwater or the residential maximum soil contaminant concentration (MSCC), whichever is lower,
- Neither groundwater nor bedrock was encountered in the excavation, and

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- Groundwater contamination (if assessed due to the presence of groundwater or bedrock in the excavation, or any other reason) does not equal or exceed the groundwater quality standards,

If the ***Initial Abatement Action Report*** indicates that:

- soil contamination remains that equals or exceeds the lower of the soil-to-groundwater or residential MSCCs following excavation to the maximum extent practicable,
- either groundwater or bedrock was encountered, *and* groundwater contamination was not assessed or
- groundwater contamination equals or exceeds the 2L groundwater quality standards,

then the responsible party must perform a Limited Site Assessment (**15A NCAC 02L .0405**). The ***Limited Site Assessment Report*** must be submitted to the appropriate UST Section regional office **within 120 days** of the discovery of the release. The outline of the report format is presented in the current version of the ***UST Section* Assessment *Guidelines***.

5.2 Excavation of Contaminated Soil from Non-Regulated Petroleum UST Releases

Once a release has been discovered or confirmed the cleanup actions for non-regulated commercial petroleum UST releases (including many large heating oil UST releases) become regulated in accordance with **15A NCAC 02N .0700** and **15A NCAC 02L .0400** and therefore become subject to the requirements for assessment and cleanup specified therein.

5.2.1 Requirements, Limits, Sampling, and Reporting for Non-regulated UST Excavations

Non-regulated commercial USTs (greater than or equal to 1,100-gallon capacity, including heating oil for five or more households): When a release is discovered prior to or during the removal of a non-regulated commercial UST system with a tank of capacity greater than 1,100 gallons, the responsible party must remove the contaminated soil in accordance with the soil excavation guidance and the assessment and reporting requirements presented in Section 6.0 for regulated petroleum USTs. (See flowchart illustrating non-regulated commercial petroleum UST release response in **Figure 4**.)

Non-regulated noncommercial USTs (less than 1,100-gallon capacity, or heating oil used by four or fewer households): When a release is discovered prior to or during the removal of a non-regulated noncommercial UST system with a tank of capacity less than 1,100 gallons (which includes most home heating oil tanks), the responsible party must report the release to the Department **within 24-hours**, but the RP is not required to remove the contaminated soil unless directed by the Department based on the risk posed by the site. (See flowchart illustrating non-regulated noncommercial petroleum UST release response in **Figure 5**)

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If a responsible party for a non-regulated noncommercial UST chooses to continue initial abatement of the release to obtain a no further action determination with unrestricted land use, their efforts should attempt to remove all contaminated soil above the lesser of the Soil-to-Groundwater or Residential Maximum Soil Contaminant Concentration levels. Excavation should cease in any direction in which clean soil or bedrock is encountered or in which excavation threatens to harm a substantial structure and generally should cease in the vertical direction when groundwater is encountered. If groundwater is encountered in the excavation, the responsible party may elect to have a monitoring well installed at the location of the release source, and a sample of the groundwater collected for analysis. Assessment and reporting should be as close to the requirements presented in **Section 6.0** as is practicable.

5.2.2 Post-Excavation Actions at Non-regulated UST Releases

If groundwater contamination does not exceed the 2L standards and any remaining soil contamination is below the lowest MSCCs, the discharge or release may be closed with unrestricted use. If the site's risk is classified as low by the Department, and soil or groundwater contamination exists above the applicable MSCCs and/or 2L standards, then the discharge or release may be closed with a notice of residual petroleum filed by the responsible party and a no further action determination by the Department.

However, if following final excavation for a release from a non-regulated commercial UST soil contamination continues to exceed the lowest MSCCs, or if groundwater contamination exceeds the groundwater quality standard limits, then the responsible party must perform a Limited Site Assessment as described in Section 6.11. For a release from a non-regulated, noncommercial UST, the Department will direct additional work if the site is determined to be high risk.

Note: For commercial, non-regulated tanks, the responsible party should follow the guidance in the State Trust Fund box under Section 5.1.4 above.

***** Please be aware as of October 1, 2015 -State Trust Fund reimbursement is no longer available for noncommercial releases. *****

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5.3 Excavation of Contaminated Soil from Regulated Non-Petroleum (Hazardous Substance) UST Releases

5.3.1 Requirements, Limits, Sampling, and Reporting for Regulated Non-Petroleum UST Excavations

Once a release has been confirmed, initial abatement actions for releases from regulated, non-petroleum USTs (including USTs containing hazardous substances such as halogenated solvents) are subject to the corrective action requirements of **15A NCAC 02N .0700**. Thus, contaminated soil must be excavated to the maximum extent practicable, and post-excavation confirmatory soil samples must be collected and analyzed using approved analytical methods, as specified in Table 6. (A flowchart illustrating the requirements for regulated hazardous substance UST releases is presented as Figure 6.)

Department Risk-Based Remediation does not use the UST programs risk-based values, there is a different process for the determination of Department Risk-Based Remediation goals. Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. In addition to DEQ's Underground Storage Tank, Dry-cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs, risk-based remediation can now be considered in all DEQ environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. More information can be found on the NCDEQ website at https://deq.nc.gov/permits-regulations/risk-based-remediation.

5.3.2 Post-Excavation for Regulated Non-Petroleum (Hazardous Substance) UST Release Reporting and Actions

For a known or suspected release from an underground storage tank (UST) system a **24-Hour Release and UST Leak Reporting Form** (UST-61 Form) should be completed and submitted to the UST Section's regional office. This form is required to be submitted within 24 hours of discovery of a known or suspected release (See Appendix A).

If groundwater contamination does not exceed the 2L standards and any remaining soil contamination is below the Soil to Groundwater MSCC, the discharge or release may be closed with unrestricted use.

After final excavation, if soil contamination continues to exceed the soil to groundwater MSCCs, or if groundwater contamination exceeds the groundwater quality standard limits, then the responsible party must perform further assessment and corrective actions.

If free product is present a **Free Product Recovery Report** should be prepared and submitted within 14 days: This report presents information on free product recovery activities following the initial and any subsequent recovery event.

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The RP must submit a **20-Day Report** summarizing the initial abatement actions that were performed within 20 days following release confirmation to the appropriate regional office of the Corrective Action Branch of the UST Section.

The RP must prepare and submit a **45-Day Report** to the appropriate regional office within 45 days of confirmation of a release. This report documents the results of the free product investigation, a receptor survey and initial site characterization activities. The priority ranking of a non-petroleum UST release will be based on the information in this report. An extension of the 45 day deadline may be granted upon written request with sufficient documentation (15A NCAC 02N .0704).

The Department will direct additional work if the site is determined to be intermediate or high priority. The RP may proceed to corrective action to pursue unrestricted use or the RP has the option to utilize the Departments Risk Based Program.

If the site's risk is classified as Low under the Department's risk based program, and a Notice of Residual Contamination is filed with the Register of Deeds in the county in which the release is located by the responsible party, a no further action determination may be requested from the Department.

5.4 Disposal of Contaminated Soil and Groundwater from Excavations

Excavations may not be back-filled with contaminated soil. As of January 1, 2018, **15A NCAC 2T .1502(4)** defines soil as contaminated with petroleum if analytical results from samples collected during the assessment or from the stockpile show the presence of contaminants at concentrations above the soil-to-groundwater or residential MSCCs, whichever is lower. Therefore, soil is not defined as "petroleum contaminated soil" if concentrations are below the soil-to-groundwater or residential MSCCs, or below the current surrogate TPH Action Levels of 50 mg/kg (TPH-GRO) and 100 mg/kg (TPH-DRO).

Once "petroleum contaminated soil" is excavated, it is considered a waste and must be properly disposed of, even if the contaminant concentrations are below the applicable risk-based cleanup levels specific to that site. A permit issued by the DWM is required if excavated contaminated soil is to be treated on site, and a certificate of approval is required if excavated contaminated soil is to be temporarily stored on site (See *Guidelines for Ex Situ Petroleum Contaminated Soil Remediation*, current version.). If soil is to be transported offsite for treatment/disposal, then disposal manifests are required.

Contaminated soil, impacted by non-petroleum contamination, may be considered hazardous waste and must be evaluated and disposed of accordingly. Excavations should be filled with clean compacted fill that is similar to the native soil removed from the excavation. If gravel or some other permeable material is to be used, then a low permeability fill material must be used to cap the excavation. Segregated overburden, benching, or other marginal excavated soils

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that, when properly screened, are not indicative of 'petroleum-contaminated soils' as defined in **15A NCAC 02T .1504**, and are not hazardous wastes as defined in **15A NCAC 13A**, may be re-used as fill in the excavation from which that soil was removed.

If the tank pit or the excavation requires de-watering, the contaminated water must be properly treated to meet discharge levels allowed in a POTW or NPDES permit, or must be transported offsite for proper disposal at a permitted facility.

Groundwater from well development, as well as drilling mud and cuttings generated from monitoring wells installed as part of the Site Check or Initial Abatement Action confirmation sampling must be disposed of according to **15A NCAC 02T .0113**, as presented in Appendix E.

Please Note: Confirmation of contamination in excess of contaminant levels allowed to remain in situ is to be provided by the analytical results of the truck waste characterization samples.

More comprehensive guidance on the proper disposal of contaminated soil and groundwater is presented in **Appendix E** – Disposal of Contaminated Soil and Groundwater.

If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (which is available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

TPH must be collected from the contaminated soil waste stream at appropriate intervals to document the claimed soil disposal volume accurately represents the volume of contaminated soil that required removal and disposal. Alternatively, mobile lab field screening (or prescreening) results may be substituted for TPH for this purpose.

State Trust Fund reimbursement for costs associated with managing clean soils removed for the purpose of accessing contaminated soils for excavation (e.g., benching, cover, etc.), managing and disposing of soils contaminated with non-petroleum hazardous wastes, and managing and disposing of dewatering or well construction/development liquids may be limited and/or require additional controls and justifications. Please contact the UST Section Trust Fund Branch at 919-707-8200 for additional information.

Stockpile sampling should be performed at the conclusion of the UST closure. If the stockpile samples indicate that the soils are not contaminated above those levels allowed to remain in situ with petroleum by-products, then reimbursement for soil removal and/or purchase of new back fill will not be allowed.

If contaminated soil cannot be weighed because it is being treated or disposed onsite, a North Carolina registered professional surveyor must be used to measure the stockpiled soil or the excavation for an exact volume and that same surveyor must perform and seal the calculations. The total volume (cubic yards) should be converted to tons by multiplying by 1.5

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if excavation was surveyed or 1.25 if stockpile was surveyed. This conversion to tons is required for proper bid evaluation. The total tonnage must be documented in order to reimburse for costs associated with excavation during UST closure activities. A surveyor's calculations may not be used in lieu of weight tickets for soils removed from the site for disposal.

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6.0 Reporting Requirements

6.1 Site Check Report

As described in Section 4.3, the results of a site check required by the UST Section must be reported in a ***Site Check Report*** (**Appendix A**) if the investigation results indicate that:

- soil contamination does *not* equal or exceed 50 mg/kg TPH GRO or 100 mg/kg TPH DRO for petroleum (or where tested, *such as for regulated hazardous substances,* does not exceed the soil-to-groundwater MSCC or the MDL if no MSCC is established),
- groundwater contamination does *not* equal or exceed the groundwater quality standard established in 15A NCAC 02L .0202, *and*
- NAPL is not present.

The ***Site Check Report*** must be submitted to the appropriate regional office of the Corrective Action Branch of the UST Section (as well as a separate copy to the Permits and Inspections Branch, if the site check was required by a UST inspector. The ***Site Check Report*** must be received by the UST Section **within 30 days** of the receipt of the ***Notice of Regulatory Requirements*** or the ***Notice of Violation***.

If the removal of all or part of the UST system was necessary to allow access for site check sampling, then the required ***UST Closure Report*** elements, including the ***UST-12 Format*** with ***UST-2 Form***, **Appendix A)** should be submitted as part of the ***Site Check Report***.

The results of a site check required by the UST Section must be incorporated within the ***Initial Abatement Action Report***. (**Appendix A**) if the investigation results indicate that:

- soil contamination equals or exceeds 50 mg/kg TPH GRO or 100 mg/kg TPH DRO for petroleum (or where tested, *such as for regulated hazardous substances,* exceeds the soil-to-groundwater MSCC or the PQL if no MSCC is established),
- groundwater contamination equals or exceeds the groundwater quality standard established in 15A NCAC 02L .0202, *or*
- NAPL is present.

Per NCGS 143-215.94B(b)8, State Trust Fund reimbursement may be available for investigative costs if a site investigation is required by the Department to determine if a release has occurred. This statute excludes coverage of routine leak detection procedures that are required by statute or rule. Accordingly, reimbursement is not available for costs incurred for routine leak detection investigations by the tank owner or operator where required by rule under 15A NCAC 02N .0601 following evidence of an on-site release. However, reimbursement of some or all investigation costs may be available for a tank owner or operator who is directed by the Department to perform a leak detection investigation under 15A NCAC 02N .0602 following the discovery of off-site contamination that appears to be related to a potential on-site release.

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If State Trust Fund reimbursement is anticipated, please refer to the current version of the Reasonable Rate Document (available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/underground-storage-tanks-section/trust-fund-branch/reasonable-rate-documents) for more information.

6.2 24-Hour Release Leak Reporting Forms

The responsible party must submit a ***24-Hour Release Reporting Form*** on discovery of a release for:

- a petroleum release from a regulated or non-regulated commercial UST;
- a hazardous substance (non-petroleum) UST release;
- a non-UST petroleum release; or.
- a non-regulated non-commercial UST release

Evidence (e.g., odor, free product, stained soil) of discovery of a release from all UST types must be reported to the UST Section **within 24 hours**. A ***UST-61 - 24-Hour Release and UST Leak Reporting Form*** (**Appendix A**) must be completed and submitted to the appropriate regional office of the Corrective Action Branch of the UST Section.

Evidence (e.g., odor, free product, stained soil) of discovery of a release from all non-UST petroleum incidents must be reported to the UST Section **within 24 hours**. A ***UST-62 - 24-Hour Notification of Discharge Form*** (**Appendix A**) must be completed and submitted to the appropriate regional office of the Corrective Action Branch of the UST Section.

6.3 Notice of Intent: UST Permanent Closure or Change-in-Service Form (UST-3 Form)

The responsible party must submit a ***Notice of Intent: UST Permanent Closure or Change-in-Service Form*** before closure (or a change in service) for:

- a petroleum release from a regulated commercial UST; or
- a hazardous substance (non-petroleum) UST release

Before closure (or a change in service) of a regulated UST is initiated, the responsible party must contact the local fire marshal and/or local county or city municipality for special closure or permit requirements. The responsible party must also file a ***UST-3 Form - Notice of Intent: UST Permanent Closure or Change-in-Service*** (**Appendix A**) with the appropriate UST Section regional office **30 days before closure** activities begin. A copy of the ***UST-3 Form*** also must be submitted to the Permits and Inspection Branch at the UST Section Central Office (or directly to the appropriate UST system inspector, if known). [Exception: Prior to December 31, 2020, if a

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professional engineer (P.E.) or licensed geologist (L.G.) is supervising the closure, a UST-3 Form may be submitted **at least five (5) working days** before the UST closure. After January 1, 2021, a UST-3 Form must be submitted **at least 30 days before closure activities begin**.]

6.4 Free Product Recovery Report

The Free Product Recovery Report presents information on free product recovery activities following the initial and any subsequent recovery event whenever the timing is appropriate. This report should be prepared and submitted only when reporting of free product recovery cannot not be achieved within a reasonable time period by incorporation in the **20-Day Report, Initial Abatement Report**, **Limited Site Assessment Report, Comprehensive Site Assessment Report**, **Corrective Action Plan**, or routine **Monitoring Reports**. A separate **Free Product Recovery Report** is required only when a more comprehensive report is not due simultaneously.

6.5 20-Day Report

The responsible party for regulated USTs and non-regulated commercial USTs must submit a ***20-Day Report*** summarizing the initial abatement actions that were performed **within 20 days** following release confirmation to the appropriate regional office of the Corrective Action Branch of the UST Section. For regulated and non-regulated commercial USTs this report must not be submitted as separate report after the 20 day limit. The outline of the report format is presented in Appendix A.

The responsible party for non-regulated noncommercial USTs is not required to perform any initial abatement actions or additional reporting except where directed by the Department based on the risk posed by the site.

If State Trust Fund reimbursement is anticipated, please note that a failure to provide this report in a timely fashion, both with respect to the 20-day deadline and to the subsequent completion of initial abatement actions and submittal of the associated Initial Abatement Action Report within 90 days of release detection, may affect the appropriateness and reimbursement of this report.

6.6 UST Closure Report (following UST-12 Format) with UST-2 Form

The responsible party must submit a ***UST Closure Report (following UST-12 Format) with UST-2 Form*** documenting clean closure for:

- a regulated commercial UST;
- An unregulated commercial UST if an NFA is desired, otherwise only the UST-2 is required; or
- a hazardous substance (non-petroleum) UST.

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For a clean closure, a responsible party must prepare a ***UST Closure Report*** following the ***UST-12 Format***, and a ***UST-2A (Registered USTs) or UST-2B Form (Unregistered USTs) Site Investigation Report for Permanent Closure or Change-in-Service of USTs*** (**Appendix A**). The closure report must be submitted to the appropriate regional office of the Corrective Action Branch of the UST Section **within 30 days** for a regulated UST or non-regulated commercial UST. The definition of a clean closure is when soil contamination is less than the 50 mg/kg TPH GRO and 100 mg/kg TPH DRO action levels for petroleum (or the soil-to-groundwater MSCCs for regulated hazardous substance), groundwater and bedrock are *not* encountered in the pit, or groundwater contamination does *not* exceed the 2L standards where encountered).

*[**Note:** Whenever a regulated or commercial UST closure is reported to the Corrective Action Branch, a separate copy of the report and **UST-2A** or **UST-2B Form** **must be submitted** to the proper UST System inspector for the system location, or directly to the Permits and Inspection Branch in the UST Section Central Office. This is necessary in part so the permit status for the system will be changed to "permanently closed" so no additional permit fees for that system are incurred by the tank owner.*

To locate the proper inspector for the UST system, please refer to the UST Inspector Assignments Map (available in electronic format at this address: https://deq.nc.gov/about/divisions/waste-management/ust/pib) or by contacting the UST Section Permits and Inspection Branch at 919-707-8200.]

6.7 Closure of a Non-regulated Noncommercial UST

For closure of a non-regulated noncommercial USTs, a responsible party is not required to remove a tank or conduct confirmation sampling. If there is a suspected release, the Department may direct further action based on an evaluation of the risk that would be posed by a release.

If the responsible party requests a ***No Further Action*** determination, confirmation sampling must be completed. This sampling should follow the recommended guidance in Section 3.7 and reporting should follow the general format of the ***UST Closure Report***. Contact the applicable regional office of the Corrective Action Branch of the UST Section for additional guidance.

6.8 UST Closure Report with Release

For a tank closure with a release, a responsible party must incorporate the information for a ***UST Closure Report*** in the ***Initial Abatement Action Report*** following the ***UST-12 Format***, and a ***UST-2A (Registered USTs) or UST-2B Form (Unregistered USTs) Site Investigation Report for Permanent Closure or Change-in-Service of USTs*** (**Appendix A**). The closure report must be submitted to the appropriate regional office of the Corrective Action Branch of the UST Section **within 30 days** for a regulated UST or non-regulated commercial UST. The definition of a release is when soil contamination is more than the 50 mg/kg TPH GRO and 100 mg/kg TPH DRO action levels for petroleum (or the soil-to-groundwater MSCCs for regulated hazardous substance), groundwater and bedrock are *not* encountered in the pit, or groundwater contamination does *not* exceed the 2L standards where encountered).

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*[**Note:** Whenever a regulated or commercial UST closure is reported to the Corrective Action Branch, a separate copy of the report and **UST-2A** or **UST-2B Form** **must be submitted** to the proper UST System inspector for the system location, or directly to the Permits and Inspection Branch in the UST Section Central Office. This is necessary in part so the permit status for the system will be changed to "permanently closed" so no additional permit fees for that system are incurred by the tank owner.*

To locate the proper inspector for the UST system, please refer to the UST Inspector Assignments Map (available in electronic format at this address: https://deq.nc.gov/about/divisions/waste-management/ust/pib) or by contacting the UST Section Permits and Inspection Branch at 919-707-8200.]

For a tank closure with a release from a non-regulated noncommercial USTs, a responsible party is not required to remove a tank or conduct confirmation sampling. However, if there is a release, the Department may direct further action based on an evaluation of the risk that would be posed by a release (see 15A NCAC 02L .0406).

Noncommercial UST releases are classified as either an acceptable risk (Low) or an unacceptable risk (High) per Session Law 2015-241. If the Department classifies the release as High risk, the responsible party must mitigate the risk to the receptor(s) in order to reduce the risk classification to Low. If a property transfer occurs before a release is mitigated to unrestricted use standards a ***Notice of Residual Petroleum*** must be recorded on the property.

For a Low risk release, if the responsible party desires a No Further Action determination without land use restrictions, confirmation sampling to show that the release has been remediated to unrestricted use standards must be completed. The sampling should follow the recommended guidance in Section 3.7 and reporting should follow the general format of the ***UST Closure Report***. If unrestricted use standards cannot be achieved, a ***Notice of Residual Petroleum*** must be recorded on the property to obtain a ***No Further Action*** determination or prior to a property transfer. Contact the applicable regional office of the Corrective Action Branch of the UST Section for additional guidance.

6.9 45-Day Report (for non-petroleum UST releases only)

The responsible party must prepare and submit the 45-Day Report to the appropriate regional office within 45 days of confirmation of a release. This report documents the results of the free product investigation, a receptor survey and initial site characterization activities. The priority ranking of a non-petroleum UST release will be based on the information in this report. The information required in the report includes the reporting of site check and/or UST closure activities and related assessment; determination of the source and nature of the release; initial abatement actions including free product investigation and recovery, confirmation of groundwater contamination; location of water supply wells, wellhead protection areas, and surface water; potential land use; and any other investigative or remedial activities undertaken soil excavation and post-excavation assessment; and potential receptor and land use information. The format is presented in the **Appendix A**.

An extension of the 45-day deadline may be granted upon written request with sufficient documentation per the requirements in 15A NCAC 02N .0704.

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6.10 Initial Abatement Action Report

The responsible party must submit an ***Initial Abatement Action Report*** on completion of initial abatement actions for:

- a petroleum release from a regulated or non-regulated commercial UST or
- a non-UST petroleum release.

The purpose of the ***Initial Abatement Action Report*** is to document the initial investigation which resulted in the discovery of the release (site check and/or UST closure) and all initial abatement actions performed, including determination of source(s), removal of free product, over-excavation, post-excavation soil contamination assessment, and groundwater assessment (if applicable).

Thus, ***Initial Abatement Action Report*** is intended to fulfill:

- the requirement for regulated UST systems under 15A NCAC 02N .0603 that a report be submitted following a site check;
- the requirement for regulated UST systems under 15A NCAC 02N .0405 that a UST closure report be submitted following closure or change-in service;
- the requirement for regulated and non-regulated commercial UST systems under 15A NCAC 02L .0404 or non-UST petroleum releases under 15A NCAC 02L .0504 that a soil contamination report be submitted to show if the soil contamination was successfully cleaned up at the completion of the over-excavation.

The responsible party must submit the ***Initial Abatement Action Report*** **within 90 days** following the date of discovery of the release to the appropriate regional office of the Corrective Action Branch of the UST Section (and to the Permits and Inspections Branch, if the investigation was initiated by a UST inspector). The outline of the report format is presented in Appendix A.

The ***Initial Abatement Action Report*** presents the assessment results from any site check conducted by incorporating the requirements for a ***Site Check Report*** (Appendix A). It also presents the results from any UST closure conducted (for regulated systems) following the ***UST--12*** Format and a completed ***UST-2A/2B Form - Site Investigation Report for Permanent Closure or Change-in-Service of USTs*** (Appendix A). The ***Initial Abatement Action Report*** incorporates the results of any free product investigation and recovery actions.

*[See also the note under Section 6.6 regarding tank closure reporting and the submittal of a copy of the **UST-2A/2B Forms** to the Permits and Inspection Branch for proper permit status updates.]*

If the ***Initial Abatement Action Report*** demonstrates that remaining unsaturated soil in the sidewalls and at the base of the excavation does not contain contaminant levels which exceed the soil-to-groundwater or the residential maximum soil contaminant concentrations (MSCCs), whichever is lower, and that no bedrock or groundwater was encountered in the excavation (or, if so, that groundwater contamination does not exceed the 02L groundwater quality standards), then the discharge or release can be classified as low risk, and no further action will be required.

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Releases from regulated and non-regulated commercial USTs will require a *Limited Site Assessment* if:

- soil contamination remains following the excavation to the maximum extent practicable exceeds the lowest MSCCs,
- bedrock or groundwater was encountered in the excavation and no groundwater sampling was conducted (for any reason), or
- groundwater sampling was conducted and contamination exceeds the 02L groundwater quality standards.

If groundwater or bedrock is encountered in the excavation, a monitoring well must be installed at the location of the release source, and groundwater must be sampled and the results reported in the ***Initial Abatement Action Report.***

If State Trust Fund reimbursement is anticipated, please note that a failure to assess groundwater where bedrock or groundwater was encountered during an Initial Abatement Action excavation may lead to a denial of reimbursement for the Limited Site Assessment, if groundwater contamination is not detected during the LSA.

For releases from non-regulated noncommercial USTs, the ***Initial Abatement Action Report*** and the associated tasks described above **are not required**, except where directed by the Department based upon the risk posed by the release. If a responsible party voluntarily chooses to continue initial abatement of the release on their own discretion, an attempt should be made to remove all contaminated soil to the maximum extent possible. Although not required, where the responsible party decides to continue cleanup to meet the standards for clean closure with unrestricted use, post-excavation confirmatory soil samples must be collected and analyzed using approved analytical methods as described in Section 5.2. Contact the applicable regional office of the Corrective Action Branch of the UST Section for additional guidance.

6.11 Limited Site Assessment Report

The responsible party must submit a ***Limited Site Assessment*** on completion of initial abatement actions if soil contamination is not remediated successfully as described below for:

- a petroleum release from a regulated or non-regulated commercial UST or
- a non-UST petroleum release.

If the soil contamination was not remediated successfully at completion of a regulated commercial or non-regulated commercial UST closure and subsequent excavation, or if groundwater or bedrock was encountered during closure or excavation and groundwater assessment was either not performed or showed contamination in excess of the 02L groundwater quality standards, then the responsible party must submit a ***Limited Site Assessment Report*** as described in the **Assessment Guidelines**. The responsible party must submit the ***Limited Site Assessment Report*** **within 120 days** following the date of discovery of the release to the appropriate regional office of the Corrective Action Branch of the UST Section. The outline of the report format is presented in the UST Section Assessment Guidelines, current version.

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The *Limited Site Assessment Report* and the associated scope are not required for releases from non-regulated noncommercial USTs**, except where directed by the Department based upon the risk posed by the release.**

In accordance with 15A NCAC 02L .0106 for releases from nonpetroleum USTs, the RP must proceed to the *Comprehensive Site Assessment* as described in the **Assessment Guidelines (for report format see Appendix A).**

6.12 Other Reports and Actions

Free Product System Recovery Specification Report* -** Following the initial free product recovery event and report (a ***Free Product Recovery Report or, if the timing is appropriate, an ***Initial Assessment Report***, ***Comprehensive Site Assessment Report***, or pre-CAP ***Monitoring Report***), the UST Section may require that the responsible party investigate to determine the product type, thickness, rate of recovery, and lateral extent of free product; relevant hydrogeological factors; and potential receptors and then submit the results of this investigation to the appropriate regional office of the UST Section in a ***FP Recovery System Specification Report***. This report should evaluate the results of the investigation and possible active free product recovery system options (e.g., excavation, SVE, MMPE, AFVR); propose a recovery plan which incorporates the most appropriate recovery system option; and conclude with a schedule for the recovery plan. (Eventually, this recovery plan will be superseded by any recovery plan incorporated in the ***Corrective Action Plan***.)

Following the completion of no more than four (4) authorized NAPL recovery events, the UST Section may request the responsible party submit a ***Free Product Recovery System Specification Report*** in which an appropriate long-term recovery plan is proposed. The formats of the ***Free Product Recovery Report*** and the ***Free Product System Specification Report*** are presented in Appendix A.

For releases from non-regulated noncommercial USTs: Please note that NAPL assessment and recovery are required for releases from non-regulated noncommercial USTs where the NAPL is pooled or running across the ground surface, is floating on the surface of a surface water body, or is weeping from a vertical wall. Additionally, if measurable NAPL greater than 1/8 of an inch (0.01 ft) in thickness is found in an excavation below the water table or in any installed well, and the location of that discovery is within 30 feet of the boundary with an adjacent property owned by someone other than the responsible party, then additional emergency response to the NAPL, which may include recovery, is required to protect the neighboring third-party property owner.

For non-regulated noncommercial UST releases that satisfy none of these conditions, subsurface free product recovery and the associated report are not required, except where otherwise directed by the Department based upon the risk posed by the release.

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7.0 Reference for Sampling: "Guidelines for Sampling"

Soil and groundwater samples required for UST closures, site checks and over-excavation must be collected, transported and analyzed in accordance with the *Guidelines for Sampling*, current version (available in electronic format from the UST Section's web page at https://deq.nc.gov/about/divisions/waste-management/ust/guidance-documents). See also Tables 1-10.

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8.0 References

American Petroleum Institute Recommended Practice 1604, *Removal an Disposal of Used Underground Petroleum Storage Tanks*, third edition, March 1996. Available on the Internet at http://publications.api.org/documents/1604-PubAcc/html5.html

American Petroleum Institute Publication 2015, *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks.* Available on the Internet at http://publications.api.org/Safety-Fire-Protection.aspx

International Air Transport Association. *Dangerous Goods Regulations.* Issued annually. Available on the Internet at http://www.iata.org/publications/dgr/Pages/index.aspx

Leaking Underground Fuel Tank Guidance Manual. California State Water Resources Control Board, September 2012 (Updated December 2015). Available on the Internet at http://www.waterboards.ca.gov/ust/luft_manual.shtml .

Massachusetts Department of Environmental Protection. *Method for the Determination of Extractable Petroleum Hydrocarbons.* May 2004. Available on the Internet at http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/iv-petroleum-hydrocarbon-methods.html

Massachusetts Department of Environmental Protection. *Method for the Determination of Volatile Petroleum Hydrocarbons.* May 2004. Available on the Internet at http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/iv-petroleum-hydrocarbon-methods.html

Massachusetts Department of Environmental Protection. *WSC-99-415 - Preservation Techniques for Volatile Organic Compound (VOC) Soil Sample Analyses.* Available on the Internet at http://www.mass.gov/eea/agencies/massdep/toxics/reports/petroleum-hydrocarbons.html

The National Institute for Occupational Safety and Health *Criteria for a Recommended Standard: Working in Confined Spaces,* December 1979. Available on the Internet at https://www.cdc.gov/niosh/docs/80-106/

U.S. EPA. *The SW-846 Compendium.* Available on the Internet at https://www.epa.gov/hw-sw846

U.S. EPA Office of Solid Waste. Memorandum. *Clarification Regarding Use of SW-846 Methods.* August 1998. Available on the Internet at https://www.epa.gov/hw-sw846/memorandum-clarification-regarding-use-sw-846-methods

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Figures

Figure 1 Flowchart of Requirements for Releases Discovered during Site Checks for Regulated Commercial Petroleum UST Systems

Figure 2 Flowchart of Requirements for Closure (or Change-in-Service) and Initial Release Response and Abatement for Regulated Commercial Petroleum UST Systems

Figure 3 Flowchart of Requirements for Closure (or Change-in-Service) and Initial Release Response and Abatement for Regulated Hazardous Substance UST Systems

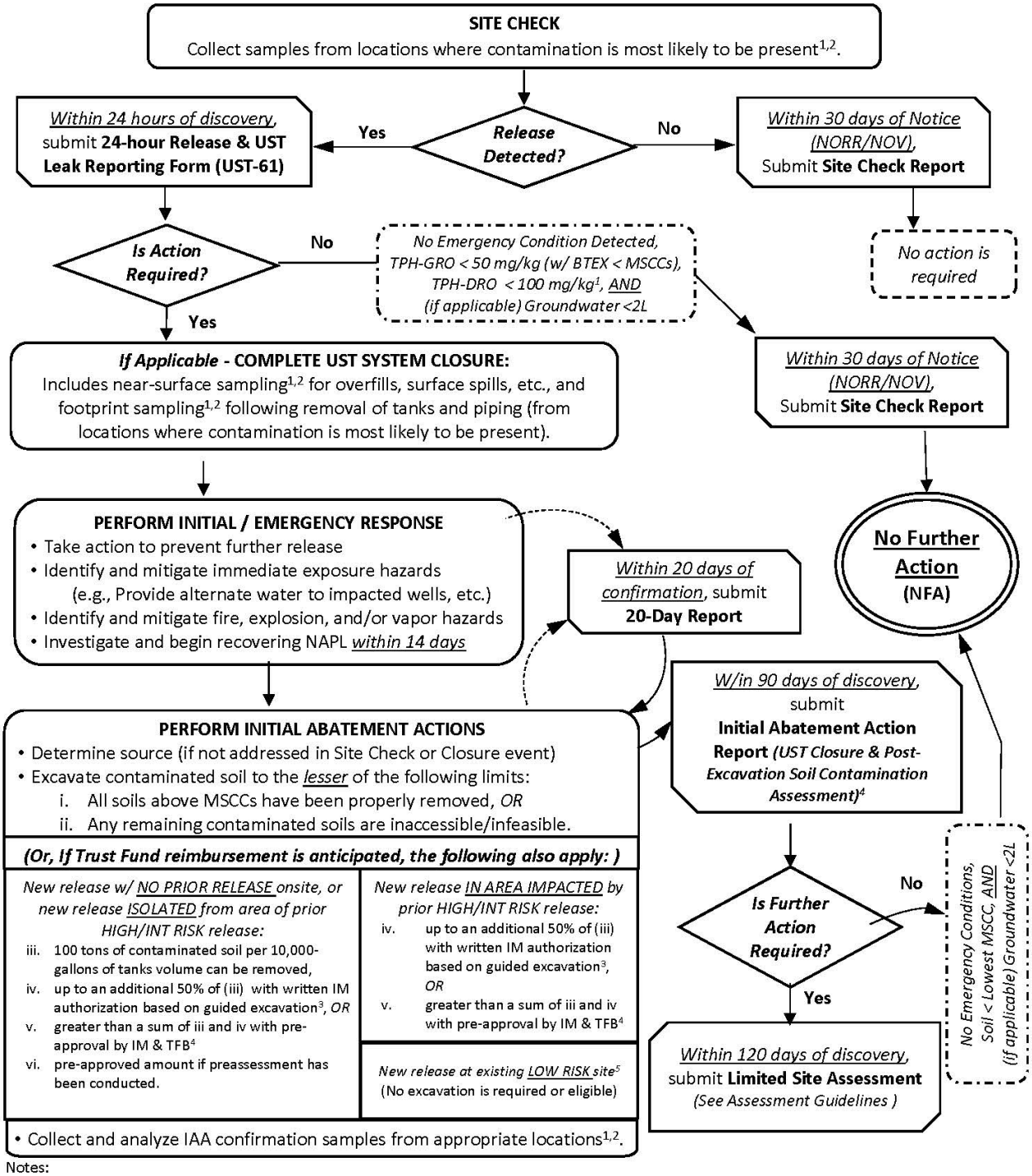
Figure 4 Flowchart of Requirements for Non-Regulated Commercial Petroleum UST Releases

Figure 5 Flowchart of Requirements for Non-Regulated Noncommercial Petroleum UST Releases

Figure 6 Flowchart of Requirements for Non-Regulated Non-Petroleum UST Releases

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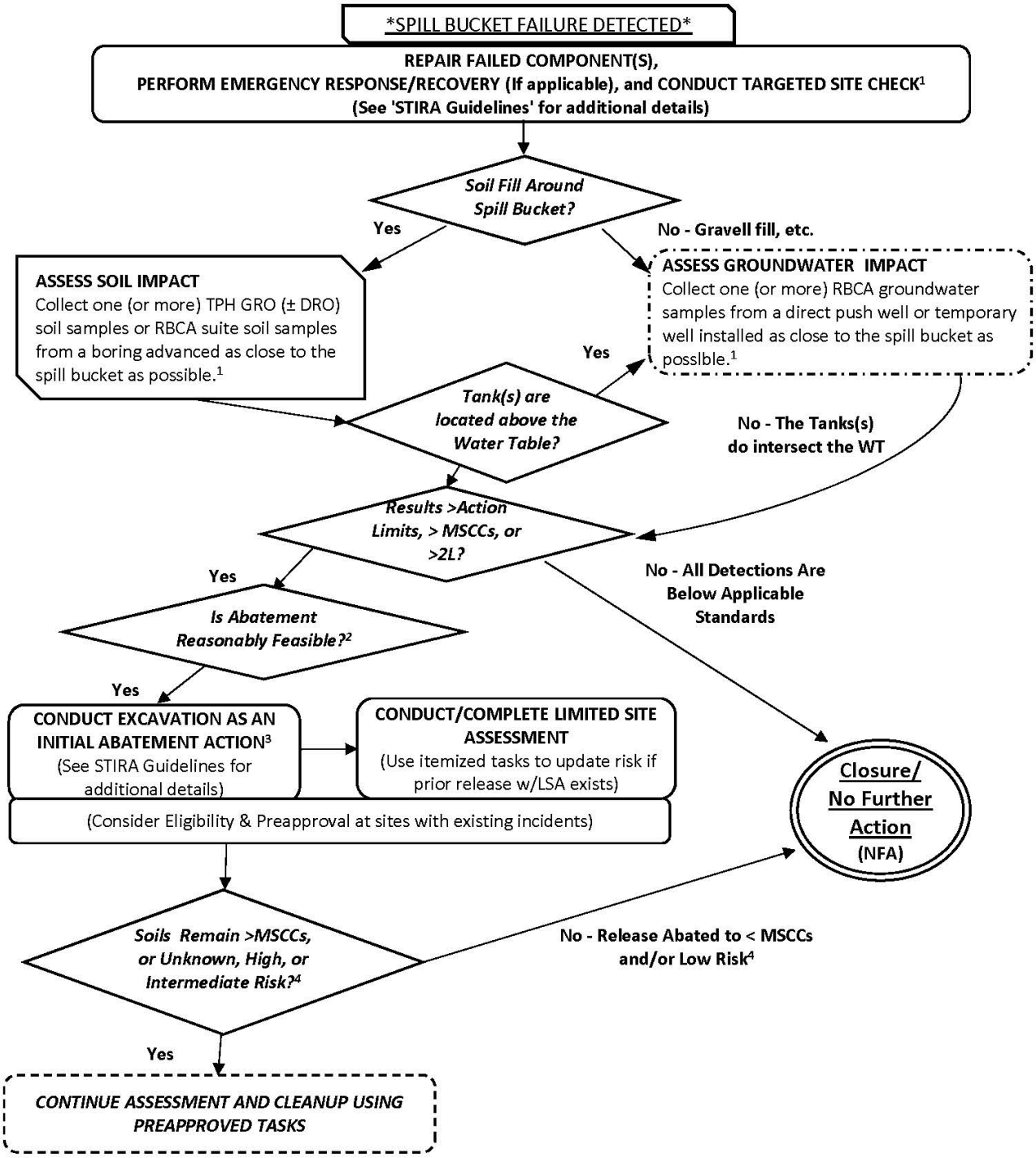
Figure 1 - Requirements for Releases Discovered during SITE CHECKS (REGULATED COMMERCIAL Petroleum UST Systems only)



Notes:

1. Collect samples for all required analyses based on suspected release type.
2. Where system removal or over-excavation intersects ground water or bedrock, a groundwater sample from a monitoring well (or similar) must be collected and analyzed for the applicable parameters from Table 4 as a surrogate for the footprint and/or pit-bottom sample(s).
3. A projected endpoint based on field screening using mobile lab or similar technolgies (UVF, MIP, Mobile GC, etc.) is required for additional volume.
4. Corrective action excavations may exceed the volume limits or 90-day IAA deadline, if pre-approved by the Incident Manager & State Trust Fund.
5. Only if the new release does not change the site's Risk classification in some way. If Risk changes, refer to guidance relative to that revised Site Risk.

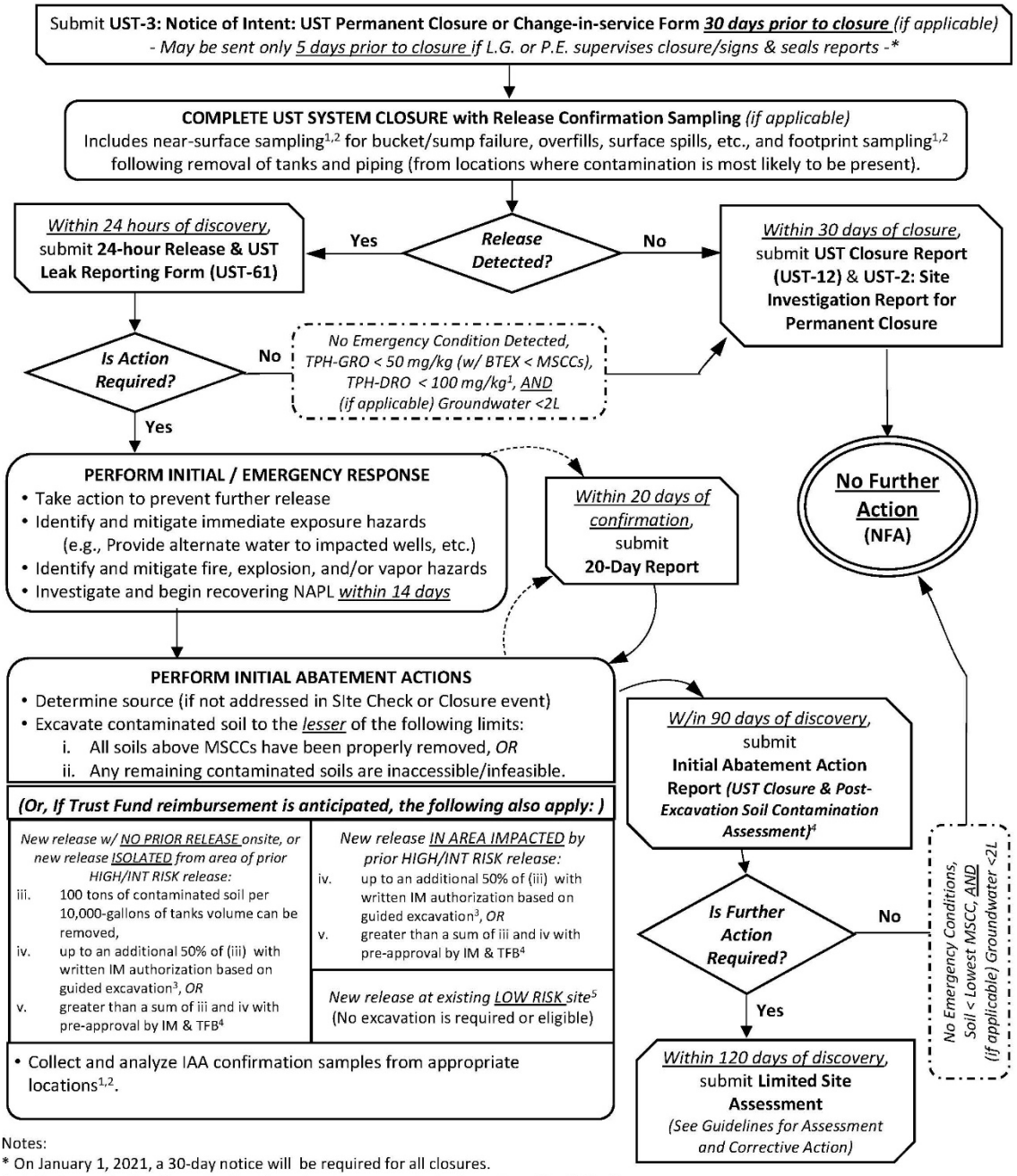
Figure 2 - Requirements for Failed Spill Bucket Tests at Commercial UST Systems



Notes:

1. See the most recent version of the *Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases (STIRA Guidelines)* for additional Information on locating soil borings and/or groundwater grab locations in proximity to existing tank systems.
2. Examples of when abatement could be reasonably feasible include low, localized concentrations in soil above the tank system that is accessible and could be excavated without impact to the system, or where high concentrations motivate the RP to remove and upgrade one or more tanks, allowing access to abate a potentially larger release, etc.
3. If, at any time during the IAA excavation, abatement is determined to be infeasible, the RP may report the IAA results and move to the LSA.
4. Risk-based NFA for Low Risk sites must comply with 15A NCAC 2L .0407(d) & .0408(3), and any Notice of Residual Petroleum, If applicable.

Figure 3 - Requirements for Closure (or Change-in-Service) and Initial Release Response and Abatement for REGULATED COMMERCIAL Petroleum UST Systems

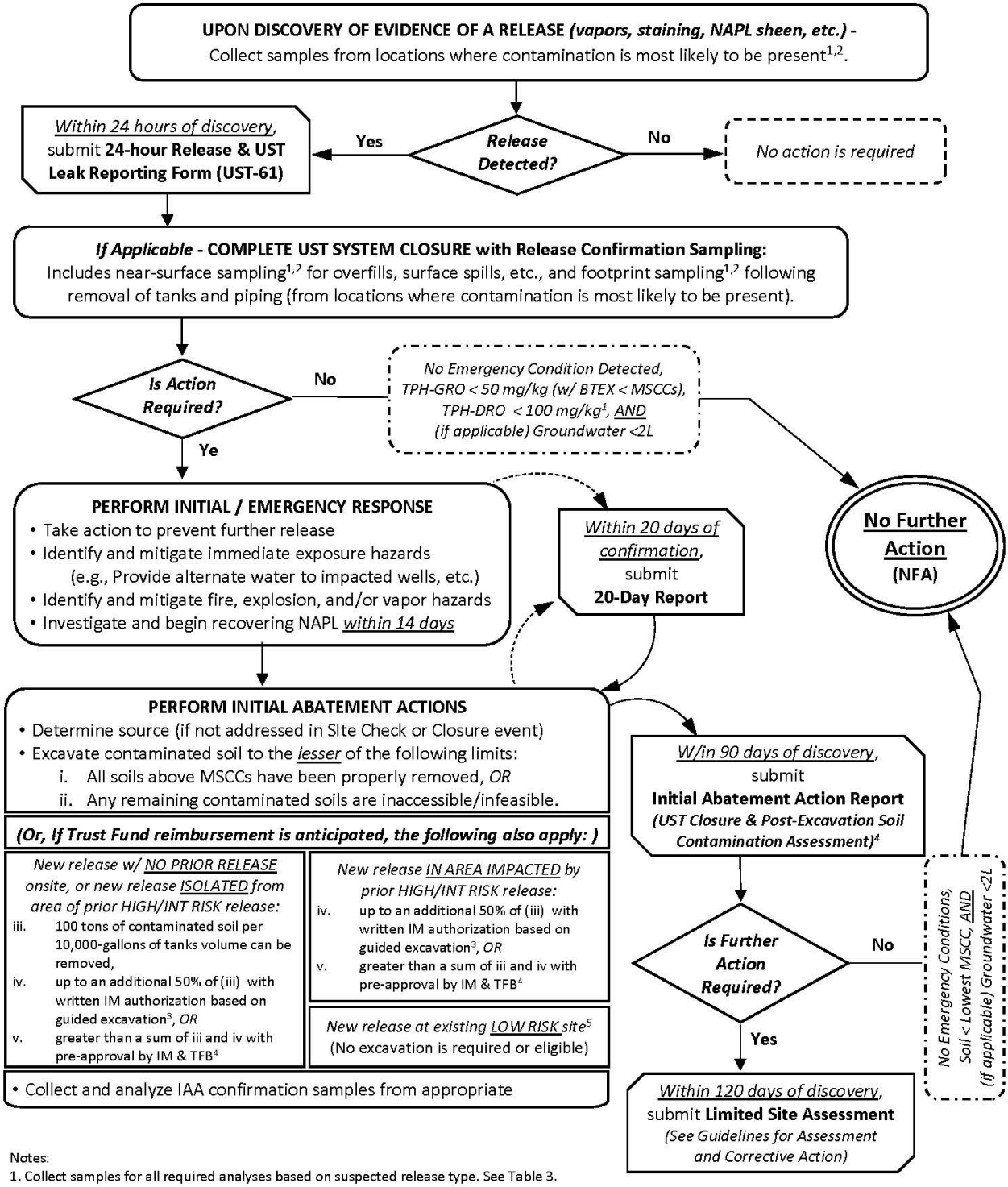


Notes:

* On January 1, 2021, a 30-day notice will be required for all closures.

1. Collect samples for all required analyses based on suspected release type. See Table 3.
2. Where system removal or over-excavation intersects ground water or bedrock, a groundwater sample from a monitoring well (or similar) must be collected and analyzed for the applicable parameters from Table 5 as a surrogate for the footprint and/or pit-bottom sample(s).
3. A projected endpoint based on field screening using mobile lab or similar technolgies (UVF, MIP, Mobile GC, etc.) is required for additional volume.
4. Corrective action excavations may exceed the volume limits or 90-day IAA deadline, if pre-approved by the Incident Manager & State Trust Fund.
5. Only if the new release does not change the site's Risk classification in some way. If Risk changes, refer to guidance relative to that revised Site Risk.

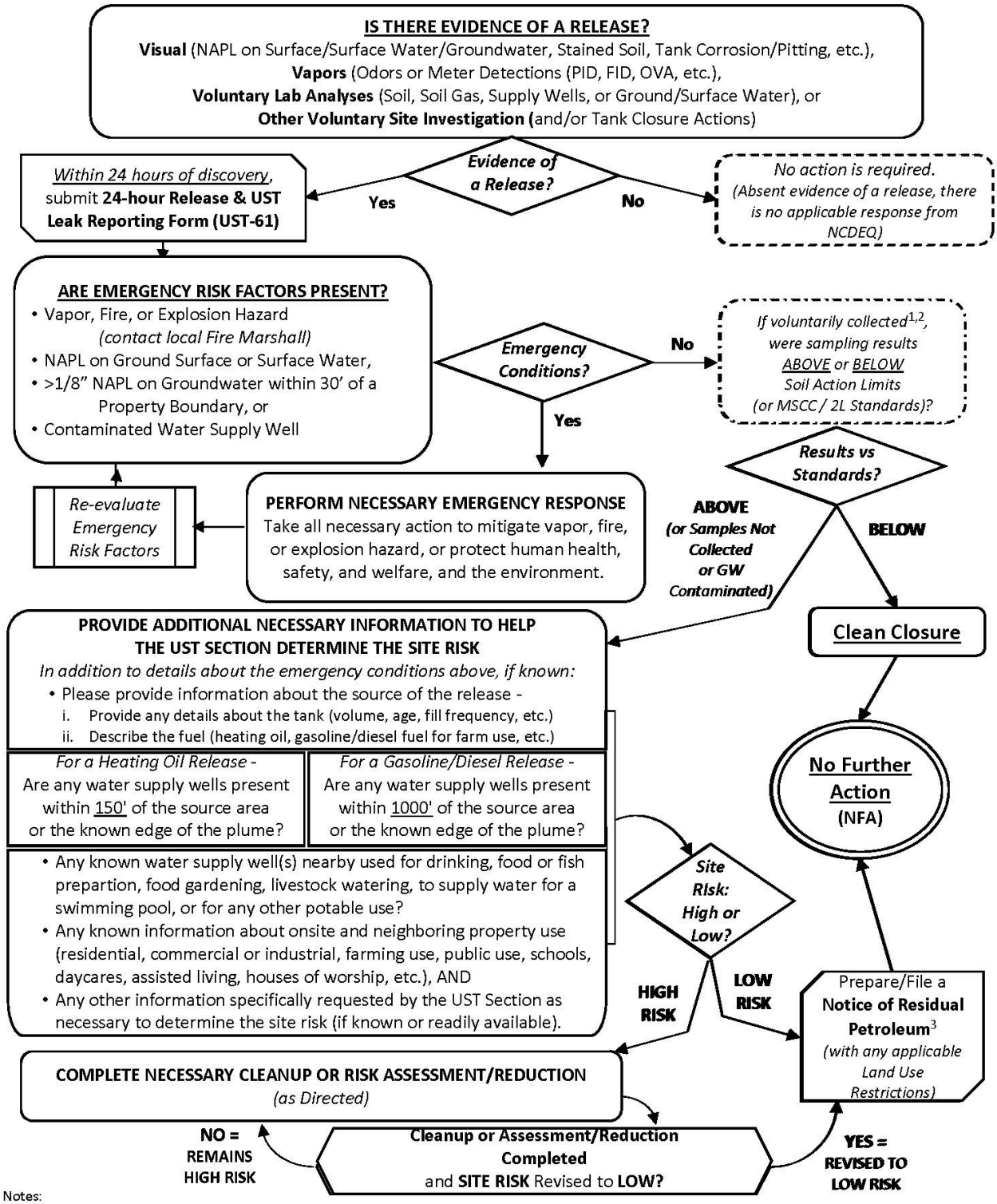
Figure 4 - Requirements for NON-REGULATED COMMERCIAL Petroleum UST Releases



Notes:

1. Collect samples for all required analyses based on suspected release type. See Table 3.
2. Where system removal or over-excavation intersects ground water or bedrock, a groundwater sample from a monitoring well (or similar) must be collected and analyzed for the applicable parameters from Table 4 as a surrogate for the footprint and/or pit-bottom sample(s).
3. A projected endpoint based on field screening using mobile lab or similar technolgies (UVF, MIP, Mobile GC, etc.) is required for additional volume.
4. Corrective action excavations may exceed the volume limits or 90-day IAA deadline, if pre-approved by the Incident Manager & State Trust Fund.
5. Only if the new release does not change the site's Risk classification in some way. If Risk changes, refer to guidance relative to that revised Site Risk.

Figure 5 - Requirements for NON-REGULATED NONCOMMERCIAL Petroleum UST Systems

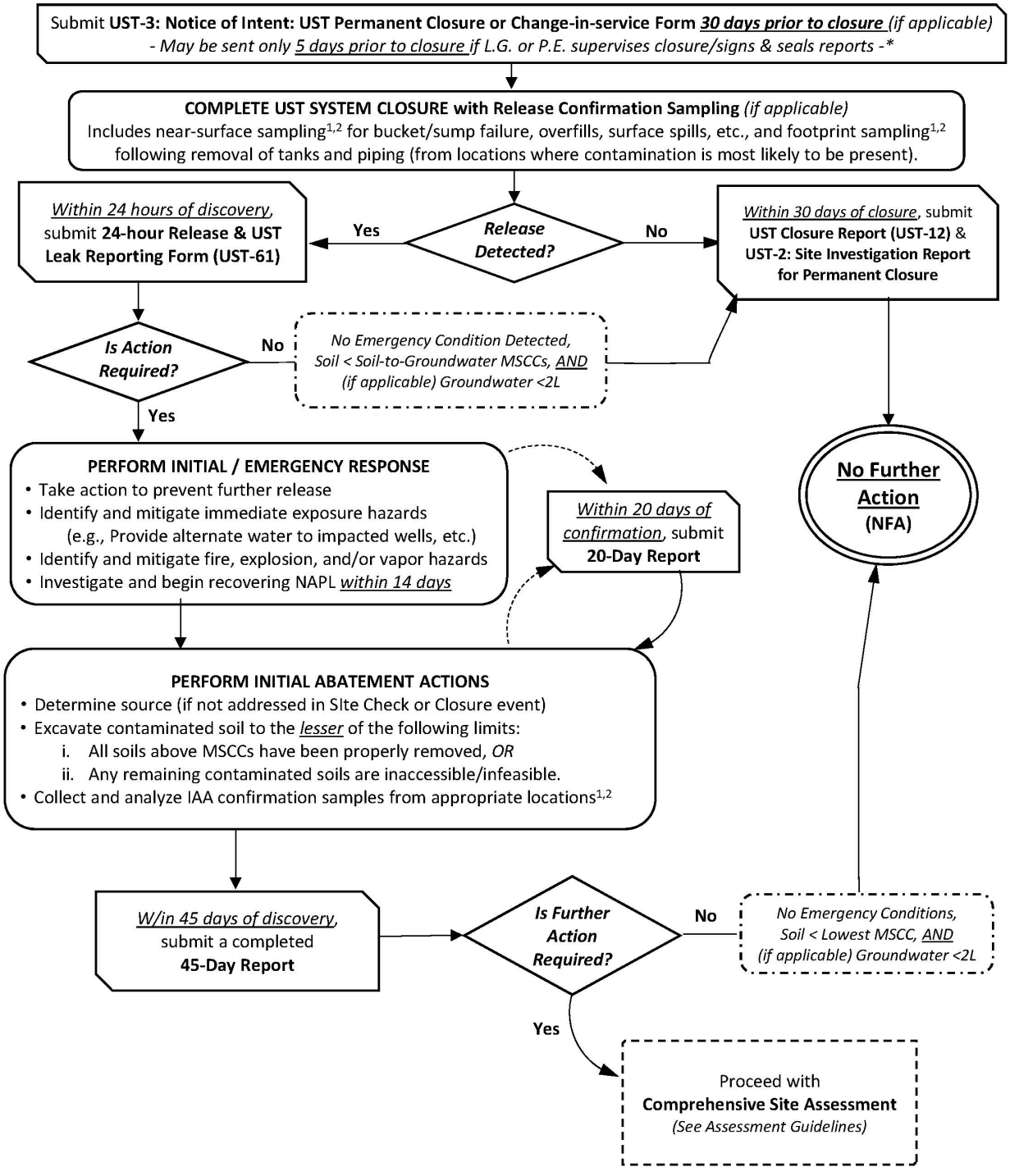


Notes:

NAPL = Non-Aqueous Phase Liquid. Also known as 'Free Product' or 'Free-Phase Petroleum'.

1. Samples would have to be voluntarily collected for the required analyses based on suspected release type. See Sections 3 and 5, and Table 3.
2. Where system removal or over-excavation intersects ground water or bedrock, a groundwater sample from a monitoring well (or similar) would need to be collected and analyzed for the applicable parameters from Table 5 as a surrogate for the footprint and/or pit-bottom sample(s).
3. If a Notice of Residucal Petroleum is not desired, then you must cleanup to unrestricted use standards.

Figure 6 - Requirements for Closure (or Change-in-Service) and Initial Release Response and Abatement for REGULATED HAZARDOUS SUBSTANCE UST Systems



Notes:

* On January 1, 2021, a 30-day notice will be required for all closures.

1. Collect samples for all required analyses based on suspected release type. See Table 3.
2. Where system removal or over-excavation intersects ground water or bedrock, a groundwater sample from a monitoring well (or similar) must be collected and analyzed for the applicable parameters from Table 5 as a surrogate for the footprint and/or pit-bottom sample(s).

End of Email #18 with Attachments

Email #19

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 Statute for NRPs
Date:	Thursday, January 14, 2021 2:37:55 PM
Attachments:	statute for NRPs.pdf

Dear Mayor and Town Council,

Below please find NC GS 143B-279.9, the state statute regarding future uses of land that a Notice of Residual Petroleum has been required to be attached to the deed. I have learned that restrictions are site-specific, and these restrictions are on record and may be found at the Guilford County Register of Deeds office for High Point.

Do we want to take this dangerous step in allowing hazardous substances to contaminate this site; a site that is not only an important piece of the gateway into High Point and the path out of High Point, a site adjacent to future open lands, and a site that is in Critical Areas Tier 2 and 3 of Oak Hollow Lake?
Will we allow contamination at this site that will restrict its future uses? It would be a beautiful welcome center and playground. I believe LeeAnn Patterson had some create and visionary uses she expressed.

Have a look at the NCDEQ tool provided to you on January 4th. There are many NRPs throughout High Point, and many around our lakes. None of these, however, pose imminent threat like this site will. Refer to Sam's Mart, Incident number 44644. The USTs were last used 9/15/2015, and clean up still is ongoing.

§ 143B-279.9. Land-use restrictions may be imposed to reduce danger to public health at contaminated sites.

(a) In order to reduce or eliminate the danger to public health or the environment posed by the presence of contamination at a site, an owner, operator, or other responsible party may impose restrictions on the current or future use of the real property comprising any part of the site where the contamination is located if the restrictions meet the requirements of this section. The restrictions must be agreed to by the owner of the real property, included in a remedial action plan for the site that has been approved by the Secretary, and implemented as a part of the remedial action program for the site. The Secretary may approve restrictions included in a remedial action plan in accordance with standards that the Secretary determines to be applicable to the site. Except as provided in subsection (b) of this section, if the remedial action is risk-based or will not require that the site meet unrestricted use standards, the remedial action plan must include an agreement by the owner, operator, or other responsible party to record approved land-use restrictions that meet the requirements of this section as provided in G.S. 143B-279.10 or G.S. 143B-279.11, whichever applies. Restrictions may apply to activities on, over, or under the land, including, but not limited to, use of groundwater, building, filling, grading, excavating, and mining. Any approved restriction shall be enforced by any owner of the land, operator of the facility, or other party responsible for the contaminated site. Any land-use restriction may also be enforced by the Department through the remedies provided by any provision of law that is implemented or enforced by the

Department or by means of a civil action. The Department may enforce any land-use restriction without first having exhausted any available administrative remedies. A land-use restriction may also be enforced by any unit of local government having jurisdiction over any part of the site. A land-use restriction shall not be declared unenforceable due to lack of privity of estate or contract, due to lack of benefit to particular land, or due to lack of any property interest in particular land. Any person who owns or leases a property subject to a land-use restriction under this Part shall abide by the land-use restriction.

(b) The definitions set out in G.S. 143-215.94A apply to this subsection. A remedial action plan for the cleanup of environmental damage resulting from a discharge or release of petroleum from an underground storage tank pursuant to Part 2A of Article 21A of Chapter 143 of the General Statutes, other petroleum sources, or from an aboveground storage tank pursuant to Part 7 of Article 21A of Chapter 143 of the General Statutes must include an agreement by the owner, operator, or other party responsible for the discharge or release of petroleum to record a notice of any applicable land-use restrictions that meet the requirements of this subsection as provided in G.S. 143B-279.11. All of the provisions of this section shall apply except as specifically modified by this subsection and G.S. 143B-279.11. Any restriction on the current or future use of real property pursuant to this subsection shall be enforceable only with respect to: (i) real property on which the source of contamination is located and (ii) any real property on which contamination is located at the time the remedial action plan is approved and that was owned or controlled by any owner or operator of the underground storage tank or other responsible party at the time the discharge or release of petroleum is discovered or reported or at any time thereafter. No restriction on the current or future use of real property shall apply to any portion of any parcel or tract of land on which contamination is not located. This subsection shall not be construed to require any person to record any notice of restriction on the current or future use of real property other than the real property described in this subsection. For purposes of this subsection and G.S. 143B-279.11, the Secretary may restrict current or future use of real property only as set out in any one or more of the following subdivisions:

(1) Where soil contamination will remain in excess of unrestricted use standards, the property may be used for a primary or secondary residence, school, daycare center, nursing home, playground, park, recreation area, or other similar use only with the approval of the Department. G.S. 143B-279.9

(2) Where soil contamination will remain in excess of unrestricted use standards and the property is used for a primary or secondary residence that was constructed before the release of petroleum that resulted in the contamination is discovered or reported, the Secretary may approve alternative restrictions that are sufficient to reduce the risk of exposure to contaminated soils to an acceptable level while allowing the real property to continue to be used for a residence.

(3) Where groundwater contamination will remain in excess of unrestricted use standards, installation or operation of any well usable as a source of water shall be prohibited.

(4) Any restriction on the current or future use of the real property that is agreed upon by both the owner of the real property and the Department.

With respect to sites contaminated by the discharge or release of petroleum from an aboveground storage tank, or another petroleum source, from which contamination has migrated to off-site properties, as that term is defined under G.S. 130A-310.65(3a), the imposition of restrictions on the current or future use of real property on such a site shall only be allowed if the Department has determined that the requirements of G.S. 143-215.104AA or G.S. 130A-310.73A, as applicable, have been satisfied for the site.

(c) This section does not alter any right, duty, obligation, or liability of any owner, operator, or other responsible party under any other provision of law.

(d) As used in this section:

(1) "Unrestricted use standards" means generally applicable standards, guidance, or established methods governing contaminants that are established by statute or adopted, published, or implemented by the Environmental Management Commission, the Commission for Public Health, or the Department. Cleanup or remediation of real property to unrestricted use standards means that the property is restored to a condition such that the property and any use that is made of the property does not pose a danger or risk to public health, the environment, or users of the property that is significantly greater than that posed by use of the property prior to its having been contaminated.

(2) "Risk-based", when used in connection with cleanup, remediation, or similar terms, means cleanup or remediation of contamination of real property to a level that, although not in compliance with unrestricted use standards, does not pose a significant danger or risk to public health, the environment, or users of the real property so long as the property remains in the condition and is used in a manner that is consistent with the assumptions as to the condition and use of the property on which the determination that the level of risk is acceptable is based. (1999-198, s. 1; 2000-51, s. 1; 2001-384, ss. 1, 12; 2002-90, s. 1; 2007-182, s. 2; 2017-209, s. 3(a); 2018-114, s. 18(a).)

Thanks again for your time and consideration,
Vesta Kennedy

Attachment to Email #19

§ 143B-279.9. Land-use restrictions may be imposed to reduce danger to public health at contaminated sites.

(a) In order to reduce or eliminate the danger to public health or the environment posed by the presence of contamination at a site, an owner, operator, or other responsible party may impose restrictions on the current or future use of the real property comprising any part of the site where the contamination is located if the restrictions meet the requirements of this section. The restrictions must be agreed to by the owner of the real property, included in a remedial action plan for the site that has been approved by the Secretary, and implemented as a part of the remedial action program for the site. The Secretary may approve restrictions included in a remedial action plan in accordance with standards that the Secretary determines to be applicable to the site. Except as provided in subsection (b) of this section, if the remedial action is risk-based or will not require that the site meet unrestricted use standards, the remedial action plan must include an agreement by the owner, operator, or other responsible party to record approved land-use restrictions that meet the requirements of this section as provided in G.S. 143B-279.10 or G.S. 143B-279.11, whichever applies. Restrictions may apply to activities on, over, or under the land, including, but not limited to, use of groundwater, building, filling, grading, excavating, and mining. Any approved restriction shall be enforced by any owner of the land, operator of the facility, or other party responsible for the contaminated site. Any land-use restriction may also be enforced by the Department through the remedies provided by any provision of law that is implemented or enforced by the Department or by means of a civil action. The Department may enforce any land-use restriction without first having exhausted any available administrative remedies. A land-use restriction may also be enforced by any unit of local government having jurisdiction over any part of the site. A land-use restriction shall not be declared unenforceable due to lack of privity of estate or contract, due to lack of benefit to particular land, or due to lack of any property interest in particular land. Any person who owns or leases a property subject to a land-use restriction under this Part shall abide by the land-use restriction.

(b) The definitions set out in G.S. 143-215.94A apply to this subsection. A remedial action plan for the cleanup of environmental damage resulting from a discharge or release of petroleum from an underground storage tank pursuant to Part 2A of Article 21A of Chapter 143 of the General Statutes, other petroleum sources, or from an aboveground storage tank pursuant to Part 7 of Article 21A of Chapter 143 of the General Statutes must include an agreement by the owner, operator, or other party responsible for the discharge or release of petroleum to record a notice of any applicable land-use restrictions that meet the requirements of this subsection as provided in G.S. 143B-279.11. All of the provisions of this section shall apply except as specifically modified by this subsection and G.S. 143B-279.11. Any restriction on the current or future use of real property pursuant to this subsection shall be enforceable only with respect to: (i) real property on which the source of contamination is located and (ii) any real property on which contamination is located at the time the remedial action plan is approved and that was owned or controlled by any owner or operator of the underground storage tank or other responsible party at the time the discharge or release of petroleum is discovered or reported or at any time thereafter. No restriction on the current or future use of real property shall apply to any portion of any parcel or tract of land on which contamination is not located. This subsection shall not be construed to require any person to record any notice of restriction on the current or future use of real property other than the real property described in this subsection. For purposes of this subsection and G.S. 143B-279.11, the Secretary may restrict current or future use of real property only as set out in any one or more of the following subdivisions:

(1) Where soil contamination will remain in excess of unrestricted use standards, the property may be used for a primary or secondary residence, school, daycare center, nursing home, playground, park, recreation area, or other similar use only with the approval of the Department.

(2) Where soil contamination will remain in excess of unrestricted use standards and the property is used for a primary or secondary residence that was constructed before the release of petroleum that resulted in the contamination is discovered or reported, the Secretary may approve alternative restrictions that are sufficient to reduce the risk of exposure to contaminated soils to an acceptable level while allowing the real property to continue to be used for a residence.

(3) Where groundwater contamination will remain in excess of unrestricted use standards, installation or operation of any well usable as a source of water shall be prohibited.

(4) Any restriction on the current or future use of the real property that is agreed upon by both the owner of the real property and the Department.

With respect to sites contaminated by the discharge or release of petroleum from an aboveground storage tank, or another petroleum source, from which contamination has migrated to off-site properties, as that term is defined under G.S. 130A-310.65(3a), the imposition of restrictions on the current or future use of real property on such a site shall only be allowed if the Department has determined that the requirements of G.S. 143-215.104AA or G.S. 130A-310.73A, as applicable, have been satisfied for the site.

(c) This section does not alter any right, duty, obligation, or liability of any owner, operator, or other responsible party under any other provision of law.

(d) As used in this section:

(1) "Unrestricted use standards" means generally applicable standards, guidance, or established methods governing contaminants that are established by statute or adopted, published, or implemented by the Environmental Management Commission, the Commission for Public Health, or the Department. Cleanup or remediation of real property to unrestricted use standards means that the property is restored to a condition such that the property and any use that is made of the property does not pose a danger or risk to public health, the environment, or users of the property that is significantly greater than that posed by use of the property prior to its having been contaminated.

(2) "Risk-based", when used in connection with cleanup, remediation, or similar terms, means cleanup or remediation of contamination of real property to a level that, although not in compliance with unrestricted use standards, does not pose a significant danger or risk to public health, the environment, or users of the real property so long as the property remains in the condition and is used in a manner that is consistent with the assumptions as to the condition and use of the property on which the determination that the level of risk is acceptable is based. (1999-198, s. 1; 2000-51, s. 1; 2001-384, ss. 1, 12; 2002-90, s. 1; 2007-182, s. 2; 2017-209, s. 3(a); 2018-114, s. 18(a).)

End of Email #19 and Attachments

Email #20

From: Vesta Kennedy
To: Public Comment
Subject: ZA-20-20; extension of compliance
Date: Thursday, January 14, 2021 2:52:11 PM

Dear Mayor and Town Council,

Below please find short article regarding a very recent extension granted to biofuel companies for compliance. Please refer back to a report I sent on the 2016 EPA's study regarding these emerging biofuels, diesel fuels and the increase in ethanol fuels that are corroding USTs at an alarming rate.

US EPA proposes to extend compliance deadlines for biofuel blending requirements

Thu, January 14, 2021, 9:41 AM

NEW YORK, Jan 14 (Reuters) - The U.S. Environmental Protection Agency has proposed to extend compliance deadlines for biofuel blending laws, after the agency delayed enforcing compliance because of the coronavirus pandemic.

Refiners must hand in credits to EPA each year to prove they complied with their annual blending obligations for the previous year. (Reporting by Stephanie Kelly Editing by Chizu Nomiyama)

This article can be found on yahoo finance

Thanks so much,

Vesta Kennedy

Email #21with Attachment(s)

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 UST program facts; end of year data
Date:	Thursday, January 14, 2021 3:17:59 PM
Attachments:	ust-program-facts.pdf

Dear Mayor and Town Council,

Attached please find an EPA end of year publication regarding USTs nationwide. I thought you may find this brief read interesting and useful. Please note the amount of money spent on clean up, and that NC has still not met the requirements of 2015 federal guidelines. Only 57.7 % of USTs nationally are in complete technical compliance, and that only 50% of NC USTs meet 2015 guidelines.

Thanks,
Vesta Kennedy

Attachment to Email #21

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

November 2020

OFFICE OF
LAND AND EMERGENCY
MANAGEMENT

UST Program Facts

Data About The Underground Storage Tank (UST) Program

- Size of the UST universe (as of September 2020)
  - There are approximately 540,000 active petroleum USTs and 3,400 hazardous substance USTs (at approximately 194,000 facilities) which are regulated by the UST program
  - Since 1984, more than 1.9 million USTs have been properly closed
- Compliance with the UST requirements (as of September 2020)
  - 68.0 percent of UST facilities are in significant operational compliance with both the release prevention and leak detection requirements
  - 57.5 percent of UST facilities in states tracking compliance with the 2015 UST regulation meet the technical compliance rate requirements
- Corrective action at UST sites (as of September 2020)
  - 559,900 releases have been confirmed
  - 497,407 cleanups have been completed
  - 62,493 cleanups have not yet been completed
- Prevention program resources
  - In fiscal year 2020, Congress appropriated approximately $25 million from the Leaking Underground Storage Tank (LUST) Trust Fund and $1.5 million of State and Tribal Assistance Grants (STAG) for states and tribes to prevent UST releases
- Cleanup program resources
  - In fiscal year 2020, Congress appropriated approximately $66 million from the LUST Trust Fund for corrective action activities, $55 million of which is for states to assess and clean up UST releases or otherwise oversee and implement the LUST program
  - Approximately 40 states have UST cleanup funds which pay for most UST cleanups and are separate from the LUST Trust Fund; collectively states raise and spend more than $1 billion annually on LUST cleanups
- State program approval
  - 39 states, plus the District of Columbia and Puerto Rico, have approved state programs; of those, 15 states have approved programs under the 2015 federal UST regulation

Background And History Of The UST Program

- In 1984, Congress responded to the increasing threat to groundwater posed by leaking underground storage tanks by adding Subtitle I to the Solid Waste Disposal Act (SWDA)
  - SWDA required EPA to develop a comprehensive regulatory program for USTs storing petroleum or certain hazardous substances to protect the environment and human health from UST releases
  - Federal UST regulations require preventive measures (such as spill, overfill, and corrosion protection), release detection monitoring, corrective action, and demonstration of financial resources to carry out corrective action
  - EPA's 1988 regulations set minimum standards for new tanks and required owners of existing tanks to upgrade, replace, or close them
- In 1986, Congress amended Subtitle I of SWDA and created the Leaking Underground Storage Tank (LUST) Trust Fund
  - It was established to:
    - Oversee cleanups by responsible parties
    - Enforce cleanups by recalcitrant parties
    - Pay for cleanups at sites where the owner or operator is unknown, unwilling, or unable to respond, or which require emergency action
  - The LUST Trust Fund is financed by a 0.1 cent federal tax on each gallon of motor fuel sold in the country
  - As of September 2020, the balance in the Fund was approximately $909 million
- In August 2005, Congress amended Subtitle I of SWDA and created the Underground Storage Tank Compliance Act of 2005 (in Title XV, Subtitle B of the Energy Policy Act of 2005)
  - This legislation focused on further preventing releases
  - In particular, it expanded eligible uses of the LUST Trust Fund and included provisions regarding operator training, delivery prohibition, secondary containment and financial responsibility, and clean up of releases that contain oxygenated fuel additives
- In July 2015, EPA revised the 1988 federal underground storage tank (UST) regulations by increasing emphasis on properly operating and maintaining UST equipment. The revisions will help prevent and detect UST releases and help ensure all USTs in the United States, including those in Indian country meet the same minimum standards. In addition, EPA added new operation and maintenance requirements
- Because of the large regulated universe of USTs at the inception of the program (over 2 million tanks), EPA designed the UST program to be implemented by states
  - 39 states, plus the District of Columbia and Puerto Rico, have been approved to act in lieu of the federal program and may have more stringent UST requirements; of those, 15 states have approved programs under the 2015 federal UST regulation
    - The remaining states have agreements with EPA to be the primary implementing agency
  - States have reported that UST releases are the most common source of groundwater contamination and that petroleum is the most common contaminant
- For more information about the underground storage tank program, see EPA's website at: www.epa.gov/ust

End of Email #21 with Attachment(s)

Email #22 with Attachment(s)

From: rollovernclover
To: Public Comment
Subject: Za_20_20, End of Year NC UST summary
Date: Thursday, January 14, 2021 4:21:08 PM

Dear Mayor and Town Council.

Attached please find a public record of year end summary of UST releases and HOW THEY OCCURRED.

I have previously sent some year end numbers, but this information of CAUSE is important to consider not only to protect our precious water table, but to give information on what will be going down the storm drains.

On the far left, the source of release is shown, and to the right of that, the cause is shown. Of the 240 releases, 139 of them were from the USTs. Of those 139, you can see that over half ...80...the cause is unknown. Scary. Corrosion and physical damage to tanks account for 35%, spill, overfill and 'other' account for 11 releases this year.
One can easily see the problems with piping, dispensing, submerged pumps, delivery, other, and the unknowns. Important to note that on the far right, that of the total 240 UST releases, 119 of them the actual cause was never determined.
Speaks volumes to the EPA's concerns about emerging fuels and their compatibility with USTs.

Please also see "Additionally, there were 292 confirmed releases from non-regulated USTs, and 253 confirmed releases from non-usts(above ground or in transport maybe?). These numbers triple the total amount of Petroleum based spills and releases into our environment.

Thanks again for your hard work and consideration,
Vesta Kennedy

Sent from my Galaxy

Underground Storage Tanks (USTs) Public Record - Summary Information

General Information

Public Record Posted Date: 12/23/2020

Total Number Of Active UST Facilities: 7,406

Total Number Of USTs: 23,940

Summary Information For On-Site Inspections

Number Of UST Facilities Inspected: 2,370

Inspection Period Dates: 10/1/2019 To: 10/1/2020

Percent Compliance (Combined Measure): 50%

Note: *Number of whole tanks = 21,618; **Compliance rate reflects implementation of new federal regulations on 10/13/2018;

Summary Information For Releases

Number Of Confirmed UST Releases: 240

Release Reporting Period Dates 10/1/2019 To: 10/1/2020

Summary Information For Release Sources And Causes

Source			Cause													
			Spill		Overfill		Corrosion		Phys/Mech Damage		Install Problem		Other		Unknown	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Tank	139	58%	2	1%	2	1%	26	19%	22	16%	0	0%	7	5%	80	58%
Piping	29	12%	0	0%	0	0%	3	10%	16	55%	0	0%	0	0%	10	34%
Dispenser	25	10%	0	0%	1	4%	5	20%	8	32%	0	0%	3	12%	8	32%
STP**	5	2%	0	0%	0	0%	1	20%	3	60%	0	0%	0	0%	1	20%
Delivery Problem	1	0%	0	0%	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%
Other	15	6%	2	13%	0	0%	0	0%	6	40%	0	0%	2	13%	5	33%
Unknown	26	11%	0	0%	0	0%	0	0%	11	42%	0	0%	0	0%	15	58%
Totals	240	100%	4	3%	3	3%	35	13%	66	33%	0	0%	12	4%	119	44%

Note: Release, source and cause information is based on data from regulated tanks. Source and cause data were collected primarily using forms and reports submitted by Responsible Parties or their agents.

*Additionally, there were 292 confirmed releases from non-regulated USTs, primarily heating oil tanks. There are also 253 confirmed releases from non-usts during the reporting period.

**STP - Submersible Turbine Pump

To obtain site-specific information on UST releases contact the Regional DENR Office for the county in which the release occurred. To obtain UST compliance information contact the UST Section Central Office.

End of Email #22 with Attachment(s)

CITY OF HIGH POINT
AGENDA ITEM

Title: **Ordinance to Demolish – 216 Underhill St.**

From: Michael E. McNair, Director
Community Development & Housing

Meeting Date: 1/19/2021

Public Hearing: No

Advertising Date:

Advertised By:

Attachments:
A. Staff report
B. Ordinance to Demolish
C. Photos
D. Maps

PURPOSE:
A request by Community Development and Housing – Local Codes Section to adopt an ordinance ordering the inspector to demolish the dwelling at 216 Underhill Street.

BACKGROUND:
After a Complaint and Notice of Hearing was issued and a hearing held, an Order to Repair or Demolish was issued on 1/23/2020. No action occurred by the compliance date of 2/27/2020. The necessary repairs to the dwelling exceed itscurrent tax value and the demolition is warranted.

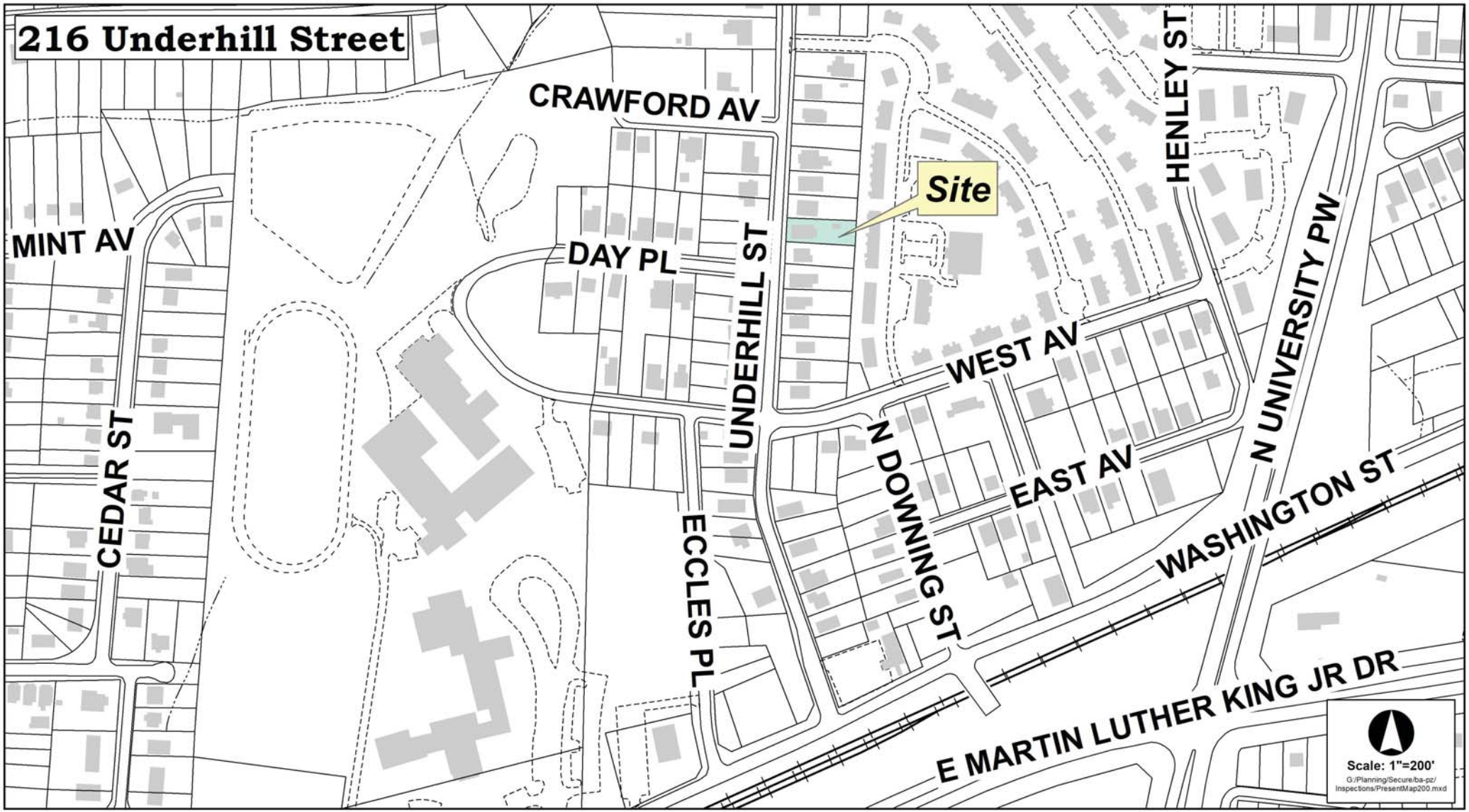
BUDGET IMPACT:
Funds are available in the Department budget for the demolition and asbestos testing of the structure(s), and for the asbestos removal if present.

RECOMMENDATION / ACTION REQUESTED:
Staff recommends the adoption of the requested ordinance to demolish this single family dwelling and all outbuildings on the property.

PENDING ACTION:
The ordinance becomes effective from the date of adoption. If there is no action by the property owner by the effective date of the ordinance, then asbestos testing and the demolition bid process will begin and the structure will be removed by the City. After City demolition, the property owner is billed for the cost. If the bill is unpaid, the City places a lien on the property.

COMMUNITY DEVELOPMENT AND HOUSING
CODE ENFORCEMENT
HOUSING ENFORCEMENT DIVISION

ORDINANCE REQUEST:	Ordinance to Demolish
PROPERTY ADDRESS:	216 Underhill St.
OWNER:	Heirs of Carol A. Kirby
REASON FOR INSPECTION:	Condition of property observed by Local Codes Inspector
FIRST INSPECTION: 3/15/2019	Summary of Major Violations 1. Repair or replace rotten roof sheathing and covering 2. Repair or replace floor joists, girders and outside bands that are damaged 3. Repair or replace water/termite damaged framing 4. Repair or replace damaged/missing ceiling material throughout 5. Repair or install all required plumbing fixtures
HEARING RESULTS: 1/21/2020	No one appeared for the Hearing. It was determined there are several violations of the Minimum Housing Code. There are multiple violations of the minimum housing code in the house that make it unsafe. In its present state, necessary repairs to the dwelling exceed 65% of the value of the structure.
ORDER(S) ISSUED: 1/23/2020	Order to Repair or Demolish Date of Compliance 2/27/2020
APPEALS:	None
OWNER ACTIONS:	None
ADDITIONAL:	Guilford County property taxes are delinquent in the amount of $12,249.46 for 2007 through 2020.


216 Underhill Street
CRAWFORD AV
Site
HENLEY ST
MINT AV
DAY PL
UNDERHILL ST
N UNIVERSITY PW
WEST AV
CEDAR ST
N DOWNING ST
EAST AV
WASHINGTON ST
ECCLES PL
E MARTIN LUTHER KING JR DR
Scale: 1"=200'
G:/Planning/Secure/ba-pz/Inspections/PresentMap200.mxd









Lisa Vierling

From:	Herbert Shannon Jr
Sent:	Tuesday, January 19, 2021 12:59 PM
To:	Lisa Vierling
Cc:	JoAnne Carlyle
Subject:	ZA-20-20 Crossfit Rezoning

From: Judy Stalder <jstalder@northstate.net>
Sent: Tuesday, January 19, 2021 12:32 PM
To: Herbert Shannon Jr <herb.shannon@highpointnc.gov>
Cc: 'Chris Dunbar' <cdunbar@blueridgecompanies.com>; 'Jim Grdich' <jgrdich@blueridgecompanies.com>; Tom Flanagan <tflanagan@blueridgecompanies.com>; stevew@cptengineering.com
Subject: Crossfit Rezoning

Herb,

BRC Spirit, the applicant for rezoning of property at 1801-1809 Eastchester Drive, requests a continuance of the public hearing by City Council until February 15. We understand that any changes in our request must be submitted to the Planning Department by February 2.

I will be at the public hearing to make the request.

Thank you,
Judy

Judy Stalder
THE STALDER GROUP LLC
PO BOX 5581 HIGH POINT NC 27262 336.688.2204

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

City of High Point
Municipal Office Building
211 South Hamilton Street
High Point, NC 27261

Certification

I, Lisa B. Vierling, City Clerk of the City of High Point, North Carolina, do hereby certify that the foregoing is a true and accurate Ordinance adopted by the City Council in official Session on January 19, 2021 and upon approval by City Council will be recorded in Book 96 of the Official Minute Books and Ordinance Book Volume XXII, Ordinance No. 7684/21-1, page 1, Legislative File No. 2021-19 of this City, under my care, custody and control. As of this date, action to adopt said Ordinance has not been amended, rescinded or repealed and is in full force and effect.

WITNESS my hand and the Corporate Seal of the City of High Point, the 20th day of January 2021.

Lisa B. Vierling, City Clerk

City of High Point North Carolina

ACKNOWLEDGEMENT

I, Mary S. Brooks, a Notary Public of said County and State, do hereby certify that Lisa B. Vierling, is known to me as City Clerk of the City of High Point; that this person personally appeared before me this date; and, upon authority duly given and as an act of said City, issued and executed the foregoing Certification.

WITNESS my hand and official Notarial Seal, this 20th day of January 2021.

Mary S. Brooks, Notary Public

MARY S BROOKS
NOTARY PUBLIC
GUILFORD COUNTY, NC
My Commission Expires 7-26-2023

Commission Expires: 7/26/2023

ORDINANCE

AN ORDINANCE REQUIRING THE BUILDING INSPECTOR OF THE CITY OF HIGH POINT TO DEMOLISH CERTAIN PROPERTY PURSUANT TO ARTICLE 19 OF THE GENERAL STATUTES OF NORTH CAROLINA; AND, TITLE 9, CHAPTER 11, ARTICLE E, OF THE MINIMUM HOUSING CODE OF THE CITY OF HIGH POINT.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HIGH POINT:

SECTION 1: That the City Council of the City of High Point finds as a fact that the following described property has been ordered to be demolished, and it further finds as a fact that the owner has been ordered to demolish said building at his expense and said Owner has failed to comply with said order.

SECTION 2: That the Inspector of the City of High Point is hereby authorized and directed to proceed with the demolition of the following described building in accordance with code of Ordinances: and, Article 19 of Chapter 160A of the General Statutes of North Carolina.

PROPERTY LOCATION	OWNER (S)
216 Underhill St.	Heirs of Carol A. Kirby P O Box 2514 Stone Mountain, GA 30086

SECTION 3: That all ordinances or parts of ordinances in conflict with the provisions of this ordinance, are hereby repealed.

SECTION 4: That this ordinance shall become effective from and after its passage as by Law provided.

Adopted by City Council,
This the19th day of January, 2021

Lisa B. Vierling, City Clerk

AN ORDINANCE AMENDING ARTICLE II, MAYOR AND COUNCIL; SECTION 2.2 COUNCIL; NUMBER; TERMS OF OFFICE AND SECTION 2.3 MAYOR; TERM OF OFFICE; DUTIES; OF THE CHARTER OF THE CITY OF HIGH POINT TO IMPLEMENT FOUR-YEAR TERMS FOR THE MAYOR AND MEMBERS OF THE CITY COUNCIL

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of High Point that Article II, Section 2.2 Council; number; terms of office and Section 2.3 Mayor; term of office; duties of the Charter of the City of High Point is amended as follows:

Sec. 2.2. – Council, number; terms of office.

The council shall be composed of eight (8) members, each of whom shall be elected by the qualified voters of the city to serve for a term of ~~two~~ four (~~2~~4) years in the manner provided by Article III of this charter and the North Carolina General Statutes.

Sec. 2.3 – Mayor; term of office; duties.

(a) The mayor shall be elected by the qualified voters of the city to serve for a term of ~~two~~ four (~~2~~4) years, in the manner provided by Article III of this charter.

(b) The mayor shall preside at meetings of the council and shall have the power to vote on all questions before the council. The mayor shall be the official head and spokesman of the city in acts of ceremony and shall represent the city in matters of governmental affairs.

Adopted by the High Point City Council
this the 1st day of February, 2021.

Jay W. Wagner, Mayor

ATTEST:

Lisa B. Vierling, City Clerk

AN ORDINANCE AMENDING "THE CITY OF HIGH POINT, NORTH CAROLINA DEVELOPMENT ORDINANCE," PURSUANT TO SECTION 2.4.20, ZONING MAP AMENDMENT, OF THE DEVELOPMENT ORDINANCE.

WHEREAS, the City Council of the City of High Point adopted "The City of High Point Development Ordinance" on May 16, 2016 with an effective date of January 1, 2017, and subsequently amended;

WHEREAS, public hearings were held before the Planning and Zoning Commission of the City of High Point on December 8, 2020 and before the City Council of the City of High Point on January 19, 2021 regarding **Zoning Map Amendment Case ZA-20-23 (ZA-20-23)** a proposed amendment to the Official Zoning Map of the "City of High Point Development Ordinance";

WHEREAS, notice of the public hearings were published in the High Point Enterprise on November 29, 2020, for the Planning and Zoning Commission public hearing and on January 6, 2021 and January 13, 2021, for the City Council public hearing pursuant to Chapter 160A-364 of the General Statutes of North Carolina; and

WHEREAS, the proposed amendment was adopted by the City Council of the City of High Point on **January 21, 2021**.

THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HIGH POINT:

SECTION 1

608 James Road and a portion of 610 James Road

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Single Family – 3 (R-3) District**. Approximately 3.5 acres located along the east side of James Road, approximately 250 feet south of Oakview Road. The site is known as Guilford County Tax Parcels 199970 (608 James Road) and a portion of 199982 (southern 45± feet, 608 James Road).

SECTION 2

Chatham Woods Apartment complex

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the Chatham Woods Apartment complex, approximately 19.99 acres, is located at the southwest corner of Lakecrest Avenue and Johnson Street and known as Guilford County Tax Parcel 199972. The property is more specifically described as follows:

Beginning at a ½-inch pipe in the northern margin of Lakecrest Avenue, said point also being the southeast comer of Lot 117 in the Lake Ridge section 1 as recorded in Plat Book 56 Page 104, Guilford County registry, and running thence with the northern right-of-way of Lakecrest Avenue six (6) calls as follows: 1.) with a circular curve to the left having a radius of 652.37' and an arc length of 141.03' (chord bearing N. 73-42-28 E. 140.76') to a ¾-inch pipe 2.) N. 67-30- 50

E. 167.25' to a 1/2 -inch pipe 3.) with a circular curve to the right having a radius of 1,102.14' and□ arc length of 247.91' (chord bearing N. 73-50-40 E. 247.39') to a ½-inch pipe 4.) N. 81-53-08 E. 58.01' to a ½-inch pipe 5.) N. 83-14-01 E. 85.15' to a ½-inch pipe 6.) N. 38-14-53 E. 28.40' to a ½-inch pipe located on the western right-of-way of Johnson Street; thence along Johnson Street two (2) calls as follows: 1.) S. 06-37-41 E. 385.80' to a ¾-inch pipe 2.) with a circular curve to the right having a radius of 2,856.42, and an arc length of 1,045.90' (chord bearing S. 03-54-38 W. 1,040.07') to a%" pipe; thence leaving said right-of-way with the common line of City of High Point (recorded in Deed Book 1750 Page 137) two (2) calls as follows: 1.) S. 87-53-11 W. 30.02' to a ¾-inch pipe 2.) S. 68-08-00 W. 114.09' to a 1" pipe; thence with the common line of Foxcroft Townhomes two (2) calls as follows 1.) N. 69-50-18 W. 359.11' to a ½-inch pipe 2.) N. 14-40-42 W. 686.45' to an iron pin; thence with the common line of Lake Ridge Subdivision (recorded in Plat Book 56 Page 104) lots 112-116 two (2) calls as follows: 1.) N. 24-24-30 W. 22.17' to a.3/4-inch pipe in concrete 2.) N. 00-33-30 W. 443.66' to the point and place of beginning containing. 19.990 acres more or less according to a survey by Don Allen & Associates, PA dated January 14111, 2019, last revised February 4, 2019.

SECTION 3

Foxcroft Townhome Development

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the Foxcroft townhome development, approximately 15.07 acres, is located at the southern terminus of Rockingham Road and at the eastern terminus of James Court. A description of this development is recorded in PB 77 - PG 80; PB82 – PG 2; and in PB 82 – PG 69 of the Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcels 205053, 205054, 205055, 205056, 205057, 205058, 205059, 205060, 205061, 205062, 205063, 205064, 205065, 205066, 205067, 205068, 205069, 205070, 205071, 205072, 205073, 205074, 205075, 205076, 205077, 205078, 205079, 205080, 205081, 205082, 205083, 205084, 205085, 205086, 205087, 205088, 205089, 205090, 205091, 205092, 205093, 205094, 205095, 205096, 205097, 205098, 205099, 205100, 205101, 205102, 205103, 205104, 205105, 205106, 205107, 205108, 205109, 205110, 205111, 205112, 205113, 205114, 205115, 205116, 205117, 205118, 205119, 205120, 205121, 205122, 205124, 205904, 205905, 205906, 205907, 205908, 205909, 205910, 205911, 205912, 205913, 205914, 205915, 205916, 205917, 205918, 205919, 205920, 205921, 205922, 205923, 205924.

SECTION 4

Windchase Townhome Development

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the Windchase townhome development, approximately 18.23 acres, is located north of the intersection of E. Hartley Drive and Windchase Court. A description of this development is recorded in PB 98 - PG 47; PB 96 – PG 107; PB 94 – PG 3; PB 92 - PG 13; PB88 – PG 1; and in PB 85 – PG 109 of the Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcels 206252, 206253, 206254, 206255, 206256, 206257, 206258, 206259, 206260, 206261, 206262, 206263, 206264, 206265, 206266, 206267, 206268, 206269, 206270, 206271, 206272, 206273, 206274, 206275, 206276, 206277, 206278, 206279, 206280,

206281, 206282, 206283, 206284, 206285, 206286, 206287, 206288, 206289, 206290, 206291, 206292, 206293, 206294, 206295, 206296, 206297, 206298, 206299, 206300, 206301, 206302, 206303, 206304, 206305, 206306, 206307, 206309, 206310, 206311, 206312, 206313, 206314, 206315, 206316, 206317, 206318, 206319, 206320, 206321, 206322, 206323, 206324, 206325, 206326, 206327, 206328, 206329, 206330, 206331, 206332, 206333, 206334, 206335, 206336, 206337, 206338, 206339, 206340, 206341, 206342, 206343, 206344, 206345, 206346, 206347, 206348, 206349, 206350, 206351, 206352, 206353, 206354, 206355, 206356, 206357, 206358, 206359, 206360, 206361, 206362, 206363, 206364, 206365, 206366, 206367, 206368, 206369, 206370, 206371, 206372, 206373, 206374, 206375.

SECTION 5

North Bridge Townhome Development

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. The land area of the North Bridge townhome development, approximately 16.25 acres, is located south of the intersection of E. Hartley Drive and Snider Street. A description of this development is recorded in PB 55 - PG 106; PB 145 – PG 82; PB 140 – PG 130; PB 139 - PG 131; PB 166 – PG 49; and in PB 157 – PG 107 of the Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcels 199994, 199995, 199996, 199997, 199998, 199999, 200000, 200001, 200002, 200003, 200004, 200005, 200006, 200007, 200008, 200009, 200010, 200011, 200012, 200013, 200014, 200015, 200016, 200017, 200018, 200019, 200020, 200021, 200022, 200023, 200024, 200025, 200026, 200027, 200028, 200029, 200030, 200031, 200032, 200033, 200034, 200035, 200036, 200037, 200038, 200039, 200040, 200041, 200042, 200043, 200044, 200045, 200046, 200047, 200048, 200049, 200050, 200051, 200052, 200053, 200054, 200055, 200056, 200057.

SECTION 6

2103 Johnson Street and 1875 Eastchester Drive (portion)

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. These parcels, approximately 1.9 acres, are located at the northwest corner of Johnson Street and E. Hartley Drive, and also known as Guilford County Register of Deeds Office. The development is also known as Guilford County Tax Parcel 206376, and that portion of Guilford County Tax Parcel 200173 lying west of Johnson Street.

SECTION 7

1221 E. Hartley Drive and 2097 & 2051 Johnson Street

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. These parcels, approximately 11.25 acres, are located at the southwest corner of E. Hartley Drive and Johnson Street. These parcels are also known Guilford County Tax Parcels 199989 and 206308 (1221 E. Hartley Drive and 2097 Johnson Street) which are both depicted on PB 113 PG 139 of the Guilford County Register of Deeds Office, and Guilford County Tax Parcel 218799 (2051 Johnson Street).

SECTION 8

Land dedicated for E. Hartley Drive extension

That the Official Zoning Map of the City of High Point be amended to establish the following described area as: **Residential Multifamily – 16 (RM-16) District**. Approximately 1.81 acres, dedicated for the E. Hartley Drive right-of-way, lying west of the intersection of Johnson Street and E. Hartley Drive intersection.

SECTION 9

Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 10

That all ordinances or parts of ordinances in conflict with the provisions of this ordinance are hereby repealed.

SECTION 11.

This ordinance shall become effective upon the date of adoption.

Adopted by the City Council
City of High Point, North Carolina
The **21st** day of **January, 2021**

By: _____
Jay W. Wagner, Mayor

ATTEST:

_____
Lisa B. Vierling, City Clerk

CITY OF HIGH POINT
AGENDA ITEM

Title: Appointments/Reappointments- Human Relations Commission

From: City Clerk's Office

Meeting Date: January 19, 2021

Public Hearing: N/A

Advertising Date / Advertised By: N/A

Attachments: Applications/Resumes

PURPOSE:
To make the necessary appointments/reappointments to the Human Relations Commission for terms that have expired.

BACKGROUND:
The following terms have expired on the Human Relations Commission:

Dev Bhandari **(Ward 4 appointee)**
Stacy Jones **(Ward 6 appointee)**
VACANT **(Moore's At Large appointee)**

Council Member Hudson is recommending the reappointment of **Dev Bhandari** to the Human Relations Commission as his Ward 4 appointee; appointment to be effective immediately and will expire 11/1/2022.

Council Member Holmes is recommending the reappointment of **Stacy Jones** to the Human Relations Commission as his Ward 6 appointee; appointment to be effective immediately and will expire 11/1/2022.

Mayor Pro Tem Moore is recommending the appointment of **Sharon McGregor** to the Human Relations Commission as his At Large appointee; appointment to be effective immediately and will expire 11/1/2022.

BUDGET IMPACT:
N/A

RECOMMENDATION / ACTION REQUESTED:
Council is requested to confirm the preceding appointments/reappointments to the Human Relations Commission.

Profile

Sharon
First Name

McGregor
Last Name

ladyref0410@yahoo.com
Email Address

805 Paramount Street
Street Address

Suite or Apt

High Point
City

NC
State

27260
Postal Code

Mobile: (336) 307-9651
Primary Phone

Alternate Phone

currently unemployed
Employer

Which Boards would you like to apply for?

Human Relations Commission: Submitted

Ward you reside in?

2

Interests & Experiences

Please list any work, volunteer, and/or educational experience that you would like us to consider in the review of your application.

2010-2014 High Point Midnight Basketball program Williams Memorial Church Feed 10,000 program Organized Summer Snack Campaign for Ward Street Boys and Girls Club with the employees of Mannington Wood and Laminate Floors Organized a Winter Scarf and Hat Campaign for Ward Street Boys and Girls Club with the employees of Mannington Wood and Laminate Floors

resume.docx
Upload a Resume

Have you participated in Leadership High Point?

○ Yes ◉ No

If yes, please list the year in which you participated in Leadership High Point:

Gender

☑ Female

SHARON MCGREGOR

336.307.9651 - Ladyref0410@yahoo.com - Linkedin.com/in/Sharon-McGregor

To become a part of a team with challenging leadership position applying creative problem solving as well as lean management skills with a stable and growing company to achieve optimum level of successes for all involved.

EXPERIENCE

AUGUST 14, 1989 – APRIL 24, 2020

SENIOR QUALITY AUDITOR, MANNINGTON WOOD AND LAMINATE FLOORS

- Audit and inspect all processes in manufacturing
- Responsible for writing Standard Operating Procedures
- Responsible for training associates on quality specifications

DISTRIBUTOR ACCOUNT REPRESENTATIVE/CUSTOMER SERVICE REPRESENTATIVE

- Responsible for creating and maintaining orders and shipments for distributors in the Northeast regions
- Worked directly with customers to resolve billing and credit issues
- Arranged logistics for shipments
- Provided information about products, warranty and availability

CLAIMS AND TECHNICAL SERVICES REPRESENTATIVE

- Review claim submissions from Distributors and determined whether it was under the warranty
- Processed credits for claims
- Communicated directly Distributors, Retailers and Customers regarding claims status and to gather additional information
- Communicated in writing via letter or emails with customers and District Managers
- Worked independently and resolved customer complaints

PRODUCTION SUPERVISOR

- Managed day to day operations including: purchasing raw materials
- Maintained and processed payroll, and vacation time through SAP
- New product development project with Research and Development group
- Scheduled manufacturing production based on sales requirements

SAFETY TRAINING COORDINATOR & ASSOCIATE ENGAGEMENT ACTIVITY COORDINATOR

- Responsible for associates monthly safety training
- Safety Committee Chairperson for the Wood and Laminate plants
- Created Associate Engagement Activities
- Worked with North Carolina Department of Labor with recertification of employer in Sharp Safety Program (Mannington is 1 of 160 companies in North Carolina to hold the Sharp Safety Awards for Gold and Silver of both plants in High Point)
- Maintained recordkeeping database for safety audits and Associate Engagement activities
- Facilitated training for the Code Blue Teams with Guilford Technical Community College
- Developed Layered Process Audits for the Safety Committee
- Worked directly Human Resources in coordinating associate events

IMPORT AND DOMESTIC RETURNS COORDINATOR

- Processed credit for returned material
- Communicated with Distributor via email regarding accounts
- Filed Non-Conformance Reports with vendors and worked with the Financial Controller to ensure credits were applied to correct accounts
- Dispositioned all incoming returns
- Worked independently and assumed responsibility for all final decisions
- Maintained returns database to ensure accurate credits

EDUCATION

GRADUATED JUNE 1985

NEW BERN SENIOR HIGH SCHOOL

GRADUATED - MAY 2017

ASSOCIATES IN APPLIED SCIENCE BUSINESS ADMINISTRATION AND CERTIFICATION IN HUMAN RESOURCE MANAGEMENT, GUILFORD TECHNICAL COMMUNITY COLLEGE

- Honors Student
- Who's who among Students at Colleges and Universities2017 edition

2018 – CURRENT STUDENT – PROJECTED GRADUATION DATE DECEMBER 2021

BACHELORS OF SCIENCE, BUSINESS ADMINISTRATION MANAGEMENT

SHAW UNIVERSITY

- Current GPA 3.8
- Member of Alpha Chi National College Honor Society

SKILLS

- Excellent skills in Excel, Word & PowerPoint
- Proficient in SAP
- Maintained and updated Emergency Action Plans for both High Point plant facilities
- Trained and implemented lean manufacturing business principle
- Excellent in executing Project Management
- Versatile working with local and corporate management
- Strong Interpersonal skills
- First Aid and CPR certified
- Trained multi-cultural associates

ACTIVITIES

- 2010-2014 Served on the board of The Midnight Basketball Program -High Point Parks & Recreation
- Spearheaded Summer Snacks Campaign for the Salvation Army Boys & Girls Club-High Point-Ward Street Branch
- Spearheaded Back to School Supplies and Winter Hat and Gloves Campaign for the Salvation Army Boys & Girls Club-High Point- Ward Street Branch
- Mannington Mills Corporate Award Recipient of the John B. Campbell Award
- Organized Associate Health Fairs
- Active participant in United Way of Greater High Point
- Organized charity basketball fundraiser for Juvenile Diabetes with Mannington Salaried and Hourly Associates
- Mentor for Higher Learning Institute Program at Williams Memorial CME Church for middle and high school students
- Safety Committee Chairperson for both manufacturing sites in High Point
- Facilitated all Employee Engagement Activities
- Spearheaded Active Shooter Training for Mannington employees with High Point Police Department

HIGH POINT CITY COUNCIL
RECESSED MEETING
(Virtual Meeting)
DECEMBER 23, 2020 – 5:30 P.M.
COUNCIL CHAMBERS

MINUTES

Note: In order to maintain the health, safety, and well-being of our residents, staff, and the City Council, this meeting was conducted electronically. As part of the City of High Point's COVID-19 mitigation efforts, in-person public attendance was not permitted. Instead, the meeting was live-streamed, and the public was provided a link to listen to the meeting as it was being live-streamed. www.HighPointNC.gov/VirtualPublicMeeting

CALL TO ORDER and ROLL CALL

Mayor Wagner called the meeting to order at 5:30 p.m.

Following a virtual roll call vote by Mayor Wagner for attendance, the following council members were present:

Mayor Jay W. Wagner (physically present)
Mayor Pro Tem Moore (physically present)
Council Member Tyrone E. Johnson- At Large (remote participation)
Council Member Williams- Ward 2 (remote participation)
Council Member Cyril Jefferson- Ward 1 (remote participation [joined at 5:32 p.m.])
Council Member Monica L. Peters- Ward 3 (remote participation)
Council Member S. Wesley Hudson- Ward 4 (remote participation)
Council Member Victor Jones- Ward 5 (remote participation)
Council Member Michael A. Holmes- Ward 6 (physically present)

The following staff members were physically present:

Randy McCaslin, Interim City Manager; Greg Ferguson, Assistant City Manager; Eric Olmedo, Assistant City Manager; Herb Shannon, Senior Planner-Planning and Development Department; Jeron Hollis, Director of Communications & Public Engagement; Mary Brooks, Deputy City Clerk; and Lisa Vierling, City Clerk

The following staff members participated remotely:

JoAnne Carlyle, City Attorney Loren Hill, President-High Point Economic Development Corporation; Meghan Maguire, Assistant City Attorney; Sandy Dunbeck, Executive Vice President-High Point Economic Development Corporation; Bobby Fitzjohn, Financial Services Director; Marshall Yandle, Vice President- Economic Development Corporation

DRAFT

Others participating remotely:

Matthew Hill, Hot Shots Distributing Inc.; Judy Stalder, TREBIC; Jim Grdich, Blue Ridge Companies; Scott Wallace, Keystone Group; David Michaels, Windsor Investments; and Marlene Sanford, TREBIC

FINANCE COMMITTEE- *Mayor Pro Tem Moore, Chair*
Committee Members: Chairman Moore, Committee Members: Holmes, Jones, and Peters

2020-514 **Public Hearing: Hot Shots Distributing, Inc. - Performance Based Incentives**

Monday, December 21, 2020 at 5:30 p.m. is the date and time established to receive public comments regarding a request for City Council to approve performance-based incentives up to the amount of $31,758.00 for Hot Shots Distributing, Inc. and authorize the City Manager to execute a performance agreement with Hot Shots Distributing, Inc. containing benchmarks for the company to achieve and a schedule for the payment of incentives.

The public hearing for this matter was held on Monday, December 21, 2020 @ 5:30 p.m.

Due to recently adopted legislation regarding remote meetings, the public hearing remained open to allow for the required 24-hour period to receive any additional comments prior to any action being taken by the City Council this matter. Mayor Wagner asked the City Clerk if any additional comments were received. The City Clerk reported there were no additional comments received. The public hearing was closed.

Approved performance-based incentives up to the amount of $31,758.00 for Hot Shots Distributing, Inc. and authorize the City Manager to execute a performance agreement with Hot Shots Distributing, Inc. containing benchmarks for the company to achieve and a schedule for the payment of incentives.

A motion was made by Mayor Wagner, seconded by Mayor Pro Tem Moore, that this matter be approved. Following a roll call vote by the Mayor, the motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner, Mayor Pro Tem Moore, Council Member Johnson, Council Member Jefferson, Council Member Williams, Council Member Peters, Council Member Hudson, Council Member Jones, and Council Member Holmes

2020-528 **Resolution- Proposed System Development Fee**

The required public hearing for this matter was held on Monday, December 21, 2020 at 5:30 p.m.

Note: for specific comments made at the public hearing regarding the proposed System Development Fee, please refer to **2020-519 Public Hearing: Proposed System Development Fee.**

Council is requested to adopt the Resolution Authorizing the High Point City Council to Establish and Adopt System Development Fees Assessed by the Water and Sewer Funds According to the Provisions of GS 162A, "North Carolina Water and Sewer Authorities Act," and that the System Development Fees become effective October 1, 2021.

The public hearing for this matter was held on Monday, December 21, 2020 @ 5:30 p.m; *however, due to recently adopted legislation regarding remote meetings, the public hearing remained open to allow for the required 24-hour period to receive any additional comments prior to any action being taken by the City Council on this matter.*

Mayor Pro Tem Moore noted that council did received comments; and were aware of citizens' concerns.

A motion was made by Mayor Pro Tem Moore, seconded by Council Member Jefferson, that this matter be referred to the Finance Committee for additional study and further discussion. Following a roll call vote by Mayor Wagner, the motion carried by the following 9-0 unanimous vote:

Aye (9): Mayor Wagner, Mayor Pro Tem Moore, Council Member Jefferson, Council Member Johnson, Council Member Williams, Council Member Peters, Council Member Hudson, Council Member Jones, and Council Member Holmes

MAYOR AND COUNCIL COMMENTS

Mayor Pro Tem Moore wished everyone a Merry Christmas; and hope for a more normalized new year in 2021.

ADJOURNMENT

The meeting adjourned at 5:37 p.m. upon motion by Mayor Pro Tem Moore and second by Council Member Johnson.

Respectfully Submitted,

_____
Jay W. Wagner, Mayor

Attest:

_____
Mary S. Brooks, Deputy City Clerk

DRAFT

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Sharon McGregor
805 Paramount Street
High Point, NC 27260

RE: Appointment- Human Relations Commission

Dear Sharon McGregor:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Human Relations Commission. Your appointment will be effective immediately and will expire on November 1, 2022.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

Mary S. Brooks, Deputy City Clerk

City of High Point, P.O. 230, 211 South Hamilton Street, High Point, NC 27261 USA
Phone: 336.883.3690 mary.brooks@highpointnc.gov

HIGH POINT CITY COUNCIL
SPECIAL MEETING
DECEMBER 21, 2020 – 4:30 P.M.
COUNCIL CHAMBERS

MINUTES

Note: In order to maintain the health, safety, and well-being of our residents, staff, and the City Council, this meeting was conducted electronically. As part of the City of High Point's COVID-19 mitigation efforts, in-person public attendance was not allowed at this meeting. Instead, the open session portion of the meeting was live-streamed and the public was provided a link to listen to the open session portion of the meeting as it was being live-streamed.
www.HighPointNC.gov/VirtualPublicMeeting

CALL TO ORDER

Mayor Wagner called the Special Meeting to order at 4:33 p.m.

Following a roll call vote by Mayor Wagner for attendance, the following council members were identified as being present:

Mayor Jay W. Wagner (physically present)
Mayor Pro Tem Britt Moore-At Large (physically present)
Council Member Tyrone Johnson- At Large (physically present)
Council Member Cyril Jefferson- Ward 1 (remote participation)
Council Member Christopher Williams- Ward 2 (remote participation)
Council Member Monica Peters- Ward 3 (physically present)
Council Member Wesley Hudson- Ward 4 (physically present)
Council Member Victor Jones- Ward 5 (remote participation)

Absent:

Council Member Michael Holmes- Ward 6

The following staff members were physically present:

Randy McCaslin, Interim City Manager; Eric Olmedo, Assistant City Manager; Greg Ferguson, Assistant City Manager; JoAnne Carlyle, City Attorney; Meghan Maguire, Assistant City Attorney; Jeron Hollis, Director of Communications & Public Engagement; Mary Brooks, Deputy City Clerk; and Lisa Vierling, City Clerk

DRAFT

PRESENTATION OF ITEMS

2020-529 **Closed Session- Attorney Client Privilege**

Council is requested to go into Closed Session pursuant to N.C. General Statute 143-318.11(a)(3) for the purpose of preserving the attorney-client privilege.

A motion was made by Mayor Pro Tem Moore, seconded by Council Member Hudson, to go into Closed Session pursuant to N.C. General Statute 143-318.11(a)(3) for attorney-client privilege. Following a roll call vote by the Mayor, the motion to go into Closed Session carried by the following unanimous 8-0 vote.

Aye (8): Mayor Wagner, Mayor Pro Tem Moore, Council Member Johnson, Council Member Williams, Council Member Jefferson, Council Member Peters, Council Member Hudson, and Council Member Jones

Absent (1): Council Member Holmes

Upon reconvening into Open Session at 4:56 p.m., Mayor Wagner announced there would be no action taken at this time as a result of the Closed Session.

ADJOURNMENT

There being nothing further to discuss, no objections were voiced to adjourn the meeting at 4:57 p.m.

Respectfully Submitted,

_____

Jay W. Wagner, Mayor

Attest:

_____

Mary S. Brooks, Deputy City Clerk

DRAFT

Vesta Kennedy Emails #32 - #36)

Lisa Vierling

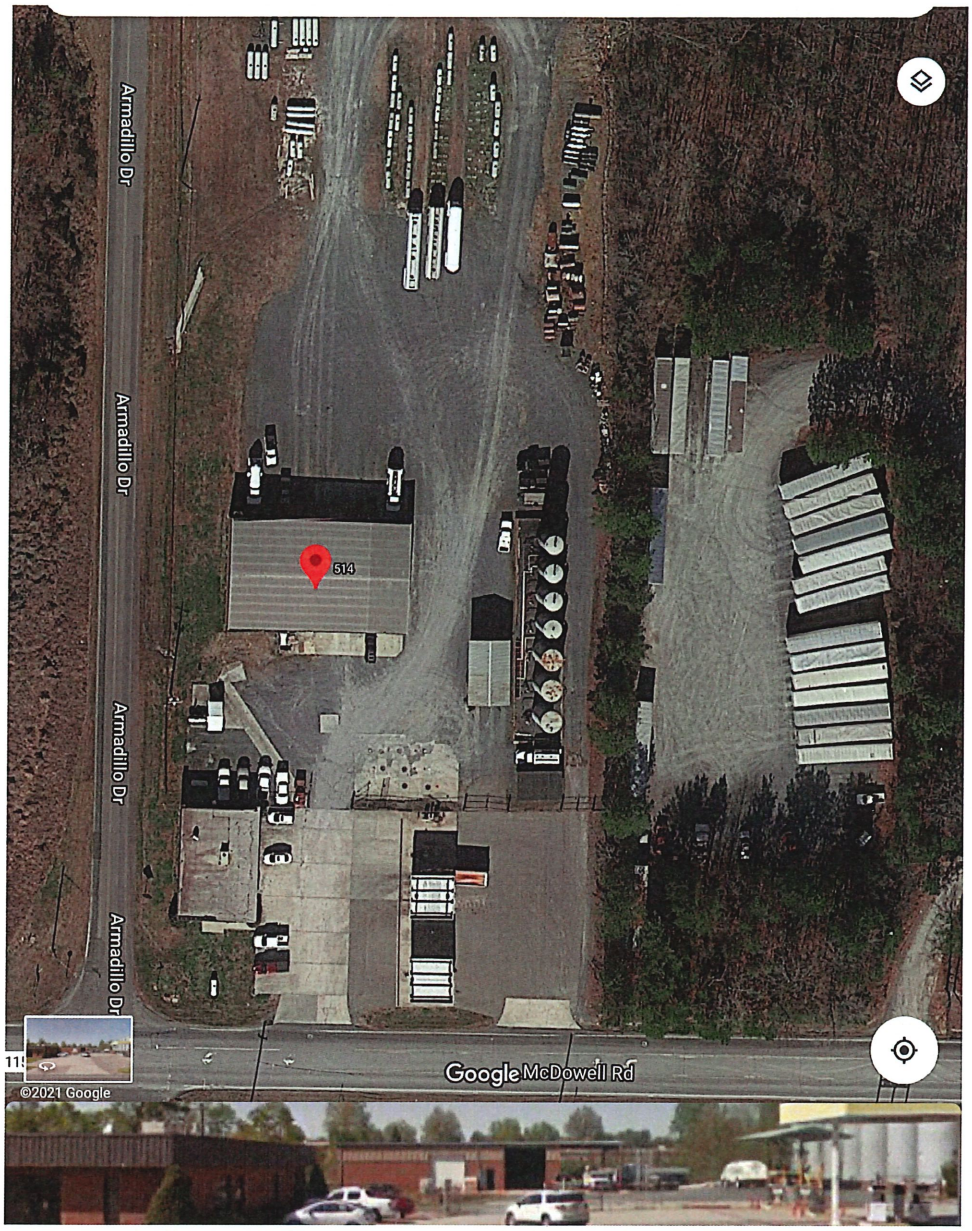
From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, February 15, 2021 12:44 PM
To: Public Comment
Subject: ZA-20-20
Attachments: Screenshot_20210215-122517.png; Screenshot_20210215-122550.png

Dear Mayor and Town Council,

Please find pictures of Briles Oil and Gas station
514 Mcdowell Rd
Asheboro, NC

This is an example of what the proposed Gas station may resemble.
More examples in our area to follow.

Thank you,
Vesta Kennedy



514 McDowell Rd

Asheboro, NC 27205

At this address: Briles Oil & Gas, Triad Transport



514 McDowell Rd
Asheboro, NC 27205

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, February 15, 2021 1:01 PM
To: Public Comment
Subject: ZA-20-20, Local ASTs with Incidents
Attachments: Screenshot_20210215-112752.png; IMG_20210214_155003.jpg; IMG_20210214_154808.jpg; Screenshot_20210215-112927.png

Dear Mayor and Town Council,

Attached please find screenshots of two local Aboveground Storage Tank retail gas stations , both with gasoline spill/piping incidents. I WISH I could give you more details, but none are available for these two due to lack of regulation!!!!!!

Stokesdale's Service Center
8508 Highway 158
Guilford County
AST Incident#15752

Southmont Grocery
10411 NC Highway 8 South
Davidson County
AST Incident#87632

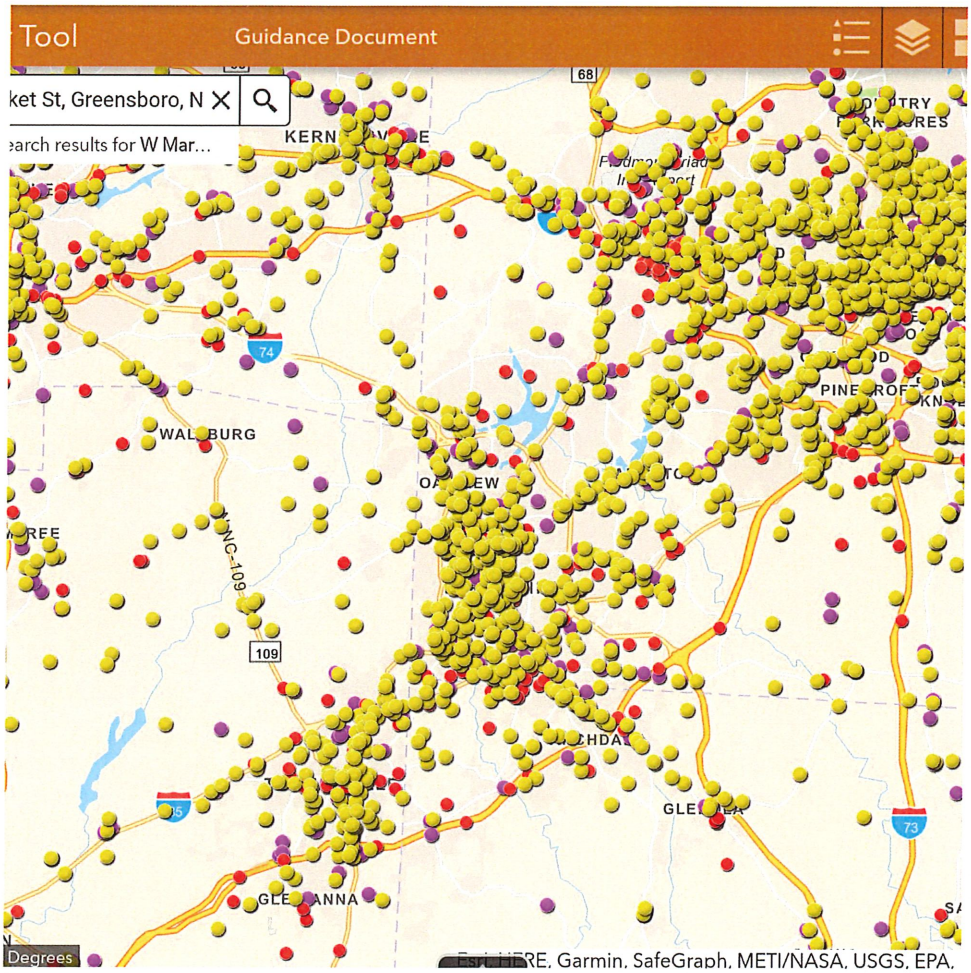
Please do not forget the numerous AST contamination incidents I have previously sent in.
Please note the many red dots on the screen shot of NCDEQ's argis tool map. Each red dot represents where gasoline contamination has occurred from ASTs.

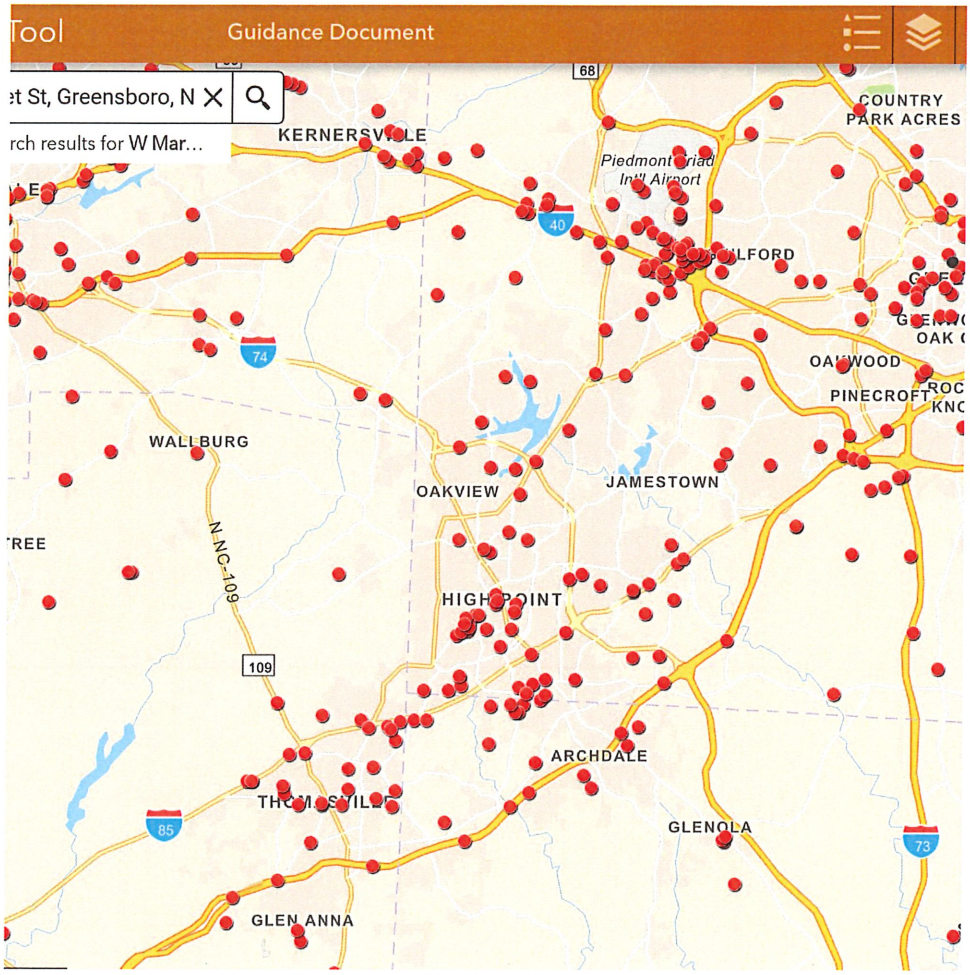
Thanks so much for your attention to my continuing efforts to insure public safety,

Vesta Kennedy

Shared via the AOL App




Tool
Guidance Document
ket St, Greensboro, N
earch results for W Mar...
KERN
WAL BURG
NC-109
109
68
74
73
PINE
GLE ANNA
Degrees
RE, Garmin, SafeGraph, METI/NASA, USGS, EPA,


Tool
Guidance Document
et St, Greensboro, N
rch results for W Mar...
KERNERSVILLE
Piedmont Triad Intl Airport
COUNTRY PARK ACRES
GUILFORD
OAKWOOD
PINECROFT
WALLBURG
OAKVIEW
JAMESTOWN
N NC-109
HIGH POINT
ARCHDALE
GLENOLA
GLEN ANNA
68
40
74
109
85
73


Google Street View
ATM Southmont Grocery

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 ASTs, examples, incidents and NCDEQ Regulation(lack of)
Date:	Monday, February 15, 2021 3:06:12 PM

Dear Mayor and City Council,

Attached please find information from NCDEQ regarding Aboveground Storage Tanks, two screenshots from NCDEQ showing a broad picture and the numerous petroleum gas leaks in High Point and within our watershed, and pictures of gas stations(non local and I THINK not allowed in NC, but examples, just in case setback requirements have changed) utilizing Aboveground Storage Tanks.

Important facts to note:

1-The proposed Aboveground Storage Tank gas station **IS NOT REQUIRED** to register with NCDEQ, as "Any retail gasoline dispensing operation serving the motoring public" is **not** included in the definition of an Oil Terminal Facility.

2-NCDEQ **DOES NOT** regulate the installation, construction, permitting or monitoring of ASTs.

3- In regards to the Division of Air Quality, NC **only requires** Stage 1 vapor recovery, for retailers that have an annual 50,000gl output.
a)This involves what is called a Dual Point System: gasoline goes in at one point through a fill tube, and gasoline vapors come out another.
b)Employee training for visual inspection of tanks, piping, valves and gaskets is at the retailer's discretion, and is **not regulated** by the state.
c)Division of Air Quality inspections are on a **once every 5 years** schedule.
d)Division of Air Quality inspects fill tubes for leaks, fill tube caps to insure the rubber gasket is not deteriorating, pressure vacuum valves on top of the tanks, and vapor recovery lines, poppet valves,
valve caps and their rubber gaskets.(below please find drawing of AST)
e)AST and UST technology is basically the same; they differ mainly only in their location. The issues for sudden onset of rust and corrosion found in the EPA's study in 2016 (previously provided) still occurs. Delivery truck drivers have stated the seals on the nozzles for delivery have a shorter shelf life due to increased ethanol and emerging fuels.

4-Federal requirements for ASTs can be found by googling MACT 6C. Basically they state that spill containment(normally a cinderblock wall) and vapor recovery is required.

5-The Fire Marshal does final inspection of new facilities, insuring that the 2018 NC State Building Code: Fire Prevention Code, Chapter 23 Motor Fuel-Dispensing Facilities and Repair Garages, Chapter 57 Flammable and Combustible Liquids, and the National Firecode Protection Association 30 are followed. (I will be happy to provide if requested) Some examples include: Setback Requirements, Fencing,

Dikes, etc depend on size of tanks. The tanks themselves need to be double-walled and insulated; they are typically painted white or silver for temperature control (petroleum has a low flash point).

6- I am unclear what regulations surround the underground piping needed from ASTs to dispensers, because there will be underground dispensing as NC has Setback requirements.(I am still researching this).

7- Will there be room for tankers to come and deliver the petroleum to this site which already has so much development on it? Imagine the traffic back up at delivery time! The ASTs are huge and will take up a lot of room by themselves, not even considering setbacks and fencing required.

8-Please inquire what storm water and runoff control measures will be used. Given the volatile and toxic nature of petroleum, industrial standards will need to be implemented.

9- PLEASE REMEMBER THAT PETROLEUM IN CRITICAL WATERSHED AREAS IS STRICTLY PROHIBITTED!!!!! Please do not allow the grading of this site to change its watershed classification and a landowner to be able to CIRCUMVENT important PUBLIC SAFETY regulations.

As always, thank you,
Vesta Kennedy

Aboveground Storage Tanks

Registration of Aboveground Storage Tanks (ASTs)
Aboveground storage tanks are **only** required to be registered with NCDEQ – Underground Storage Tanks (UST) Section if they meet the definition of an Oil Terminal Facility. Most ASTs do not meet this definition and do not require registration. If your ASTs do require registration, then the registration form can be found on the Oil Terminal Facility page.

excerpt from Oil Terminal Facility Page:
What is an Oil Terminal Facility?
The definition of an oil terminal facility is found in North Carolina Oil Pollution and Hazardous Substances Control Act (NCGS 143-215.77(11)):

- Oil terminal facility means any facility of any kind and related appurtenances located in, on or under the surface of any land, or water, including submerged lands, which is used or capable of being used for the purpose of transferring, transporting, storing, processing or refining oil

This definition does not include any of the following:

- Any facility having a storage capacity of less than 500 barrels (21,000 gallons)
- Any retail gasoline dispensing operation serving the motoring public
- A vessel shall be considered an oil terminal facility only in the event that it is utilized to transfer oil from another vessel to an oil terminal facility; or to transfer oil between one oil terminal facility and another oil terminal facility; or is used to store oil.

AST Releases

If an AST has a release, then the release must be reported to the appropriate NCDEQ UST Section regional office and must be cleaned up as required by the state. For guidance, please see the Non-UST Program.

AST Construction Standards

Aboveground storage tank construction standards are addressed in the North Carolina Building Code, Chapter 22 of the North Carolina Fire Code and the National Fire Protection Association Standard 30 and 30A (NFPA 30 and NFPA 30A).

> ***DEQ does not regulate the installation, construction, permitting or monitoring of** ASTs.*

Questions regarding AST construction standards should be directed to the local and/or county fire prevention departments where the AST is being installed. A list of these fire prevention departments can be found here

The North Carolina Department of Insurance – Office of State Fire Marshal may also be contacted for questions at (919) 661-5880.

Federal Requirements for Prevention of Oil Pollution

The EPA's Oil Pollution Prevention regulation (40 CFR Part 112) establishes requirements for facilities to prevent oil spills from reaching the navigable waters of the U.S. or adjoining shorelines. The rule applies to owners or operators of certain facilities that drill, produce, gather, store, process, refine, transfer, distribute, use or consume oil.

The regulation applies to non-transportation-related facilities with a total aboveground (i.e., not completely buried) oil storage capacity of greater than 1,320 gallons, or total completely buried oil storage capacity greater than 42,000 gallons. The regulations apply specifically to a facility's storage capacity, regardless of whether the tank(s) is completely filled. In addition to the storage capacity criteria, a facility is regulated if a discharge or release of oil from the facility could enter navigable waters of the United States or adjoining shorelines.

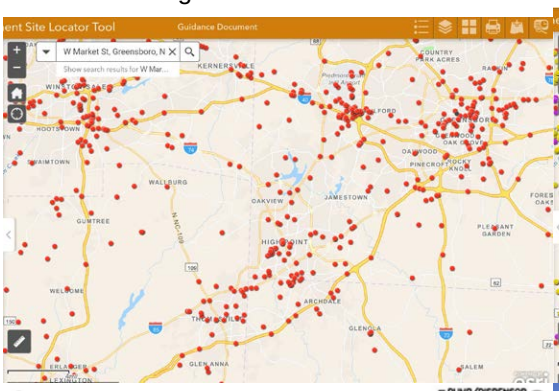
The regulation requires that all regulated facilities have a fully prepared and implemented Spill Prevention, Control, and Countermeasure, or SPCC Plan. Find more information on EPA’s Oil Pollution Prevention regulations and SPCC plans or contact EPA Region IV in Atlanta, Georgia at (404) 562-8752.

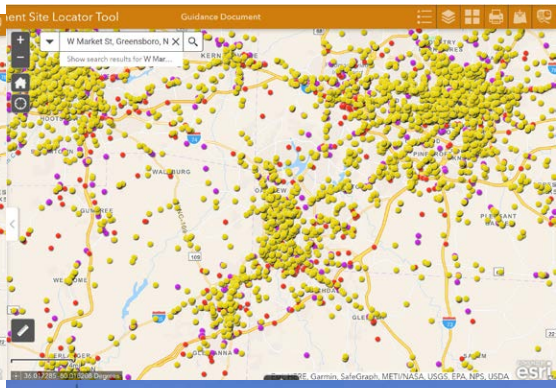
AST Stage I / II Vapor Recovery Requirements

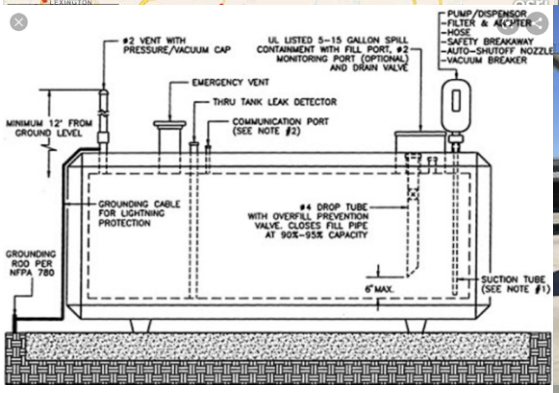
Stage I vapor recovery is required on all service stations/gasoline dispensing facilities that have annual throughputs greater than 50,000 gallons per year. Stage II vapor

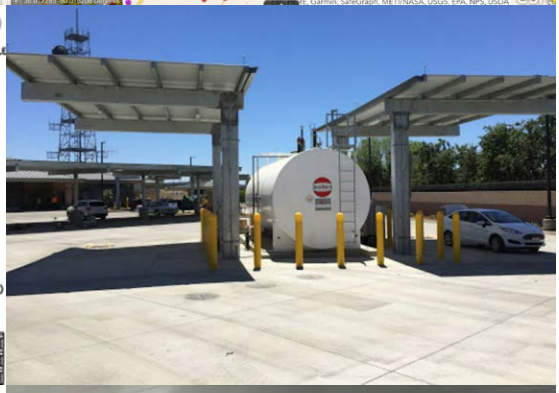
recovery is only required in certain areas.
Questions regarding Stage I and Stage II controls for ASTs should be directed to the Division of Air Quality at (919) 707-8419.

7 Attached Images





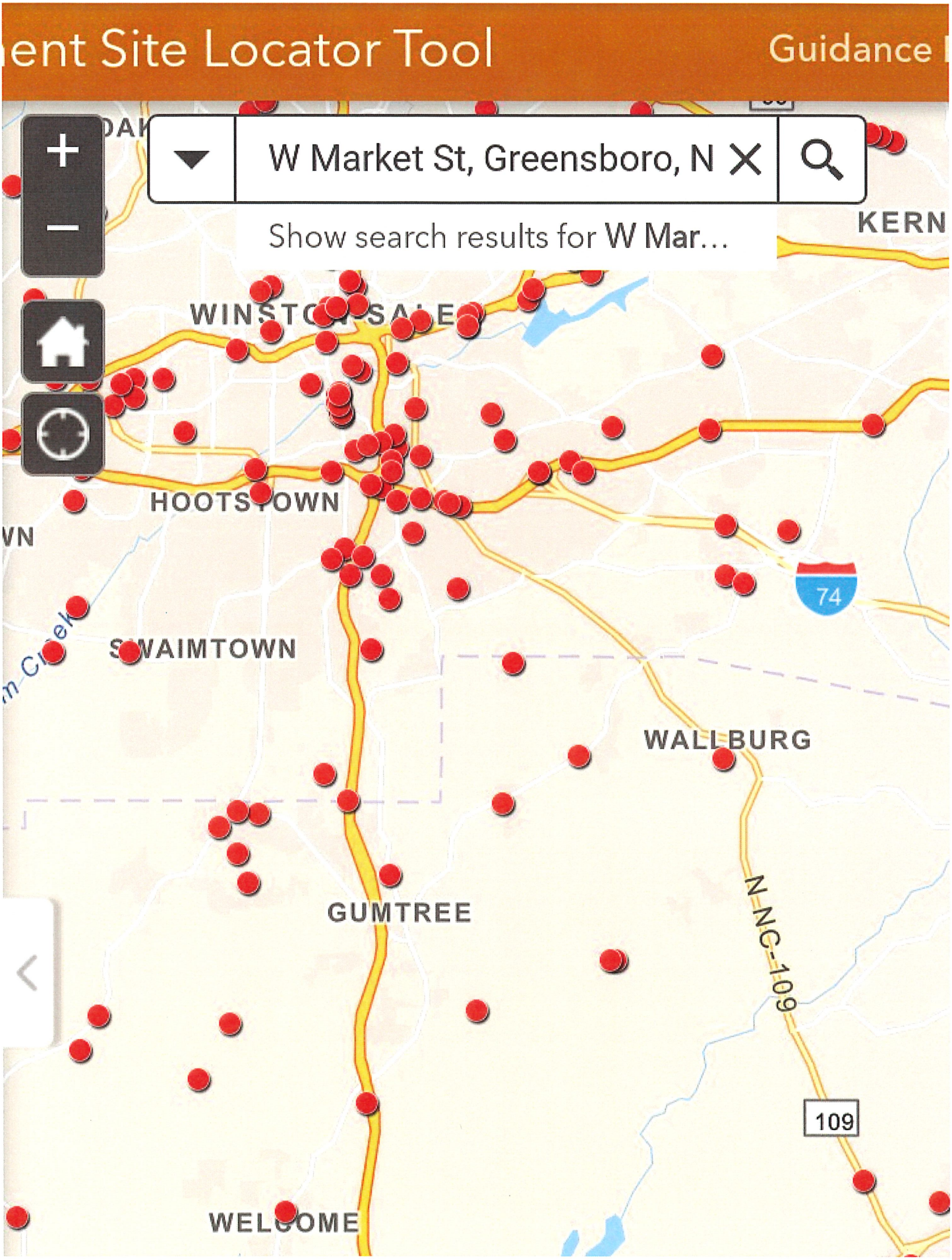


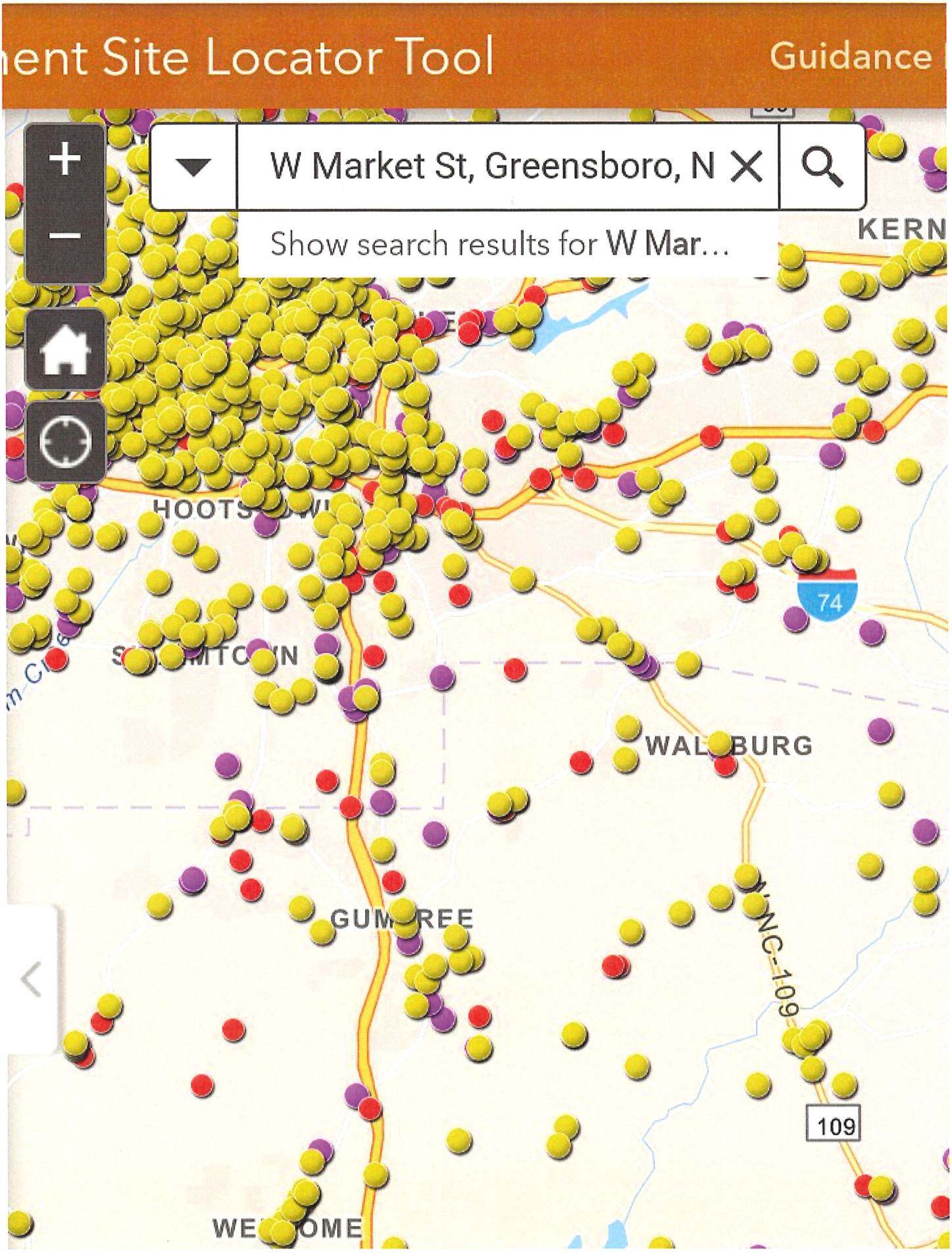


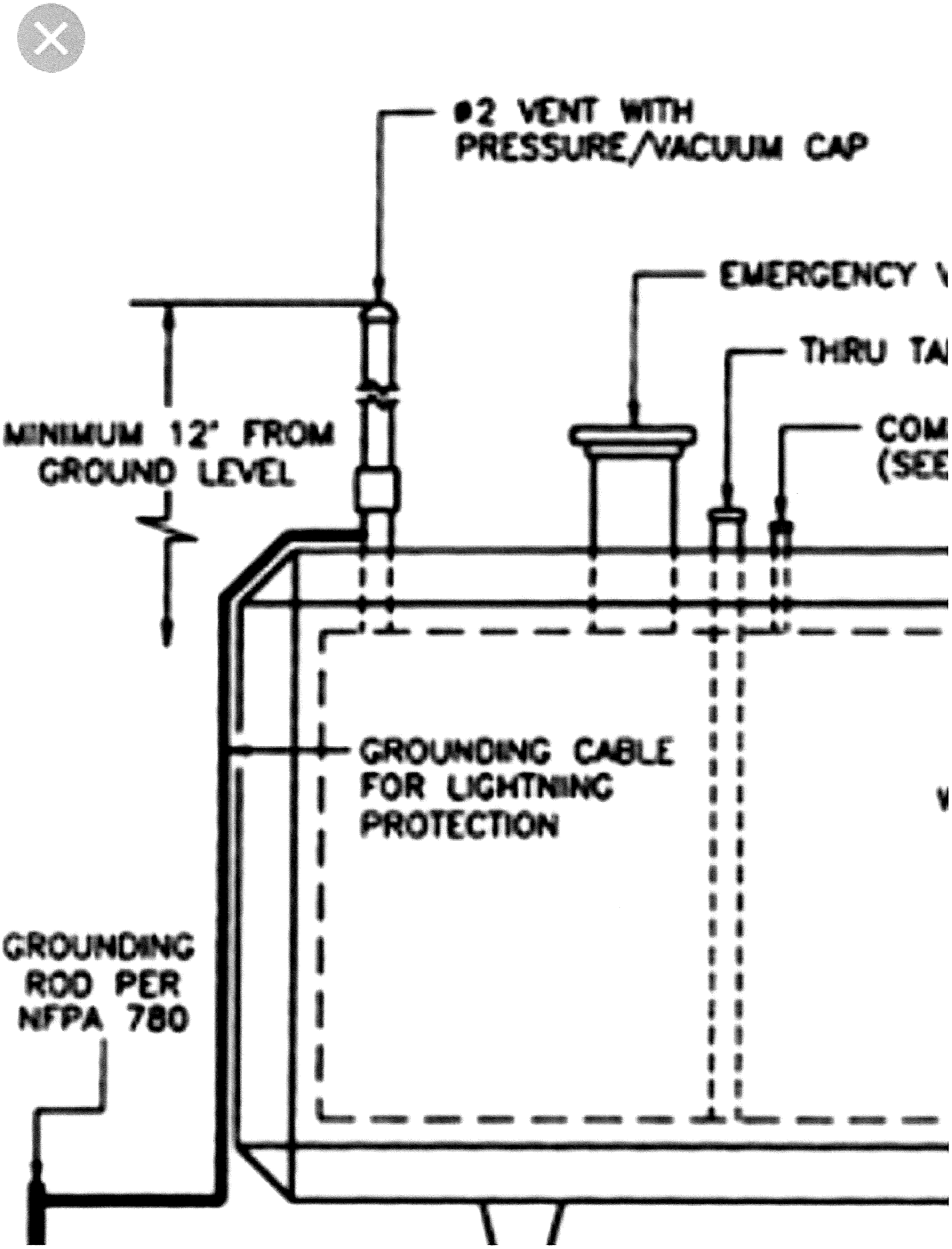







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FOR LIGHTNING
PROTECTION
GROUNDING
ROD PER
NFPA 780




MERCIAL FUELING CENTER
NO SMOKING





Lisa Vierling

From: rollovernclover <rollovernclover@aol.com>
Sent: Monday, February 15, 2021 4:36 PM
To: Public Comment
Subject: ZA-20-20
Attachments: IMG951123.jpg; IMG951122.jpg; IMG951121.jpg; IMG951120.jpg; IMG951119.jpg

Enclosed please find pictures of 7-11 that is at the end of Penny Rd in Jamestown.
This is very bright and red, green and white at night. Add a fast food restaurant AND ASTs to this visual.

Thanks so much,
Vesta Kennedy

Sent from my Galaxy


WIN A PS5


Exit Only


Exit
2.99
2.95


Car Wash



From:	rollovernclover
To:	Public Comment
Subject:	ZA-20-20
Date:	Tuesday, February 16, 2021 8:53:08 AM

Dear Mayor and City Council,

Thank you so much for your time and consideration.
I was so relieved that petroleum was taken off the table last night by BRC Spirit; that is one of the issues with this rezoning request finally off the table.
Just a quick follow up for future knowledge regarding the underground piping for ABT fuel dispensing, it is NOT regulated nor overseen by ANYONE.
This was confirmed last night by DEQ after the meeting started.

I hope you all got some well earned rest last night,
Vesta Kennedy

Sent from my Galaxy

(end of emails #32 - #36)

Vesta Kennedy Emails #37 - #43

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Thursday, February 25, 2021 10:20 AM
To: Public Comment
Subject: ZA-20-20 floodplain course
Attachments: Crossfit 100 foot undisturbed buffer (1).pdf; IMG_20210222_124151.JPG; nfip_sg_unit_1 (1).pdf

Dear Mayor and City Council,

I hope all of you are having a good week and your families are happy and healthy.

Attached please find Unit 1 of Floodplain Management published by the National Flood Insurance Program, an image from NCFRIS system, and the undisturbed 100ft buffer zone drawing submitted by Blue Ridge Spirit group.

The drawing from Blue Ridge Spirit clearly shows the point of storm water discharge from the site being in catchment basin 27392. The perennial stream and catchment basin lead into the West Fork of Deep River, directly effecting Foxwood Meadows.

There are SEVENTY TWO structures (the majority are homes) located in the crosshatch (FLOODWAY), and in the 100year and 500 year floodplains. These residents are mostly **elderly and young families and they deserve your consideration and attention.** Two residents have shared with me that they endured THREE floods last year alone.

Currently High Point does not have a certified floodplain manager.
I tried to cut and paste the most important parts of the attached Floodplain Management unit(only 32 pages with pictures!) for you guys, but my email became too big each time. So, **please** take a few minutes to review, with special attention paid to these key points:

- The purpose of this study guide is to familiarize you with how this problem can be curbed through proper management of how your floodplains are developed.
- Most floods fall into one of three major categories: ◆ Riverine flooding(this is the West Fork of Deep River!) ◆ Coastal flooding ◆ Shallow flooding
- A watershed is an area that drains into a lake, stream or other body of water. Other names for it are basin or catchment area.
- The terms tributary(the perennial stream of catchment basin 27392) and channel (West Fork itself)
- What happens in a watershed will affect events and conditions downstream. Terrain helps determine the dynamics of riverine flooding. In relatively flat areas, shallow, slow-moving floodwater may cover the land for days or even weeks. In hilly and mountainous areas, a flood may come scant minutes after a heavy rain. Such a flash flood gives short notice and moves so fast that it is particularly dangerous to people and property in its path.
- Note that the velocity of floodwaters is determined by the slope of the terrain and that affects how much warning people have. Foxwood Meadows is surrounded by steep slopes. The point of discharge for 1809 and 1801 Eastchester Drive is down a steep slope.
- While flash floods occur in all fifty states, areas with steep slopes and narrow stream valleys are particularly vulnerable, as are the banks of small tributary streams.
- In urban areas, flash flooding can occur where impervious surfaces, gutters and storm sewers speed runoff.
- Riverine erosion River channels change as water moves downstream, acting on the channel banks and on the channel bottom (the thalweg). This force is made more potent during a flood, when the river's velocity increases.
- Properties on the outside of curves face a double threat of inundation and undercutting from riverine erosion during floods. In addition, meanders do not stay in the same place—they migrate slowly downstream and across the floodplain, reworking the shape of the channel within the floodplain.
- Urban drainage An urban drainage system comprises the ditches, storm sewers, retention ponds and other facilities constructed to store runoff or carry it to a receiving stream, lake or the ocean.
- PLEASE pay close attention to the section on Floodplain Development Dynamics in Riverine floodplains, pages 19, 20,21. It states: Human development can have an adverse impact on floods and floodplains.

- The most obvious impact of development on riverine flooding comes with moving or altering channels or constructing bridges and culverts with small openings. Construction and regrading of the floodplain can obstruct or divert water to other areas. Levees and dikes are the best known examples of this, but even small construction projects have an impact.
- Filling obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater velocity.(see figure 1-12)
- **Watersheds Development in riverine watersheds affects the runoff of stormwater and snowmelt. Buildings and parking lots replace the natural vegetation which used to absorb water. When rain falls in a natural setting, as much as ninety percent of it will infiltrate the ground; in an urbanized area, as much as ninety percent of it will run off. (see figure 1-13)**
- **Urban features alter flood dynamics as well. Storm sewers and more efficient ditches that come with urban drainage systems speed flood flows. The result of urbanization is that there is more runoff in the watershed and it moves faster, increasing flooding downstream. Thus, a 10-year storm may produce the runoff equivalent of a 25-year storm, overloading the man-made drainage system.**
- **Urbanization also changes the timing of flows along the tributaries. If one subwatershed develops faster than another, the flood will leave sooner than it used to, possibly arriving at the main channel at the same time as the peak arrives from another tributary, causing increased flooding downstream.**
- Please be sure to review Flood Damage section. Knowing the impact of a potential hazard—and guarding against it—is integral to administering a floodplain management program.
- As a floodplain management administrator, you need to be knowledgeable about the five main causes of flood damage: ◆ Hydrodynamic forces ◆ Debris impact ◆ Hydrostatic forces ◆ Soaking ◆ Sediment and contaminants
- While velocity is one factor in determining the potential harm of a flood, the total impact of moving water is related to the depth of the flooding. Studies have shown that deep water and low velocities can cause as much damage as shallow water and high velocities.
- People are more susceptible to damage than buildings: Studies have shown that it doesn't take much depth or velocity to knock a person over. Thus, no areas with moving floodwater can be considered safe for walking.
- A car will float in only two feet of moving water, which is one reason floods kill more people trapped in vehicles than anywhere else.
- SAFETY AND HEALTH HAZARDS:. Disruption of normal public utilities and the presence of flood debris and damage can produce safety and health hazards.
- When utilities are damaged, hazards arise. Electrocution is the second most frequent cause of flood deaths, claiming lives in a flooded area that is carrying a live current created when electrical components short. Floods also can damage gas lines, floors and stairs, creating secondary hazards such gas leaks and unsafe structures.
- Fire can be a result of too much water: floods can break gas lines, extinguish pilot lights, and short circuit electrical wiring – causing conditions ripe for a fire. Fire equipment may not be able reach a burning building during high water.
- **Flooding, especially repetitive flooding, takes a toll on people's mental health. Stress comes from facing the loss of time, money, property and personal possessions such as heirlooms. This is aggravated by fatigue during cleanup and anxiety over lost income, health risks and damage to irreplaceable items.**
- **Children and the elderly are especially susceptible to stress from the disruption of their daily routines.**

THE MOST IMPORTANT TAKEAWAY FROM THIS UNIT MUST BE THE FOUR (**THE FIRST THREE ARE THE MOST FEASIBLE)** STRATEGIES OF FLOODPLAIN MANAGEMENT:

Strategy 1: Modify human susceptibility to flood damage Reduce disruption by avoiding hazardous, uneconomic or unwise use of floodplains.

Tools include: ◆ Regulating floodplain use by using zoning codes to steer development away from hazardous areas or natural areas deserving preservation, establishing rules for developing subdivisions, and rigorously following building, health and sanitary codes. ◆ Establishing development and redevelopment policies on the design and location of public services, utilities and critical facilities. ◆ Acquiring land in a floodplain in order to preserve open space and permanently relocate buildings. ◆ Elevating or floodproofing new buildings and retrofitting existing ones. ◆ Preparing people and property for flooding through forecasting, warning systems and emergency plans. ◆ Restoring and preserving the natural resources and functions of floodplains.

Strategy 2: Modify the impact of flooding Assist individuals and communities to prepare for, respond to and recover from a flood.

Tools include: ◆ Providing information and education to assist self-help and protection measures. ◆ Following flood emergency measures during a flood to protect people and property. ◆ Reducing the financial impact of flooding through disaster assistance, flood insurance and tax adjustments. ◆ Preparing post-flood recovery plans and programs to help people rebuild and implement mitigation measures to protect against future floods

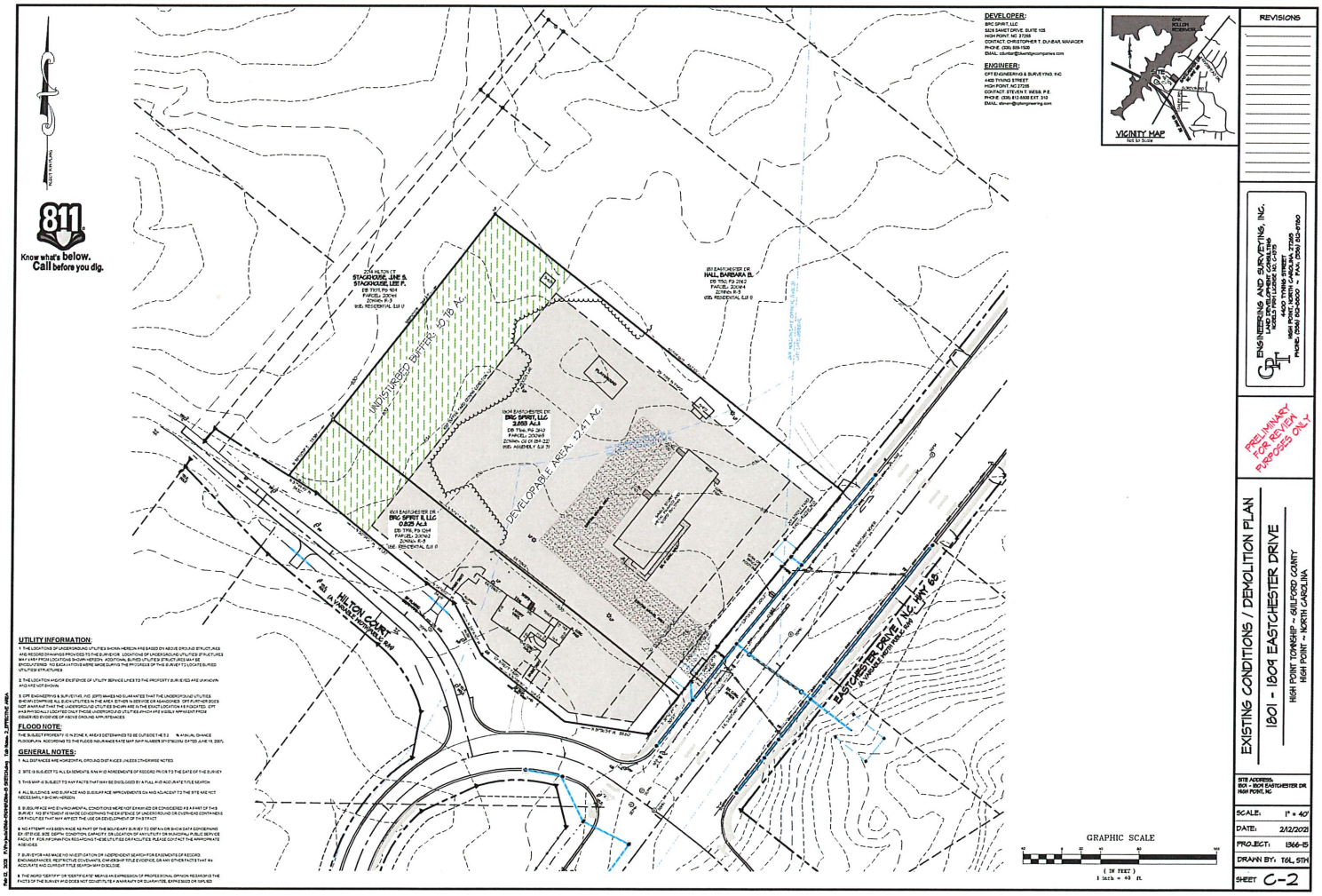
Strategy 3: Modify flooding itself Develop projects that control floodwater.
Tools include: ◆ Building dams and reservoirs that store excess water upstream from developed areas. ◆ Building dikes, levees and floodwalls to keep water away from developed areas. ◆ Altering channels to make them more efficient, so overbank flooding will be less frequent. ◆ Diverting high flows around developed areas. ◆ Treating land to hold as much rain as possible where it falls, so it can infiltrate the soil instead of running off. ◆ Storing excess runoff with on-site detention measures. ◆ Protecting inland development with shoreline protection measures that account for the natural movement of shoreline features. ◆ Controlling runoff from areas under development outside the floodplain.

Strategy 4: Preserve and restore natural resources Renew the vitality and purpose of floodplains by reestablishing and maintaining floodplain environments in their natural state.
Tools include: ◆ Floodplain, wetlands and coastal barrier resources or land use regulations, such as zoning, can be used to steer development away from sensitive or natural areas. ◆ Development and redevelopment policies on the design and location of public services, utilities and critical facilities. ◆ Land acquisition; open space preservation; permanent relocation of buildings; restoration of floodplains and wetlands, and preservation of natural functions and habitats. ◆ Information and education to make people aware of natural floodplain resources and functions and how to protect them. ◆ Tax adjustments to provide a financial initiative for preserving lands or restoring lands to their natural state.

In conclusion, please recognize that there ARE tools High Point can use to mitigate some of the current flooding of Foxwood Meadows, and we can certainly NOT ADD DEVELOPMENT PROJECTS that increase these floodwaters! The most vulnerable of our society, elderly and young children , are the most at risk and comprise the majority of Foxwood Meadows.
How will the storm water runoff, quantity and quality, be mitigated from 1809 and 1801 Eastchester Drive?

Sincerely,
Vesta Kennedy

Attachment



DEVELOPER:
BIG SPIRIT, LLC
5826 SWEET DRIVE, SUITE 105
HIGH POINT, NC 27265
CONTACT: CHRISTOPHER T. DUFFAR, MANAGER
PHONE: (336) 889-1926
EMAIL: cduffar@bestbigcompanies.com

ENGINEER:
CPT ENGINEERING & SURVEYING, INC.
4400 TYNING STREET
HIGH POINT, NC 27265
CONTACT: STEVEN T. WEBB, P.E.
PHONE: (336) 812-8888 EXT. 310
EMAIL: steven@cptengineering.com

VICINITY MAP
Not to Scale

Know what's below. Call before you dig. 811

UTILITY INFORMATION:

1. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON ABOVE GROUND STRUCTURES AND RECORD DRAWINGS PROVIDED TO THE SURVEYOR. LOCATIONS OF UNDERGROUND UTILITIES OR STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES OR STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES OR STRUCTURES.
2. THE LOCATION AND/OR EXISTENCE OF UTILITY SERVICE LINES TO THE PROPERTY SURVEYED ARE UNKNOWN AND ARE NOT SHOWN.
3. CPT ENGINEERING & SURVEYING, INC. (CPT) MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. CPT FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION AS PLOTTED. CPT HAS PHYSICALLY LOCATED ONLY THOSE UNDERGROUND UTILITIES WHICH ARE VISIBLY APPARENT FROM OBSERVED EVIDENCE OF ABOVE GROUND APPURTENANCES.

FLOOD NOTE:
THE SUBJECT PROPERTY IS IN ZONE X, AND IS DETERMINED TO BE OUTSIDE THE 0.2 % ANNUAL CHANCE FLOODPLAIN, ACCORDING TO THE FLOOD INSURANCE RATE MAP MAP NUMBER 3710782200J DATED JUNE 19, 2007.

GENERAL NOTES:
1. ALL DISTANCES ARE HORIZONTAL GROUND UNLESS OTHERWISE NOTED.
2. SITE IS SUBJECT TO ALL EASEMENTS, R/W AND AGREEMENTS OF RECORD PRIOR TO THE DATE OF THE SURVEY.
3. THIS MAP IS SUBJECT TO ANY FACTS THAT MAY BE DISCLOSED BY A FULL AND ACCURATE TITLE SEARCH.
4. ALL BUILDINGS AND SURFACE AND SUBSURFACE IMPROVEMENTS ON AND ADJACENT TO THE SITE ARE NOT NECESSARILY SHOWN HEREON.
5. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND OR OVERHEAD CONTAINERS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT.
6. NO ATTEMPT HAS BEEN MADE AS PART OF THE BOUNDARY SURVEY TO OBTAIN OR SHOW DATA CONCERNING: ZONING REQUIREMENTS, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE.
7. SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE.
8. THE WORD "CERTIFY" OR "CERTIFICATE" MEANS AN EXPRESSION OF PROFESSIONAL OPINION REGARDING THE FACTS OF THE SURVEY AND DOES NOT CONSTITUTE A WARRANTY OR GUARANTEE, EXPRESSED OR IMPLIED.

REVISIONS

ENGINEERING AND SURVEYING, INC.
LAND DEVELOPMENT CONSULTING
NC FIRM LICENSE NUMBER
4400 TYNING STREET
HIGH POINT, NORTH CAROLINA 27265
PHONE: (336) 812-8888 • FAX: (336) 812-8810

PRELIMINARY FOR REVIEW PURPOSES ONLY

EXISTING CONDITIONS / DEMOLITION PLAN
1801 - 1804 EASTCHESTER DRIVE
HIGH POINT TOWNSHIP ~ GUILFORD COUNTY
HIGH POINT ~ NORTH CAROLINA

SITE ADDRESS:
801 - 809 EASTCHESTER DR
HIGH POINT, NC

SCALE: 1" = 40'
DATE: 2/12/2021
PROJECT: 1366-15
DRAWN BY: TGL, STH
SHEET C-2

Feb 12, 2021 P:\Projects\Hilton-Eastchester-2-3\ECP.dwg Tab Name: 2_EXISTING_AREA

Attachment

804.0
795.9
787.0
780.2
778.0
783.3
782.7
Lacy Ln
Stanley Rd
Red Run Ct
Scarborough Rd
Cumbridge Dr
Sandy Woods Ct
Deadeck Ln
Harrison Pl
Hillcrest Rd
Hillandale Ct
Hillandale Dr
Hillandale Pl
Hillandale Ct
Hillandale Cv
Hillandale Pl
Hillandale Cv
Hillandale Ct
Hillandale Pl
Hillandale Cv
Hillandale Ct
Hillandale Pl
Hillandale Cv
Hillandale Ct

Attachment

UNIT 1: FLOODS AND FLOODPLAIN MANAGEMENT

In this unit

Unit 1 lays the groundwork for the course by explaining:

- The more common types of floods and floodplains,
- How floods affect floodplain development,
- The strategies and tools for floodplain management, and
- Basic terms used throughout the course.

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INTRODUCTION

Throughout time, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water—either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream.

Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of the United States, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands.

This pattern of development continued as communities grew. In recent decades, development along waterways and shorelines has been spurred by the aesthetic and recreational value of these sites.

The result has been an increasing level of damage and destruction wrought by the natural forces of flooding on human development. It is probable that you are taking this course because your community has experienced some of this. You, yourself, or someone you know may have suffered through a flood and a long, painful and expensive repair and recovery process.

The purpose of this study guide is to familiarize you with how this problem can be curbed through proper management of how your floodplains are developed. Communities that guide development following the standards of the National Flood Insurance Program have seen the results – their new buildings and neighborhoods have had less damage and suffering from flooding.

To start, we need an orientation into the natural processes of flooding. That is the focus of Section A. Many terms are introduced in this section, such as watershed and coastal erosion that are used throughout the course.

Next, we review of the other part of the equation – human development in the path of that flooding. The final section in this unit discusses the Federal government's overall floodplain management effort and the other strategies and tools that help prevent and reduce flood damage.

A. FLOODS AND FLOODPLAINS

Floods are part of the Earth's natural hydrologic cycle.

The cycle circulates water throughout the environment (Figure 1-1). This process maintains an overall balance between water in the air, on the surface and in the ground.

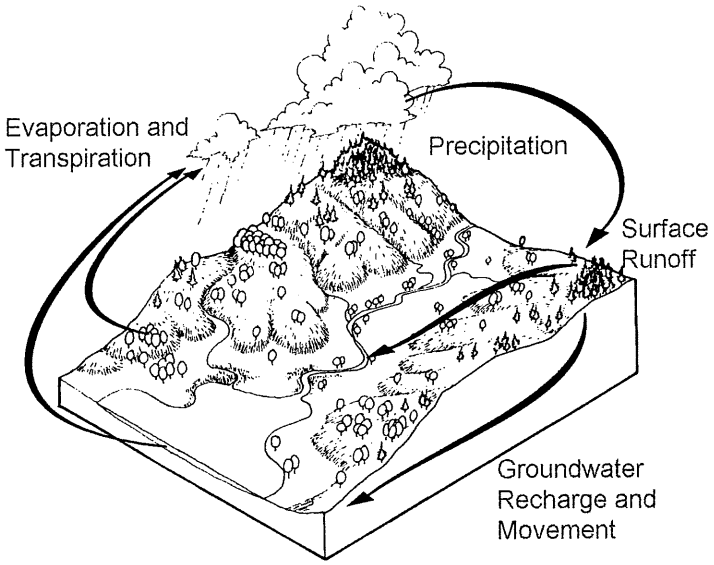


Figure 1-1. The Hydrologic cycle

Sometimes the hydrologic cycle gets outs of balance, sending more water to an area than it can normally handle.

The result is a flood.

A flood inundates a floodplain. There are different types of floodplains and they are based on they type of flooding that forms them.

Most floods fall into one of three major categories:

- Riverine flooding
- Coastal flooding
- Shallow flooding

RIVERINE FLOODING

A watershed is an area that drains into a lake, stream or other body of water. Other names for it are basin or catchment area.

Watersheds vary in size. Larger ones can be divided into sub-watersheds.

Figure 1-2 shows a watershed and some of the key terms. The boundary of a watershed is a ridge or divide. Water from rain and snowmelt are collected by the smaller channels (tributaries) which send the water to larger ones and eventually to the lowest body of water in the watershed (main channel).

Channels are defined features on the ground that carry water through and out of a watershed. They may be called rivers, creeks, streams or ditches. They can be wet all the time or dry most of the time.

When a channel receives too much water, the excess flows over its banks and into the adjacent floodplain. Flooding that occurs along a channel is called riverine flooding.

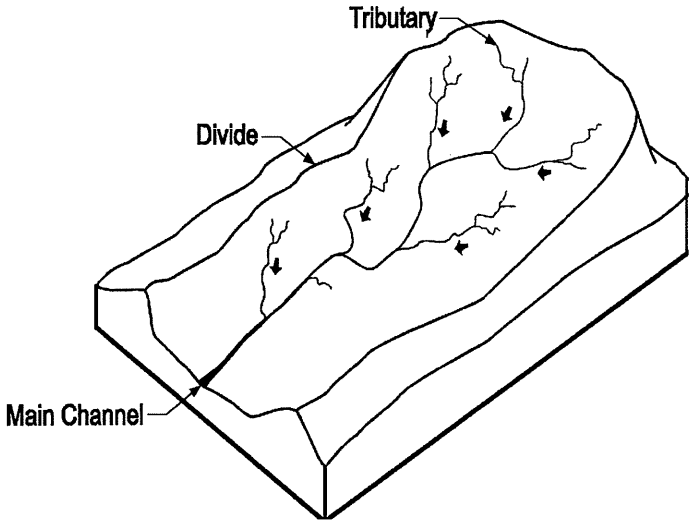


Figure 1-2. Riverine Watershed and Floodplain

What happens in a watershed will affect events and conditions downstream. Terrain helps determine the dynamics of riverine flooding. In relatively flat areas, shallow, slow-moving floodwater may cover the land for days or even weeks.

In hilly and mountainous areas, a flood may come scant minutes after a heavy rain. Such a flash flood gives short notice and moves so fast that it is particularly dangerous to people and property in its path.

Overbank flooding

The most common type of flooding in the United States is called overbank flooding (Figure 1-3).

Overbank flooding occurs when downstream channels receive more rain or snowmelt from their watershed than normal, or a channel is blocked by an ice jam or debris. For either reason, excess water overloads the channels and flows out onto the floodplain.

Overbank flooding varies with the watershed's size and terrain. One measure of a flood is the speed of its moving water, which is called velocity. Velocity is measured in feet per second.

Hilly and mountainous areas have faster moving water, so velocity can pose a serious hazard. In flat areas, the flood may move slowly, making its velocity less of a hazard.

Terrain may affect how much warning people have that a flood is building. Conditions on a river that drains a large watershed may warn of a pending flood hours or even days before actual flooding. On the other hand, streams in hilly areas may give no warning that a flash flood is about to strike.

Flood depths vary, as do flood durations. Generally, the larger the river, the deeper the flood and the longer it will last. However, in hilly or mountainous areas with narrow valleys, flooding can be very deep in small watersheds.

Depending on the size of the river and terrain of its floodplain, flooding can last for days and cover wide areas.

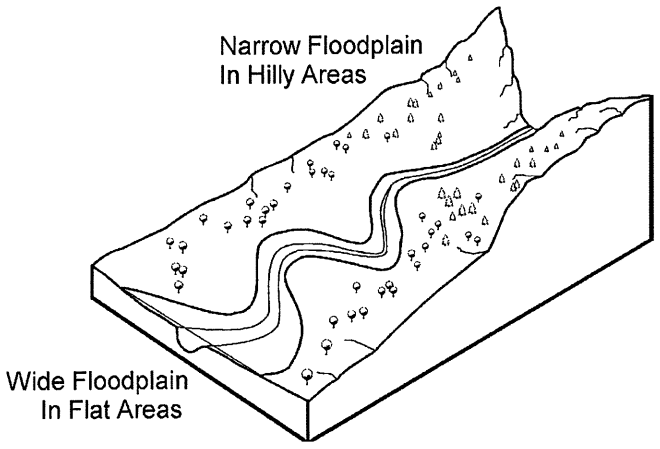


Figure 1-3. Riverine floodplain

Flash flooding

A severe storm that drops much rainfall in a short time can generate a flash flood. All flash floods strike quickly and end swiftly.

While flash floods occur in all fifty states, areas with steep slopes and narrow stream valleys are particularly vulnerable, as are the banks of small tributary streams. In hilly areas, the high-velocity flows and short warning time make flash floods hazardous and very destructive.

In urban areas, flash flooding can occur where impervious surfaces, gutters and storm sewers speed runoff. Flash floods also can be caused by dam failure, the release of ice-jam flooding, or collapse of debris dams.

Flash floods rank first as the cause of flood-related deaths in the United States. In the 1970s, four flash floods in a five-year period killed 570 people. Death tolls associated with the 1993 Mississippi River flood or hurricanes are in another category because such events build over several days, giving people enough time to evacuate safely.

- In 1972, 118 people died along Buffalo Creek in West Virginia when an embankment made of coal refuse washed out, destroying 546 houses and damaging as many more.
- Weeks later, 236 people died when heavy rain and a dam failure inundated the area near Rapid City, South Dakota. Property damage exceeded $100 million.
- In 1976, heavy rains spawned floods in Colorado's Big Thompson Canyon, killing 139 people.
- The next year, 77 people died in Johnstown, Pennsylvania, when heavy rain overwhelmed a dam, causing $200 million in damage.

Riverine erosion

River channels change as water moves downstream, acting on the channel banks and on the channel bottom (the thalweg). This force is made more potent during a flood, when the river's velocity increases.

Several features along a river are affected by this flow of water in different ways. A meander is a curve in a channel. On the outside of a meander, the banks are subject to erosion as the water scours against them (Figure 1-4). On the other hand, areas on the inside of meanders receive deposits of sand and sediment transferred from the eroded sites.

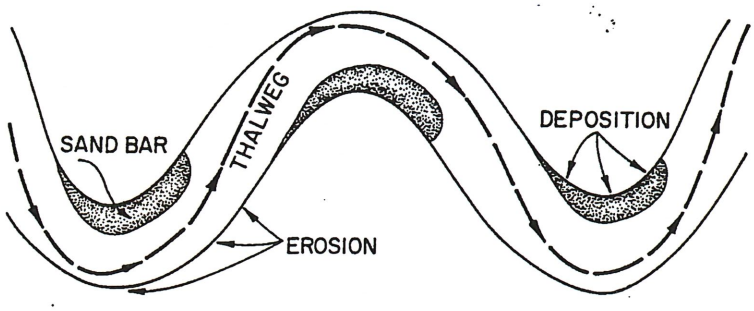


Figure 1- 4. Erosion changes the shape of channels

Properties on the outside of curves face a double threat of inundation and undercutting from riverine erosion during floods (Figure 1- 5).

In addition, meanders do not stay in the same place—they migrate slowly downstream and across the floodplain, reworking the shape of the channel within the floodplain.

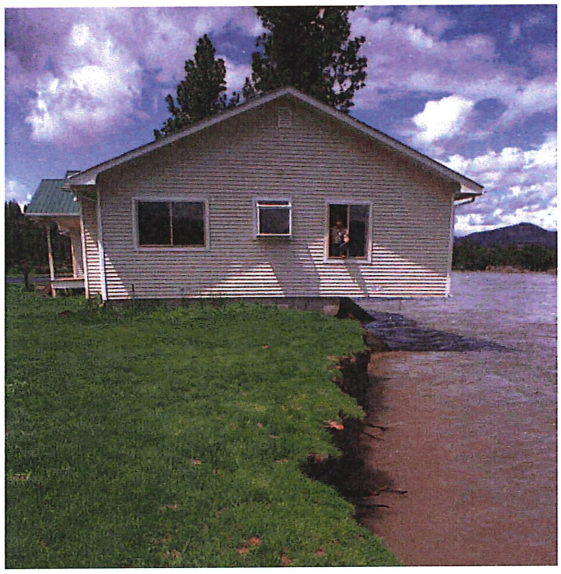


Figure 1-5. Riverine erosion can undercut structures

COASTAL FLOODING

Development along the coasts of the oceans, the Gulf of Mexico, and large lakes can be exposed to two types of flood problems not found in riverine areas: coastal storms and coastal erosion. The Pacific and Caribbean coasts face a third hazard: tsunamis.

Coastal storms

Hurricanes and severe storms cause most coastal flooding. These include "Nor'easters," which are severe storms on the Atlantic coast with winds out of the northeast.

Persistent high wind and changes in air pressure push water toward the shore, causing a storm surge which can raise the level of a large body of water by several feet. Waves can be highly destructive as they move inland, battering structures in their path.

On open coasts, the magnitude of a flood varies with the tides. An increase in the level of the ocean during high tide will flood larger areas than a storm that strikes during low tide.

Major coastal storms can significantly change the shape of shoreline landforms, making sandy coastal floodplains particularly unstable places for development.

Wind and waves shape sand dunes, bluffs and barrier islands. Because these landforms provide natural buffers from the effects of a storm, their preservation is important to the protection of inland development.

Coastal erosion

Long-term coastal erosion is another natural process that shapes shorelines. It is a complex process that involves natural and human-induced factors. The natural factors include sand sources, sand size and density, changes in water level, and the effects of waves, currents, tides and wind. These factors determine whether a shoreline will recede or accrete.

Human activity—such as construction of groins or seawalls, the dredging of channels and placement of sandbags—also can contribute to coastal erosion by altering the natural systems that transport sand.

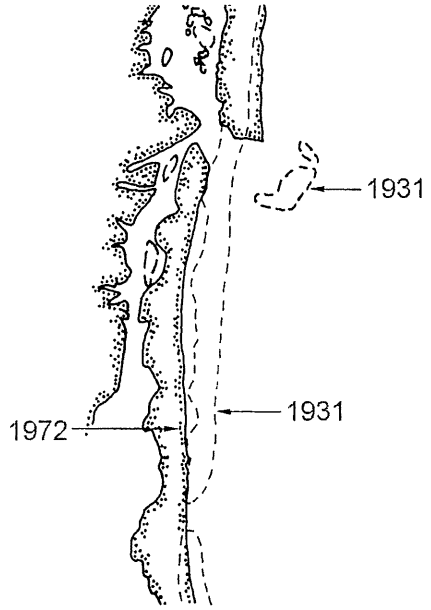


Figure 1-6. This area of the Maryland shore shows how erosion can move or remove entire islands over a period as short as 40 years.

TSUNAMIS

Another hazard along the coast is a tsunami, a large wave often called a "tidal wave" even though tides and tsunamis are not related. Caused by an underwater earthquake or volcano, a tsunami is a pressure wave that can raise water levels as much as 15 feet.

In the open ocean, a tsunami's wave may be only a few feet high. Because the wave's energy extends from the surface to the bottom, that energy is compressed as the wave approaches shallow water, creating higher, more life-threatening waves (Figure 1-7).

Tsunamis usually occur in the Pacific Ocean, but they have caused floods in the Caribbean. Because they can happen on a clear day and are not related to storms, they can catch many people unawares.

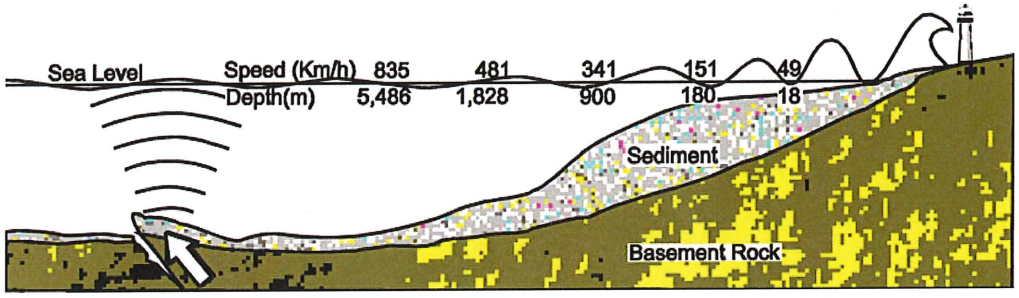


Figure 1- 7. Tsunami waves increase in shallower water.

Lake flooding

Lake shores can flood in ways similar to ocean coasts. Along the Great Lakes, severe storms can produce waves and cause shoreline erosion. FEMA is starting to map Great Lakes flooding with the same techniques it uses for ocean coastal flooding.

SHALLOW FLOODING

Shallow flooding occurs in flat areas where a lack of channels means water cannot drain away easily. Shallow flood problems fall into three categories: sheet flow, ponding and urban drainage.

Sheet flow

Where there are inadequate or no defined channels, floodwater spreads out over a large area at a somewhat uniform depth in what's called sheet flow.

Sheet flows occur after an intense or prolonged rainfall during which the rain cannot soak into the ground. During sheet flow, the floodwaters move downhill and cover a wide area.

Ponding

In some flat areas, runoff collects in depressions and cannot drain out, creating a ponding effect. Ponding floodwaters do not move or flow away. Floodwaters will remain in the temporary ponds until they infiltrate into the soil, evaporate or are pumped out.

Ponding is especially a problem in glaciated areas, where glaciers carved out depressions; in areas where caves and sinkholes are common, and in other areas where man-made features, such as roads and railroad embankments, have blocked outlets.

Urban drainage

An urban drainage system comprises the ditches, storm sewers, retention ponds and other facilities constructed to store runoff or carry it to a receiving stream, lake or the ocean. Other man-made features in such a system include yards and swales that collect runoff and direct it to the sewers and ditches.

When most of these systems were built, they were typically designed to handle the amount of water expected during a 10-year storm. Larger storms overload them, and the resulting backed-up sewers and overloaded ditches produce shallow flooding.

Another urban drainage problem occurs in the areas protected by levees. Being in floodplains, they are flat and don't drain naturally, especially when a levee blocks the flow to the river.

To drain these areas, channels have been built and pumps installed to mechanically move the water past the levee. Often, these man-made systems do not have the capacity to handle heavy rains or intense storms.

SPECIAL FLOOD HAZARDS

The flooding types described so far are the more common types found in the United States. There are many special local situations in which flooding or flood-related problems do not fit the national norm.

This section discusses five of those special flood hazards:

- Closed basin lakes
- Uncertain flow paths.
- Dam breaks.
- Ice jams.
- Mudflows.

Closed basin lakes

There are two types of closed basin lake:

- Lakes with no outlets, like the Great Salt Lake, Utah, Devil's Lake, North Dakota, and the Salton Sea, California; and
- Lakes with inadequate, regulated or elevated outlets, such as the Great Lakes and many glacial lakes.

Seasonal increases in rainfall cause a closed basin lake's level to rise faster than it can drain. As a result, they are subject to large fluctuations in water surface elevation. Floodwaters in closed basin lakes may stay up for weeks, months or even years.

The long periods of high water make closed basin lake flooding particularly problematic. Properties may not be heavily damaged, but they are unusable for long periods because they are surrounded by—or under—water. Buildings are isolated and septic fields are unusable. Properties are exposed to waves (and sometimes ice) that add to the hazard.

Uncertain flow paths

The section on riverine erosion explained that stream channels change their locations gradually or only after very large and rare floods. However, in some areas of the country, *every* flood may change channels.

For example, in mountainous areas, high-velocity floodwater picks up sediment and rock. At the base of the valley where the slope flattens out, the floodwater decreases in speed and spreads out, as in a sheet flow, dropping sediment and rock over a fan-shaped area called an alluvial fan.

Figure 1-8 shows how an alluvial fan can have numerous channels. During the next flood, the channels may be in different locations.

Alluvial fan flooding is more common in the mountainous western states, where there is less ground cover and more opportunity for erosion.

Alluvial fan floods are not as predictable as riverine floods—one never knows where the floodwaters will spread out across the fan. Thus, they pose three hazards:

- Velocity of floodwaters and the debris they carry.
- Sediment and debris deposited by the floodwaters.
- The potential for the channel to move across the fan during the flood.

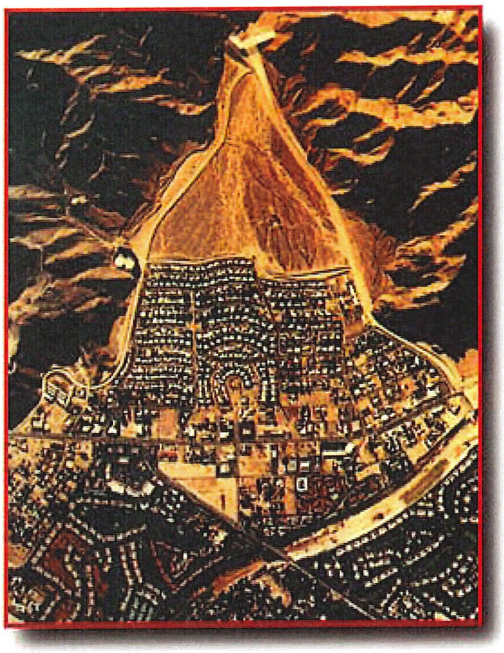


Figure 1-8. An alluvial fan can have numerous channels.

The arid west is subject to another type of flooding that features uncertain flow paths, known as movable stream beds.

When a high-velocity flood runs through an area with sand or loose soil, the erosion and sedimentation can occur so fast that the stream channel can be lowered, filled in or relocated through processes known as degradation, aggradation and migration. In some cases, these processes may occur simultaneously, or one process may occur in one flood and another process in a later event.

Dam breaks

A break in a dam can produce an extremely dangerous flood situation because of the high velocities and large volumes of water released by such a break. Sometimes they can occur with little or no warning on clear days when people are not expecting rain, much less a flood.

Breaching often occurs within hours after the first visible signs of dam failure, leaving little or no time for evacuation. (As noted in the earlier section on flash flooding, three of the four top killer floods in the 1970s were related to the failure of a dam or dam-like structure.)

Dam breaks occur for one of three reasons:

- The foundation fails due to seepage, settling or earthquake.
- The design, construction, materials or operation were deficient.

- Flooding exceeds the capacity of the dam's spillway.

Proper design can prevent dam breaks. While dam safety programs can ensure that new dams are properly designed, there are still many private or locally built dams that were poorly designed and maintained.

Ice jams

Ice jam flooding generally occurs when warm weather and rain break up frozen rivers or any time there is a rapid cycle of freezing and thawing.

The broken ice floats downriver until it is blocked by an obstruction such as a bridge or shallow area (Figure 1-9). An ice dam forms, blocking the channel and causing flooding upstream.

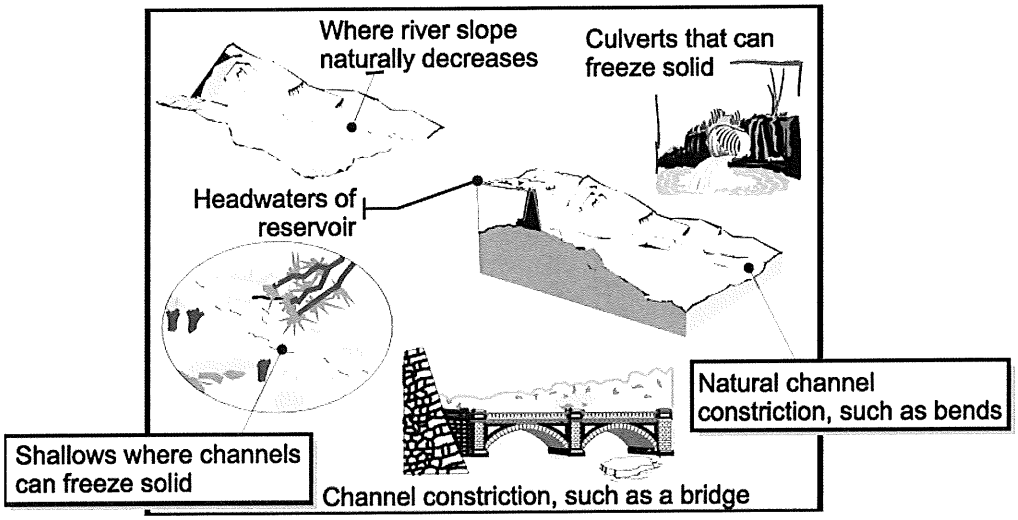


Figure 1-9. Likely Ice Jam Areas

Ice jams present three hazards:

- Sudden flooding of areas upstream from the jam, often on clear days with little or no warning.
- Movement of ice chunks (floes) that can push over trees and crush buildings (see Figure 1-18).
- Sudden flooding of areas downstream when an ice jam breaks. The impact is similar to a dam break, damaging or destroying buildings and structures.

Mudflow

A mudflow is a type of landslide that occurs when runoff saturates the ground. Soil that is dry during dry weather turns into a liquid solution that slides downhill.

They typically cause more damage than clear-water flooding due to the combination of debris and sediment, and the force of the debris-filled water.

The NFIP officially defines a "mudslide (i.e. mudflow)" as "a condition where there is a river, flow or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover, and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain." The NFIP provides flood insurance coverage for mudslides that meet this definition, but does not map or require floodplain management measures in these areas.

What many people view as mudfloods are technically landslides and are not covered by the NFIP.

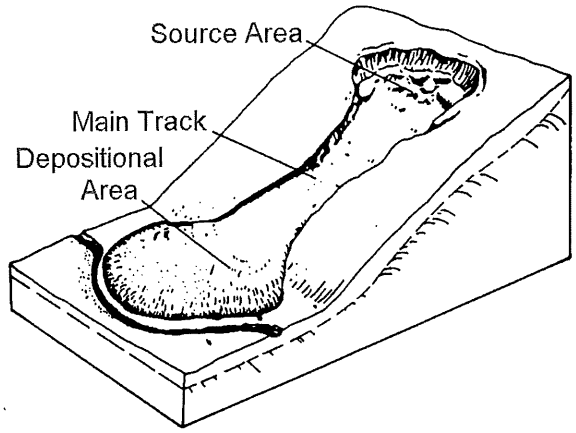


Figure 1-10. Mudflows are caused by saturated soil

NATURAL AND BENEFICIAL FLOODPLAIN FUNCTIONS

Floodplain lands and adjacent waters combine to form a complex, dynamic physical and biological system found nowhere else. When portions of floodplains are preserved in their natural state, or restored to it, they provide many benefits to both human and natural systems.

Some are static conditions—such as providing aesthetic pleasure—and some are active processes, such as reducing the number and severity of floods, helping handle stormwater runoff and minimizing non-point water pollution. For example, by allowing floodwater to slow down, sediments settle out, thus maintaining water quality. The natural vegetation filters out impurities and uses excess nutrients.

Such natural processes cost far less money than it would take to build facilities to correct flood, stormwater, water quality and other community problems.

Natural resources of floodplains fall into three categories: water resources, living resources and societal resources. The following sections describe each category's natural and beneficial functions.

Natural flood and erosion control

Over the years, floodplains develop their own ways to handle flooding and erosion with natural features that provide floodwater storage and conveyance, reduce flood velocities and flood peaks, and curb sedimentation.

Natural controls on flooding and erosion help to maintain water quality by filtering nutrients and impurities from runoff, processing organic wastes and moderating temperature fluctuations.

These natural controls also contribute to recharging groundwater by promoting infiltration and refreshing aquifers, and by reducing the frequency and duration of low surface flows.

Biologic resources and functions

Floodplains enhance biological productivity by supporting a high rate of plant growth. This helps to maintain biodiversity and the integrity of ecosystems.

Floodplains also provide excellent habitats for fish and wildlife by serving as breeding and feeding grounds. They also create and enhance waterfowl habitats, and help to protect habitats for rare and endangered species.

Societal resources and functions

People benefit from floodplains through the food they provide, the recreational opportunities they afford and the scientific knowledge gained in studying them.

Wild and cultivated products are harvested in floodplains, which are enhanced agricultural land made rich by sediment deposits. They provide open space, which may be used to restore and enhance forest lands, or for recreational opportunities or simple enjoyment of their aesthetic beauty.

Floodplains provide areas for scientific study and outdoor education. They contain cultural resources such as historic or archaeological sites, and thus provide opportunities for environmental and other kinds of studies.

These natural resources and functions can increase a community's overall quality of life, a role that often has been undervalued. By transforming stream and river floodplains from problem areas into value-added assets, the community can improve its quality of life.

Parks, bike paths, open spaces, wildlife conservation areas and aesthetic features are important to citizens. Assets like these make the community more appealing to potential employers, investors, residents, property owners and tourists.



Figure 1-11 Floodplains offer recreation and aesthetic benefits.

B. FLOODPLAIN DEVELOPMENT

Throughout time, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water—either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream.

Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of the United States, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands.

This pattern of development continued as communities grew. In recent decades, development along waterways and shorelines has been spurred by the aesthetic and recreational value of these sites.

Because floodplains have attracted people and industry, a substantial portion of this country's development is now subject to flooding. Floodplains account for only seven percent of the nation's total land area. However, they contain a tremendous amount of property value. It is estimated that there are 8 – 10 million households in our floodplains.

Two problems result from floodplain development:

- Development alters the floodplain and the dynamics of flooding.
- Buildings and infrastructure are damaged by periodic flooding.

FLOODPLAIN DEVELOPMENT DYNAMICS

Human development can have an adverse impact on floods and floodplains. Three types of problems are reviewed here.

Riverine floodplains

The most obvious impact of development on riverine flooding comes with moving or altering channels or constructing bridges and culverts with small openings. Construction and regrading of the floodplain can obstruct or divert water to other areas. Levees and dikes are the best known examples of this, but even small construction projects have an impact (Figure 1-12).

Filling obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater velocity.

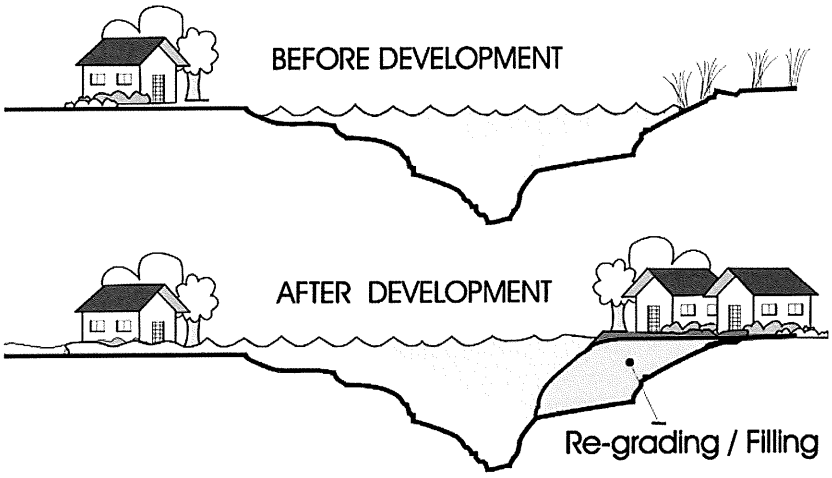


Figure 1-12. Effects of development on a riverine floodplain

Watersheds

Development in riverine watersheds affects the runoff of stormwater and snowmelt. Buildings and parking lots replace the natural vegetation which used to absorb water. When rain falls in a natural setting, as much as ninety percent of it will infiltrate the ground; in an urbanized area, as much as ninety percent of it will run off (Figure 1-13).

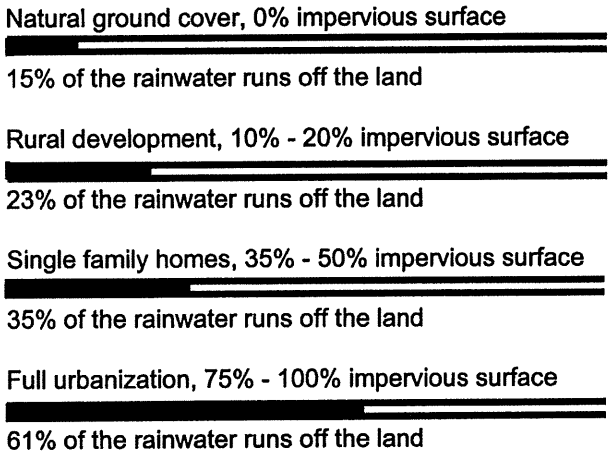


Figure 1-13. Effects of development on stormwater runoff. (Data for Northeastern Illinois)

Urban features alter flood dynamics as well. Storm sewers and more efficient ditches that come with urban drainage systems speed flood flows. The result of urbanization is that there is more runoff in the watershed and it moves faster, increasing flooding downstream. Thus, a 10-year storm may produce the runoff equivalent of a 25-year storm, overloading the man-made drainage system.

Urbanization also changes the timing of flows along the tributaries. If one subwatershed develops faster than another, the flood will leave sooner than it used to, possibly arriving at the main channel at the same time as the peak arrives from another tributary, causing increased flooding downstream.

Coasts

Coastal development similarly affects the dynamics of coastal flooding. Removing the sand from beaches and dunes removes the natural barrier built up by flood forces over the years and exposes inland areas to increased risk of flooding.

Coastal erosion is affected by construction of navigation channels, breakwaters, and jetties, and mining of sand. Often construction of barriers, seawalls, or even sandbag walls to protect buildings from flooding or erosion has an adverse affect on properties at the end of the walls where erosion is accelerated.

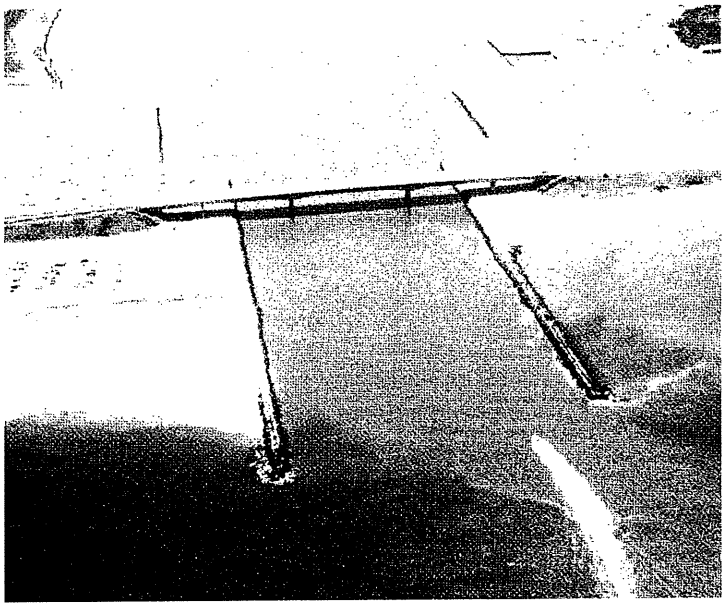


Figure 1-14. Jetties to protect a navigation inlet affect sand accumulation and erosion.

FLOOD DAMAGE

Floodplains are home to between 8 and 10 million households. In an average year, floods kill 150 people and cause over $6 billion in property damage. Nationally, average annual flood losses continue to increase.

Floods can hurt or kill people, and damage property, in several ways. Knowing the impact of a potential hazard—and guarding against it—is integral to administering a floodplain management program.

As a floodplain management administrator, you need to be knowledgeable about the five main causes of flood damage:

- Hydrodynamic forces
- Debris impact
- Hydrostatic forces
- Soaking
- Sediment and contaminants

Hydrodynamic forces

Moving water creates a hydrodynamic force which can damage a building's walls in three ways (see Figure 1-15):

- Frontal impact, as water strikes the structure.
- Drag effect, as water runs along the sides of a structure.
- Eddies or negative pressures, created as water passes the downstream side.

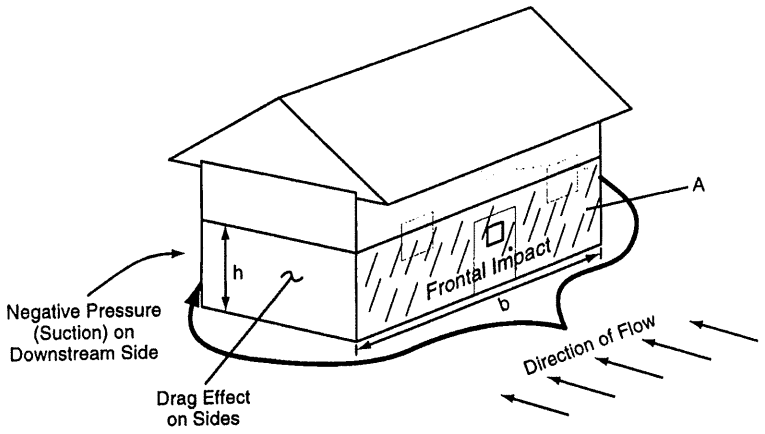


Figure 1-15. Hydrodynamic forces on a building.

The speed of moving water is called velocity, a force that is measured in feet per second. The faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building's foundation.

Floodwaters moving faster than 5 feet per second comprise a high-velocity flood, requiring special design considerations for buildings, roads, bridges and other manmade structures in its path.

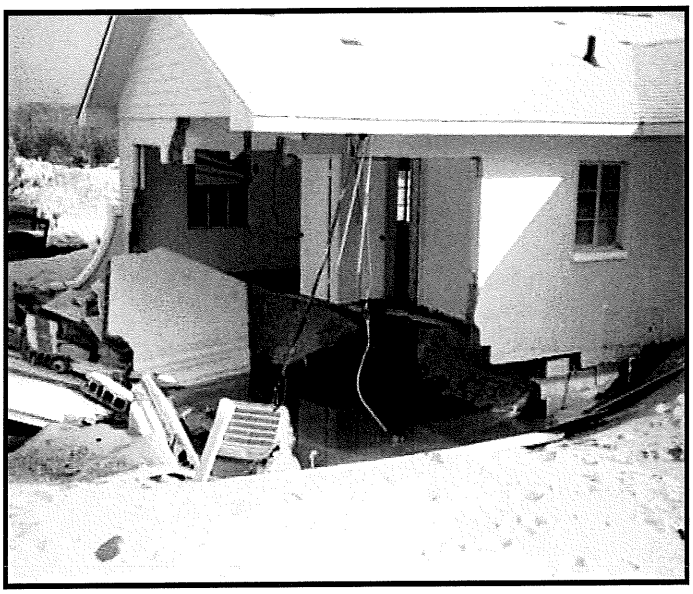


Figure 1-16. Beaches are particularly susceptible to undermining of foundations due to velocity flows.

While velocity is one factor in determining the potential harm of a flood, the total impact of moving water is related to the depth of the flooding. Studies have shown that deep water and low velocities can cause as much damage as shallow water and high velocities.

People are more susceptible to damage than buildings: Studies have shown that it doesn't take much depth or velocity to knock a person over. Thus, no areas with moving floodwater can be considered safe for walking (Figure 1-17).

A car will float in only two feet of moving water, which is one reason floods kill more people trapped in vehicles than anywhere else. Often victims put themselves in perilous situations by ignoring warnings about travel or mistakenly thinking that a washed-out bridge is still open.



Figure 1-17. Even shallow floodwaters can stop cars and wash people off their feet

Debris impact

Debris also increases the hazard posed by moving water. Floodwaters can and will pick up anything that will float—logs, lumber, ice, even propane tanks and vehicles (Figure 1-18). Moving water will also drag or roll objects that don't float. All of this debris acts as battering rams that can knock holes in walls.



Figure 1-18. Ice floes and other large items of debris can crush a house

Hydrostatic forces

The weight of standing water puts hydrostatic pressure on a structure. The deeper the water, the more it weighs and the greater the hydrostatic pressure.

Because water is fluid, it exerts the same amount of pressure sideways (lateral pressure) as it does downward. As water gets deeper, it exerts more lateral pressure than shallow water.

Most walls are not built to withstand lateral pressure. Studies and tests have shown that the lateral force presented by three feet of standing water can be enough to collapse the walls of a typical frame house.

Basement walls and floors are particularly susceptible to damage by hydrostatic pressure. Not only is the water deeper, a basement is subjected to the combined weight of water and saturated earth. Water in the ground underneath a flooded building will seek its own level – resulting in uplift forces that can break a concrete basement floor (Figure 1-19).



Figure 1-19. This basement floor broke from hydrostatic pressure

Hydrostatic pressure can also cause damage due to floatation or buoyancy. Improperly anchored buildings can float off their foundations and empty in-ground storage tanks can pop out of the ground even forcing their way through several inches on concrete.

Soaking

When soaked, many materials change their composition or shape.

Wet wood will swell, and if it is dried too fast it will crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture may get so badly warped that it can't be used. Other furnishings, such as upholstery, carpeting, mattresses and books, usually are not worth drying out and restoring. Electrical appliances and gasoline engines won't work safely until they are professionally dried and cleaned.

Sediment and contaminants

Many materials, including wood and fiberglass or cellulose insulation, absorb floodwater and its sediment. Even if allowed to dry out, the materials will still hold the sediment, salt and contaminants brought by the flood. Simply letting a flooded house dry out will not render it clean—and it certainly will not be as healthy a place as it was before the flood.

Few floods, especially those that strike inland, have clear floodwater, and so they leave a mess made of natural and man-made debris. Stormwater, snowmelt and river water pick up whatever was on the ground, such as soil, road oil, and farm and lawn chemicals. If a wastewater treatment plant upstream was inundated, the floodwaters will likely include untreated sewage.

Especially in the arid west and coastal areas, flooding can leave large amounts of sand, sediment and debris (Figure 1-20) that require major cleanup efforts. After the water recedes or evaporates, these sediments are left on and in a building, and its contents.

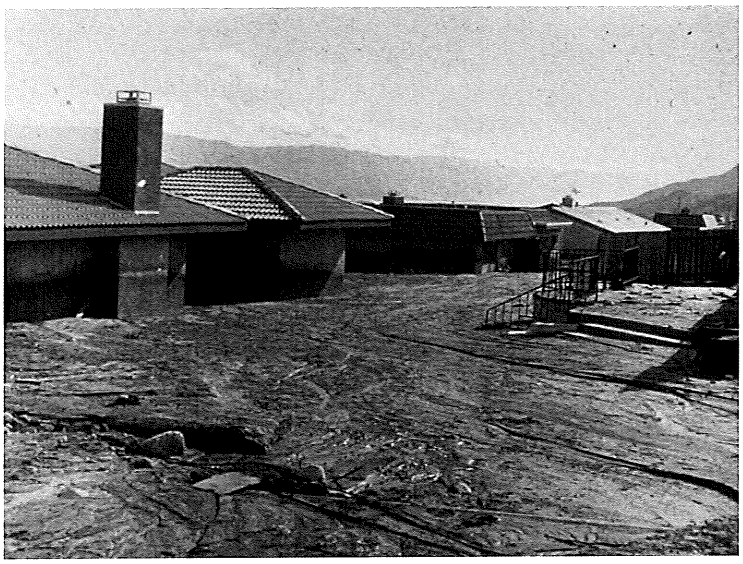


Figure 1-20. Debris flows can completely fill a house with sediment

SAFETY AND HEALTH HAZARDS

Floods pose a variety of hazards as they build, crest and subside. At different points in the life of a flood, people are displaced, damage occurs and finally a cleanup can begin. Disruption of normal public utilities and the presence of flood debris and damage can produce safety and health hazards.

When utilities are damaged, hazards arise. Electrocution is the second most frequent cause of flood deaths, claiming lives in a flooded area that is carrying a live current created when electrical components short. Floods also can damage gas lines, floors and stairs, creating secondary hazards such gas leaks and unsafe structures. If the water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

Fire can be a result of too much water: floods can break gas lines, extinguish pilot lights, and short circuit electrical wiring – causing conditions ripe for a fire. Fire equipment may not be able reach a burning building during high water.

Floods bring and leave health hazards in the form of animal carcasses, garbage and ponds that can become breeding grounds for germs and mosquitoes. Any flooded items that come in close contact with people must be thrown out, including such things as food, cosmetics, medicines, stuffed animals and baby toys. Clothes and dishes need to be washed thoroughly.

Mold, mildew and bacteria grow in damp, flooded areas. One health hazard occurs when heating ducts in a forced-air system are not properly cleaned following inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

Flooding, especially repetitive flooding, takes a toll on people's mental health. Stress comes from facing the loss of time, money, property and personal possessions such as heirlooms. This is aggravated by fatigue during cleanup and anxiety over lost income, health risks and damage to irreplaceable items.

Children and the elderly are especially susceptible to stress from the disruption of their daily routines.

C. FLOODPLAIN MANAGEMENT

The strategies and tools available to prevent problems and protect people and development from flooding have been developed over many years. A short history of U.S. policy on floodplain management will help explain their evolution.

EVOLUTION

The federal government got involved in floodplain management in the 1800s, when it had an interest in maintaining the navigability of rivers to facilitate interstate commerce. The great Mississippi River flood of 1927 led the federal government to become a major player in flood control.

As defined by the Flood Control Acts of 1928 and 1936, the role of government agencies was to build massive flood control structures to control the great rivers, protect coastal areas and prevent flash flooding. The 1936 act alone authorized construction of some 250 projects for both flood control and relief work.

Until the 1960's, such structural flood control projects were seen as the primary way to reduce flood losses. Public policy emphasized that flood losses could be curbed by controlling floodwater with structures, such as dams, levees and floodwalls. But people began to question the effectiveness of this single solution. Disaster relief expenses were going up, making all taxpayers pay more to provide relief to those with property in floodplains. Studies during the 1960s concluded that flood losses were increasing, in spite of the number of flood control structures that had been built.

One of the main reasons structural flood control projects failed to reduce flood losses was that people continued to build in floodplains. In response, federal, state and local agencies began to develop policies and programs with a "non-structural" emphasis, ones that did not prescribe projects to control or redirect the path of floods. Since the 1960s, floodplain management has evolved from heavy reliance on flood control, or structural measures, to one using a combination of many tools.

The creation of the National Flood Insurance Program in 1968 was a landmark step in this evolution. The NFIP:

- Established an insurance program as an alternative to disaster relief.
- Distributed responsibility for floodplain management to all levels of government and the private sector.
- Set a national standard for regulating new development in floodplains.
- Began a comprehensive floodplain mapping program.

Also during the 1960s and 1970s, interest increased in protecting and restoring the environment, including the natural resources and functions of floodplains. Coordinating flood-loss reduction programs with environmental protection and watershed management programs has since become a major goal of federal, state and local programs.

As a result of this evolution, we no longer depend solely on structural projects to control floodwater. U.S. floodplain policies are now multi-purpose and result in a mix of solutions to suit many situations. Consequently, administrators like you have several non-structural flood protection measures at their disposal. They include:

- Regulations to prohibit development in high-hazard areas.
- Building codes requiring flood-resistant construction for new buildings in floodprone areas.
- Acquisition and relocation of buildings in high hazard areas.
- Modifying or retrofitting existing buildings.
- Installing flood warning systems.
- Controlling stormwater runoff.
- Providing self-help advice to property owners.

THE UNIFIED NATIONAL PROGRAM FOR FLOODPLAIN MANAGEMENT

To coordinate the efforts of the many government programs that can affect flooding or floodplain development, Congress created the Unified National Program for Floodplain Management under the National Flood Insurance Act of 1968.

The Unified National Program sets forth a conceptual framework for coordinating the floodplain management efforts of federal, state and local agencies as well as private parties.

The program is coordinated by a Federal Interagency Floodplain Management Task Force made up of federal agencies that are involved in flooding, or with development that can be affected by flooding.

The Task Force defines "floodplain management" as "a decision-making process that aims to achieve the wise use of the nation's floodplains." "Wise use" means both reduced flood losses *and* protection of the natural resources and functions of floodplains.

Where floodplain development is permitted, floodplain management results in development and construction measures that minimize the risk to life and property from floods and the risk to the floodplain's natural functions posed by human development.

Strategies and tools

The Task Force has identified four floodplain management strategies for reducing the human economic losses from flooding as well as minimizing the losses of natural and beneficial floodplain resources. Each strategy is supported by an array of tools which are summarized in the rest of this section.

Many of the tools can be used in more than one strategy.

In most cases, a combination of these tools is needed to reduce risks and protect natural resources and functions. Because floodplain management is a process, there is no one "best" set of tools or one single "wise use" of the floodplain.

The important message from this definition of floodplain management is to consider all the options and account for both the hazard and the natural values before developing or implementing any action that will change the floodplain.

FLOODPLAIN MANAGEMENT STRATEGIES

Strategy 1: Modify human susceptibility to flood damage

Reduce disruption by avoiding hazardous, uneconomic or unwise use of floodplains.

Tools include:

- Regulating floodplain use by using zoning codes to steer development away from hazardous areas or natural areas deserving preservation, establishing rules for developing subdivisions, and rigorously following building, health and sanitary codes.
- Establishing development and redevelopment policies on the design and location of public services, utilities and critical facilities.
- Acquiring land in a floodplain in order to preserve open space and permanently relocate buildings.
- Elevating or floodproofing new buildings and retrofitting existing ones.
- Preparing people and property for flooding through forecasting, warning systems and emergency plans.
- Restoring and preserving the natural resources and functions of floodplains.

Strategy 2: Modify the impact of flooding

Assist individuals and communities to prepare for, respond to and recover from a flood.

Tools include:

- Providing information and education to assist self-help and protection measures.
- Following flood emergency measures during a flood to protect people and property.
- Reducing the financial impact of flooding through disaster assistance, flood insurance and tax adjustments.
- Preparing post-flood recovery plans and programs to help people rebuild and implement mitigation measures to protect against future floods

Strategy 3: Modify flooding itself

Develop projects that control floodwater.

Tools include:

- Building dams and reservoirs that store excess water upstream from developed areas.
- Building dikes, levees and floodwalls to keep water away from developed areas.
- Altering channels to make them more efficient, so overbank flooding will be less frequent.
- Diverting high flows around developed areas.
- Treating land to hold as much rain as possible where it falls, so it can infiltrate the soil instead of running off.
- Storing excess runoff with on-site detention measures.
- Protecting inland development with shoreline protection measures that account for the natural movement of shoreline features.
- Controlling runoff from areas under development outside the floodplain.

Strategy 4: Preserve and restore natural resources

Renew the vitality and purpose of floodplains by reestablishing and maintaining floodplain environments in their natural state.

Tools include:

- Floodplain, wetlands and coastal barrier resources or land use regulations, such as zoning, can be used to steer development away from sensitive or natural areas.
- Development and redevelopment policies on the design and location of public services, utilities and critical facilities.
- Land acquisition; open space preservation; permanent relocation of buildings; restoration of floodplains and wetlands, and preservation of natural functions and habitats.
- Information and education to make people aware of natural floodplain resources and functions and how to protect them.
- Tax adjustments to provide a financial initiative for preserving lands or restoring lands to their natural state.
- Beach nourishment and dune building to protect inland development by maintaining the natural flood protection features.

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 DUTY AND DUE DILIGENCE
Date:	Thursday, February 25, 2021 1:24:12 PM

Dear Mayor and City Council,

A few times now, I have listened to Tom Terrell and Judy Stalder tell Zoning and Planning Commissioners and now City Council what their job is and is not. As this led me to look up the ZnP's duties, I started looking for the same that applies to you.

from High Point's website:
" The City Council is the Governing Body of the City. On behalf of the City, and in conformity with applicable laws, the Council provides for the exercise of all municipal powers, and is charged with the general government of the City by setting and directing policy."

ARTICLE II - Mayor and Council

Sec. 2.1. - Governing body.

The mayor and council shall be the governing body of the city. On behalf of the City, and in conformity with applicable laws, the mayor and council shall provide for the exercise of all municipal powers, and shall be charged with the general government of the city.

Oath of Office:
I, council member, do solemnly swear (or affirm) that I will support, uphold and defend the Constitution of the United States of America, and the laws thereof; that I will support, uphold and defend the Constitution and laws of the State of North Carolina, not inconsistent therewith and that I will faithfully discharge the duties of the Office of Council Member according to the best of my skill and ability, so help me God.

Since the oath says that you are bound to uphold federal and state constitutions, laws, and local ordinances, here are just a few that pertain to ZA-20-20:

LOCALLY: **ALL** OF SECTION 6:

6.2.1. - Purpose and Intent

These watershed protection standards are established in accordance with the requirements in the North Carolina General Statutes Sections 143-214.5 through 143-214.7 related to water supply watershed protection. They are intended to regulate residential density and impervious surface cover in water supply watershed drainage areas to control non-point source water pollution and protect drinking water quality.

STATE:
Article 21. Water and Air Resources, GS 143-211

§ 143-211. Declaration of public policy.

(a) It is hereby declared to be the public policy of this State to provide for the conservation of its water and air resources. Furthermore, it is the intent of the General Assembly, within the context of this Article and Articles 21A and 21B of this Chapter, to achieve and to maintain for the citizens of the State a total environment of superior quality. Recognizing that the water and air resources of the State belong to the people, the General Assembly affirms the State's ultimate responsibility for the preservation and development of these resources in the best interest of all its citizens and declares the prudent utilization of these resources to be essential to the general welfare.

(excerpt, BUT ALL OF IT IS IMPORTANT!)
15A NCAC 02B .0216 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-IV WATERS The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-IV. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section shall also apply to Class WS-IV waters.
(1) The best usage of waters classified as WS-IV shall be as a source of water supply for drinking, culinary, or food-processing purposes for those users where a more protective WS-I, WS-II or WS-III classification is not feasible as determined by the Commission in accordance with Rules .0212 through .0215 of this Section and any other best usage specified for Class C waters.
(2) The best usage of waters classified as WS-IV shall be maintained as follows:
(e) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.

15A NCAC 02B .0250 RANDLEMAN LAKE WATER SUPPLY WATERSHED: PROTECTION AND MAINTENANCE OF EXISTING RIPARIAN BUFFERS

§ 113A-3. Declaration of State environmental policy. The General Assembly of North Carolina, recognizing the profound influence of man's activity on the natural environment, and desiring, in its role as trustee for future generations, to assure that an environment of high quality will be maintained for the health and well-being of all, declares that it shall be the continuing policy of the State of North Carolina to conserve and protect its natural resources and to create and maintain conditions under which man and nature can exist in productive harmony. Further, it shall be the policy of the State to seek, for all of its citizens, safe, healthful, productive and aesthetically pleasing surroundings; to attain the widest range of beneficial uses of the environment without degradation, risk to health or safety; and to preserve the important historic and cultural elements of our common inheritance. (1971, c. 1203, s. 3.)

North Carolina Constitution
Article XIV MISC

Sec. 5. Conservation of natural resources.

It shall be the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry, and to this end it shall be a proper function of the State of North Carolina and its political subdivisions to acquire and preserve park, recreational, and scenic areas, to control and limit the pollution of our air and water, to control excessive noise, and in

every other appropriate way to preserve as a part of the common heritage of this State its forests, wetlands, estuaries, beaches, historical sites, openlands, and places of beauty. To accomplish the aforementioned public purposes, the State and its counties, cities and towns, and other units of local government may acquire by purchase or gift properties or interests in properties which shall, upon their special dedication to and acceptance by a law enacted by a vote of three-fifths of the members of each house of the General Assembly for those public purposes, constitute part of the 'State Nature and Historic Preserve,' and which shall not be used for other purposes except as authorized by law enacted by a vote of three-fifths of the members of each house of the General Assembly. The General Assembly shall prescribe by general law the conditions and procedures under which such properties or interests therein shall be dedicated for the aforementioned public purposes. (1971, c. 630, s. 1; S.L. 1999-268, ss 3-5; S.L. 2001-217, s. 3; S.L. 2002-3 Extra Session.)

§ 143-152. Injury to water supply misdemeanor.

If any person shall in any way intentionally or maliciously damage or obstruct any waterline of any public institution, or in any way contaminate or render the water impure or injurious, he shall be guilty of a Class 1 misdemeanor

FEDERAL:

Federal Water Pollution Control Act aka(Clean Water Act)
Toxic Substance Control Act
Safe Drinking Water Act
Emergency Planning and Community Right to Know Act aka (SARAIII)

The bottom line is this.

If City Council is taxed with the DUTY of voting on LANDUSE and ZONING AMENDMENTS, and LANDUSE is the NUMBER ONE TOOL in Watershed Protection and Mitigation of Floodwaters, HOW is the consideration of protection and mitigation "not your job"?
I would also like to add that the City Attorney is JoAnne Carlyle, not private citizens and not representatives of development companies.

Sincerely,
Vesta Kennedy

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 Applicable Standards re: Conditional Zoning Districts
Date:	Thursday, February 25, 2021 1:52:21 PM

Dear Mayor and City Council,

Please consider the following local ordinance:

PART C. That Section 3.6.4., Applicable Standards, regarding Conditional Zoning Districts, is hereby amended as follows: Development in a conditional zoning district shall be subject to all the use and development standards and requirements that apply to development in the parallel general zoning district, plus any conditions imposed and agreed to as part of the conditional zoning approval (including a conditional zoning plan, if provided), which may not be less restrictive than the regulations for the parallel general zoning district.

Would this not apply to to the rezoning of 1809 and 1801 Eastchester Drive request?

The parcel at 1809 is currently CU OI.
The parcel at 1801 is currently R-3.

Changing the zoning to be CU GB for either of these properties would be a LOT less restrictive for the parallel general zoning districts. The use and development standards and requirements are vastly different.
How can this request be in keeping with this ordinance?

Sincerely,
Vesta Kennedy

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20, pics of stream 27392 catchment basin, and under bridge at dam
Date:	Friday, February 26, 2021 3:45:22 PM

Dear Mayor and City Council,

Attached please find pictures of the perennial stream associated with 27392 catchment basin and its path to the West Fork of Deep River at the Foxwood Meadows development. The bridge underpass you see is the Eastchester Drive bridge. This stream is one of many that dump into the West Fork at or near Foxwood Meadows. On the same side of perennial stream of 27392, Boulding Branch comes in a little south of the neighborhood. On the opposite side of Foxwood Meadows, an unnamed tributary and NC Stream #18 add to the floodwaters.

The pictures you see do not do the amount of water that comes through the West Fork and the neighborhood justice. PLEASE consider this dangerous flooding happening to the elderly and young families that live there, and do not allow any more quantity and degraded quality of water to be added by impervious surfaces.

Thank you,
Vesta Kennedy

Sent from my Galaxy

Sent from my Galaxy
















BRITTANY
TOYA BF
ZONED








TOYA



From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 traffic
Date:	Friday, February 26, 2021 4:29:15 PM

Dear Mayor and City Council,

Thank you for your continued time and attention to ZA-20-20.

I am writing to express my concerns about the public safety issue of traffic in regards to this rezoning request; specifically, the volume, speeds, and motorists' ability to follow direction.

I appreciate the fact that a convenience store with gas pumps and car wash has been taken off the list as possible uses. However, it has been indicated by Judy Stalder via email, that BRC Spirit still hopes to develop more than one use on these sites. I don't see how this will not increase the volume of traffic to the same level of intensity that a gas station would. My most recent p2c.highpointnc.com revealed 128 accidents within 1 mile of 1809 Eastchester Drive from 1/1/20 to 12/31/20.

Motorists completely ignore the construction 35 mph speed. It has been over 6 months since the cloverleaf was reconfigured and EVERYDAY people still try to take a left to enter I-74 southbound. People just don't follow direction.
This leads me to surmise that westbound motorists, thinking that they will be exiting to I-74 North, will get in the far right lane and find themselves in the turn only lane for Cypress. MOST will then try to come back over into the correct lane for entering the highway; not following through with their initial action, and causing even more accidents.
I also anticipate northbound I-74 motorists exiting onto eastbound Eastchester Dr in one of the 2 righthand turn lanes, won't know to be in the far left righthand turn lane in order to safely get into the immediate left hand turn lane at the light to turn onto Cypress Ct. Boggles the mind just writing it, much less navigating it in a vehicle when no one is following speed limits.
Making the taper and median as long as possible will not address these issues.

Please consider once this is rezoned, the say and permission is gone for good. What if the fast food uses are Starbucks or Chk-Fil-A?
BOTH the recently reconfigured N. Main Chk-Fil-A and the recent Starbucks had site plans that were approved. I am sure businesses do their best to get their patrons to comply and be safe while waiting in line, but the back up on Main Street occurs EVERYDAY ALL DAY!

Please consider public safety and vote against this rezoning. A restaurant IS ALREADY allowed under the current zoning; PLEASE don't allow a drive thru to be part of it.

Sincerely,
Vesta Kennedy

From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20 current flow of water
Date:	Friday, February 26, 2021 5:01:54 PM
Attachments:	Screenshot_20210128-202019.png Screenshot_20210128-201900.png Screenshot_20210128-202217.png Screenshot_20210128-202825.png Screenshot_20210128-202642.png

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Dear Mayor and City Council,

Attached please find screenshots from The Point, showing the current flow of water on 1801 and 1809 Eastchester Drive. As you may recall, the sites also sit in CWA Tiers 2 and 3 of Oak Hollow.

Allowing landowners to grade their land to change watershed classification should not be allowed. This is a loophole in current statutes, violating the Clean Water Act and the Safe Drinking Water Act. The petition to the NC Environmental Commission is underway to close this loophole.

The natural flow of water is vital to Watershed Protection and Floodplain Management. Previously sent documents state LAND USE is the number one tool in both of these.

Please consider Oak Hollow's Water Table in making this decision. One of the engineered approaches may be a dry retention pond underneath the site, as the point of discharge is catchment basin 27392, and we already know that is in a floodplain (so digging out for water mitigation violates state and federal regulation) and contributes to Foxwood Meadow's flooding.

Please vote against this rezoning. Planning and Zoning Staff and Commissioners understand the
topographical restraints at these sites.

Thanks again for your time and consideration,
Vesta Kennedy

Shared via the AOL App

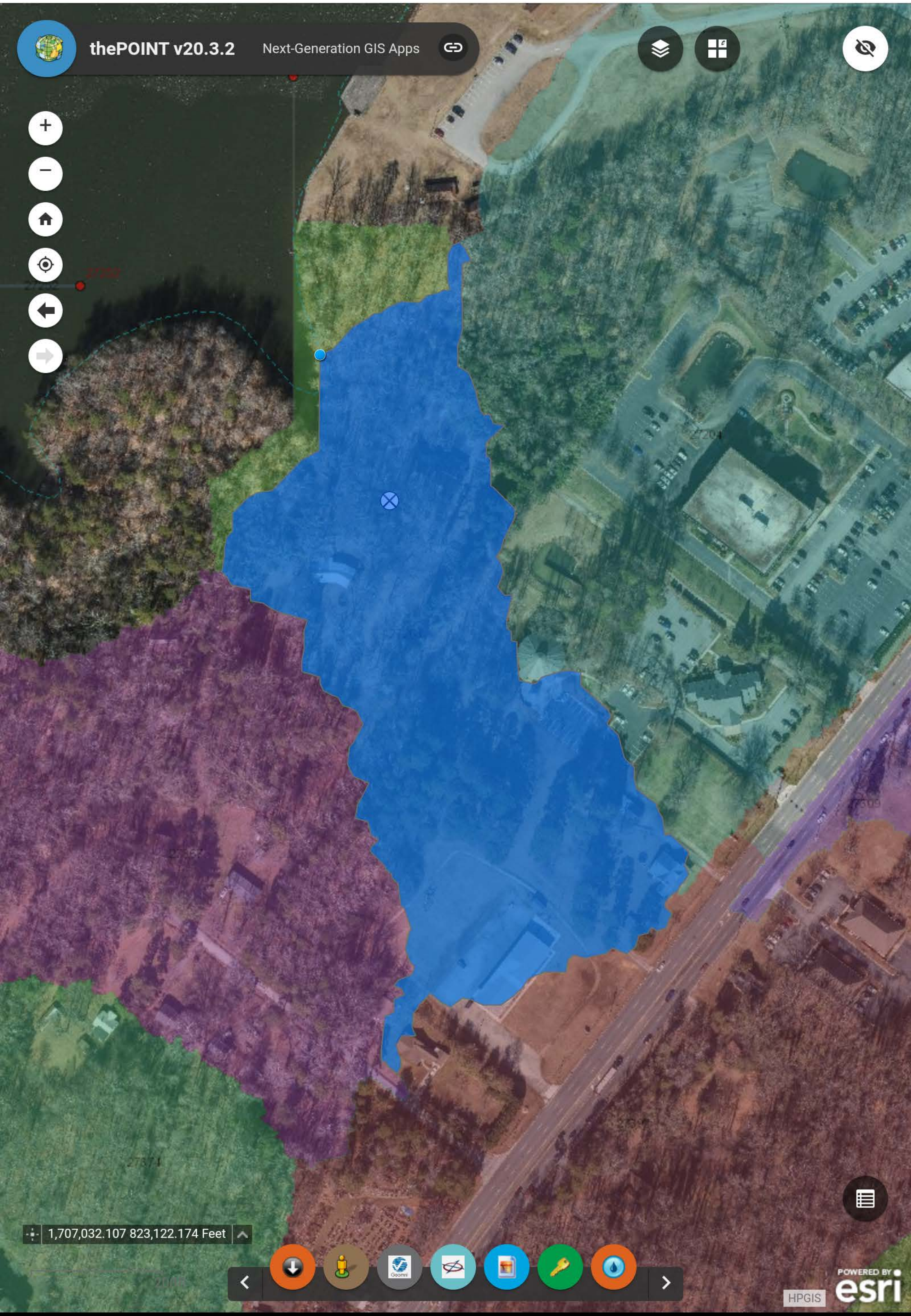
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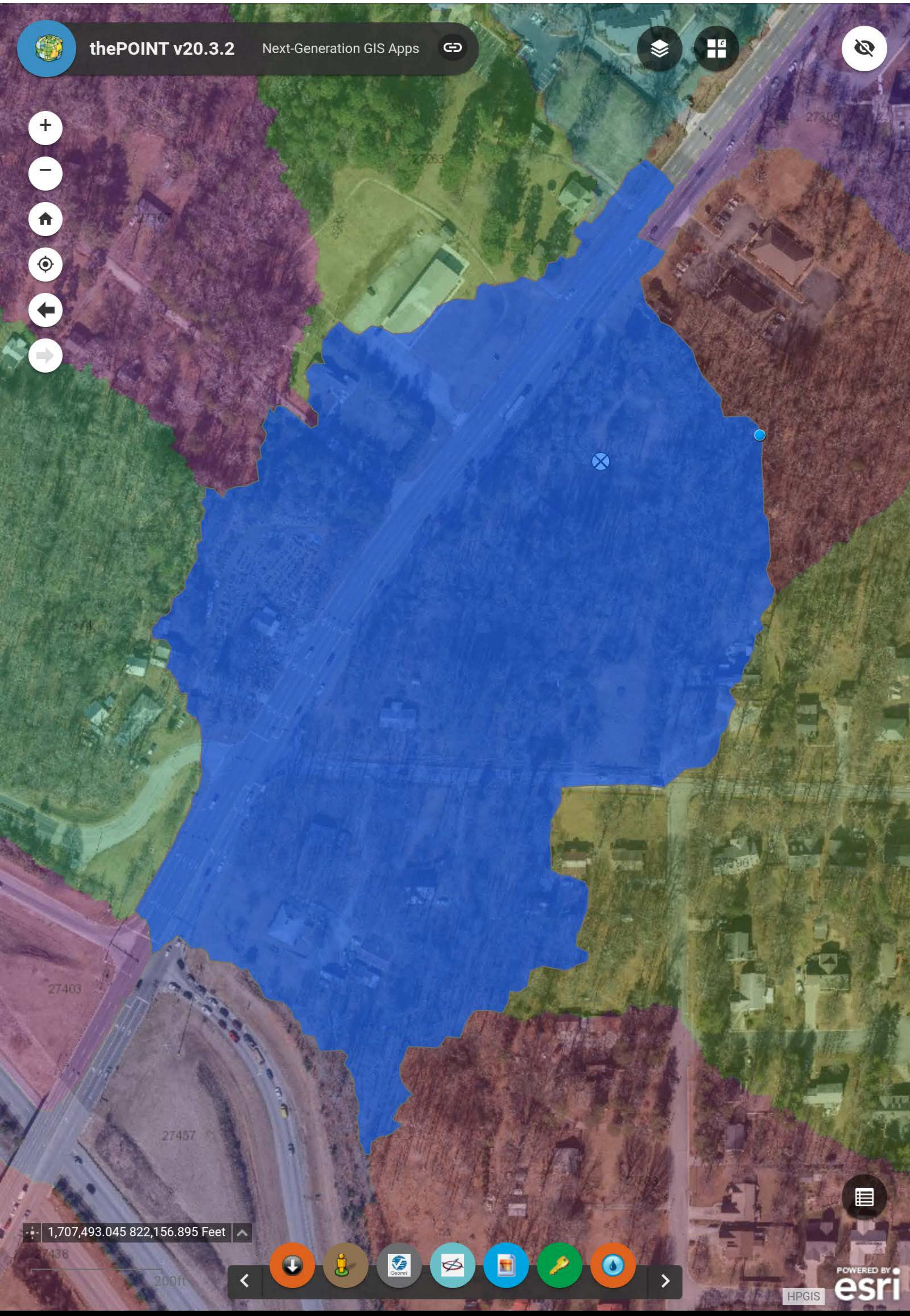
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From:	Vesta Kennedy
To:	Public Comment
Subject:	ZA-20-20
Date:	Monday, March 1, 2021 2:42:41 PM

Dear Mayor and City Council,

One of the possible uses cited by BRC Spirit group for sites 1801 and 1809 Eastchester Drive was for a hotel/Motel.

I conducted a survey last week of four High Point hotels, one boutique and three others that don't have the reputation of being drug dens (although all but one admitted they have had a few opioid drug use instances; seems if they charge more per night, it helps some of that).

The top three hotel brands are Marriot, IHG, and Hilton. These seem to be able to do a better job of managing their clientele.

All four had a booked average in 2019 in the 70 to 75% capacity range, and all four had a 2020 booked average of 40 to 45 % capacity range.

ALL said they have seen a change of clientele, meaning more folks with little to no luggage.

Please take this into consideration when contemplating this rezoning for this particular use.
Besides my deep concerns of TRAFFIC, QUANTITY AND QUALITY OF STORMWATER RUNOFF, I also worry about crime in this area.
There were 290 arrests/incidents within a one mile radius of 1809 Eastchester Drive, January1, 2020 to December 31, 2020.

Sincerely,
Vesta Kennedy

End of Email #37 - #43 with attachments

CITY OF HIGH POINT
AGENDA ITEM

Title: Guilford County Multi-Jurisdictional Hazard Mitigation Plan Adoption

From: Perry Hall, Emergency Manager

Meeting Date: January 19, 2021

Public Hearing: N/A

Advertising Date / Advertised By: N/A

Attachments: Guilford County Multi-Jurisdictional Hazard Mitigation Plan – 2020
Resolution

PURPOSE:
2020 update to the Guilford County Multi-Jurisdictional Hazard Mitigation Plan (HMP)

BACKGROUND:
The 2020 update to the Guilford County Multi-Jurisdictional Hazard Mitigation Plan (HMP) has been approved by FEMA. The approved version of the plan can be found at:
https://atkins.box.com/s/q224ojh7p7lwws8xcrmwm8eqw5ohmx9s
The updated plan was adopted by the Guilford County Board of Commissioners at the January 7th board meeting. The final step in the process is for each jurisdiction to adopt the plan by resolution.

BUDGET IMPACT:
No budget impact.

RECOMMENDATION *I* ACTION REQUESTED:
Staff request City Council adopt the resolution and recommends approval of the 2020 Guilford County Multi-Jurisdictional Hazard Mitigation Plan.

RESOLUTION
ADOPTING GUILFORD COUNTY MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN

WHEREAS, the citizens and property within City of High Point are subject to the effects of natural hazards that pose threats to lives and cause damage to property, and with the knowledge and experience that certain areas of the county are particularly vulnerable to hazards such as drought, extreme temperatures, hurricanes and tropical storms, thunderstorms, tornadoes, winter storms, floods, wildfires, and numerous other hazards; and

WHEREAS, the City desires to seek ways to mitigate the impact of identified hazard risks; and

WHEREAS, the Legislature of the State of North Carolina has in Part 6, Article 21 of Chapter 143; Parts 3, 5, and 8 of Article 19 of Chapter 160A; and Article 8 of Chapter 160A of the North Carolina General Statutes, delegated to local governmental units the responsibility to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry; and

WHEREAS, the Legislature of the State of North Carolina has enacted General Statute Section 166A-19.41 (*State emergency assistance funds*) which provides that for a state of emergency declared pursuant to G.S. 166A-19.20(a) after the deadline established by the Federal Emergency Management Agency pursuant to the Disaster Mitigation Act of 2002, P.L. 106-390, the eligible entity shall have a hazard mitigation plan approved pursuant to the Stafford Act; and.

WHEREAS, Section 322 of the Federal Disaster Mitigation Act of 2000 states that local governments must develop an All-Hazards Mitigation Plan in order to be eligible to receive future Hazard Mitigation Grant Program Funds and other disaster-related assistance funding and that said Plan must be updated and adopted within a five year cycle; and

WHEREAS, the City of High Point has performed a comprehensive review and evaluation of each section of the previously approved Hazard Mitigation Plan and has updated this plan as required under regulations at 44 CFR Part 201 and according to guidance issued by the Federal Emergency Management Agency and the North Carolina Division of Emergency Management.

WHEREAS, it is the intent of the High Point City Council to fulfill this obligation in order that the City will be eligible for federal and state assistance in the event that a state of disaster is declared for a hazard event affecting the City;

NOW, THEREFORE, be it resolved that the High Point City Council hereby:

1. Adopts the Guilford County Multi-Jurisdictional Hazard Mitigation Plan.

2. Vests Guilford County Emergency Management with the responsibility, authority, and the means to:

   (a) Inform all concerned parties of this action.
   (b) Cooperate with Federal, State and local agencies and private firms which undertake to study, survey, map and identify floodplain areas, and cooperate with neighboring communities with respect to management of adjoining floodplain areas in order to prevent exacerbation of existing hazard impacts.

3. Appoints Guilford County Emergency Management to assure that the Hazard Mitigation Plan is reviewed annually and every five years as specified in the Plan to assure that the Plan is in compliance with all State and Federal regulations and that any needed revisions or amendments to the Plan are developed and presented to the High Point City Council for consideration.

4. Agrees to take such other official action as may be reasonably necessary to carry out the objectives of the Hazard Mitigation Plan.

Adopted this the 19th day of January, 2021.

_____
Jay Wagner
Mayor

Attest:

_____
Lisa Vierling
City Clerk

Certified by: _____ (SEAL)

Date: _____

ATKINS

Guilford County, NC

Guilford County Multi-Jurisdictional Hazard Mitigation Plan

DRAFT | May **2020**

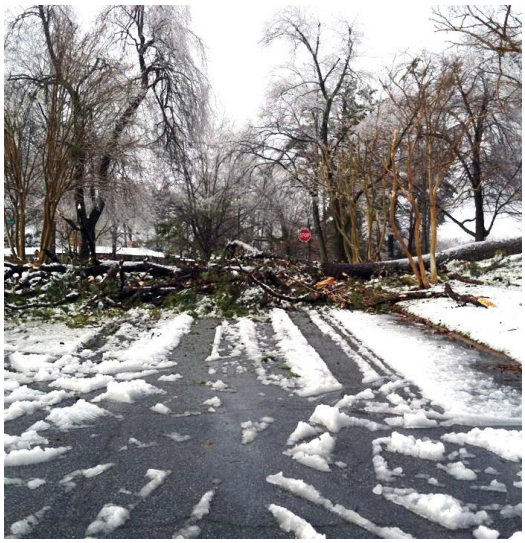












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SECTION 1
INTRODUCTION

This section provides a general introduction to the Guilford County Multi-Jurisdictional Hazard Mitigation Plan. It consists of the following five subsections:

- 1.1 Background
- 1.2 Purpose
- 1.3 Scope
- 1.4 Authority
- 1.5 Summary of Plan Contents

1.1 BACKGROUND

Natural and man-made hazards, such as floods, hurricanes, and hazardous materials incidents, are a part of the world around us. In some cases, their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. In others, we have more power to control the intensity and probability but can never truly eliminate the threat entirely. In either case, we must consider these hazards to be legitimate and significant threats to human life, safety, and property.

Guilford County is located in the Piedmont area of North Carolina. The County includes the Town of Gibsonville, City of Greensboro, City of High Point, Town of Jamestown, Town of Oak Ridge, Town of Pleasant Garden, Town of Sedalia, Town of Stokesdale, Town of Summerfield, Town of Whitsett, and all unincorporated areas within the county. This area is vulnerable to a wide range of natural hazards such as hurricanes, floods, severe thunderstorms, and tornados. It is also vulnerable to human-caused hazards including nuclear accidents and hazardous material spills. These hazards threaten the life and safety of residents in Guilford County and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and vacation in Guilford County.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our community and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as *hazard mitigation*.

FEMA Definition of Hazard Mitigation:
"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures (such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards) and non-structural measures (such as the adoption of sound land use policies and the creation of public awareness

programs). It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

A key component in the formulation of a comprehensive approach to hazard mitigation is to develop, adopt, and update a local hazard mitigation plan as needed. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

The county and ten municipalities participating in the Guilford County Multi-Jurisdictional Hazard Mitigation Plan have an existing hazard mitigation plan that has evolved over the years, as described in Section 2: *Planning Process*. This update of the plan draws from the previous plan to document the efforts of each jurisdiction to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the Plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce Guilford County's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1.1 The Disaster Mitigation Act and the Flood Insurance Reform Acts

In an effort to reduce the Nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state, local, and Tribal government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local or Tribal government applying for federal mitigation grant funds. In short, if a jurisdiction is not covered by an approved mitigation plan, it will not be eligible for mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program, both of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

In addition to federal requirements for hazard mitigation planning, the State of North Carolina also requires a hazard mitigation plan be in place for jurisdictions to receive mitigation and public assistance funds after a state-declared disaster. This requirement is codified in NC Senate Bill 300, which lays out the need for mitigation planning and ties it to disaster funding at the state level.

Additionally, the Flood Insurance Reform Act of 2004 (P.L. 108-264) created two new grant programs, Severe Repetitive Loss (SRL) and Repetitive Flood Claim (RFC), and modified the existing Flood Mitigation Assistance (FMA) program. One of the requirements of this Act is that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for these FEMA mitigation programs.

However, as of early 2014, these programs have been folded into a single Flood Mitigation Assistance (FMA) program.

This change was brought on by new, major federal flood insurance legislation that was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner Flood Insurance Affordability Act in 2014 which revised Biggert-Waters. These acts made several changes to the way the National Flood Insurance Program is to be run, including raises in rates to reflect true flood risk and changes in how Flood Insurance Rate Map (FIRM) updates impact policyholders. These acts further emphasize Congress' focus on mitigating vulnerable structures.

The Guilford County Multi-Jurisdictional Hazard Mitigation Plan has been prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCEM) to ensure that the Plan meets all applicable FEMA and state requirements for hazard mitigation plans. A *Local Mitigation Plan Review Tool*, found in Appendix C, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

1.2 PURPOSE

The purpose of the Guilford County Multi-Jurisdictional Hazard Mitigation Plan is to:

- Reduce risk to people, property, and the critical infrastructure;
- Increase public awareness and education about the plan and the planning process;
- Maintain grant eligibility for participating jurisdictions; and
- Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

The focus of the Guilford County Multi-Jurisdictional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to Guilford County as determined through a detailed hazard risk assessment. Other hazards that pose a "low" or "negligible" risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are determined to be of high or moderate risk. This enables the participating jurisdictions to prioritize mitigation actions based on those hazards which are understood to present the greatest risk to lives and property.

The geographic scope (i.e., the planning area) for the Plan includes all of Guilford County including all of its incorporated jurisdictions (see below) and unincorporated areas. **Table 1.1** indicates the participating jurisdictions.

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE GUILFORD COUNTY HAZARD MITIGATION PLAN

Guilford County	
Gibsonville	Pleasant Garden
Greensboro	Sedalia
High Point	Stokesdale
Jamestown	Summerfield
Oak Ridge	Whitsett

1.4 AUTHORITY

The Guilford County Multi-Jurisdictional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans and has been adopted by each participating jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Final Rule published in the Federal Register, at 44 CFR Part 201 (201.6 for local mitigation planning requirements and 201.7 for Tribal planning requirements); and
- Flood Insurance Reform Act of 2004 (P.L. 108-264), Biggert-Waters Flood Insurance Reform Act of 2012 (P.L. 112-141) and the Homeowner Flood Insurance Affordability Act.

1.5 SUMMARY OF PLAN CONTENTS

The contents of this Plan are designed and organized to be as reader-friendly and functional as possible. While significant background information is included on the processes used and studies completed (i.e., risk assessment, capability assessment), this information is separated from the more meaningful planning outcomes or actions (i.e., mitigation strategy, mitigation action plan).

Section 2, ***Planning Process***, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of participants on the planning team and describes how the public and other stakeholders were involved. It also includes a detailed summary for each of the key meetings held along with any associated outcomes.

The ***Community Profile***, located in Section 3, provides a general overview of Guilford County, including prevalent geographic, demographic, and economic characteristics. In addition, building characteristics and land use patterns are discussed. This baseline information provides a snapshot of the planning area and helps local officials recognize those social, environmental, and economic factors that ultimately play a role in determining the region's vulnerability to hazards.

The Risk Assessment is presented in three sections: Section 4, ***Hazard Identification***; Section 5, ***Hazard Profiles***; and Section 6, ***Vulnerability Assessment***. Together, these sections serve to identify, analyze,

and assess hazards that pose a threat to Guilford County. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of Guilford County.

The Risk Assessment begins by identifying hazards that threaten Guilford County. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, FEMA's Hazus®MH loss estimation methodology is used in conjunction with GIS analysis to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the participating jurisdictions in Guilford County seek to determine the most appropriate mitigation actions to pursue and implement—enabling them to prioritize and focus their efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The ***Capability Assessment***, found in Section 7, provides a comprehensive examination of Guilford County's capacity to implement meaningful mitigation strategies and identifies opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability, and political capability. Information was obtained through the use of a detailed survey questionnaire and an inventory and analysis of existing plans, ordinances, and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses, or conflicts in programs or activities that may hinder mitigation efforts and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The *Risk Assessment* and *Capability Assessment* collectively serve as a basis for determining the goals for the Guilford County Multi-Jurisdictional Hazard Mitigation Plan, each contributing to the development, adoption, and implementation of a meaningful and manageable *Mitigation Strategy* that is based on accurate background information.

The ***Mitigation Strategy***, found in Section 8, consists of broad goal statements as well as an analysis of hazard mitigation techniques for the jurisdictions participating in the Guilford County Multi-Jurisdictional Hazard Mitigation Plan to consider in reducing hazard vulnerabilities. The strategy provides the foundation for a detailed ***Mitigation Action Plan***, found in Section 9, which links specific mitigation actions for each jurisdiction to locally assigned implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic, through the identification of long-term goals, and functional, through the identification of immediate and short-term actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program and policy alternatives to help make Guilford County less vulnerable to the damaging forces of hazards while improving the economic, social, and environmental health of the community. The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety.

Plan Maintenance, found in Section 10, includes the measures that the jurisdictions participating in the plan will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

SECTION 2
PLANNING PROCESS

This section describes the planning process undertaken to develop the Guilford County Multi-Jurisdictional Hazard Mitigation Plan. It consists of the following eight subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in Guilford County
- 2.3 Preparing the 2020 Plan
- 2.4 The Guilford County Hazard Mitigation Planning Team
- 2.5 Community Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Involving the Stakeholders
- 2.8 Documentation of Plan Progress

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44 CFR Requirement
44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process culminates in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department, or agency along with a schedule or target completion date for its implementation (see Section 10: *Plan Maintenance*). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the Plan remains a current, dynamic, and effective planning document over time that becomes integrated into the routine local decision-making process.

Communities that participate in hazard mitigation planning have the potential to accomplish many benefits, including:

- saving lives and property,
- saving money,
- speeding recovery following disasters,
- reducing future vulnerability through wise development and post-disaster recovery and reconstruction,

- expediting the receipt of pre-disaster and post-disaster grant funding, and
- demonstrating a firm commitment to improving community health and safety.

Typically, communities that participate in mitigation planning are described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Mitigation measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health, and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN GUILFORD COUNTY

Each of the eleven participating jurisdictions has previously adopted the Guilford County Hazard Mitigation Plan. This plan was developed using the multi-jurisdictional planning process recommended by the Federal Emergency Management Agency (FEMA). The FEMA approval date for this plan (1/20/2016), pertains to all communities listed below:

- *Guilford County Hazard Mitigation Plan*
  - Guilford County
  - City of Greensboro
  - City of High Point
  - Town of Gibsonville
  - Town of Jamestown
  - Town of Oak Ridge
  - Town of Pleasant Garden
  - Town of Sedalia
  - Town of Stokesdale
  - Town of Summerfield
  - Town of Whitsett

2.3 PREPARING THE 2020 PLAN

Hazard mitigation plans are required to be updated every five years to remain eligible for federal mitigation funding. To simplify planning efforts, the jurisdictions in Guilford County decided to join together to create the *Guilford County Multi-Jurisdictional Hazard Mitigation Plan*. This allows resources to be shared amongst the participating jurisdictions and eases the administrative duties of all of the participants.

To prepare the Plan, a team led by a consulting firm, Atkins, was brought together to carry out the planning process. To meet planning requirements of the Community Rating System, the county ensured that the planning process was facilitated under the direction of a professional planner. Ryan Wiedenman from Atkins served as the lead planner for this project and is a member of the American Institute of Certified Planners (AICP). Further, CRS planning requirements from section 510 of the 2013 Coordinator's Manual are addressed throughout this plan. The intent is to try to maximize the number of CRS points for those jurisdictions that currently participate in the CRS program (City of Greensboro and Guilford County) and those that may wish to join in the future.

Per the contractual scope of work, the consultant team followed the mitigation planning process recommended by FEMA (Publication Series 386 and Local Mitigation Plan Review Guide) and recommendations provided by North Carolina Division of Emergency Management (NCEM) mitigation planning staff. The Local Mitigation Plan Review Tool, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this Plan. These standards are based upon FEMA's Final Rule as published in the Federal Register in Part 201 of the Code of Federal Regulations (CFR). The planning team used FEMA's Local Mitigation Plan Review Guide (October 2011) for reference as they completed the Plan.

Additionally, the planning team determined that it was important to include and analyze technological and man-made hazards in the plan to provide a more comprehensive approach to hazard management within the county. Although this is not a requirement as per regulations regarding hazard mitigation planning at the state or federal level, it is a noteworthy step in the direction of an all-hazards approach to risk analysis and management.

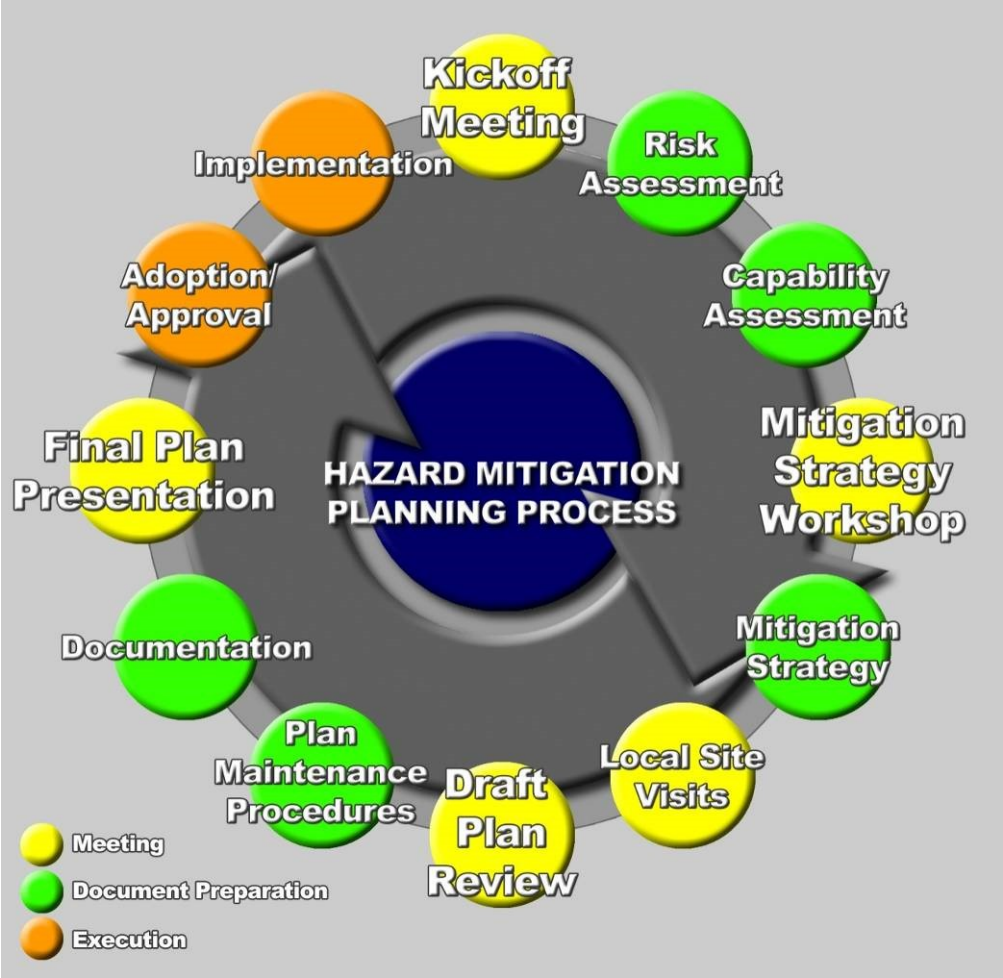
Key elements from the previously approved plan are referenced throughout the document (e.g., existing actions) and required a discussion of changes made. For example, all of the risk assessment elements needed to be updated to include most recent information. It was also necessary to review the goals for the county. The Capability Assessment section includes updated information for all of the participating jurisdictions and the Mitigation Action Plan provides implementation status updates for all of the actions identified in the previous plans.

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately one year, beginning in May 2019. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

Over the past five years, each participating jurisdiction has been actively working to implement the existing plan. This is documented in the Mitigation Action Plan through the implementation status

updates for each of the Mitigation Actions. The Capability Assessment also documents changes and improvements in the capabilities of each participating jurisdiction to implement the Mitigation Strategy.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR GUILFORD COUNTY



As is further detailed below, the planning process was conducted through Hazard Mitigation Planning Team meetings comprised primarily of local government staff from each of the participating jurisdictions and advisory stakeholders.

Additionally, for the 2020 update, FEMA Community Rating System (CRS) requirements were integrated into the plan update. **Table 2.1** below provides an overview of how the CRS requirements were integrated into this plan update.

TABLE 2.1: FEMA HAZARD MITIGATION PLANNING REQUIREMENTS AND THE CRS 10-STEP PLANNING PROCESS REFERENCE TABLE

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
Phase I – Planning Process	
§201.6(c)(1)	Step 1: Organize to Prepare the Plan
§201.6(b)(1)	Step 2: Involve the Public

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
§201.6(b)(2) & (3)	Step 3: Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4: Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5: Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6: Set Goals
§201.6(c)(3)(ii)	Step 7: Review Possible Activities
§201.6(c)(3)(iii)	Step 8: Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9: Adopt the Plan
§201.6(c)(4)	Step 10: Implement, Evaluate and Revise the Plan

2.4 THE GUILFORD COUNTY HAZARD MITIGATION PLANNING TEAM

In order to guide the development of this Plan, Guilford County and its jurisdictions created the Guilford County Hazard Mitigation Planning Team (Hazard Mitigation Planning Team or Planning Team). The Hazard Mitigation Planning Team represents a community-based planning team made up of representatives from various county and municipal departments, and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in May 2019, the Hazard Mitigation Planning Team members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

Specifically, the tasks assigned to the Hazard Mitigation Planning Team members included:

- Participate in Hazard Mitigation Planning Team meetings and workshops
- Provide best available data as required for the risk assessment portion of the Plan
- Provide information that will help complete the Capability Assessment section of the plan and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan
- Support the development of the Mitigation Strategy, including the design and adoption of countywide goal statements
- Help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan
- Review and provide timely comments on all study findings and draft plan deliverables
- Support the adoption of the 2020 *Guilford County Hazard Mitigation Plan*

Table 2.2 lists the members of the Hazard Mitigation Planning Team who were responsible for participating in the development of the Plan.

TABLE 2.2: MEMBERS OF THE GUILFORD COUNTY HAZARD MITIGATION PLANNING TEAM

Name	Position	Organization
Steven Grose	Emergency Management Coordinator	Guilford County
Catherine Hughes	Emergency Management Coordinator	Guilford County
Taylor Jones	Emergency Management Coordinator	Guilford County
Ken Jacobs	Town Administrator	Whitsett
Rachel Faucette	Emergency Management Coordinator	Guilford County
Chris Susi	Battalion Chief	Greensboro
Don Campbell	Emergency Management Division Director	Guilford County
Kenny Cole	Town Manager	Jamestown
Chris York	Town Planner	Summerfield
Thearon Hooks	Mayor Pro Term	Stokesdale
Alisa Houk	Town Clerk	Stokesdale
Aldoud Heron	Deputy Sheriff	GCSO
Jason Geary	Engineering Supervisor	Greensboro
Vivian Bou Gomez	Engineering Specialist	Greensboro
Perry Hall	Emergency Manager	High Point
Brandon Parker	Town Planner	Gibsonville
Frank Park	Chief Plans Engineer	Guilford County
Angela Deal	Town Clerk	Pleasant Garden
Paul Blanchard	Public Services Director	Jamestown
Ashley Royal	Deputy Clerk	Oak Ridge
Teresa Andrews	Stormwater Program Administrator	Guilford County
Bobby Carman	Deputy Fire Marshal	Guilford County
Stephen Dew	GIS Manager	Guilford County
Matthew Smith	Fire Captain	Greensboro
Bobbie Hatley	Town Clerk	Pleasant Garden
Conor Baker	Emergency Management Coordinator	Guilford County
Kenny Stewart	Emergency Management Coordinator	UNCG
Ben Baxley	Town Manager	Gibsonville
Cam Dungee	Town Clerk	Sedalia

2.4.1 Multi-Jurisdictional Participation

The *Guilford County Multi-Jurisdictional Hazard Mitigation Plan* includes Guilford County and its ten incorporated municipalities. To satisfy multi-jurisdictional participation requirements, the county and its participating jurisdictions were required to perform the following tasks:

- Participate in mitigation planning workshops;
- Identify completed and update existing mitigation projects, if applicable; and

- Develop and adopt (or update) their local Mitigation Action Plan.

Each jurisdiction participated in the planning process and has developed a local Mitigation Action Plan unique to their jurisdiction. Each jurisdiction will adopt the plan which includes the individual Mitigation Action Plan that provides the means for jurisdictions to monitor and update their Plan on a regular basis.

2.5 COMMUNITY MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus, and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan. The following is a summary of the key meetings and community workshops held during the development of the plan update.[1] In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their department or agency to undertake and include in the Mitigation Action Plan.


May 30, 2019 Guilford County HMPC Meeting

May 30, 2019
First Hazard Mitigation Planning Team Meeting – Bur-Mill Park Clubhouse

The Guilford County Emergency Management Director started the meeting by welcoming the representatives from the county, participating municipal jurisdictions, and other stakeholders. He then introduced the Project Manager from the project consulting team, Atkins.

The Project Manager led the kickoff meeting and began by providing an overview of the items to be discussed at the meeting. He briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, presentation slides, and the public survey). He then provided a brief overview/reminder of mitigation and discussed the impetus for the update of the hazard mitigation plan as per the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

The Project Manager from Atkins then explained the six different categories of mitigation techniques (prevention; property protection; natural resource protection; emergency services; structural projects; public education and awareness) and gave examples of each. This explanation culminated with an Ice Breaker Exercise for the attendees. The Project Manager instructed attendees on how to complete the exercise.

[1] Copies of agendas, sign-in sheets, minutes, and handout materials for all meetings and workshops can be found in Appendix D.

Attendees were each given an equal amount of fictitious FEMA money ($20) and asked to spend it in the various mitigation categories. Participants were asked to imagine this to be grant money that their community or organization received that could be used towards mitigation projects or actions. Attendees were asked to target their money towards areas of mitigation that were of greatest concern for their community/organization. Ideally, the exercise was intended to pinpoint areas of mitigation that the community may want to focus on when developing their mitigation action plan and overall mitigation program in the community.

After completing the exercise, the Project Manager reviewed several items that were new in mitigation planning during this update cycle. He then noted that all local governments in the county are participating in the existing county-level hazard mitigation plan and that this plan expires in January of 2021, so the planning team will plan to develop a draft to submit to FEMA by February 2020.

He then discussed the key objectives and structure of the planning process, explaining the specific tasks to be accomplished for this project, including the planning process, risk and vulnerability assessment, capability assessment, mitigation strategy, plan maintenance procedures, and documentation. The project schedule was presented and the need for assistance with data collection and public outreach efforts were also discussed.

The Project Manager then reviewed the roles and responsibilities of Atkins and participating communities/stakeholders. The presentation concluded with a discussion of the next steps to be taken in the project development, which included discussing data collection efforts, continuing public outreach, and the next meeting for the HMPT.

The Project Manager then shared the results of the Icebreaker Exercise which was carried out earlier in the meeting. The results were as follows:

- Prevention $119
- Property Protection $62
- Natural Resource Protection $33
- Structural Projects $66
- Emergency Services $112
- Public Education and Awareness $69

The meeting was opened for questions and comments and, as there were none, the meeting was adjourned.

August 28, 2019
Second Hazard Mitigation Planning Team Meeting – Guilford County Emergency Services Building

The Emergency Management Director with Guilford County Emergency Services welcomed everyone to the meeting and went over safety and administrative topics. He then passed the meeting over to the Project Manager to lead the presentation and discussion for the remainder of the meeting.

The Project Manager initiated the meeting with a review of the meeting handouts, which included an agenda, presentation slides, the current critical facility list, a capability assessment table, and the

existing mitigation actions from current plan. The Project Manager reviewed the discussion from the previous meeting explained that the project was still on schedule.

He then went on to present the findings of the risk assessment, starting with a review of the hazards that had been identified to profile and assess in the plan. He then explained the process for preparing Hazard Profiles and discussed how each hazard falls into one of four categories: Natural, Biological, Technological, and Man-Made/Intentional. He indicated that each hazard must be evaluated and profiled to determine a relative risk for each hazard.

The Project Manager reviewed the information and analysis for each hazard using the Hazard Profiles as a baseline. The following bullets summarize the information presented:

Natural Hazards

- DROUGHT. There have been eight years between 2000 and 2019 where drought conditions have been reported as at least severe in Guilford County.

- EARTHQUAKES. There have been 5 recorded earthquake events in Guilford County since 1850. Overall earthquake risk is relatively low.

- EXTREME COLD. Cold temperatures as low as -8 degrees have occurred in the county and indicate that extreme cold events are possible.

- EXTREME HEAT. Extreme temperatures of 106 degrees have occurred in the county and indicate that extreme heat events are possible.

- FIRE/WILDFIRE. There have been an average of 33 fires per year reported in Guilford County.

- FLOOD. There have been over $18 million of recorded damages due to flood events in Guilford County since 1996 according to NCEI. There have been almost 600 flood insurance claims since 1978 and approximately $5.6 million in claims.

- HAILSTORM. These events occur frequently and hail stones as large as 2.75 inches in diameter have been recorded.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that more than 55 storm tracks have come within 75 miles of Guilford County since 1850 and 5 federal disaster declarations have been made due to hurricanes in the county.

- THUNDERSTORM WIND/LIGHTNING. There have been more than 250 severe thunderstorm events reported since 1950 and the county is in an area that experiences 6 to 12 lightning flashes per square mile per year.

- TORNADOES. There have been 2 federal disasters declared in the county and the county has experienced an EF3 level tornado.

- WINTER STORM. The greatest 24-hour snowfall in the county was 20 inches and there have been 6 federal disaster declarations related to winter weather in Guilford County.

Biological Hazards

- BIOTERRORISM. There have not been any major bioterrorism incidents in the county, but future occurrences are possible and may cause major impacts to hospitals and loss of economic productivity.

- PUBLIC HEALTH/EMERGING DISEASE. There have been several disease outbreaks in the county, notably in 1999 (SARS) and 2003 (West Nile). Impacts could be widespread, affecting thousands.

Technological Hazards

- BUILDING/STRUCTURE COLLAPSE. Few past incidents have been recorded. Future occurrences are possible, but damage would be highly localized.

- COMMUNICATIONS SYSTEMS DISRUPTION/FAILURE. At least one past event occurred in 2011 and there would potentially be delays in emergency service response time during these events as a result of diminished in-building radio coverage due to the building's construction.

- ENERGY/POWER/UTILITY FAILURE. A number of impacts could occur including traffic issues and loss of heat and air conditioning associated with a loss of power. Loss of other utilities could cause public health concerns or downtime for businesses.

- HAZARDOUS MATERIALS INCIDENTS. There have been more than 2,000 reported hazardous materials events reported in the county. Certain areas in High Point and Greensboro contain higher concentrations of hazardous materials facilities.

- NUCLEAR ACCIDENT. The southeastern portion of the county falls within the 50-mile ingestion pathway zone of Shearon Harris Nuclear Plant, but there have been no major incidents and future occurrences are unlikely.

- PIPELINE FAILURE. Some major pipelines run through Guilford County and there is a center of breakout tanks located off I-40 that has experienced at least one major incident in the past.

- RESOURCE SHORTAGE (WATER/FUEL). Several water and fuel shortages have impacted the county in the past 20 years. Future incidents could have major impacts on businesses and consumers.

- TRANSPORTATION INCIDENT. Several plane and train incidents have occurred in the county in past years in addition to numerous vehicle incidents. Impacts are typically very localized but can cause logistical issues.

Man-Made/Intentional Hazards

- CIVIL DISTURBANCE. Few recent events but future occurrences are most likely to occur in prominent locations causing work stoppages and loss of productivity.

- CYBER-SECURITY THREAT. No large-scale cyber-attacks have been recorded in Guilford County, but these have impacted neighboring communities and may result in theft, loss of IT functions, or dissemination of misinformation.

- TERRORISM. There have been no major historic terrorism events in the county, but several facilities were identified as potential targets and confirmed by the planning team.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate, or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Winter Storm.

In general, the planning team agreed with the overall rankings of the hazards and felt that they accurately represented the relative risk in the county. In concluding the review of Hazard Profiles, the Project Manager stated if anyone had additional information for the hazard profiles, or had concerns with any of the data presented, they could call or email him.

The Project Manager then walked the planning team through another exercise related to critical facilities. A list of all of the critical facilities that had been pre-identified was presented to each planning team member. Members were asked to review the list and ensure that the proper information (name, location, etc.) was attached to each facility. Further, the team was asked to provide suggestions on any facilities that should be removed or added to the list. After reviewing, several suggestions were made to include additional facilities to the list. The Project Manager made note of these suggestions and made updates to the list accordingly.

Next, the Project Manager reviewed the data that would be included in the hazard vulnerability assessment. Because of the detailed and granular level of the analysis, an in-depth review of this data was not presented to the planning team during this meeting. Instead, the overall process of carrying out the vulnerability assessment was described to the team.

After the conclusion of the Risk and Vulnerability findings were presented, the Project Manager presented the Capability Assessment findings. Atkins developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, and Community Rating System (CRS) participation were evaluated as part of the Local Capability Assessment Survey conducted by Atkins.

The Project Manager reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions were found to be in the moderate to high range overall for capability based upon the scoring methodology developed by Atkins. The planning team was then asked to review the capability scoring and note any areas where Atkins' analysis had not accurately captured the actual capability of the community. A few areas were noted by the planning team and these changes were recorded by the Project Manager.

The Project Manager also discussed the results of the public participation survey that was posted on the county and municipal websites as well as made available in hard copy form at several government locations. As of the meeting date, around 50 responses had been received. The Project Manager explained that the survey would close August 31, so the HMPT could make one final push to get responses back from the public. Based on preliminary survey results, respondents felt that hurricane/tropical storm posed the greatest threat to their neighborhood. Ninety-two percent of the

respondents were interested in making their homes more resistant to hazards. However, sixty-three percent do not know who to contact regarding reducing their risks to hazards.

The Project Manager then reminded team members of the results of the icebreaker exercise from the first Hazard Mitigation Team meeting, where attendees were given "money" to spend on various hazard mitigation techniques and compared them to the results of the public survey. The results of the public survey ranked the categories as follows:

- Prevention
- Emergency Services
- Public Education and Awareness
- Structural Projects
- Property Protection
- Natural Resource Protection

Finally, the Project Manager gave an overview of Mitigation Strategy Development and presented the existing goals for the plan and explained that Atkins recommended keeping the goals as they are. The Hazard Mitigation Team accepted the existing goals for the plan. The Project Manager then provided an overview and examples of suggested mitigation actions tailored for Guilford County. The Project Manager then asked each county and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by September 30, 2019. The Project Manager also asked planning team members to include any new mitigation actions by this time.

The Project Manager thanked the group for taking the time to attend and the Emergency Management Director explained that if team members had any issues or questions about the planning process or their next steps, they could contact him or the Project Manager. The meeting was adjourned.

November 6, 2019
Sedalia Mitigation Planning Team Meeting – Sedalia Town Hall

Due to the small size of the Town of Sedalia and the limited availability of its staff, representatives from the town were unable to attend the first two meetings of the planning team. Therefore, a separate meeting was held with the town at their town hall to ensure that the town was involved as an active participant in the planning process. The minutes from this meeting are as follows.

The Project Manager led the meeting and began by providing an overview of the items to be discussed at the meeting. He briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, mitigation actions, capability assessment). He then provided a brief overview/reminder of mitigation and discussed the impetus for the update of the hazard mitigation plan as per the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

The Project Manager then went over a number of the findings from the Risk Assessment which had been reviewed at the last meeting of the planning team. He described the hazard profiles and critical facilities that had been identified through the planning process and worked with the community to understand all aspects of the information provided. The community then provided feedback on what was presented, and the Project Manager took note of the few comments the community had.

Next, the Project Manager worked with the community to update the capability assessment worksheet that was provided and then to write status updates for each of the existing mitigation actions that the community had presented in the previous plan update. These updates were completed and the discussion moved to whether there were any new actions that the community would like to add to the plan during this update cycle. The community members present wished to further discuss with other staff and said they would provide any new actions to the Project Manager via email.

The meeting concluded with a discussion of the next steps to be taken in the project development, which getting the draft plan ready to share with the planning team. The Project Manager asked the community to review the draft and provide comments in accordance with the timeline set out in the forthcoming draft review email.

The Project Manager asked if there were any final questions or comments and, as there were none, the meeting was adjourned.

2.6 INVOLVING THE PUBLIC

44 CFR Requirement
44 CFR Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

An important component of the mitigation planning process involved public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community "buy-in" from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business or entire city safer from the potential effects of hazards.

Public involvement in the development of the Guilford County Multi-Jurisdictional Hazard Mitigation Plan was sought using three methods: (1) public meetings were held and were advertised in local media; (2) public survey instruments were made available in hard copy and online; and (3) the draft Plan deliverables were made available on county and municipal websites and at government offices along with contact information for providing input.

The general public was provided three opportunities to be involved in the development of the county plan: (1) during the drafting stage of the Plan; and (2) upon completion of a final draft Plan, but prior to official Plan approval and adoption. During the drafting stage, an open meeting was held on June 13, 2019 at the American Red Cross building in Greensboro. Additional information on these meetings can be found in Appendix D. In addition, a public participation survey (discussed in greater detail in Section 2.6.1) was made available during the planning process at various locations throughout the county and on participating community websites.

A final open public meeting was held on XXXXX at XXXXX. The meeting, specifically held to discuss the hazard mitigation plan, was held more than two weeks prior to plan adoption and was advertised by the participating jurisdictions on community websites and through community newsletters and ebulletins. The purpose of the meeting was to present the final plan and its findings and recommendations and so that the public could ask questions and submit any final comments for review, consideration, and potential modification of the plan. No additional public comments for the plan were provided at this meeting. The meeting agenda and sign-in sheet are included in Appendix D.

2.6.1 Public Survey

The Hazard Mitigation Planning Team was successful in getting citizens to provide input to the mitigation planning process through the use of a *Public Participation Survey*. The *Public Participation Survey* was designed to capture data and information from residents of Guilford County that might not be able to attend public meetings or participate through other means in the mitigation planning process and to facilitate participation for any who wished to participate.

Copies of the *Public Participation Survey* were distributed to the Hazard Mitigation Planning Team to be made available for residents at local public offices. A link to an electronic version of the survey was also posted on the county and municipal websites. The responses that were received provided valuable, additional input for the Hazard Mitigation Planning Team to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 32 percent of survey respondents were very or extremely concerned about the possibility of being impacted by a disaster.
- The top 5 hazards of greatest concern according to the survey were hurricane/tropical storm, thunderstorm, tornado, winter storm, and energy/power/utility failure
- Approximately 71 percent of respondents felt at least moderately prepared if a disaster were to occur.
- Only 22 percent of respondents felt very informed about the risks and impacts of disasters.
- Around 92 percent of respondents expressed interest in making their homes safer from hazards, but only 47 percent had already taken action to make their homes safer.

A copy of the survey is provided in Appendix B and a detailed summary of the survey results are provided in Appendix F.

2.7 INVOLVING THE STAKEHOLDERS

44 CFR Requirement
44 CFR Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other non-profit interests to be involved in the planning process.

At the beginning of the planning process for the development of this plan, the project consultant worked with the County Emergency Management lead to initiate outreach to stakeholders to be involved in the planning process. The project consultant sent out a list of recommended stakeholders

provided from FEMA Publication 386-1 titled **Getting Started: Building Support for Mitigation Planning**. The list of recommended stakeholders is found in Appendix C of that publication (Worksheet #1: Build the Planning Team) and has been included in Appendix B of this plan to demonstrate the wide range of stakeholders that were considered to participate in the development of this plan. The County Emergency Management lead used that list for reference as they invited stakeholders to participate in the planning process.

In addition to the planning team itself, which was composed of core stakeholders who were primarily involved in making substantive decisions about mitigation in their respective communities, the planning team felt it was important to reach out to other affected stakeholders who were not directly involved on the planning team, but whose direct participation in the process could provide value to the plan overall. **Table 2.3** lists the key stakeholders who were involved in the planning process, but who were not directly involved as members of the planning team. They include a diverse set of interests including neighboring communities, academia, and other private/non-profit organizations. Each was solicited for input and information and given an advanced opportunity to comment on the draft plan.

TABLE 2.3: OTHER STAKEHOLDERS INVOLVED IN THE PLANNING PROCESS

Name	Position	Organization
Debbie Hatfield	Emergency Management Coordinator	Alamance County
Barry Lynch	Emergency Management Coordinator	Caswell County
Steve Newton	Emergency Management Director	Chatham County
Alton Hanes	Emergency Management Coordinator	Davidson County
August Vernon	Emergency Management Director	Forsyth County
Jared Byrd	Emergency Management Coordinator	Randolph County
Rodney Cates	Emergency Management Coordinator	Rockingham County
Greg Collins	Emergency Management Coordinator	Stokes County
Susan Smith	Senior Disaster Program Manager	American Red Cross
Margaret Erga	Senior DPS Volunteer Partner	American Red Cross
Wannetta Mallette	Transportation Planner	Burlington Graham MPO
Deborah Hooper	Chief Operating Officer	Greensboro Chamber of Commerce
Kenney McDowell	Director	Greensboro Engineering & Inspections
Jim Robinson	Deputy Fire Chief	Greensboro Fire Department
Jane Nickles	Director	Greensboro IT
Sue Schwartz	Director	Greensboro Planning Department
Russ Clegg	Senior Planner	Greensboro Planning Department
Bruce Adams	Public Transportation Manager	Greensboro Transit Authority
Craig McKinney	Transportation Planner	Greensboro Urban Area MPO
Virginia Spillman	Engineering Manager	Greensboro Water Resources
Steven Drew	Interim Asst. City Manager	Greensboro Water Resources
David Phlegar	Stormwater Management Manager	Greensboro Water Resources
Hemant Desai	CIO	Guilford County IT
Leslie Bell	Development Director	Guilford County Planning

Name	Position	Organization
Daryl Loftis	Captain	Guilford County Sheriff's Office
Rachel Moss	Chief Operating Officer	High Point Chamber of Commerce
Garey Edwards	Director	High Point Electric Utilities
Keith Pugh	Director	High Point Engineering Services
Steve Lingerfelt	Director	High Point IT
Lee Burnette	Director	High Point Planning & Development
Terry Houk	Director	High Point Public Services
Trevor Spencer	Manager	High Point Stormwater
Angela Wynes	Transit Manager	High Point Transit
Greg Venable	Transportation Planner	High Point Urban Area MPO
Katie McBride	Town Clerk	Jamestown
Travis Auman	Emergency Management Coordinator	North Carolina A&T State University
Sandra Smith	Town Clerk	Oak Ridge
Mark Kirstner	Director of Planning	Piedmont Authority for Regional Transportation
Jesse Day	Regional Planning Director	Piedmont Triad Regional Council
Scott Whitaker	Town Manager	Summerfield
Zach Smith	Emergency Management Director	University of North Carolina - Greensboro

Finally, the Hazard Mitigation Planning Team encouraged more open and widespread participation in the mitigation planning process by designing and distributing the *Public Participation Survey*. All of the aforementioned opportunities were provided for local officials, residents, businesses, academia, and other private interests in the county to be involved and offer input throughout the local mitigation planning process.

2.8 DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in Guilford County is documented in this plan update. Since hazard mitigation planning efforts officially began in the participating communities with the development of the initial Hazard Mitigation Plan in the early 2000s, many mitigation actions have been completed and implemented in the participating jurisdictions. These actions will help reduce the overall risk to people and property in Guilford County. The actions that have been completed are documented in the Mitigation Action Plan found in *Section 9: Mitigation Actions*.

In addition, community capability continues to improve with the implementation of new plans, policies and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in *Section 7: Capability Assessment*. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and hazard mitigation planning and have proven this by developing the Hazard Mitigation Planning Team to update the Plan and by continuing to involve the public in the hazard mitigation planning process.

SECTION 3
COMMUNITY PROFILE

This section of the Plan provides a general overview of Guilford County and its participating municipalities. It consists of the following four subsections:

- 3.1 Geography and the Environment
- 3.2 Population and Demographics
- 3.3 Housing, Infrastructure, and Land Use
- 3.4 Employment and Industry

3.1 GEOGRAPHY AND THE ENVIRONMENT

Guilford County is located in the Piedmont area of North Carolina, centered along the piedmont industrial crescent stretching from Raleigh to Charlotte. For the purposes of this plan, Guilford County includes the Town of Gibsonville, City of Greensboro, City of High Point, Town of Jamestown, Town of Oak Ridge, Town of Pleasant Garden, Town of Sedalia, Town of Stokesdale, Town of Summerfield, Town of Whitsett, and all unincorporated areas within the county. An orientation map is provided as **Figure 3.1**.

Guilford County contains multiple university and higher learning facilities advocating higher education. The Cities of Greensboro and High Point each have an operational courthouse allowing Guilford County to be one of the few counties within the nation that have a dual court system. Various companies and businesses operate within the county, including the region's largest furniture merchandising, retail, and service industries.

Guilford County is included in the Piedmont Triad within the north-central region of North Carolina. The Triad consists of areas within Alamance, Davidson, Forsyth, Guilford, Randolph, Rockingham, and Surry Counties. Areas within and surrounding the three major cities of Greensboro, High Point, and Winston-Salem make up the base for of the Piedmont Triad. The Triad has an extensive freeway network consisting of four interstate highways and numerous secondary Interstate routes and US routes. This allows the area to support a mixed economy consisting of industry and manufacturing along with technology and biotechnology. The area also contains prominent regional shopping facilities.

The total land area of each of the participating jurisdictions is presented in **Table 3.1**.

TABLE 3.1: TOTAL LAND AREAS OF PARTICIPATING JURISDICTIONS

Jurisdiction	Total Land Area
Guilford County	**645.7 square miles**
Gibsonville*	3.5 square miles
Greensboro	126.5 square miles
High Point*	53.8 square miles
Jamestown	2.9 square miles

Jurisdiction	Total Land Area
Oak Ridge	15.4 square miles
Pleasant Garden	15.3 square miles
Sedalia	2.1 square miles
Stokesdale	19.2 square miles
Summerfield	26.6 square miles
Whitsett	2.6 square miles

*Portions of land that make up Gibsonville and High Point are located in neighboring counties. Note: these areas are not included in the Guilford County total.

Source: United States Census Bureau

Guilford County enjoys a moderate climate that is characterized by mild winters and hot, humid summers. In general, the spring months are marked by unpredictable weather and changes can occur rapidly with sunny skies yielding to severe thunderstorms in just a few hours.

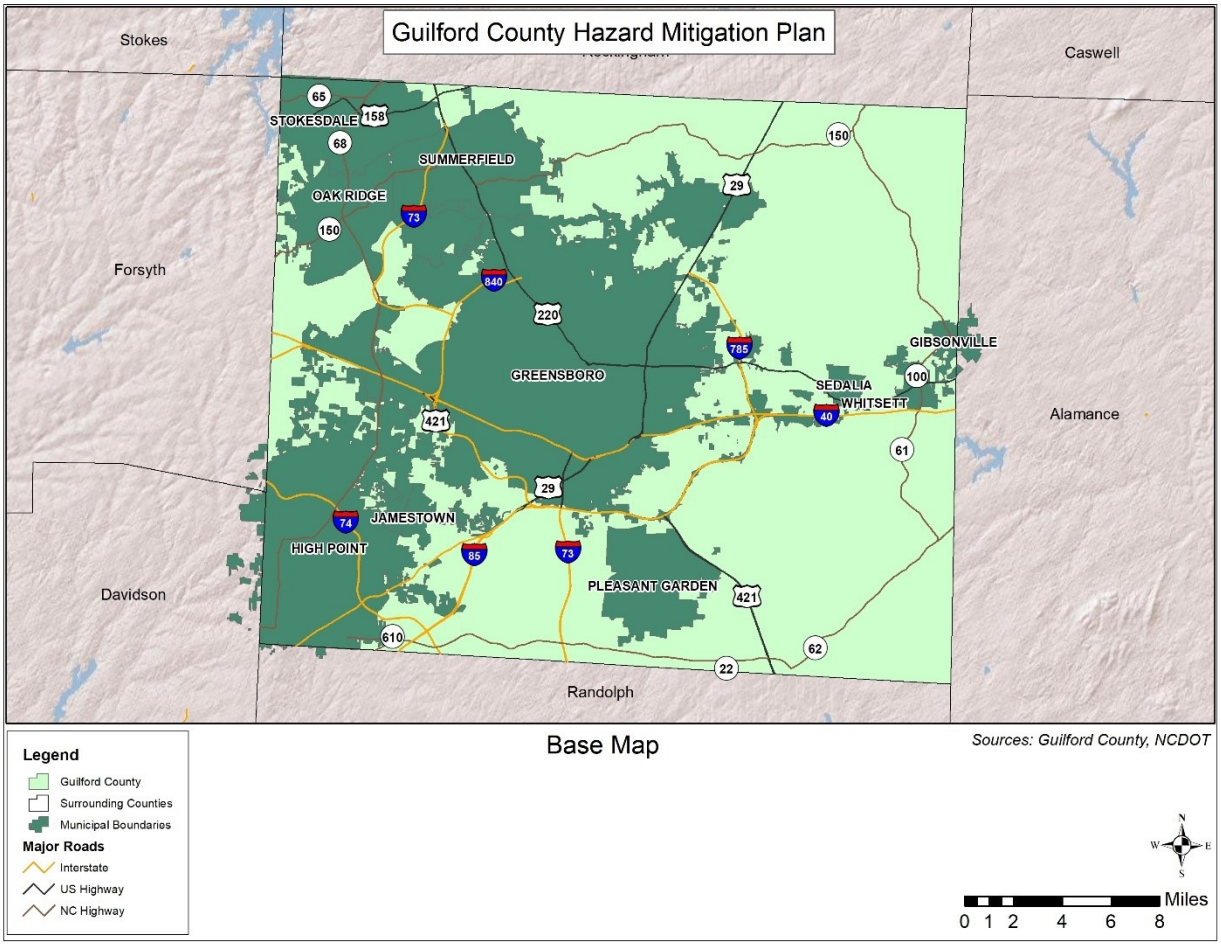
From March through May, temperatures have an average high in the mid 70s˚F with lows in the 40s˚F. Typically, the weather is milder by late March and warm by late April.

In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the upper 80s˚F in July and August. These months are also the most common for rain in Guilford County.

September through mid-November is typified by clear skies and cooler weather that alternates between warm days and cool nights. Highs and lows are usually similar to those experienced in the spring, with November days cooling off considerably.

Winter in Guilford County is generally moderate, but extremes do occur. High temperatures are usually in the lower 50s˚F and winter lows in the upper 20s˚F. Snow and ice do tend to occur.

FIGURE 3.1: GUILFORD COUNTY ORIENTATION MAP



3.2 POPULATION AND DEMOGRAPHICS

Greensboro is the largest participating municipal jurisdiction by area and it also has the largest population. Between 2000 and 2017, the majority of participating jurisdictions experienced population growth. Oak Ridge had the highest county growth rate at around 69%. Population counts from the US Census Bureau for 1990, 2000, and 2010 and from the American Community Survey for 2017 for each of the participating jurisdictions are presented in **Table 3.2**.

TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING JURISDICTIONS

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	2017 ACS Population	% Change 2000-2017
Guilford County	**347,420**	**421,048**	**488,406**	**517,197**	**22.8%**
Gibsonville*	3,441	4,372	6,410	6,845	56.6%
Greensboro	183,521	223,891	269,666	284,816	27.2%
High Point*	69,496	85,839	104,371	109,849	28.0%
Jamestown	2,600	3,088	3,382	3,836	24.2%
Oak Ridge	4,716	3,988	6,185	6,728	68.7%

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	2017 ACS Population	% Change 2000-2017
Pleasant Garden	2,228	4,714	4,489	4,762	1.0%
Sedalia	--	618	623	548	-11.3%
Stokesdale	2,134	3,267	5,047	5,331	63.2%
Summerfield	2,051	7,018	10,232	10,957	56.1%
Whitsett	--	686	590	973	41.8%

*The population counts of Gibsonville and High Point include population residing in neighboring counties. Note: these populations are not included in the Guilford County total.
Source: United States Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

Based on the 2017 American Community Survey, the median age of residents in Guilford County is 37.2. The racial characteristics of the participating jurisdictions are presented in **Table 3.3**. Generally, whites make up the majority of the population in the county accounting for over 56 percent of the population in overall. However, Sedalia has a much higher minority population.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING JURISDICTIONS

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Guilford County	**56.1%**	**33.7%**	**0.4%**	**4.8%**	**0.1%**	**2.6%**	**2.3%**	**7.7%**
Gibsonville	76.8%	15.6%	1.5%	0.9%	0.0%	0.7%	4.4%	4.3%
Greensboro	48.0%	41.8%	0.4%	4.4%	0.1%	2.7%	2.5%	7.3%
High Point	51.4%	34.0%	0.4%	8.2%	0.1%	3.3%	2.7%	10.1%
Jamestown	79.9%	16.2%	0.0%	2.9%	0.5%	0.3%	0.2%	5.1%
Oak Ridge	78.6%	9.3%	1.4%	8.3%	0.0%	0.7%	1.8%	3.8%
Pleasant Garden	88.0%	6.9%	0.6%	0.4%	0.0%	0.5%	3.5%	5.7%
Sedalia	23.0%	73.7%	0.9%	0.0%	0.0%	1.8%	0.5%	8.4%
Stokesdale	89.6%	7.0%	0.0%	1.1%	0.0%	0.0%	2.3%	6.9%
Summerfield	94.2%	2.8%	0.1%	1.8%	0.0%	0.0%	1.2%	3.4%
Whitsett	87.4%	8.8%	0.0%	2.6%	0.0%	0.0%	1.2%	0.2%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the 2017 American Community Survey, there were 225,009 housing units in Guilford County, the majority of which are single family homes or multiple unit homes. Housing information for the ten participating jurisdictions is presented in **Table 3.4**. As shown in the table, Guilford County has a very low percentage of seasonal housing across the jurisdictions; however, Whitsett and Gibsonville have a slightly higher rate compared to the other municipalities.

TABLE 3.4: HOUSING CHARACTERISTICS OF PARTICIPATING JURISDICTIONS

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Seasonal Units, Percent (2017)	Median Home Value (2017)
Guilford County	**218,017**	**225,009**	**0.6%**	**$160,200**
Gibsonville*	2,798	2,684	1.7%	$153,400
Greensboro	124,074	129,162	0.5%	$152,300
High Point*	46,677	46,550	1.0%	$144,900
Jamestown	1,517	1,609	0.0%	$222,200
Oak Ridge	2,226	2,378	0.4%	$338,600
Pleasant Garden	1,819	1,830	0.4%	$158,500
Sedalia	279	276	0.0%	$139,700
Stokesdale	1,955	1,952	0.0%	$189,600
Summerfield	3,756	3,904	0.0%	$349,000
Whitsett	279	421	1.7%	$186,700

*The housing unit counts for Gibsonville and High Point include units located in neighboring counties. Note: these housing units are not included in the Guilford County total.
Source: United States Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

3.3.2 Infrastructure

Transportation

There are several major highways that cross through Guilford County. The county is connected to other counties in the region by Interstates 40, 73, 74, and 85. Interstate 40 runs through the state of North Carolina from the Tennessee state line. Interstate 73 runs into the county directly from the south and into Greensboro. Interstate 74 is partially completed within the state of North Carolina. The first section in the Piedmont Triad starts at the Virginia state line running through the southwest corner of Guilford County. Interstate 85 runs northeast-southwest through North Carolina and is the second longest interstate in the state (behind Interstate 40). Within Guilford County, multiple transportation routes run in concurrency.

The Piedmont Triad International Airport serves Guilford County. The airport has five airlines that service it with flights daily. Residents within the county also use the Charlotte-Douglas International Airport, the largest airport in the state, and Raleigh-Durham International Airport. The Charlotte-Douglas International Airport currently offers 1,400 daily flights on 15 airlines to cities around the country and the world. The Raleigh-Durham International Airport offers more than 400 daily domestic and international flights on 10 different airlines.

In terms of other transportation services, Guilford County provides a public transit system that serves residents without access to additional public transportation services in Greensboro or High Point. Transportation is provided for medical appointments, employment, education, senior services, nutrition sites, and senior citizen care. The Piedmont Authority for Regional Transportation (PART) also provides bus services throughout the Triad.

Utilities

Electrical power in Guilford County is provided primarily by Duke Energy, a major provider in many areas of North Carolina, although some areas are served by Energy United or other local cooperatives. The

City of High Point provides electricity to most of the City of High Point. Duke Energy also owns Piedmont Natural Gas, which provides natural gas service to much of the population.

Water and sewer services are provided throughout Guilford County by several municipalities including the City of Greensboro, City of High Point, Town of Jamestown, Sedgefield Sanitary District, City of Burlington, and Town of Stokesdale. Guilford County does not directly manage any water or sewer systems but is responsible for well and septic system permits.

Community Facilities

There are a number of public buildings and community facilities located throughout Guilford County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 75 fire stations, 17 public safety facilities (including police and sheriff's offices), and 218 schools located within the study area.

There are five acute care hospitals in the county, which provide nearly 1,500 licensed beds. Major hospitals located in Guilford County include Moses H. Cone Memorial Hospital, Wake Forest Baptist High Point Medical Center, Kindred Hospital Greensboro, Cone Health Wesley Long Hospital, and Cone Health MedCenter High Point. Cone Health Network System also operates several satellite locations throughout the county. Additionally, three nationally prominent teaching hospitals are within an hour's drive of the county.

Guilford County affords the full range of amenities of a thriving urban area, including three regional shopping malls and more than three million square feet of retail space. Guilford County is also home to several parks, including: Bur-Mil Park, Gibson Park, Guilford-Mackintosh Park, Hagan-Stone Park, Northeast Park, Southwest Park, and Triad Park. There are also a number of municipal parks located throughout the communities.

3.3.3 Land Use

Guilford County positions itself to accommodate new growth and redevelopment that is efficient and cost-effective; improves the quality of life for residents; enhances economic vitality; is respectful to citizen-based area plans; supports creativity and innovative design; and protects and preserves the natural, historic, and cultural resources and assets of the county.

The county continues to utilize the future land uses depicted on citizen-based area plans, in conjunction with the rezoning guidance matrix, as the basis for land use and policy recommendations. Guilford County is an active partner in the planning and implementation of large-scale multi-jurisdictional land use initiatives such as the Heart of the Triad and transit-oriented development. Local land use and associated regulations are further discussed in *Section 7: Capability Assessment.*

3.4 EMPLOYMENT AND INDUSTRY

Guilford County's traditional employment base of textiles, apparel, and furniture has diversified greatly in the last fifty years, and now encompasses more than 300 companies producing a wide range of products. An excellent transportation infrastructure, including two interstate highways, Piedmont Triad International Airport, and readily available rail and truck service, has helped solidify the county's position as a major distribution and transportation center in the Southeast.

Many corporate and regional offices are located in Guilford County, including Polo/Ralph Lauren, BB&T, Lincoln Financial, Volvo Trucks North America, and ITG Brands. The International Home Furnishings Market in High Point attracts some 150,000 visitors annually, generating millions of dollars in economic benefits to the community. Aggressive economic recruitment efforts by both private and public sectors have yielded many new corporate neighbors.

According to the 2013-2017 American Community Survey, Guilford County had an average annual employment of 246,145 workers and an average unemployment rate of 6.6 percent in 2017 (compared to 7.2 percent for the state). Educational services, and health care and social assistance employed 23.8 percent of the county's workforce followed by manufacturing (12.9%); retail trade (12.7%); and professional, scientific, and management, and administrative and waste management services (10.1%). The average annual median household income in Guilford County in 2017 was $49,253 compared to $50,320 for the State of North Carolina.

SECTION 4
HAZARD IDENTIFICATION

This section describes how the planning team identified the hazards to be included in this plan. It consists of the following five subsections:

- 4.1 Overview
- 4.2 Description of Full Range of Hazards
- 4.3 Disaster Declarations
- 4.4 Hazard Evaluation
- 4.5 Hazard Identification Results

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44 CFR Requirement
44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

4.1 OVERVIEW

Guilford County is vulnerable to a wide range of natural and human-caused hazards that threaten life and property. Current FEMA regulations and guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused hazards (i.e., technological, intentional, etc.) is encouraged, though not required, for plan approval. Guilford County has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating jurisdictions in Guilford County (Gibsonville, Greensboro, High Point, Jamestown, Oak Ridge, Pleasant Garden, Sedalia, Stokesdale, Summerfield, and Whitsett) have identified a number of hazards that are to be addressed in their Multi-Jurisdictional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Guilford County Hazard Mitigation Planning Team members, research of past disaster declarations in the county[1], and review of the North Carolina Enhanced State Hazard Mitigation Plan (2018). Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

Table 4.1 lists the full range of hazards initially identified for inclusion in the Plan and provides a brief description for each. This table includes 33 individual hazards. Some of these hazards are considered to be interrelated or cascading, but for preliminary hazard identification purposes these individual hazards are broken out separately.

Next, **Table 4.2** lists the federal disaster declarations in Guilford County.

[1] A complete list of disaster declarations for Guilford County can be found below in Section 4.3.

Table 4.3 documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not). Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the Hazard Mitigation Planning Team during the plan update process.

Table 4.4 provides a summary of the hazard identification and evaluation process noting that 24 of the 33 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑").

4.2 DESCRIPTION OF FULL RANGE OF HAZARDS

TABLE 4.1: DESCRIPTIONS OF THE FULL RANGE OF INITIALLY IDENTIFIED HAZARDS

Hazard	Description
NATURAL HAZARDS	
Avalanche	A rapid fall or slide of a large mass of snow down a mountainside.
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Earthquake	A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.
Erosion	Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

Expansive Soils	Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet, and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor or can be severe enough for the home to be structurally unsafe.
Extreme Cold	Extreme cold is generally considered to occur when the temperature is at or below freezing for a period of time. Often these events are associated with winter storms and other winter weather, but extreme cold events can occur on their own. Dangers associated with extreme cold events include frostbite and hypothermia among other impacts to people and these events can often last for several days or weeks in a row.
Extreme Heat	A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community.
Fire/Wildfire	A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning. A structure fire is any fire in or on a building or other structure, even if the structure itself was not damaged. Mobile property used as a fixed structure, such as manufactured homes and portable buildings, are considered structures. These fires occur frequently in today's world and are often caused by humans within their homes or businesses.
Flooding	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage).
Hail	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing.

Hurricane/Other Tropical Disturbance	Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.
Landslide	The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.
Land Subsidence	The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.
Nor'easter	Similar to hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding.
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.

Thunderstorm (Wind and Lightning)	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines. Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm.
Tsunami	A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.
Volcano	A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion.
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.

BIOLOGICAL HAZARDS	
Bioterrorism	Bioterrorism is defined by the Centers for Disease Control as an attack wherein there is a deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. These agents are typically found in nature, but it is possible that they could be changed to increase their ability to cause disease, make them resistant to current medicines, or to increase their ability to be spread into the environment.
Public Health/Emerging Disease Threat	Public health threats are often defined by an infectious disease that involves a biological agent/disease that may result in mass casualties or an outbreak of symptoms in those affected. Often emerging diseases are the greatest threat because they are new or varied iterations of existing threats and the population may not have built up a collective immunity to the disease.
TECHNOLOGICAL HAZARDS	
Building/Structure Collapse	According to the United States Department of Labor, a collapsed structure occurs when internal load bearing structural elements fail and the building collapses into itself with the exterior walls being pulled into the falling structure. This scenario may be caused by construction activity, an earthquake, or fire, and may result in a dense debris field with a small footprint. Alternatively, if the structural failure is caused by an explosion or natural forces such as weather, the building may collapse in an outward direction, resulting in a less dense and more scattered debris field.
Communications Systems Disruption/Failure	The failure or disruption of communications systems occurs when emergency response personnel or government officials are unable to utilize their existing communications equipment due to overload of the system or impacts from a hazard. These events can have a critical impact because they may result in lengthened response times and cause miscommunication among responders, resulting in additional impacts that may otherwise have been avoided.
Energy/Power/Utility Failure	Energy/power/utility failures often occur hand in hand with other hazards and are often caused by rising flood waters or high winds. These events most commonly occur when wind events knock down power lines or water treatment plants are flooded by rising waters, thereby shutting down these utilities. The impacts from these failures are often widespread and can affect thousands of people even when small areas of this infrastructure are affected.
Hazardous Materials Incident	Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.

Nuclear Power Plant Emergency	A nuclear and radiation accident is defined by the International Atomic Energy Agency as "an event that has led to significant consequences to people, the environment or the facility. Often, this type of incident results from damage to the reactor core of a nuclear power plant which can release radioactivity into the environment. The degree of exposure from nuclear accidents has varied from serious to catastrophic.
Pipeline Failure	In the case of this plan, a pipeline incident generally refers to a spill, explosion, or fire caused in the transport of flammable liquid or gas being carried by fixed pipes across the United States. These pipes often carry petroleum-based products that are dangerous to health and safety of people as well as the environment if exposed in large quantities.
Resource Shortage (Water/Fuel)	A resource shortage occurs whenever supplies of a resource have been depleted to the point that there is very little to none of the resource available to the public. Most commonly resource shortages occur when there has been a steady decrease in the amount of available resource over time, but these shortages can also be the result of a major event that quickly reduces supply.
Transportation Incident	Transportation incidents come in many forms in the United States, especially given the many forms of transportation available today. The most common types of transportation incidents are motor vehicle accidents, but plane, train, and watercraft accidents occur as well and often have higher magnitude impacts.
MAN-MADE/INTENTIONAL HAZARDS	
Civil Disturbance	Public unrest has been evident in society from the earliest recordings of civilization. Most of these disturbances have been related to political or social issues. Insurrection has framed much of history, dictating the governance and progression of society. In recent years, most of the publicized disturbances have been protests and riots. Rioting does not occur very often in the United States; however, marches and protests are common and could subsequently lead to riots.
Cyber-Security Threat	Cyber-security threats are a deliberate attack on an individual or group using the internet. In the past few decades, society has become dependent on computers and internet connections for much of daily life. This dependence has opened up the avenue for crime to be committed from afar, often from a different country. Some common examples of cyber-security threats include a hacker accessing bank accounts by hacking into a bank's website, infecting a computer system with a virus, Trojan horse, or worm to inflict damage to the information in the system, or disseminating incorrect or otherwise flawed information, also called "misinformation." Also, denial-of-service attacks could occur against prominent websites, which prevent legitimate users from accessing information or services
Terrorism	Terrorism is defined by FEMA as, "the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom." Terrorist acts may include assassinations, kidnappings, hijackings, bomb scares and bombings, cyber attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons.

4.3 DISASTER DECLARATIONS

Federal disaster declarations provide initial insight into the hazards that may impact the Guilford County planning area. Since 1989, 13 presidential disaster declarations have been reported in Guilford County. This includes six storms related to severe winter weather, two tornado events, and five hurricanes.

However, this list is not inclusive of many of the major disaster events that impacted the county and which ultimately resulted in Small Business Administration disaster loan assistance such as the straight line wind event that occurred on May 21, 2001 and the High Point tornado (2010).

TABLE 4.2: GUILFORD COUNTY FEDERAL DISASTER DECLARATIONS

Year	Disaster Number	Description
1989	827	TORNADOES
1989	844	HURRICANE HUGO
1996	1087	BLIZZARD OF 96
1996	1103	WINTER STORM
1996	1134	HURRICANE FRAN
1999	1292	HURRICANE FLOYD MAJOR DISASTER DECLARATIONS
2000	1312	SEVERE WINTER STORM
2002	1448	SEVERE ICE STORM
2003	1457	ICE STORM
2004	1553	HURRICANE IVAN
2014	4167	SEVERE WINTER STORM
2018	4364	TORNADO AND SEVERE STORMS
2018	4393	HURRICANE FLORENCE

4.4 HAZARD EVALUATION

TABLE 4.3: DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
NATURAL HAZARDS			
Avalanche	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of US Forest Service National Avalanche Center website	• The United States avalanche hazard is limited to mountainous western states including Alaska, as well as some areas of low risk in New England. • Avalanche hazard was removed from the North Carolina State Hazard Mitigation Plan after determining the mountain elevation in Western North Carolina did have enough snow to produce this hazard. • Avalanche is not included in the previous Guilford County hazard mitigation plan. • There is no risk of avalanche events in this area of North Carolina.
Drought	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of the US Drought Monitor website	• Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. • Droughts are discussed in the NC State Hazard Mitigation Plan as a threat to Guilford County. • Drought is included in the previous Guilford County hazard mitigation plan. • There are reports of at least moderate drought conditions in 15 of the last 19 years in Guilford County, according to the US Drought Monitor.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Earthquake	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • USGS Earthquake Hazards Program website	• Although the zone of greatest seismic activity in the United States is along the Pacific Coast, eastern regions have experienced significant earthquakes. • Earthquake events are discussed in the NC State Hazard Mitigation Plan and Guilford County is considered to be at low to moderate risk to an earthquake event. • Earthquake was included in the previous Guilford County hazard mitigation plan. • Earthquakes have occurred in and around the State of North Carolina in the past. The state is affected by several fault zones including the Charleston and the New Madrid (near Missouri) zones which have generated a magnitude 8.0 earthquake in the last 200 years. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for Guilford County is approximately 2 to 5%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Erosion	NO	• Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan	• Coastal erosion is discussed in the NC State Hazard Mitigation Plan but only for coastal areas. Guilford County is not located in a coastal area. • Erosion is not included as a hazard in the previous Guilford County hazard mitigation plan. • Riverine erosion remains a natural, dynamic, and continuous process that has the potential to affect Guilford County since several rivers/streams run through the county. But, upon evaluation, this did not warrant inclusion for further hazard evaluation.
Expansive Soils	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of USDA Soil Conservation Service's Soil Survey	• The effects of expansive soils are most prevalent in parts of the Southern, Central, and Western U.S. • Expansive soils are not specifically identified in the NC State Hazard Mitigation Plan. • Guilford County is located in an area that has little to no clay swelling potential. • The previous Guilford County Hazard Mitigation Plan did not identify expansive soils as a potential hazard.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Extreme Cold	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the North Carolina State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database	• Many areas of the United States are susceptible to extreme cold, including North Carolina. • Extreme cold was included in the previous Guilford County hazard mitigation plan. • The county has experienced extreme cold events a number of times in the past.
Extreme Heat	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the North Carolina State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database	• Many areas of the United States are susceptible to heat waves, including North Carolina. • Extreme heat was included in the previous Guilford County hazard mitigation plan under the extreme temperatures hazard. • The county has experienced extreme heat events a number of times in the past.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Fire/Wildfire	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Division of Forest Resources website	• Wildfires occur in virtually all parts of the United States. Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. • Wildfires are discussed in the state plan, though Guilford County, is located in an area with relatively lower risk compared to other parts of the state. • The previous Guilford County hazard mitigation plan addressed fire and wildfire. • A review of SWRA data indicates that there are some areas of elevated concern to wildfire in Guilford County. • According to the North Carolina Forest Service, over the period 2010-2019, Guilford County experienced an average of 65 fires each year which burned an average of 40.0 acres per year. • Structure fires happen across the United States in all areas of the country and can impact any building. Many structure fires have occurred in Guilford County historically.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Flood	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database • Review of historical disaster declarations • Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)	• Floods occur in all 50 states and in the U.S. territories. • The flood hazard is thoroughly discussed in the NC State Hazard Mitigation Plan. Much like a majority of the state, Guilford County was found to have vulnerability to flooding. • The previous Guilford County hazard mitigation plan addresses flood hazard. • NCEI reports that Guilford County has been affected by 92 flood events since 1996. In total, these events caused 1 death and an estimated $18.8 million (2019 dollars) in property damages. • None of the county's Presidential Disaster Declarations were specifically flood-related, however, several declarations were hurricane-related which caused flooding issues. • All jurisdictions in the county participate in the NFIP and Guilford County (unincorporated area) and the City of Greensboro also participate in the CRS.
Hail	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database	• Although hailstorms occur primarily in the Midwestern states, they do occur in every state on the mainland U.S. Most inland regions experience hailstorms at least two or more days each year. • Hailstorm events are discussed in the NC State Hazard Mitigation Plan under the Tornadoes/Thunderstorms • Hail is included in the previous Guilford County hazard mitigation plan. • NCEI reports 177 hailstorm events (0.75 to 2.75 inch size hail) for Guilford County since 1950.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Hurricane and Tropical Storm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	• The Atlantic and Gulf regions are most prone to landfall by hurricanes and tropical storms. • Hurricane and tropical storm events are discussed in the NC State Hazard Mitigation Plan and are listed as a hazard that can affect any area in the state. • Hurricanes and tropical weather were addressed in the previous Guilford County hazard mitigation plan. • NOAA historical records indicate 58 hurricanes/tropical storms have come within 75 miles of Guilford County since 1850. • NCEI reports 4 hurricane events since 1996 for Guilford County. • Numerous disaster declarations in Guilford County were directly related to hurricane events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Landslide	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides	• Landslides occur in every state in the U.S, and they are most common in the coastal ranges of California, the Colorado Plateau, the Rocky Mountains, and the Appalachian Mountains. • Landslide/debris flow events are discussed in the state plan, but Guilford County does not have much risk. • The previous Guilford County hazard mitigation plan did not address landslides. • USGS landslide hazard maps indicate that a moderate incidence rate is found across the northwestern half of the county. • Data provided by NCGS indicate there are no recorded landslide events in the Guilford County.
Land Subsidence	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan	• Land subsidence affects at least 45 states, including North Carolina. However, because of the broad range of causes and impacts, there has been limited national focus on this hazard. • The state plan identifies certain areas that are susceptible to land subsidence hazards in North Carolina; however, Guilford County does not have soil types that are highly susceptible to subsidence. • The previous Guilford County hazard mitigation plan did not identify land subsidence as a potential hazard.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Nor'easter	NO	• Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database	• Nor'easters are not identified as a hazard in the state plan. • Nor'easters were not identified in the previous Guilford County hazard mitigation plan. • NCEI does not report any nor'easter activity for Guilford County. However, nor'easters may have affected the area as severe winter storms. In this case, the activity would be reported under winter storm events.
Storm Surge	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database	• Given the inland location of Guilford County, storm surge would not affect the area. • Storm surge is discussed in the NC State Hazard Mitigation Plan under the hurricane hazard and Guilford County does not have any vulnerability to storm surge. • The previous Guilford County hazard mitigation plan did not address storm surge. • No historical events were reported by NCEI.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Thunderstorm (Wind and Lightning)	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan Review of NOAA NCEI Storm Events Database • Review of Vaisala's NLDN Lightning Flash Density Map	• Severe thunderstorm events were addressed in the previous Guilford County hazard mitigation plan. • NCEI reports 311 thunderstorm/high wind events in Guilford County since 1950. These events have resulted in $2.6 million (2019 dollars) in property damage. • The central region of the Florida has the highest density of lightning strikes in the mainland U.S.; however, lightning events are experienced in nearly every region. • Lightning events are discussed in the NC State Hazard Mitigation Plan as part of the tornado/thunderstorm and wildfire hazards. • Lightning is included in the previous Guilford County hazard mitigation plan. • According to Vaisala's U.S. National Lightning Detection Network, Guilford County is located in an area that experienced an average of 6 to 12 lightning flashes per square mile per year.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Tornado	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	• Tornado events are discussed in the NC State Hazard Mitigation Plan. Since there is risk of tornadoes across the state, Guilford County is at risk. • Tornado events were addressed in the previous Guilford County hazard mitigation plan. • NCEI reports 15 tornado events in Guilford County since 1950. These events have resulted in $87.9 million (2019 dollars) in property damage with the most severe being an EF3. • Two of the county's disaster declarations were directly related to tornadoes.
Tsunami	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses).	• No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. • Tsunami inundation zone maps are not available for communities located along the U.S. East Coast. • Tsunamis are not identified as a hazard in the state plan and Guilford County is not a coastal community so has no tsunami hazard risk. • The previous Guilford County hazard mitigation plan did not address tsunamis. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Volcano	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of USGS Volcano Hazards Program website	• More than 65 potentially active volcanoes exist in the United States and most are located in Alaska. The Western states and Hawaii are also potentially affected by volcanic hazards. • There are no active volcanoes in North Carolina. • There has not been a volcanic eruption in North Carolina in over 1 million years. • No volcanoes are located near Guilford County.
Winter Storm and Freeze	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of the previous Guilford County hazard mitigation plan • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	• Winter storms affect every state in the continental U.S. and Alaska. • Severe winter storms, including snow storms and ice storms, are discussed in the NC State Hazard Mitigation Plan and can affect all areas of the state. • Winter snow and ice storm events were addressed in the previous Guilford County hazard mitigation plan. • NCEI reports that Guilford County has been affected by 69 snow and ice events since 1996. These events resulted in $9.4 million (2019 dollars) in damages. • Seven of the county's disaster declarations were directly related to winter storm events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
BIOLOGICAL HAZARDS			
Bioterrorism	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included bioterrorism and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • There have been no major bioterrorism events in the county, however, these kinds of events are often unpredictable and Guilford County could be affected.
Public Health/Emerging Disease Threat	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included public health/emerging disease threat and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Public health emergencies are often unpredictable and can ramp up quickly depending on how quickly they are recognized. These threats will potentially impact the county in the future.
TECHNOLOGICAL HAZARDS			
Building/Structure Collapse	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included building/structure collapse and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Building/structure collapse is a hazard that often happens on a very localized level, but the impacts can be severe and could potentially occur anywhere.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Communications Systems Disruption/Failure	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included communications systems disruption/failure and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Communications systems disruptions can happen in any location throughout the United States and throughout the county.
Energy/Power/Utility Failure	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included energy/power/utility failure and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Energy/Power/Utility failures occur frequently in the county, especially during winter storms or high wind events. These will continue to impact the county going forward.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Hazardous Materials Incident	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Review Facility Registry Service data • Review of USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) incident database	• Cities, counties, and towns where hazardous materials fabrication, processing, and storage sites are located, and those where hazardous waste treatment, storage or disposal facilities operate are at risk for hazardous materials events. • The previous Guilford County hazard mitigation plan included hazardous materials incidents and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Fifty PHMSA-reported HAZMAT incidents in the county were classified as "serious" incidents. In total, these incidents have resulted in over $2.9 million (2019 dollars) in property damages.
Nuclear Power Plant Emergency	YES	• Review of IAEA data on the location of nuclear reactors • Review of the Guilford County HIRA • Discussion with local officials about location of nuclear power stations • Discussions with local officials	• The Shearon Harris Nuclear Power Plant is located within 50 miles of the southeastern corner of Guilford County. • The previous Guilford County hazard mitigation plan included nuclear power plant emergency and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • A nuclear accident is unlikely to occur, but could cause severe damage in the event of a major incident.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Pipeline Failure	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included pipeline failure and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • There have been several pipeline failures that occurred within the county, including two in 1978 on a line leading eastward from Greensboro's tank farm and one caused by digging near Lake Brandt in 1987.
Resource Shortage (Water/Fuel)	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included resource shortage and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Resource shortages of both fuel and water have occurred in the county in the past and are likely to occur again in the future.
Transportation Incident	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included transportation incident and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Given the number of transportation corridors and hubs located within Guilford County, it is highly likely that more transportation incidents will occur in the future.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
MAN-MADE/INTENTIONAL HAZARDS			
Civil Disturbance	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included civil disturbance and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Although there have not been any major civil disturbances in the county in many years, there is some possibility that this could impact the county in the future.
Cyber-Security Threat	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the Guilford County HIRA • Discussions with local officials	• The previous Guilford County hazard mitigation plan included cyber-security threats and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • Cyber-security threats can occur without regard to specific location, so it was evaluated in this plan.
Terrorism	YES	• Review of the Guilford County HIRA • Review of local official knowledge • Discussions with local officials	• The previous Guilford County hazard mitigation plan included terrorism and it is a hazard addressed in the County's Hazard Identification and Risk Assessment document. • There are several high profiles targets in the area that caused the planning team to determine that the hazard should be evaluated further.

4.5 HAZARD IDENTIFICATION RESULTS

TABLE 4.4: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

NATURAL HAZARDS	BIOLOGICAL HAZARDS
☐ Avalanche	☑ Bioterrorism
☑ Drought	☑ Public Health/Emerging Disease Threat
☑ Earthquake	**TECHNOLOGICAL HAZARDS**
☐ Erosion	☑ Building/Structure Collapse
☐ Expansive Soils	☑ Communications Systems Disruption/Failure
☑ Extreme Cold	☑ Energy/Power/Utility Failure
☑ Extreme Heat	☑ Hazardous Materials Incident
☑ Fire/Wildfire	☑ Nuclear Power Plant Emergency
☑ Flooding	☑ Pipeline Failure
☑ Hail	☑ Resource Shortage (Water/Fuel)
☑ Hurricane/Other Tropical Disturbance	☑ Transportation Incident
☐ Landslide	**MAN-MADE/INTENTIONAL HAZARDS**
☐ Land Subsidence	☑ Civil Disturbance
☐ Nor'easter	☑ Cyber-Security Threat
☐ Storm Surge	☑ Terrorism
☑ Thunderstorm (Wind and Lightning)	
☑ Tornado	
☐ Tsunami	
☐ Volcano	
☑ Winter Storm	

☑ = Hazard considered significant enough for further evaluation in the Guilford County hazard risk assessment.

SECTION 5
HAZARD PROFILES

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the Guilford County Hazard Mitigation Plan. It contains the following subsections:

Overview

- 5.1 Overview
- 5.2 Study Area
- 5.3 Climate Adaptation

Natural Hazards

- 5.4 Drought
- 5.5 Earthquake
- 5.6 Extreme Cold
- 5.7 Extreme Heat
- 5.8 Fire/Wildfire
- 5.9 Flooding
- 5.10 Hail
- 5.11 Hurricane / Other Tropical Disturbance
- 5.12 Thunderstorm (Wind and Lightning)
- 5.13 Tornado
- 5.14 Winter Storm

Biological Hazards

- 5.15 Bioterrorism
- 5.16 Public Health / Emerging Disease Threat

Technological Hazards

- 5.17 Building / Structure Collapse
- 5.18 Communications Systems Disruption / Failure
- 5.19 Energy / Power / Utility Failure
- 5.20 Hazardous Materials Incident
- 5.21 Nuclear Power Plant Emergency
- 5.22 Pipeline Failure
- 5.23 Resource Shortage (Water / Fuel)
- 5.24 Transportation Incident

Man-Made / Intentional Hazards

- 5.25 Civil Disturbance
- 5.26 Cyber-Security Threat
- 5.27 Terrorism

Conclusion

- 5.28 Conclusions on Hazard Risk
- 5.29 Final Determinations

44 CFR Requirement
44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events

Overview

5.1 OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in Guilford County hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard,

its location and extent, notable historical occurrences, and the probability of future occurrences. Each profile also includes specific items noted by members of the Guilford County Hazard Mitigation Planning Team as it relates to unique historical or anecdotal hazard information for Guilford County or a participating municipality within it.

The following hazards were identified:

- **Natural**
  - Drought
  - Extreme Cold
  - Extreme Heat
  - Fire/Wildfire
  - Flooding
  - Hail
  - Hurricane / Other Tropical Disturbance
  - Thunderstorm (wind and lightning)
  - Tornado
  - Winter Storm
- **Biological**
  - Bioterrorism
  - Public Health / Emergency Disease Threat
- **Technological**
  - Building / Structure Collapse
  - Communications Systems Disruption / Failure
  - Energy / Power / Utility Failure
  - Hazardous Materials Incident
  - Nuclear Power Plant Emergency
  - Pipeline Failure
  - Resource Shortage (Water / Fuel)
  - Transportation Incident
- **Man-Made / Intentional**
  - Civil Disturbance
  - Cyber-Security Threat
  - Terrorism

5.2 STUDY AREA

Guilford County includes 10 municipalities: Gibsonville, Greensboro, High Point, Jamestown, Oak Ridge, Pleasant Garden, Sedalia, Stokesdale, Summerfield, and Whitsett. **Table 5.1** provides a summary table of the participating jurisdictions. In addition, **Figure 5.1** provides a base map, for reference, of Guilford County.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE GUILFORD COUNTY HAZARD MITIGATION PLAN

Guilford County	
Gibsonville	Pleasant Garden
Greensboro	Sedalia
High Point	Stokesdale
Jamestown	Summerfield
Oak Ridge	Whitsett

FIGURE 5.1: GUILFORD COUNTY BASE MAP

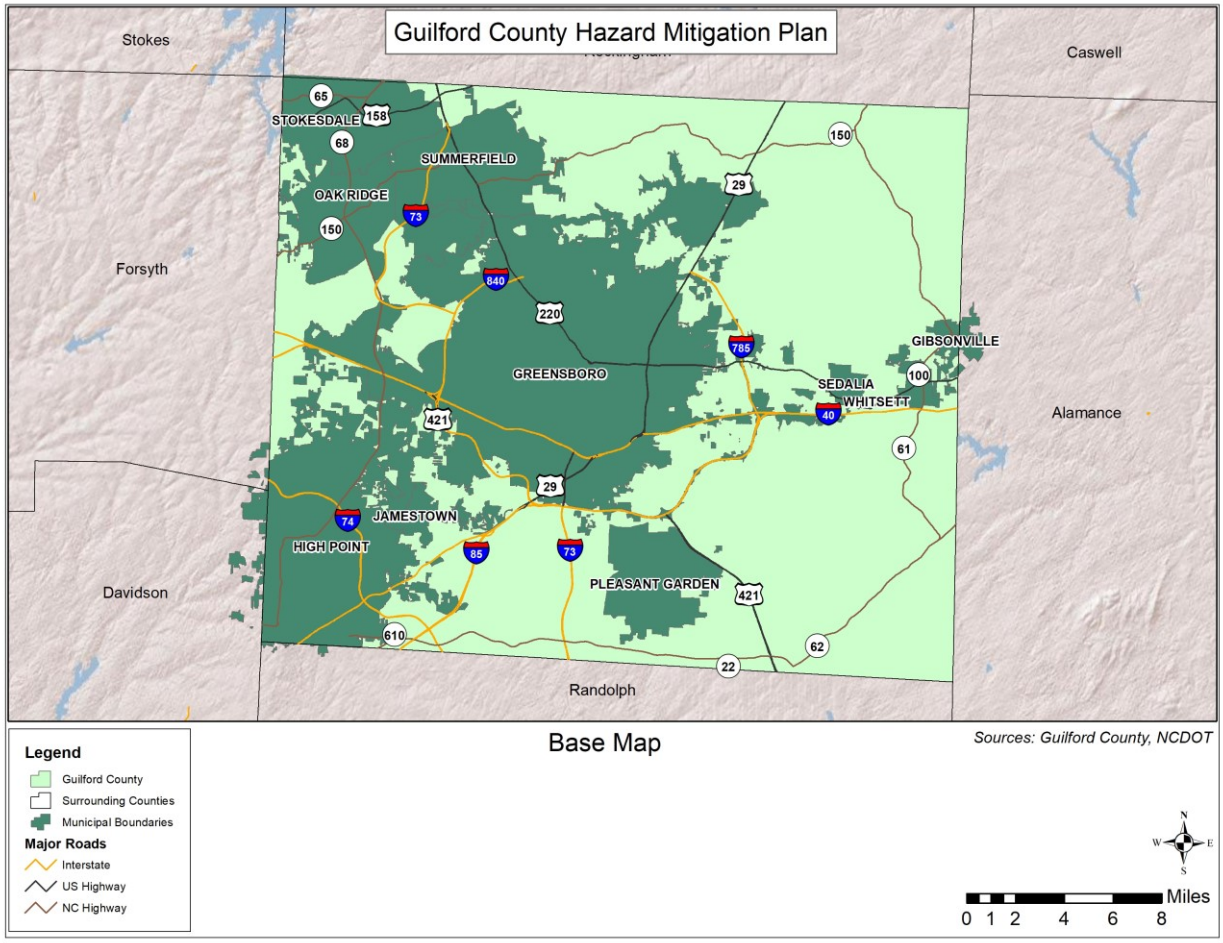


Table 5.2 lists each significant hazard for Guilford County and identifies whether or not it has been determined to be a specific hazard of concern for the 10 municipal jurisdictions and the county's unincorporated areas. This is the based on the best available data and information from the Guilford County Hazard Mitigation Planning Team. (● = hazard of concern)

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN GUILFORD COUNTY

Jurisdiction	Natural												Biological	
	Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding	Hail	Hurricane / Other Tropical Disturbance	Thunderstorm – Wind	Thunderstorm – Lightning	Tornado	Winter Storm	Bioterrorism	Public Health / Emerging Disease Threat
Guilford County														
Gibsonville	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Greensboro	●	●	●	●	●	●	●	●	●	●	●	●	●	●
High Point	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Jamestown	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oak Ridge	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pleasant Garden	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sedalia	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stokesdale	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Summerfield	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Whitsett	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN GUILFORD COUNTY (CONTINUED)

Jurisdiction	Technological							Man-Made		
	Building / Structure Collapse	Communications Systems Disruption / Failure	Energy / Power / Utility Failure	Hazardous Materials Incident	Nuclear Power Plant Emergency	Resource Shortage (Water / Fuel)	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Guilford County										
Gibsonville	●	●	●	●	●	●	●	●	●	●
Greensboro	●	●	●	●	●	●	●	●	●	●
High Point	●	●	●	●		●	●	●	●	●
Jamestown	●	●	●	●		●	●	●	●	●
Oak Ridge	●	●	●	●		●	●	●	●	●
Pleasant Garden	●	●	●	●	●	●	●	●	●	●
Sedalia	●	●	●	●	●	●	●	●	●	●
Stokesdale	●	●	●	●		●	●	●	●	●
Summerfield	●	●	●	●		●	●	●	●	●
Whitsett	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●

5.3 CLIMATE ADAPTATION

The *Piedmont Together Climate Adaptation Report* is a climate adaptability report that has been developed for the Piedmont Triad Region (including Guilford County) and is based upon a wealth of

information and data analysis.[1] Much of the data indicates that the primary factor in altering the global climate is greenhouse gas emissions from human activities. Guilford County appears to be fundamentally changing due to climate change which has resulted in more violent thunderstorms, higher temperatures, increased drought risk, greater winter precipitation, and more intense hurricanes. These changes are expected to continue in the foreseeable future for the county and the region. Primary public health concerns as a result of climate change impacts in the Piedmont Triad include impacts of the urban heat island effect upon city residents and outdoor workers, impacts to rural workers (primarily farmworkers), health of elderly in both rural an urban communities, and impacts to local ecosystems.

Compared to other regions of the nation and world, the impacts of climate change on Guilford County may less dramatically alter lifestyles and the environment from today's "normal," but there will be fundamental changes to the Piedmont Triad which are discussed (where applicable) in the hazard profiles found in this section.

Natural Hazards

5.4 DROUGHT

5.4.1 Background

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts. Drought may also lead to more severe wildfires.

Droughts are typically classified into one of four types: 1) meteorological, 2) hydrologic, 3) agricultural, or 4) socioeconomic. **Table 5.3** presents definitions for these types of drought.

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

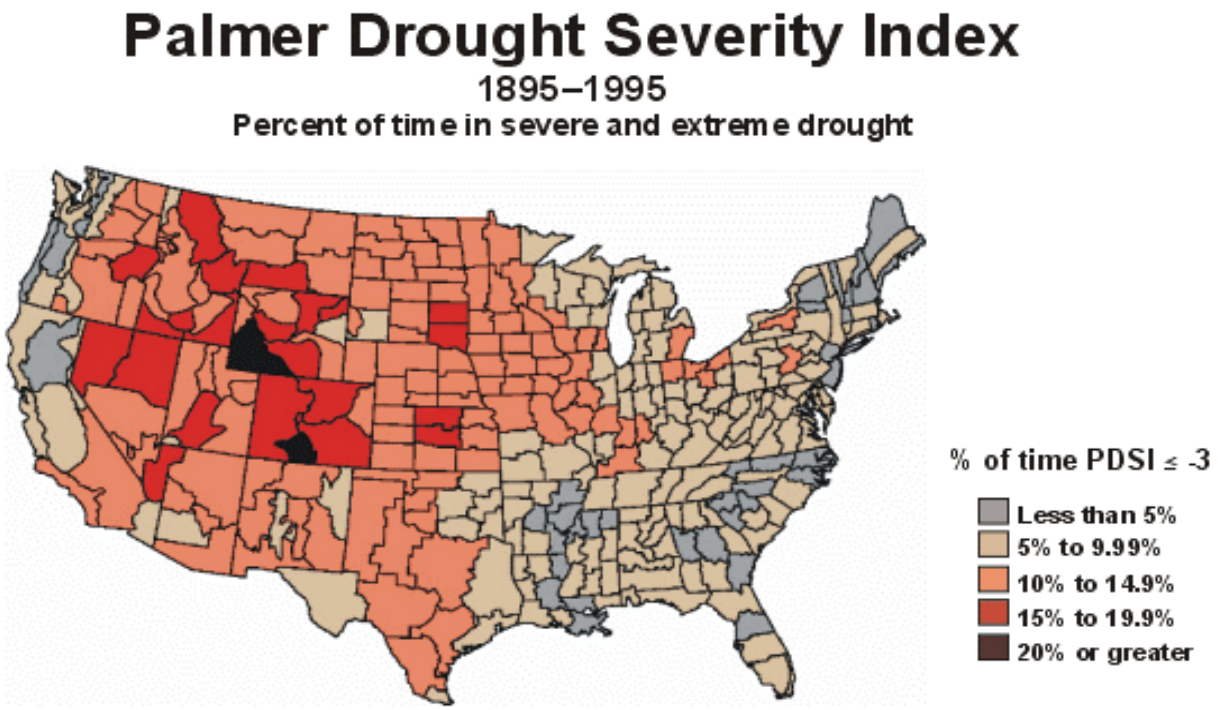
Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Droughts are slow-onset hazards, but over time, can have very damaging effects on crops, municipal water supplies, recreational uses, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impact can be significant.

[1] https://www.ptrc.org/Home/ShowDocument?id=7238

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and ranges from -0.5 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United States, drought affects most areas of the United States, but is less severe in the Eastern United States.

FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



Source: National Drought Mitigation Center

5.4.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index, North Central North Carolina has a relatively low risk for drought hazard compared to much of the country. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Furthermore, it is assumed that Guilford County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

5.4.3 Historical Occurrences

The United States Drought Monitor reports data on North Carolina drought conditions from 2000 to 2019. It classifies drought by county on a scale of D0 to D4 where:

- D0: Abnormally Dry
- D1: Moderate Drought

- D2: Severe Drought
- D3: Extreme Drought
- D4: Exceptional Drought

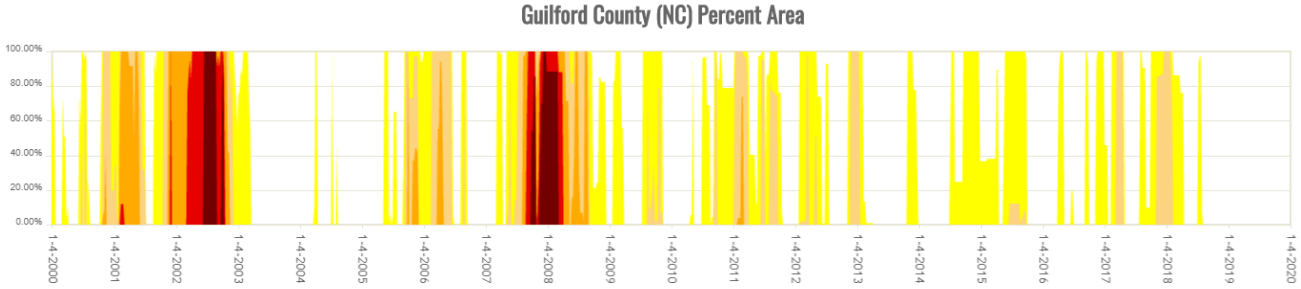
According to the United States Drought Monitor records, Guilford County experienced at least moderate drought occurrences in 15 of the last 19 years (2000-2018). **Table 5.4** shows the most severe drought condition reported for each year in Guilford County and **Figure 5.3** shows historic data on these drought conditions in time-series format. However, it should be noted that the most severe classification reported is based on monthly regional averages, and conditions in Guilford County may actually have been less or more severe than what is reported.

TABLE 5.4: HISTORICAL DROUGHT OCCURRENCES IN GUILFORD COUNTY

Year	Drought Level
2000	SEVERE
2001	EXTREME
2002	EXCEPTIONAL
2003	ABNORMAL
2004	ABNORMAL
2005	SEVERE
2006	SEVERE
2007	EXCEPTIONAL
2008	EXCEPTIONAL
2009	MODERATE
2010	MODERATE
2011	SEVERE
2012	MODERATE
2013	MODERATE
2014	ABNORMAL
2015	MODERATE
2016	ABNORMAL
2017	MODERATE
2018	MODERATE
2019*	NONE

Source: United States Drought Monitor
**Data only available through 7/2/19*

FIGURE 5.3: HISTORIC DROUGHT CONDITIONS IN GUILFORD COUNTY



Source: United States Drought Monitor

Data from the National Centers for Environmental Information (NCEI) was also reviewed to obtain additional information on historical drought events in the county, but no events were reported in Guilford County. However, according to the *Piedmont Together Climate Adaptation Report*, 2012 was the year in which 64% of the continental U.S. experienced drought that directly led to over 100 deaths. Additionally, the report found that in the 2007-2008 drought, North Carolina recorded heat stress levels of almost 16 hospitalizations per 100,000 people and almost 13 deaths per 100,000, with 84% of these hospitalizations occurring between June and August.

5.4.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Guilford County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions. Additionally, according to the *Piedmont Together Climate Adaptation Report*, the increased likelihood of drought due to climate change will result in greater agricultural losses and more water supply shortages in the county.

5.4.5 Consequence Analysis

People (The Public and Public Confidence)

Drought can have a detrimental effect on the livelihood of farmers and agricultural producers in Guilford County. Efforts to mitigate against drought, such as using irrigation equipment, have a high initial cost, including the need for an increase in management requirements, cost of operation and maintenance, and the lack of good quality water resources—which during times of drought would be severely affected. Although the general public may be subject to water restrictions during extreme drought events, it is unlikely that public confidence in the state's governance would be impacted severely as a result of a drought.

Responders

Although drought would have many of the same impacts on responders as it would on the public, the overall effects would be relatively limited when compared to other hazards could potentially have on responders. Since a drought is typically a slowly developing event, the risk and exposure that responders would face is minimal.

Continuity of Operations

Drought would have minimal impacts on continuity of operations due to the relatively long warning time that would allow for plans to be made to maintain continuity of operations. Normal operations would very likely be able to continue throughout the event and there would likely be little change to the program's management overall.

Built Environment (Property, Facilities, and Infrastructure)

Water Use

Drought has the potential to affect Guilford County's water supply for residential, commercial, institutional, industrial, and government-owned areas. Drought can reduce water supply in wells and reservoirs. When drought conditions persist with no relief, local or state governments often institute

water restrictions which may have an impact on personal property to some degree, though generally these restrictions are meant to protect life safety by ensuring adequate supplies of drinking water for consumption and other critical purposes.

Irrigation
Drought would affect irrigation and outdoor landscaping efforts around residential, commercial, institutional, industrial, and government-owned land. Water conservation strategies can limit the amount of water used to maintain the aesthetic environment around buildings, businesses, and areas such as golf courses. This would include automatic and non-automatic spray irrigation systems, hose-end sprinklers, handheld hoses, bucket watering, drip irrigation, athletic field irrigation, swimming pools, car washing, pressure washing, and reuse water.

Economy

Drought can have a detrimental effect on agricultural and agribusiness industry sectors which account for more than 16 percent of North Carolina's workforce.[2] Extreme drought has the potential to depress local businesses and industries such as landscaping, recreation and tourism, and public utilities. Nursery and landscape businesses can also face significant losses from a drought. Losses include reduction of output and sales of nursery crops, reduction in plant sales, and an increase in watering costs. This can lead to the closing of many business locations, lay-off of employees, and increases in bankruptcy filing.

Environment

Agriculture
The agriculture sector of Guilford County is particularly susceptible to drought damage. **Table 5.5** shows there are 962 farms in Guilford County, with 90,750 acres in total farmland.[3] Agricultural drought has the potential to directly affect much of the land in Guilford County. Agricultural areas at particular risk are cropland and pastures.

TABLE 5.5: GUILFORD COUNTY FARMLAND OVERVIEW

Census of Agriculture (2012)	
Number of Farms	962
Total Land in Farms, Acres	90,750
Average Farm Size, Acres	94

Source: United States Department of Agriculture

Crops
Prolonged periods of dry weather are the most difficult and damaging problem faced by crop growers and agricultural suppliers. According to the USDA's Census of Agriculture, Guilford County has 36,234 acres of harvested cropland.

Short- or long-term moisture deficits—even with the use of irrigation methods—during critical stages of crop development can severely reduce yields, with the amount of yield lost depending on when the drought occurs (see **Table 5.6** for a list of Guilford County crop specific information), the growth stage of the crop, the severity of dry conditions, and the amount of available water that the soil can hold.

[2] United States Department of Agriculture. (2018). *North Carolina Agricultural Statistics.* Retrieved October 8, 2019, from https://www.nass.usda.gov/Statistics_by_State/North_Carolina/Publications/Annual_Statistical_Bulletin/AgStat/Section01.pdf
[3] Guilford *County: Census of agriculture—2012*. Retrieved October 8, 2019, from https://www.nass.usda.gov/Publications/AgCensus/2012/Full_Report/Volume_1,_Chapter_2_County_Level/North_Carolina/

TABLE 5.6: GUILFORD COUNTY CROP INFORMATION

Crops	Acres Harvested	Farms
Corn for Grain	3,761	70
Corn of Silage or Greenchop	1,961	21
Wheat for grain, all	5,256	104

Source: United States Department of Agriculture

Livestock[4]

Table 5.7 shows the type of livestock in Guilford County, including the quantity of livestock and the number of farms. These are at risk for being affected by drought conditions in the county.

Livestock losses from drought will most likely be confined to forage-based production systems. Losses in beef and dairy systems will potentially be of a single-season or multiyear variety. Single-season losses will include lost forage production (on both hay and grazing land), reduced weaning weights, reduced milk production, and increased mortality.

Multiyear losses could include the cost of reestablishing pastures and reduced meat or milk production in subsequent years due to forced sales in the drought year. In addition, drought conditions could result in poor pasture conditions, reduced drinking water supplies, and a critical hay shortage that directly affects livestock and poultry health.

TABLE 5.7: GUILFORD COUNTY LIVESTOCK (2012)

Livestock	Number	Farms
Cattle and calves inventory	14,861	378
Beef cows	5,293	300
Milk cows	1,484	11
Hogs and pigs	14,502	29
Layers inventory	306,500	83
Broilers and other meat-type chickens sold	Information withheld	5

Source: United States Department of Agriculture

Environmental Degradation

Drought may also lead to pollution of water sources as a result of lack of rain water to dilute industrial and agricultural chemical runoff. This poses a risk to plants and animals and makes it difficult to maintain a clean drinking water supply.

Lack of water reaching the soil may also cause the ground to become dry and unstable. Erosion can increase and loss of topsoil can be severe if a high-intensity rain falls on ground lacking a ground cover of plants. As a result of these environmental impacts, habitats may be degraded through a loss of wetlands, lake capacity, and vegetation.

[4] North Carolina Division of Water Resources. (2009). *The water connection: Water resources, drought and the hydrologic cycle in North Carolina*. Retrieved May 7, 2012, from http://www.ncwater.org/Reports_and_Publications/primer/The_Water_Connection_Booklet_9x12_150dpi.pdf

5.5 EARTHQUAKE

5.5.1 Background

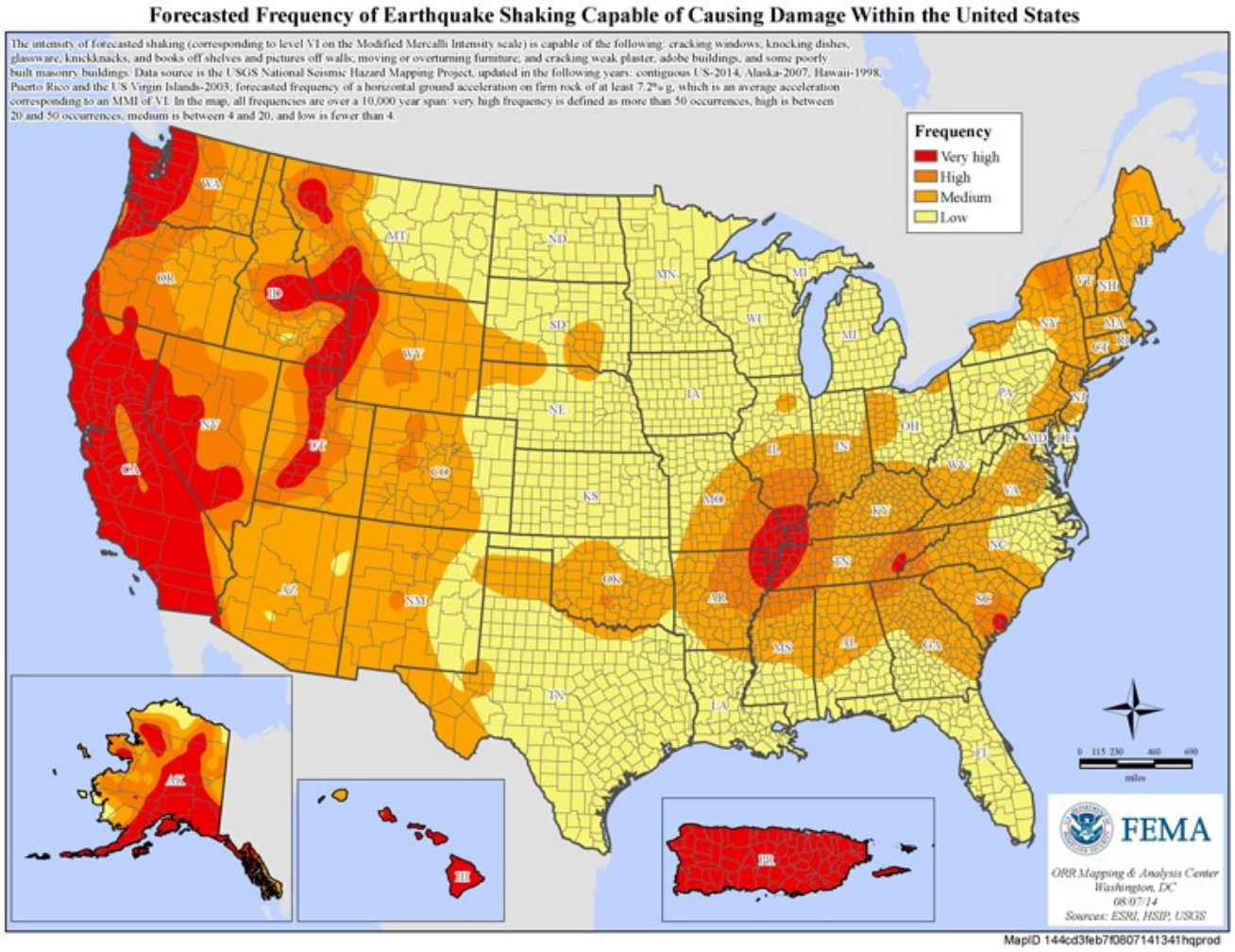
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quick sand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth’s outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 5.4** shows relative seismic risk for the United States.

FIGURE 5.4: UNITED STATES EARTHQUAKE HAZARD MAP



Source: Federal Emergency Management Agency, 2014

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (**Table 5.8**). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.9**.

TABLE 5.8: RICHTER SCALE

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
< 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

TABLE 5.9: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

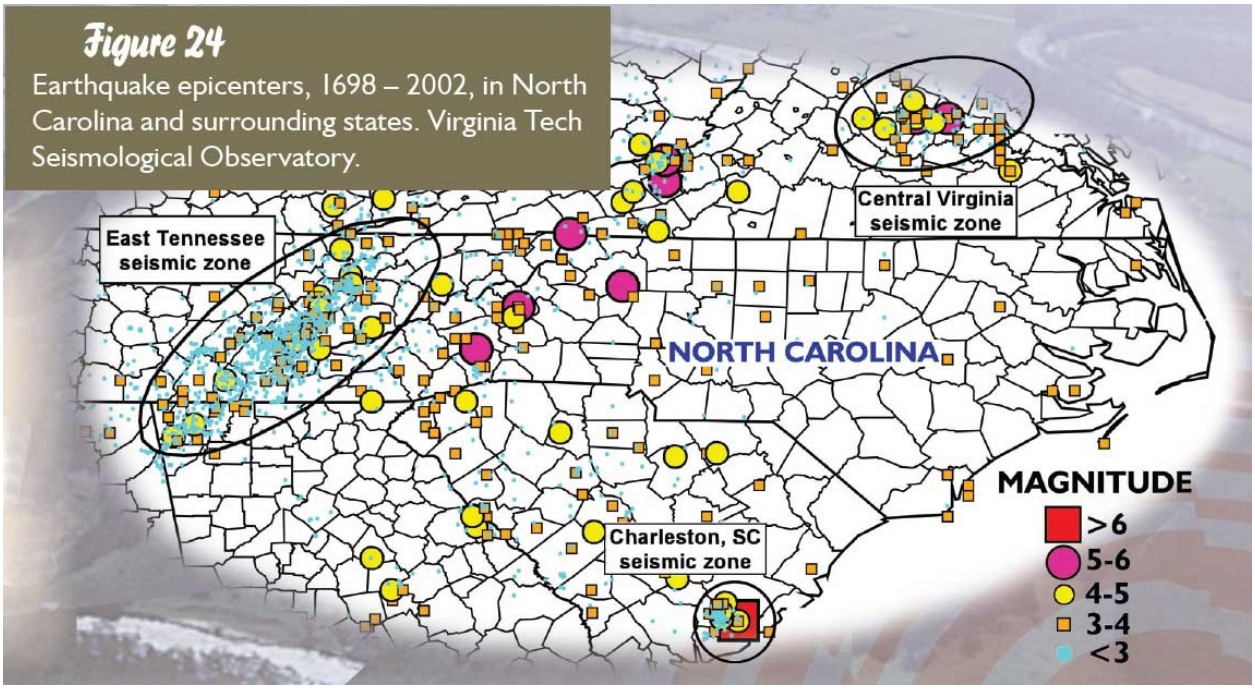
Source: Federal Emergency Management Agency

5.5.2 Location and Spatial Extent

Much of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by the Charleston seismic zone in South Carolina, the East Tennessee seismic zone in Tennessee, and the Central Virginia seismic zone in Virginia. The Charleston fault has generated earthquakes measuring greater than 8 on the Richter Scale during

the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.5** is a map showing geological and seismic information for North Carolina.

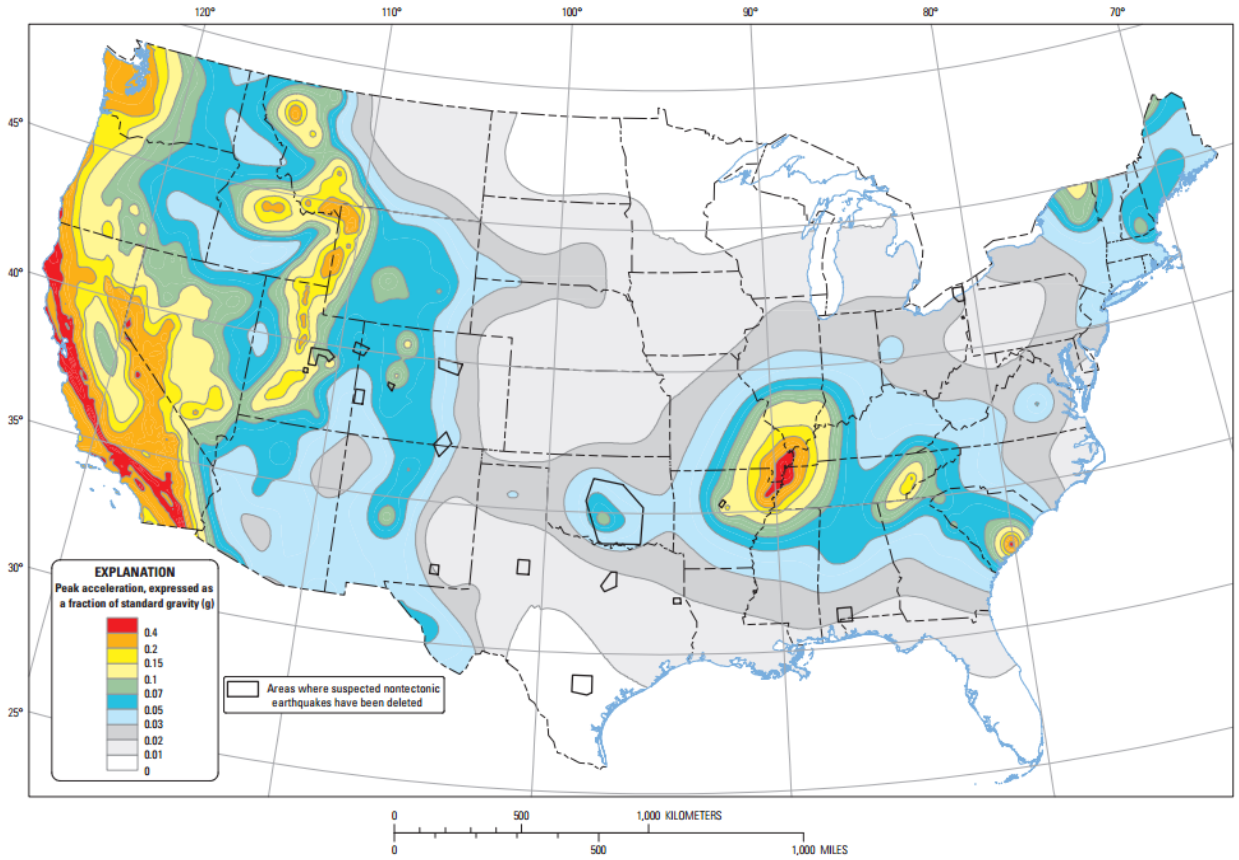
FIGURE 5.5: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



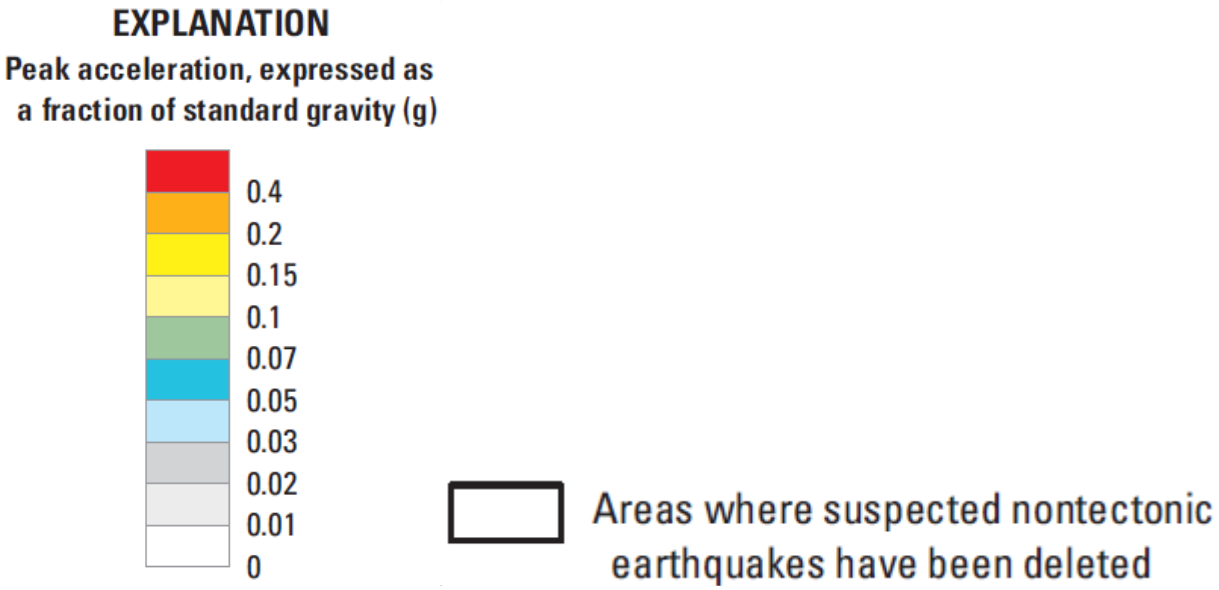
Source: Virginia Tech Seismological Observatory, North Carolina Department of Environmental Quality

Figure 5.6 shows the intensity level associated with Guilford County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Guilford County lies within an approximate zone of 0.02 to 0.05 peak ground acceleration. This indicates that the county as a whole exists within an area of low to moderate seismic risk.

FIGURE 5.6: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Ten-percent probability of exceedance in 50 years map of peak ground acceleration



Source: United States Geological Survey, 2014

5.5.3 Historical Occurrences

At least five earthquakes are known to have affected Guilford County since 1852. The strongest of these measured a IV on the Modified Mercalli Intensity (MMI) scale. **Table 5.10** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table 5.11** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known).[5]

TABLE 5.10: SUMMARY OF SEISMIC ACTIVITY IN GUILFORD COUNTY (1638-1985)

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Gibsonville	0	--	--
Greensboro	5	IV	4.3
High Point	0	--	--
Jamestown	0	--	--
Oak Ridge	0	--	--
Pleasant Garden	0	--	--
Sedalia	0	--	--
Stokesdale	0	--	--
Summerfield	0	--	--
Whitsett	0	--	--
Unincorporated Area	0	--	--
GUILFORD COUNTY TOTAL	**5**	**IV**	**4.3**

Source: National Geophysical Data Center

TABLE 5.11: SIGNIFICANT SEISMIC EVENTS IN GUILFORD COUNTY (1638-1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Gibsonville				
None Reported	--	--	--	--
Greensboro				
Greensboro	4/29/1852	--	--	III
Greensboro	12/23/1875	205.0	--	IV
Greensboro	2/21/1916	252.0	--	III
Greensboro	3/12/1960	348.0	--	IV
Greensboro	11/20/1969	183.0	4.3	IV
High Point				
None Reported	--	--	--	--
Jamestown				
None Reported	--	--	--	--
Oak Ridge				
None Reported	--	--	--	--

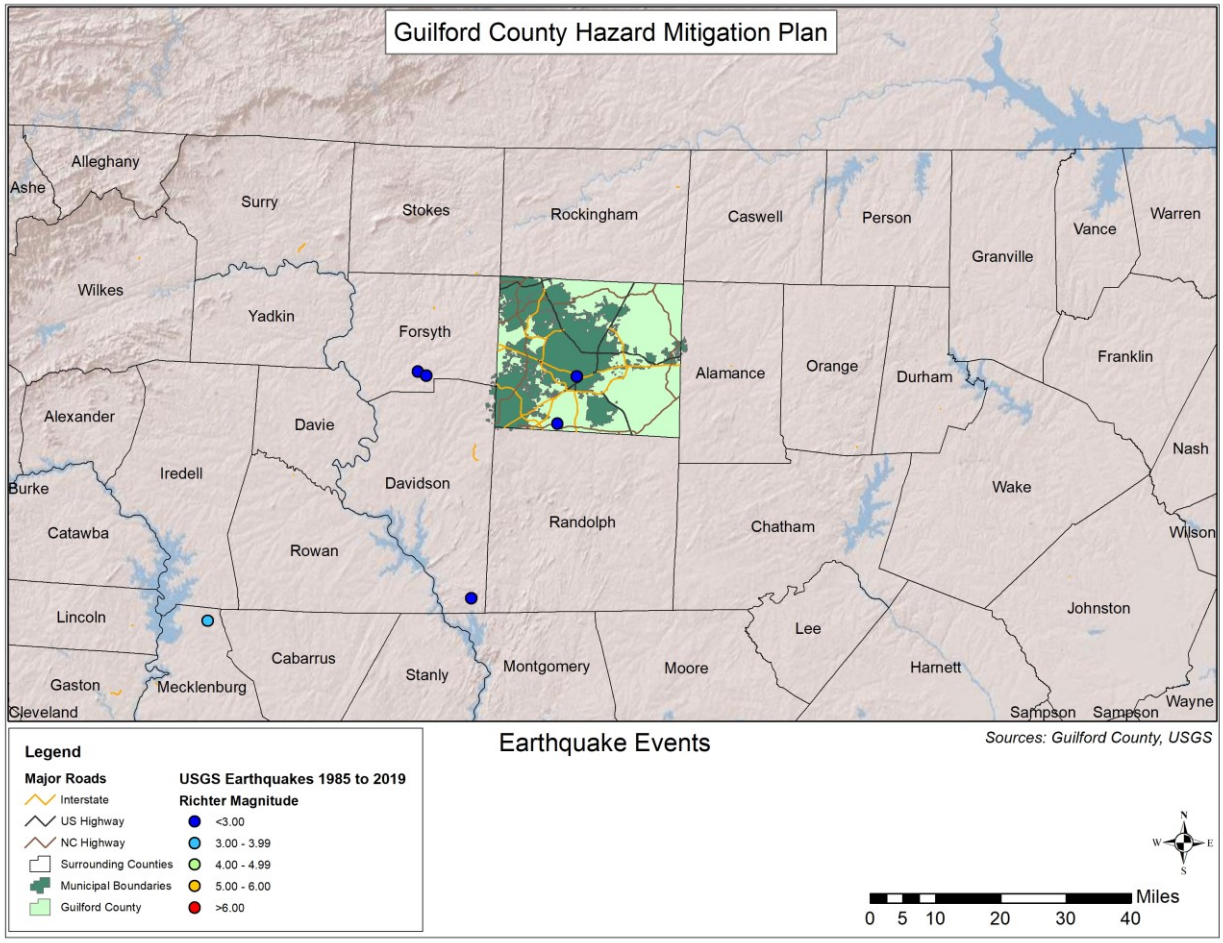
[5] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

Location	Date	Epicentral Distance	Magnitude	MMI
Pleasant Garden				
None Reported	--	--	--	--
Sedalia				
None Reported	--	--	--	--
Stokesdale				
None Reported	--	--	--	--
Summerfield				
None Reported	--	--	--	--
Whitsett				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

Figure 5.7 shows the earthquake epicenters that have occurred in and around Guilford County starting in 1985 and running through 2019.

FIGURE 5.7: HISTORIC EARTHQUAKES, 1985-2019



Source: United States Geological Survey, 2018, supplemented by information provided by Guilford County

In addition to those earthquakes specifically affecting Guilford County, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.12.**

TABLE 5.12: EARTHQUAKES WHICH HAVE CAUSED NOTABLE DAMAGE IN NORTH CAROLINA

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 - 1	NE Arkansas	8.5	XI	VI
12/16/1811 - 2	NE Arkansas	8.0	X	VI
12/18/1811 - 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/071812	New Madrid, MO	8.7	XII	VI
04/29/1852 *	Wytheville, VA	5.0	VI	VI
08/31/1861	Wilkesboro, NC	5.1	VII	VII
12/23/1875 *	Central Virginia	5.0	VII	VI
08/31/1886	Charleston, SC	7.3	X	VII
05/31/1897	Giles County, VA	5.8	VIII	VI
01/01/1913	Union County, SC	4.8	VII	VI
02/21/1916 *	Asheville, NC	5.5	VII	VII
07/08/1926	Mitchell County, NC	5.2	VII	VII
11/03/1928	Newport, TN	4.5	VI	VI
05/13/1957	McDowell County, NC	4.1	VI	VI
07/02/1957	Buncombe County, NC	3.7	VI	VI
11/24/1957	Jackson County, NC	4.0	VI	VI
10/27/1959 **	Chesterfield, SC	4.0	VI	VI
07/13/1971	Newry, SC	3.8	VI	VI
11/30/1973	Alcoa, TN	4.6	VI	VI
11/13/1976	Southwest Virginia	4.1	VI	VI
05/05/1981	Henderson County, NC	3.5	VI	VI
08/23/2011	Louisa County, VA	5.8	VII	V

*This event is accounted for in the Guilford County occurrences.

** Conflicting reports on this event, intensity in North Carolina could have been either V or VI

Source: This information compiled by Dr. Kenneth B. Taylor and provided by Tiawana Ramsey of NCEM. Information was compiled from the National Earthquake Center, Earthquakes of the US by Carl von Hake (1983), and a compilation of newspaper reports in the Eastern Tennessee Seismic Zone compiled by Arch Johnston, CERI, Memphis State University (1983).

5.5.4 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Guilford County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 1 and 10 percent (possible).

5.5.5 Consequence Analysis

People (The Public and Public Confidence)

Earthquakes in Guilford County generally are not high impact events that cause injury or death as most are low to moderate in terms of impact. The public typically experiences some shaking in these events

and the greatest threat to health and well-being is often from objects falling from shelves. Public confidence would likely not be affected drastically in the event of an earthquake.

Responders

There would be little impact on responders in the event of an earthquake, because Guilford County is only likely to experience a moderate earthquake magnitude at a maximum. Since there would be minimal damage to structures and infrastructure, responders would likely not be impacted in their ability to respond to an earthquake. If there were any major collapses of buildings or infrastructure however, responders will need to take care when accessing these structures in case they have become structurally unstable and unsafe. It should also be noted that because earthquakes can knock items such as candles off shelves or damage gas lines, fires are possible directly after an event. This may cause additional emergency calls for responders and create a burden on response operations.

Continuity of Operations

During and after an earthquake, continuity of operations could relatively easily be maintained and there would likely be little disruption to services or operations during an event. The most likely impact may be downed communication networks which could cause interruptions to normal operations.

Built Environment (Property, Facilities, and Infrastructure)

Ground shaking is the primary cause of damage to the built environment during an earthquake. There are three important variables that determine the amount of damage: the intensity of the quake, local soil characteristics, and the quality of the impacted structures. The amount of damaged caused by an earthquake is strongly influenced by soil characteristics. The velocity at which the rock or soil transmits shear waves is the main contributor to ground shaking. Shaking is increased by soft, thick, or wet soil types.

Certain building types are particularly vulnerable to earthquake damage: wood-frame multi-unit buildings, single-family homes, mobile homes, and unreinforced masonry buildings.[6] The most susceptible structures are wood-frame, multi-story, mixed-use buildings that have large openings on the first floor for garages or commercial space and housing on the upper floors. During an earthquake, these types of structures could sway or even collapse.

Single-family homes built prior to the 1970s are often not bolted to their foundations, and walls surrounding crawl spaces are not braced (i.e., cripple walls). Typical earthquake damage to these structures include cracked foundations, chimneys breaking at the roof line, wood frames coming off their foundations, and racking of cripple walls.

Mobile homes that are built of light-weight metal or a combination of steel frame and wood are easily damaged by a quake. Mobile homes installed prior to 1995 were often not attached to their foundations and could shift off their supports.

The last type of susceptible building material is unreinforced masonry—masonry walls that have not been reinforced with steel. These buildings were often built before 1960 in an era when reinforcing was not generally used, anchorage to floors and roofs was missing, and use of low-strength lime mortar was common. Earthquake damage to these buildings can be severe. A lack of reinforcement and tie-downs

[6] Association of Bay Area Governments. (2012). *Guide to housing vulnerable resources*. Retrieved October 8, 2019, from http://quake.abag.ca.gov/housing/

can result in substantial damage in the form of cracked or leaning walls. Damage may also occur between the walls, and separation between the framing and walls could lead to full collapse due to a lack of vertical support.

Critical Infrastructure and Key Resources
There are a handful of key resource categories that could be impacted by an earthquake including transportation systems, communication systems, and utility systems. Historically, the county has not been impacted by an earthquake with more than a moderate intensity so damage to these resources would be very minor; however, an inspection of certain features after a strongly felt earthquake may be necessary.

Economy
There are several sources of economic loss associated with an earthquake including property damage and business interruption costs; cost to repair public transportation, communication, or utility systems; and debris removal costs. Historically, there have been very minor losses from earthquakes felt within the county.

Environment
There would be no substantial impacts to the environment following a large earthquake that is felt in Guilford County with a moderate intensity. Secondary effects from the damage of the key resources mentioned above (e.g., utility systems) could impact the environment, but the probability of this type of situation is very small. For instance, a ruptured pipeline could release dangerous materials that could damage the surrounding environment, but the likelihood of an earthquake causing this in Guilford County is relatively low.

5.6 EXTREME COLD

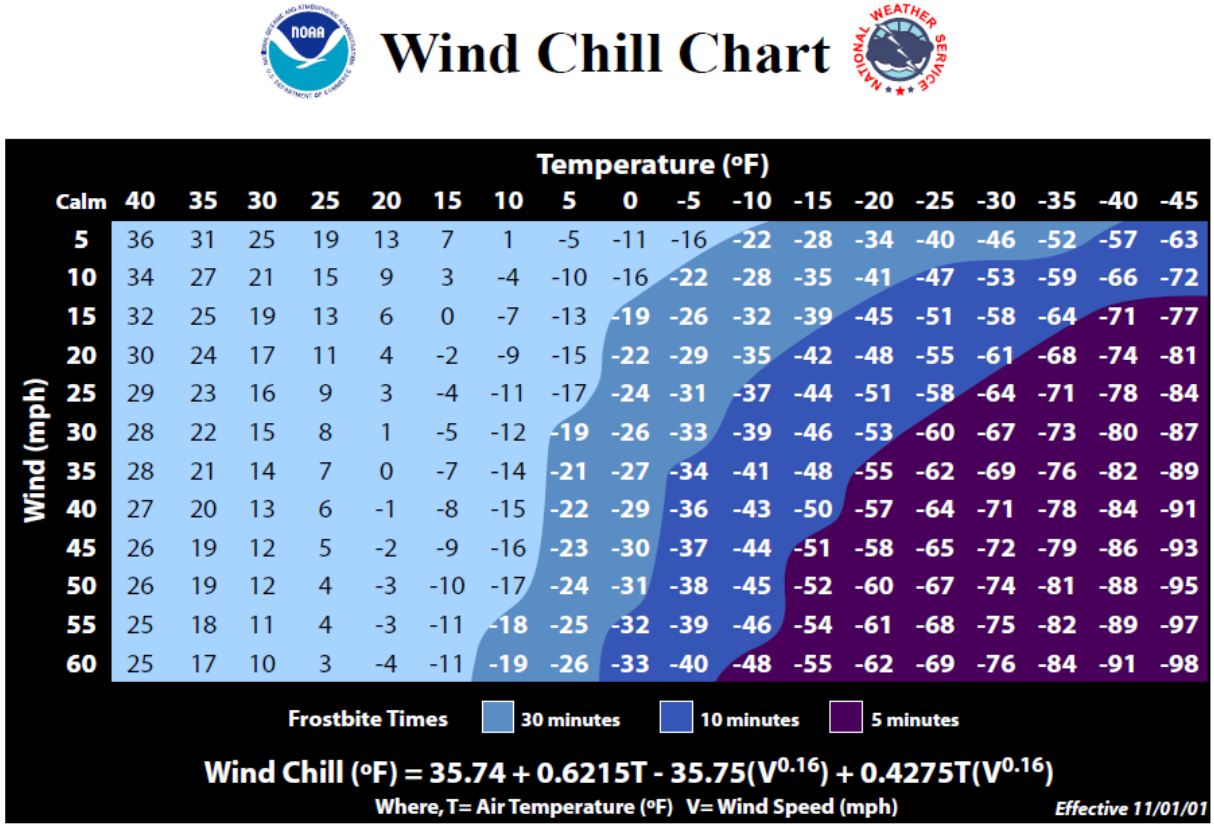
5.6.1 Background

What constitutes extreme cold and its effect varies across different regions of the United States, according to the National Weather Service (NWS). In the South and other areas relatively unaccustomed to cold weather, temperatures near or below freezing (32°F) are considered extreme cold. Freezing temperatures in these areas may cause damage to citrus fruit crops and other vegetation and may cause pipes to freeze and burst in homes that are poorly insulated or without heat. However, in the North, temperatures well below 0°F are considered extreme cold, and long cold spells can cause rivers to freeze, which can disrupt shipping, and ice jams to form, which can lead to flooding.

Prolonged exposure to extreme cold temperatures can lead to serious health problems, including hypothermia, cold stress, frostbite, or freezing, and infants and the elderly are most susceptible to these conditions. Extreme cold events are most likely to occur during January and February, and even areas that normally experience mild winters can be hit with extreme cold.

Extreme cold conditions can be the result of cold temperatures and high winds, a combination known as “wind chill.” The Wind Chill Temperature index, in **Figure 5.8**, shows the apparent temperature combining the effect of wind and air temperatures on exposed skin.

FIGURE 5.8: WIND CHILL TEMPERATURE INDEX



Source: National Weather Service, National Oceanic and Atmospheric Administration

The NWS issues wind chill advisories when wind chill hazards are potentially hazardous. Wind chill warnings are issued when wind chill temperatures are life threatening. Criteria for issuing wind chill warnings and advisories are set locally. For example, in Rochester, New York, wind chill advisories are issued when the wind chill temperature is expected to fall between -15°F to -24°F, and wind chill warnings are issued when wind chill temperature is expected to fall at or below -25°F. This warning system should not be mistaken as describing the extent or magnitude of extreme cold; rather, it is intended to provide advanced notice of excessive cold conditions for the protection of life and property.

5.6.2 Location and Spatial Extent

Extreme cold typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme cold conditions.

5.6.3 Historical Occurrences

Data from the National Centers for Environmental Information was used as one source to determine historical extreme cold events in Guilford County. One event was reported:

February 3, 1996 – *Cold/Wind Chill* – a cold/wind chill event impacted Guilford County for two days.
In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been recorded in Guilford

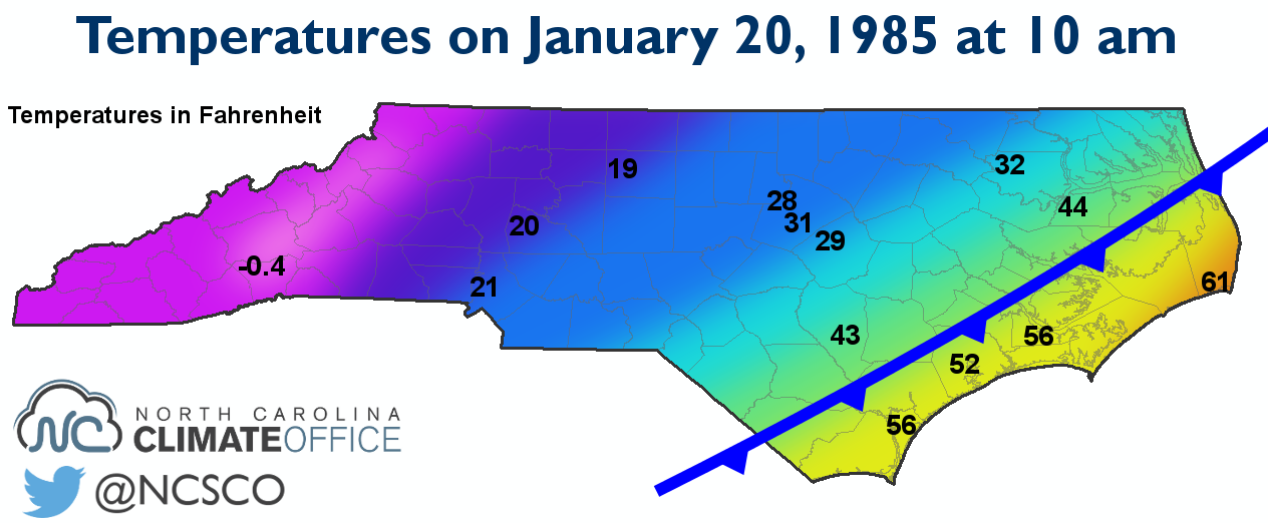
County since 1903. The recorded minimum for the county can be found below in **Table 5.13**. **Figure 5.9** shows temperatures across the state on the day when the coldest temperature was recorded.

TABLE 5.13: LOWEST RECORDED TEMPERATURES IN GUILFORD COUNTY

Location	Date	Temperature (°F)
Greensboro Airport	01/21/1985	-8
Greensboro Airport	1/27/1940	-7
Greensboro Airport	1/29/1940	-7
High Point	1/21/1985	-7
Greensboro Airport	1/20/1985	-6

Source: State Climate Office of North Carolina

FIGURE 5.9: RECORDED TEMPERATURES ON COLDEST DAY IN GUILFORD COUNTY



Source: State Climate Office of North Carolina

The State Climate Office also reports average minimum temperatures at various stations in the county. The most centralized location is in Greensboro. **Table 5.14** shows the average minimum temperatures from 1971 to 2000 at the Greensboro Airport observation station which can be used as a general baseline for the county.

TABLE 5.14: AVERAGE MINIMUM TEMPERATURE IN GUILFORD COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	28.2 °F	30.6 °F	37.8 °F	45.5 °F	54.7 °F	63.5 °F	68.1 °F	66.8 °F	60.1 °F	47.5 °F	38.6 °F	31.4 °F

Source: State Climate Office of North Carolina

5.6.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Guilford County has a probability level of possible (1 to 10 percent annual probability) for future extreme cold events to impact the county.

5.6.5 Consequence Analysis

People (The Public and Public Confidence)

Extreme cold can affect many people and to varying degrees. Often the elderly and very young are susceptible to the most detrimental impacts, but hypothermia and frostbite can plague anyone. Extreme cold events generally have minimal effects on public confidence.

Responders

Extreme cold can also affect responders who are often more susceptible to the effects of cold weather because they are forced to be exposed to the elements to complete tasks for their jobs. In these cases, responders could be negatively impacted by extreme cold.

Continuity of Operations

Extreme cold would likely have few impacts on continuity of operations as the warning time for these events is usually long and direct impacts to large numbers of personnel or other resources necessary to maintain operations are unlikely.

Built Environment (Property, Facilities, and Infrastructure)

Extreme cold would likely have a minor effect on the built environment, although low temperatures could potentially put a strain on infrastructure such as power generation due to higher demand.

Economy

An extreme cold event could potentially have a negative impact on the economy in the short term as the public may be advised to stay inside, causing them to reduce overall spending and negatively impact businesses in the community. Extended periods of extreme cold may also disrupt the local economy if agricultural, dairy, and livestock production declines, resulting in income loss for famers and others affected.

Environment

The environment would be impacted by extreme cold as many plants and animals that are not able to withstand lower temperatures may die off and crops and livestock may be impacted by unusually low temperatures, resulting in death or illness.

5.7 EXTREME HEAT

5.7.1 Background

Extreme heat, like drought and extreme cold, poses little risk to property. However, extreme heat can have devastating effects on health. Extreme heat is often referred to as a “heat wave.” According to the National Weather Service, there is no universal definition for a heat wave, but the standard U.S.

definition is any event lasting at least three days where temperatures reach ninety degrees Fahrenheit or higher. However, it may also be defined as an event at least three days long where temperatures are ten degrees greater than the normal temperature for the affected area. Heat waves are typically accompanied by humidity but may also be very dry. These conditions can pose serious health threats causing an average of 1,500 deaths each summer in the United States[7].

According to the National Oceanic and Atmospheric Administration, heat is the number one weather-related killer among natural hazards, followed by frigid winter temperatures[1]. The National Weather Service devised the Heat Index as a mechanism to better inform the public of heat dangers. The Heat Index Chart, shown in **Figure 5.10**, uses air temperature and humidity to determine the heat index or apparent temperature. **Table 5.15** shows the dangers associated with different heat index temperatures. Some populations, such as the elderly and young, are more susceptible to heat danger than other segments of the population.

FIGURE 5.10: HEAT INDEX CHART

	Relative Humidity (in percent)																				
Air Temp (in F)		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	140	125																				
	135	120	128																			
	130	117	122	131																		
	125	111	116	123	131	141																
	120	107	111	116	123	130	139	148														
	115	103	107	111	115	120	127	135	143	151												
	110	99	102	105	108	112	117	123	130	137	143	150										
	105	95	97	100	102	105	109	113	118	123	129	135	142	149								
	100	91	93	95	97	99	101	104	107	110	115	120	126	132	138	144						
	95	87	88	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136				
	90	83	84	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113	117	122		
	85	78	79	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97	99	102	105	108
	80	73	74	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86	87	88	89	91
	75	69	69	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80
	70	64	64	65	65	66	66	67	67	68	68	69	69	70	70	70	70	71	71	71	71	72

Source: National Oceanic and Atmospheric Administration

[7] http://www.noaawatch.gov/themes/heat.php

TABLE 5.15: HEAT DISORDERS ASSOCIATED WITH HEAT INDEX TEMPERATURE

Heat Index Temperature (Fahrenheit)	Description of Risks
80°- 90°	Fatigue possible with prolonged exposure and/or physical activity
90°- 105°	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105°- 130°	Sunstroke, heat cramps, and heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity
130° or higher	Heatstroke or sunstroke is highly likely with continued exposure

Source: National Weather Service, National Oceanic and Atmospheric Administration

Urban areas are at greater risk to heat effects. Stagnant atmospheric conditions trap pollutants, thus adding unhealthy air to excessively hot temperatures. In addition, the "urban heat island effect" can produce significantly higher nighttime temperatures because asphalt and concrete (which store heat longer) gradually release heat at night.

5.7.2 Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire county is susceptible to extreme heat conditions. Additionally, according to the *Piedmont Together Climate Adaptation Report*, the Piedmont Triad has the state's largest elderly and aging populations—the fastest growing age demographic both nationally and regionally—making heat stress one of the leading climate adaptability priorities for the region and Guilford County.

5.7.3 Historical Occurrences

According to the *Piedmont Together Climate Adaptation Report*, the 10 warmest years in recorded history have occurred since 1997. Data from the National Centers for Environmental Information was used to determine historical extreme heat and heat wave events in Guilford County. Two events were reported:

July 22, 1998 –*Heat* – Excessive heat plagued central North Carolina during July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees for several hours each afternoon. To make matters worse, the minimum temperatures did not fall below 80 at several locations and those that did achieved that feat for only an hour or two. Strong thunderstorms ended the 2 day excessive heat ordeal on the evening of the 23 when rain cooled the environment enough to send temperatures into the lower 70s at most locations.

May 27, 2008 –*Heat* – North Carolina A&T State University Senior Chad Wiley collapsed after a voluntary football workout on campus Tuesday May 27th. Chad was 22 years old.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been recorded in Guilford County since 1903. The five highest temperatures recorded for the county can be found below in **Table**

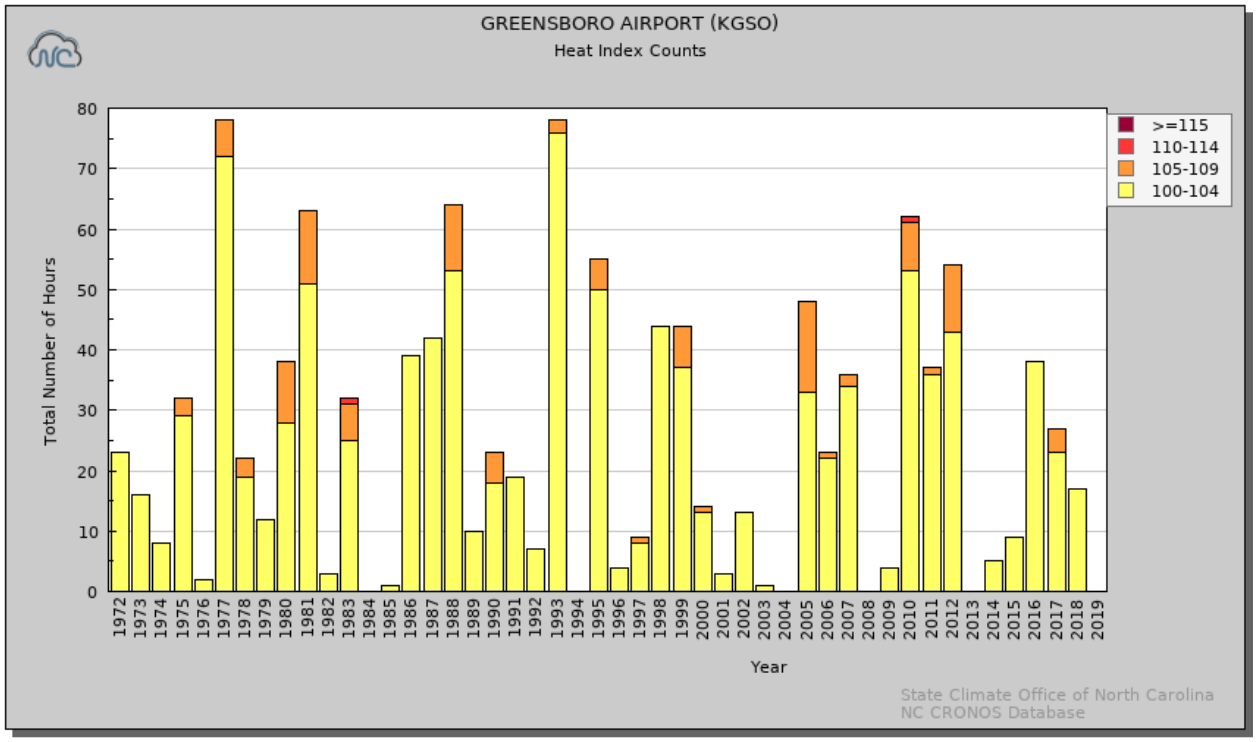
5.16. In addition, **Figure 5.11** shows the number of times the heat index value was recorded at over 100°F at Greensboro Airport since 1972.

TABLE 5.16: HIGHEST RECORDED TEMPERATURE IN GUILFORD COUNTY

Location	Date	Temperature (°F)
High Point	07/20/1926	106
High Point	7/29/1952	106
High Point	6/28/1934	105
High Point	7/15/1954	105
High Point	8/31/1932	105

Source: State Climate Office of North Carolina

FIGURE 5.11: HEAT INDEX COUNTS AT GREENSBORO AIRPORT (1972-2019)



**Counts are defined as the number of hours in a given year where the heat index reached or exceeded 100 degrees Fahrenheit*

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures at various stations in the county. The most centralized location is in Greensboro. **Table 5.17** shows the average maximum temperatures from 1971 to 2000 at the Greensboro Airport Observation Station which can be used as a general baseline for the county.

TABLE 5.17: AVERAGE MAXIMUM TEMPERATURE IN GUILFORD COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	47.2 °F	51.7 °F	60.3 °F	69.7 °F	76.9 °F	83.8 °F	87.6 °F	85.7 °F	79.4 °F	69.6 °F	59.9 °F	50.6 °F

Source: State Climate Office of North Carolina

5.7.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Guilford County has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the county. Additionally, according to the *Piedmont Together Climate* Adaptation Report, the average increase in annual temperature for the Piedmont Triad is estimated to be 5°F and higher annual average temperatures will likely create a longer growing season that may be supportive of agriculture. However, these hot, dry summers and wetter winter conditions could stress farms. Furthermore, the increased likelihood of heat waves due to climate change will result in a higher number of rolling brown/blackouts and decreased air quality in the county.

5.7.5 Consequence Analysis

People (The Public and Public Confidence)

Extreme heat can affect many people and to varying degrees. Often the elderly and very young are susceptible to the most detrimental impacts, but heat stroke and exhaustion can plague anyone. People who are overweight, who overexert during work or exercise, and who are ill or are on certain medications are also at greater risk of suffering from heat-related illness. Risks from exposure to extreme heat include heat cramps, heat exhaustion, heat stroke, and death. Many of the impacts of extreme heat on people are the result of heat exhaustion or improperly functioning air conditioning units.

A heat wave or extreme heat event would have minimal effects on public confidence as these events are frequent and the public likely understands the potential impacts. However, if an extreme heat event results in a large number of illnesses and fatalities, government organizations may be accused of failing to properly prepare for or respond to the threat, and public confidence could suffer.

Responders

Extreme heat can also affect responders who are often more susceptible to heat stroke and exhaustion due to the nature of their work. This work forces police and emergency medical providers to be exposed to the elements, physically exert themselves, or wear heavy personal protective equipment. In these cases, responders could be negatively impacted by extreme heat and will need to protect themselves and prepare accordingly.

Continuity of Operations

Extreme heat would likely have few impacts on continuity of operations as the warning time for these events is usually long and direct impacts to large numbers of personnel or other resources necessary to maintain operations are unlikely. If air conditioning systems in operations centers break down due to overuse, operations could be interrupted or forced to move to secondary facilities.

Built Environment (Property, Facilities, and Infrastructure)

Extreme heat would likely have a minor effect on the built environment, although high temperatures could potentially put a strain on infrastructure such as power generation and water systems due to higher demand. During times of extreme heat, air conditioning units work harder and require more electricity, making brownouts and blackouts possible if electricity demands exceed generation. Extreme heat can also cause transportation infrastructure such as roads, bridges, railways, and runways to buckle, crack, or shatter.

Economy

An extreme heat event could potentially have a negative impact on the economy in the short term as the public may be advised to stay indoors, causing them to reduce overall spending and negatively impact businesses in the community. Additionally, extreme heat events can also result in decreased worker productivity as high temperatures can result in decreased energy, loss of concentration, and heat-related illness in workers. This can cause disruptions to the regular working of the local economy. Extended periods of extreme heat may also disrupt the local economy if agricultural, dairy, and livestock production declines, resulting in income loss for farmers and other related industries as well as increased prices for consumers.

Environment

The environment would be impacted by extreme heat as many plants and animals that are not able to withstand the heat may die off and crops and livestock may be impacted by unusually high temperatures, resulting in death or illness. Heat waves can also contribute to higher levels of air pollution since air becomes stagnant and traps emitted pollutants, often causing increased levels of surface ozone.

5.8 FIRE/WILDFIRE

5.8.1 Background

Wildfire

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.[8] Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors.

Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning. In North Carolina, a majority of fires are caused by debris burning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildfires are usually signaled by dense smoke that fills the area for miles around.

[8] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses, and industries are located within high wildfire hazard areas. Furthermore, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends, and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning, and cooperative land management planning can also be encouraged to reduce fire hazards.

Structure Fire

According to the National Fire Protection Association (NFPA), any fire in or on a building or other structure is considered a structure fire even if the structure itself was not damaged. Mobile property used as a fixed structure, such as manufactured homes and portable buildings, are considered structures. In general, structure fires occur frequently in the United States and can have serious impacts such as death, injury and economic loss. Although structure fires can be caused by wildfires, in this plan, structure fires are categorized separately as a fires that are typically localized to the built environment and have generally been caused by humans.

The NFPA reports that, in 2018, structure fires that were not related to wildfire caused around $11 billion in property damage in the United States, with an average loss of around $22,244. Among the deadliest of these are fires that occur in nightclubs and other social establishments because they allow large numbers of people to congregate in a single location, thereby making egress difficult in situations where fires occur.

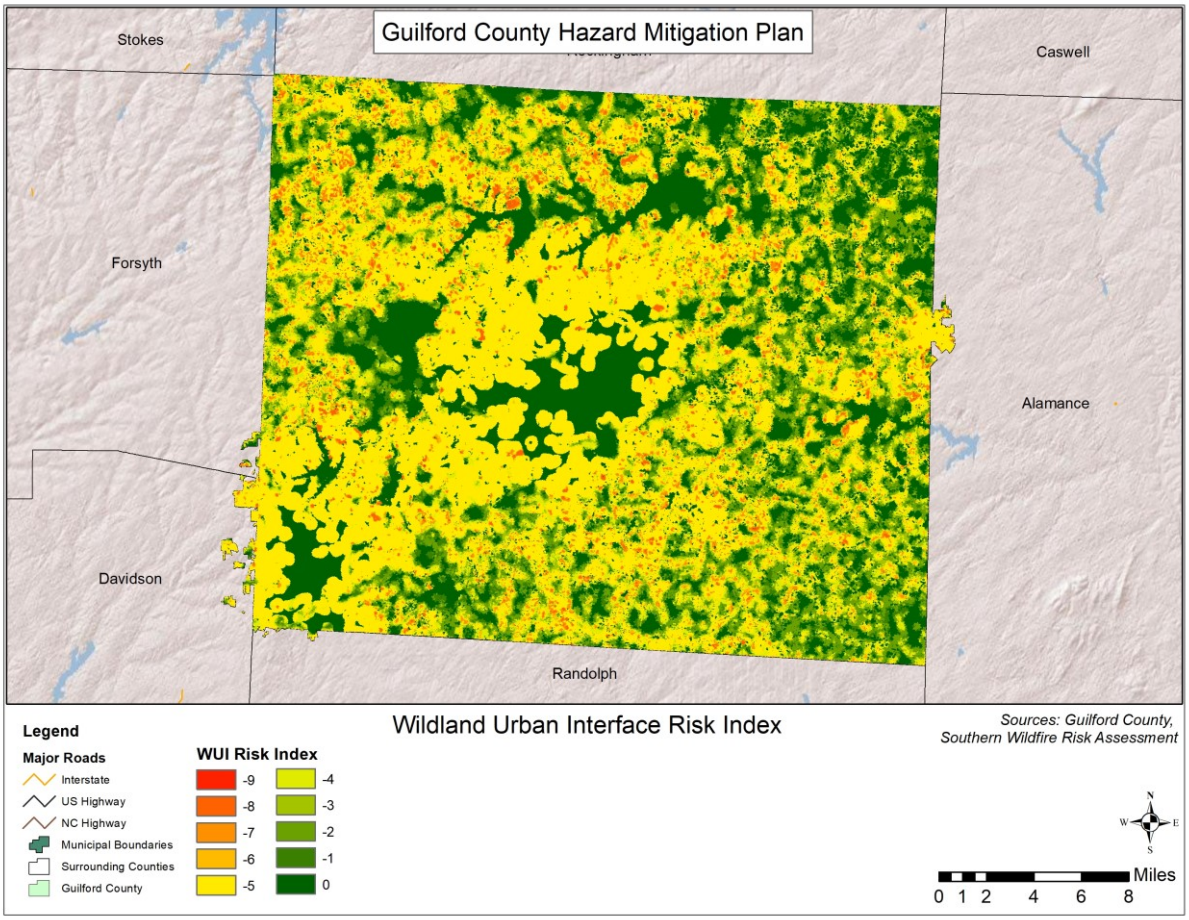
5.8.2 Location and Spatial Extent

Wildfire

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly

undeveloped areas. The Wildland Urban Interface Risk Index data shown in **Figure 5.12** below gives an indication of areas where there is higher risk to wildfire for people/property in Guilford County.

FIGURE 5.12: WILDLAND URBAN INTERFACE RISK INDEX IN GUILFORD COUNTY

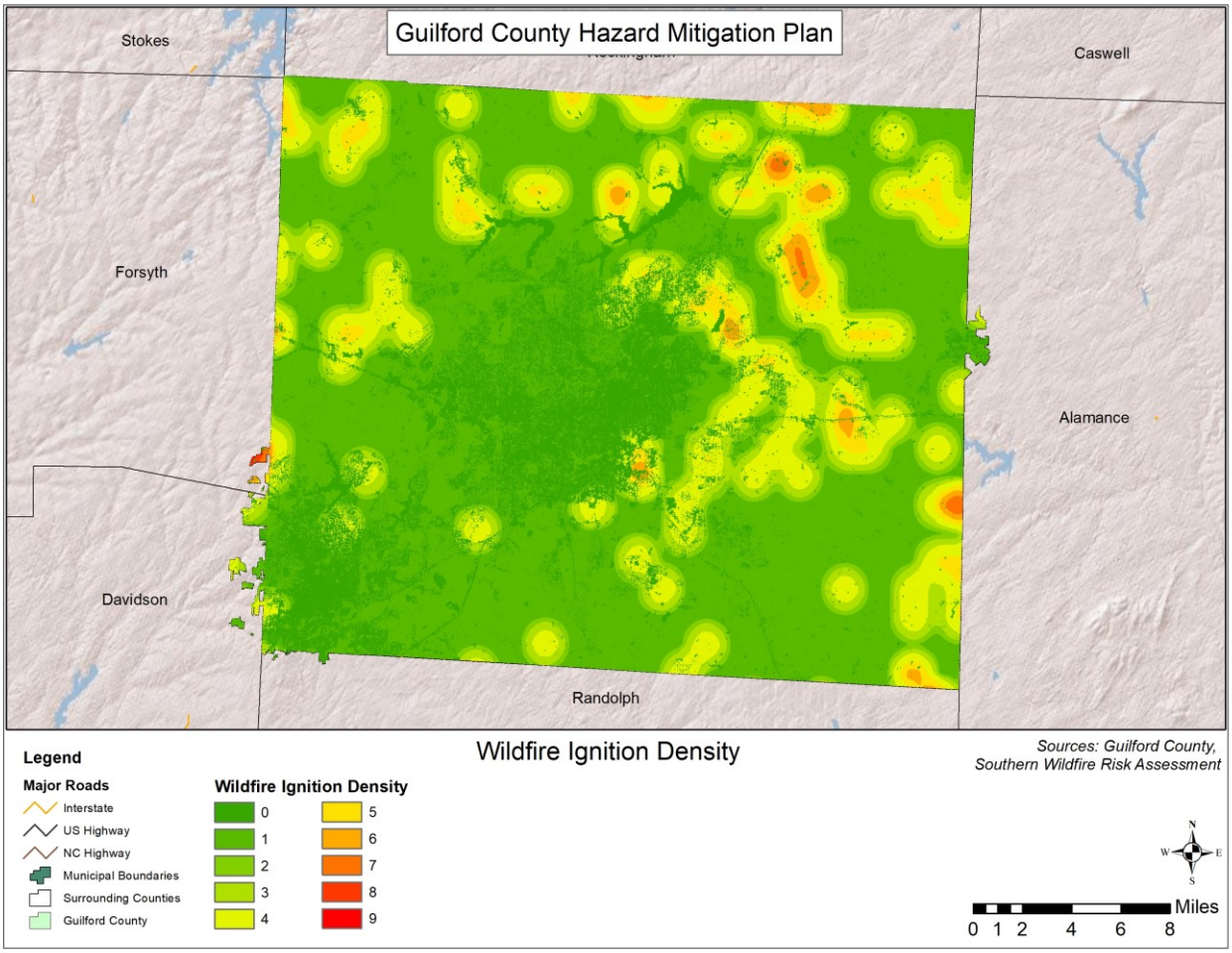


Source: Southern Wildfire Risk Assessment

Figure 5.13, Figure 5.14, **Figure 5.15**, **Figure 5.16**, **Figure 5.17**, **Figure 5.18**, **Figure 5.19**, **Figure 5.20**, **Figure 5.21**, **Figure 5.22**, and **Figure 5.23** show the Wildfire Ignition Density in Guilford County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.[9]

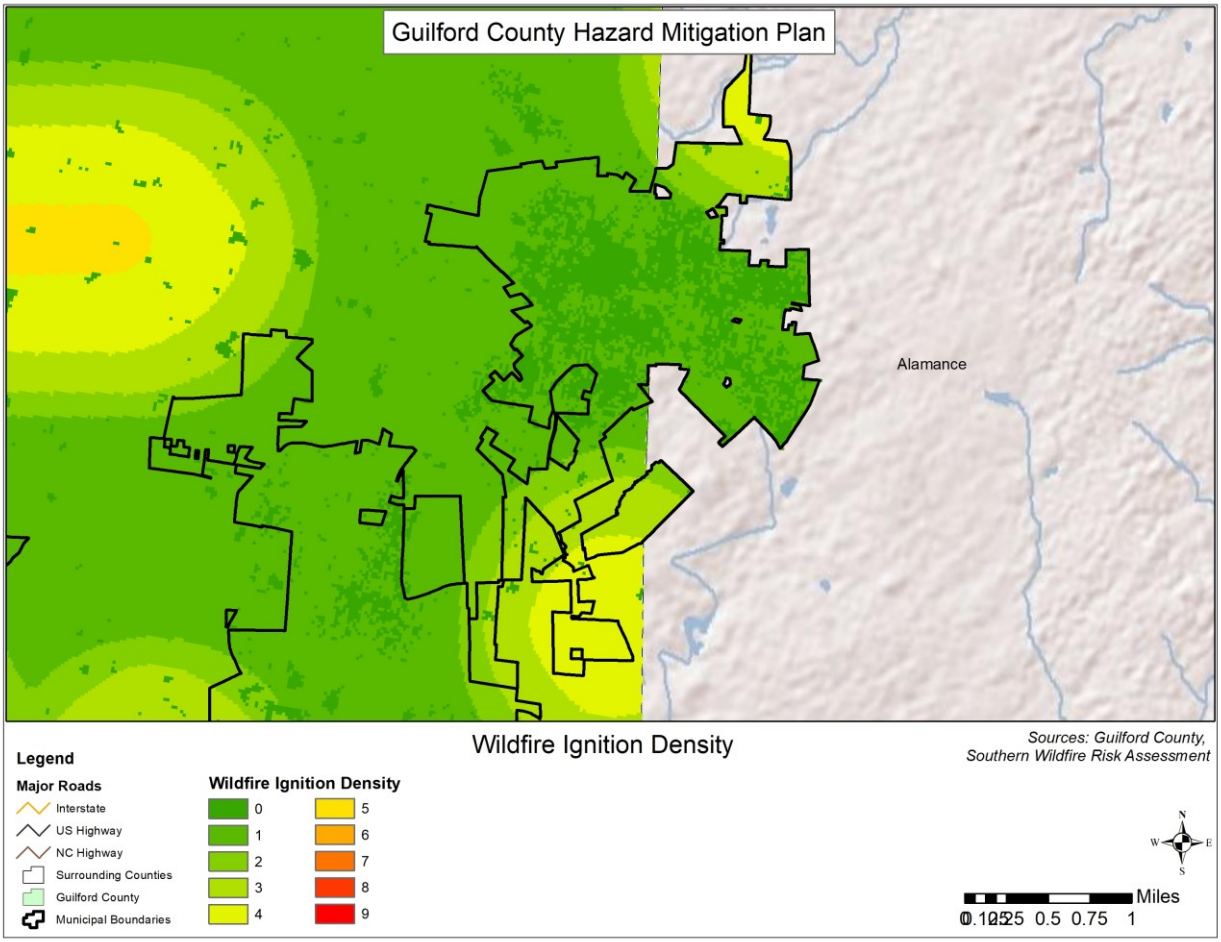
[9] Southern Wildfire Risk Assessment, 2014.

FIGURE 5.13: WILDFIRE IGNITION DENSITY IN GUILFORD COUNTY



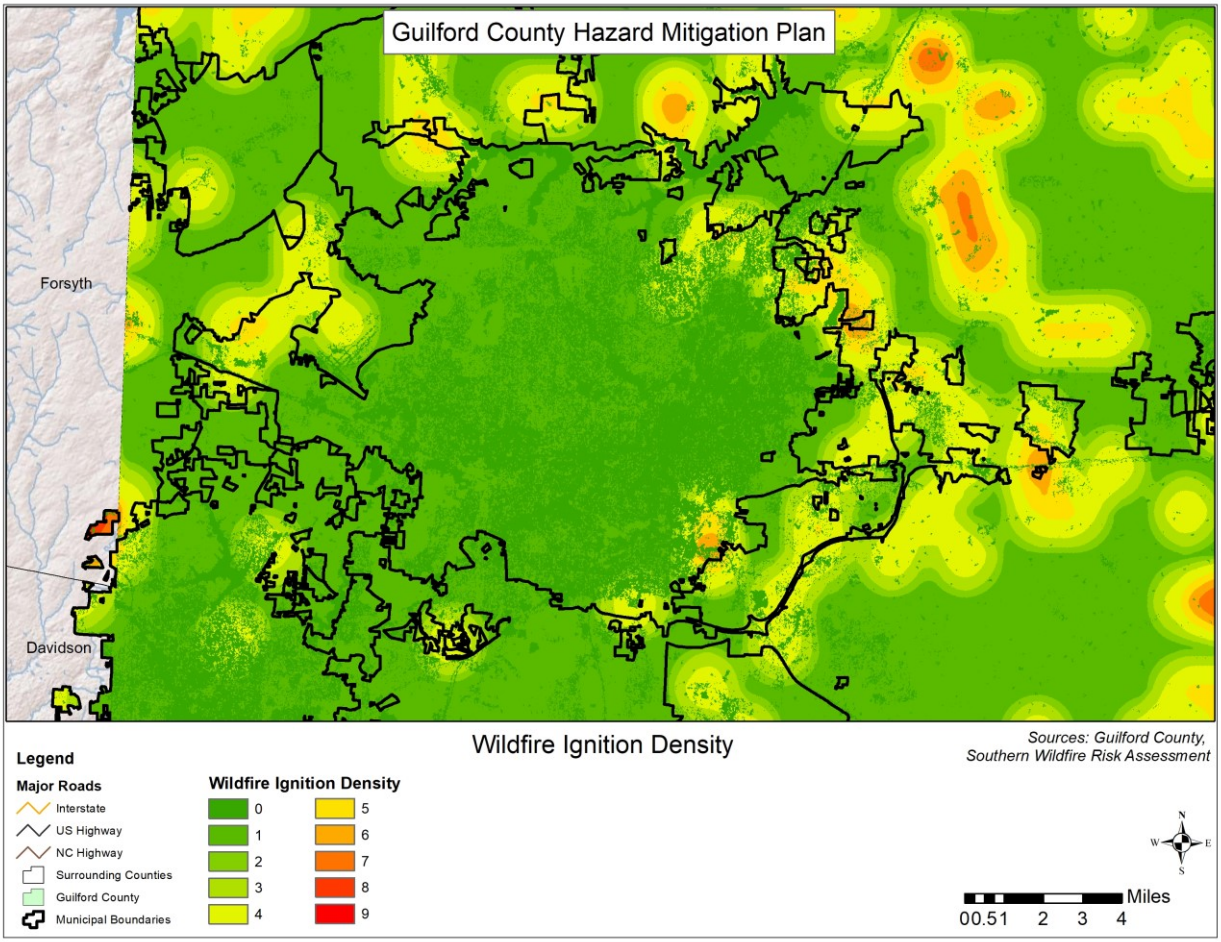
Source: Southern Wildfire Risk Assessment

FIGURE 5.14: WILDFIRE IGNITION DENSITY IN GIBSONVILLE



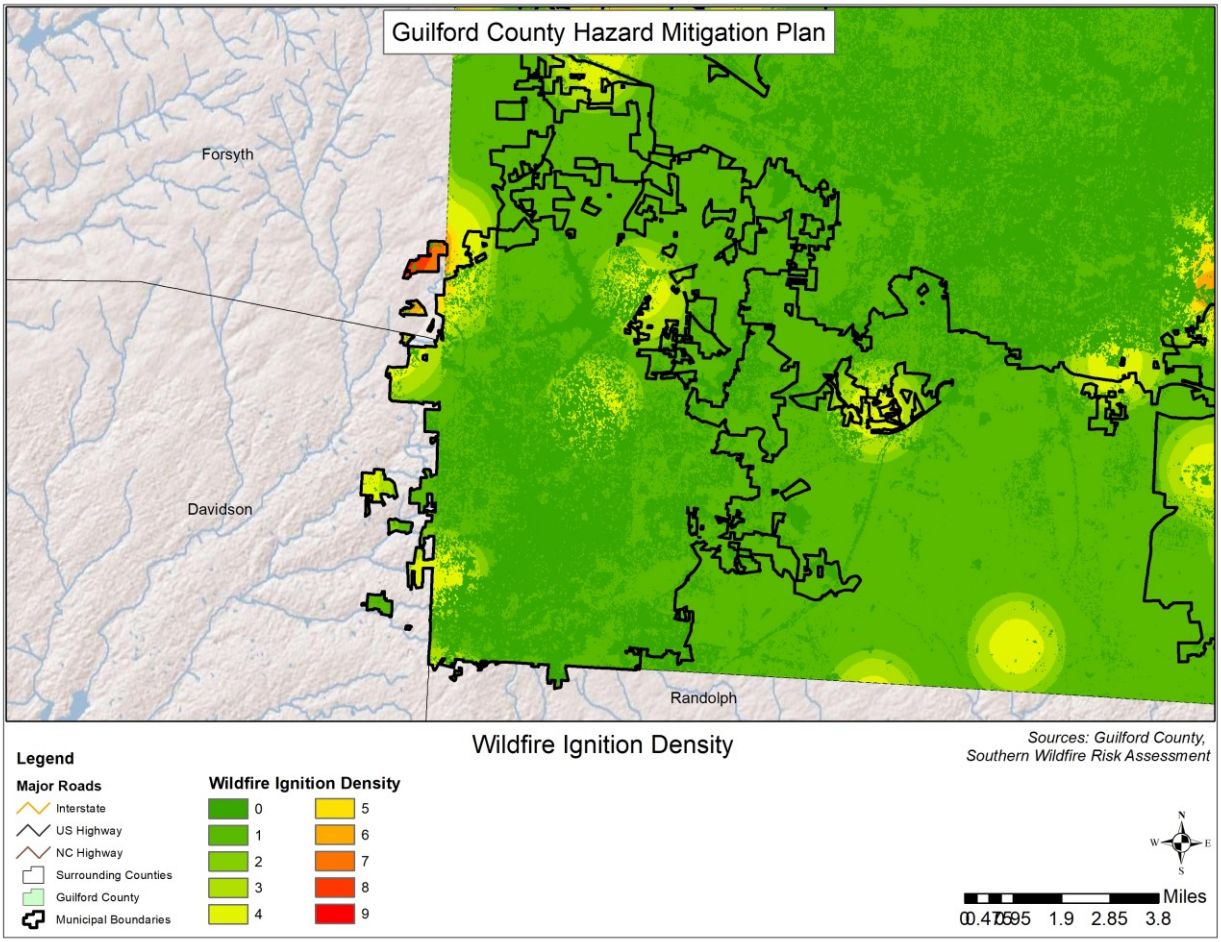
Source: Southern Wildfire Risk Assessment

FIGURE 5.15: WILDFIRE IGNITION DENSITY IN GREENSBORO



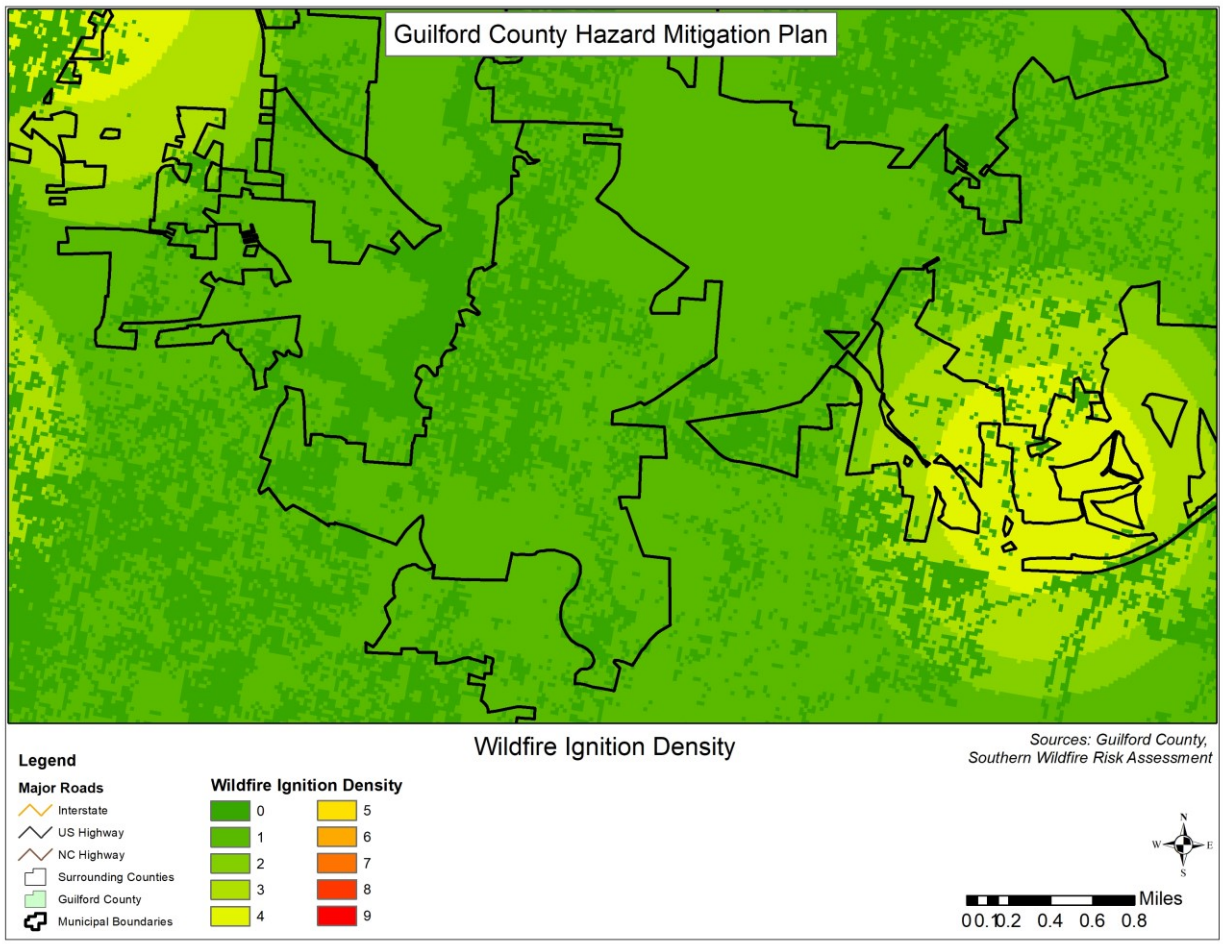
Source: Southern Wildfire Risk Assessment

FIGURE 5.16: WILDFIRE IGNITION DENSITY IN HIGH POINT



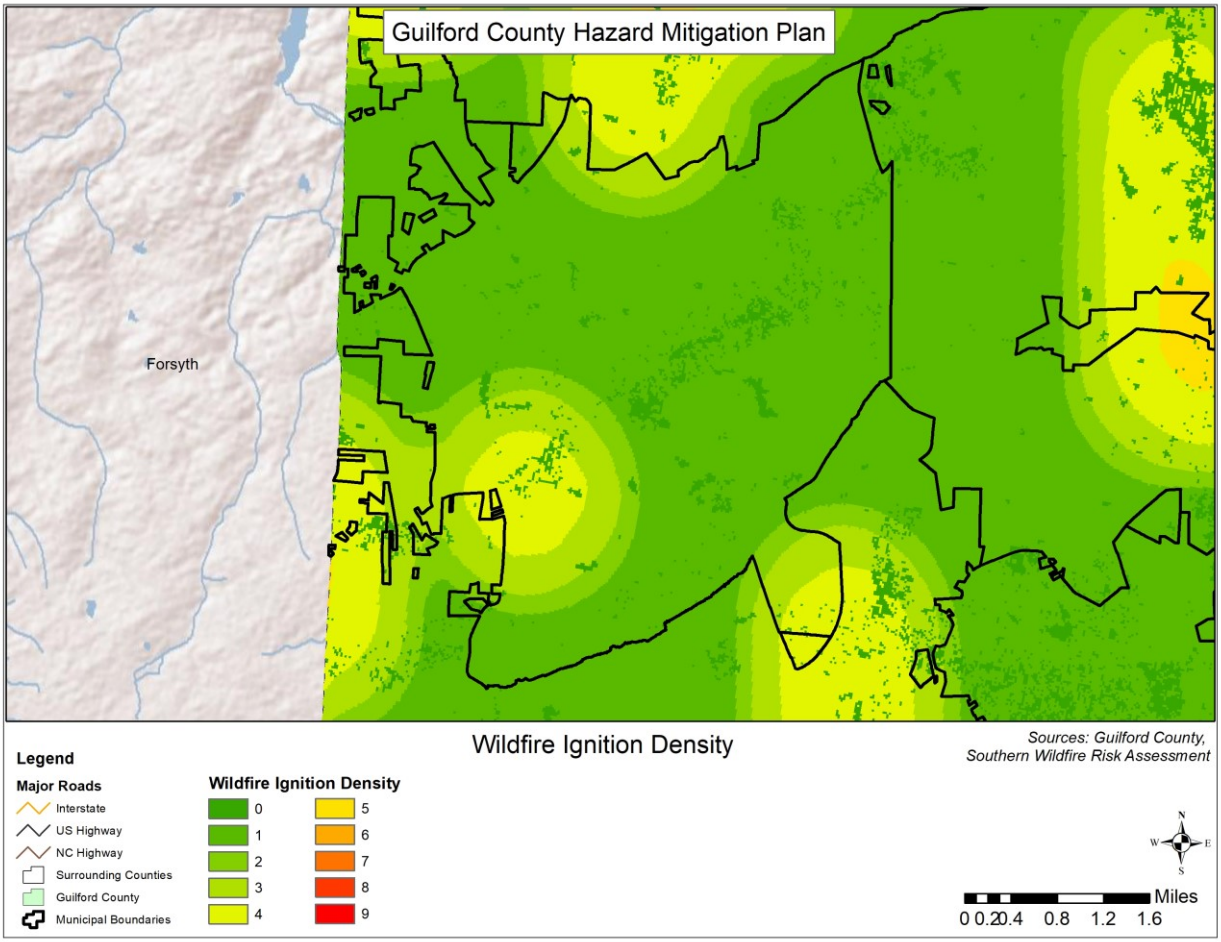
Source: Southern Wildfire Risk Assessment

FIGURE 5.17: WILDFIRE IGNITION DENSITY IN JAMESTOWN



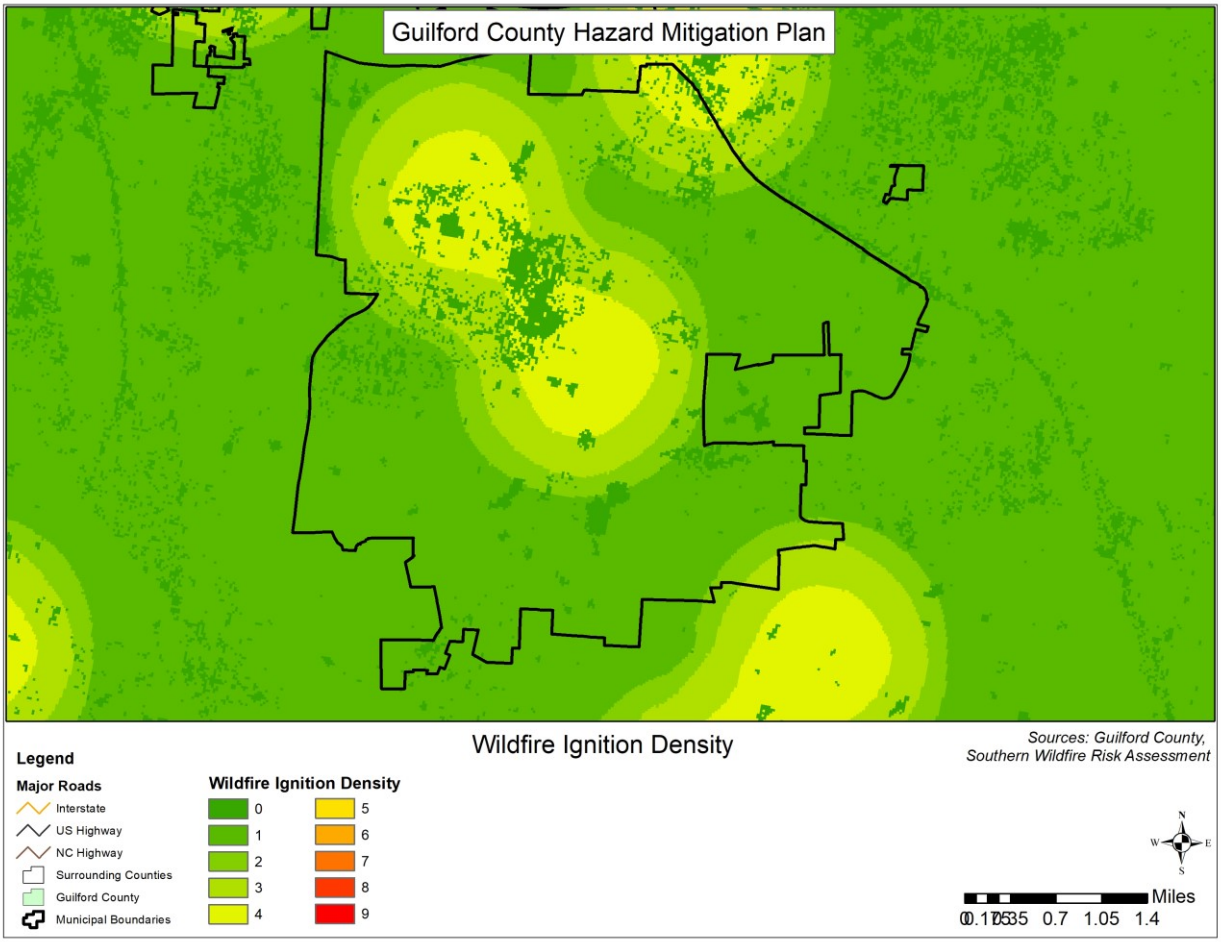
Source: Southern Wildfire Risk Assessment

FIGURE 5.18: WILDFIRE IGNITION DENSITY IN OAK RIDGE



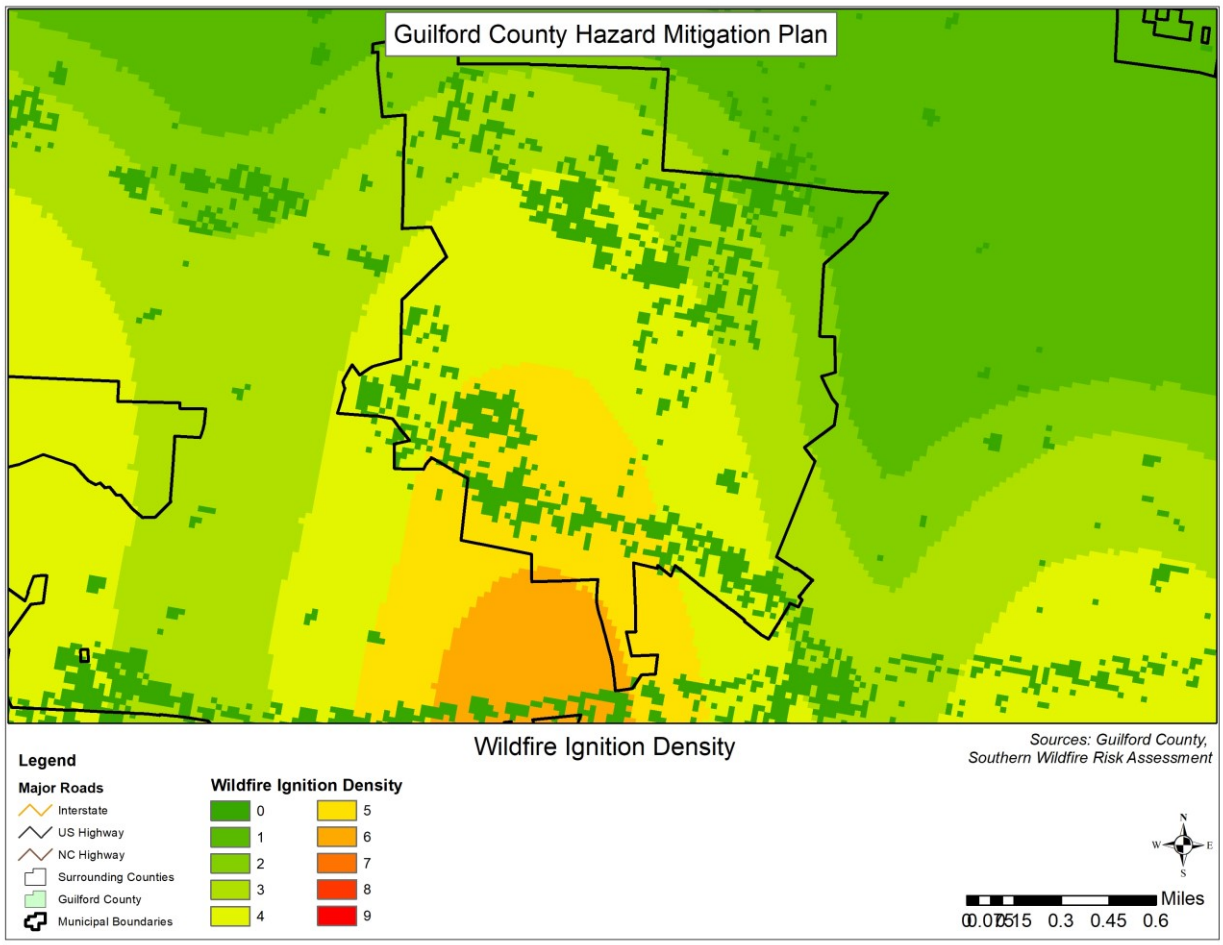
Source: Southern Wildfire Risk Assessment

FIGURE 5.19: WILDFIRE IGNITION DENSITY IN PLEASANT GARDEN



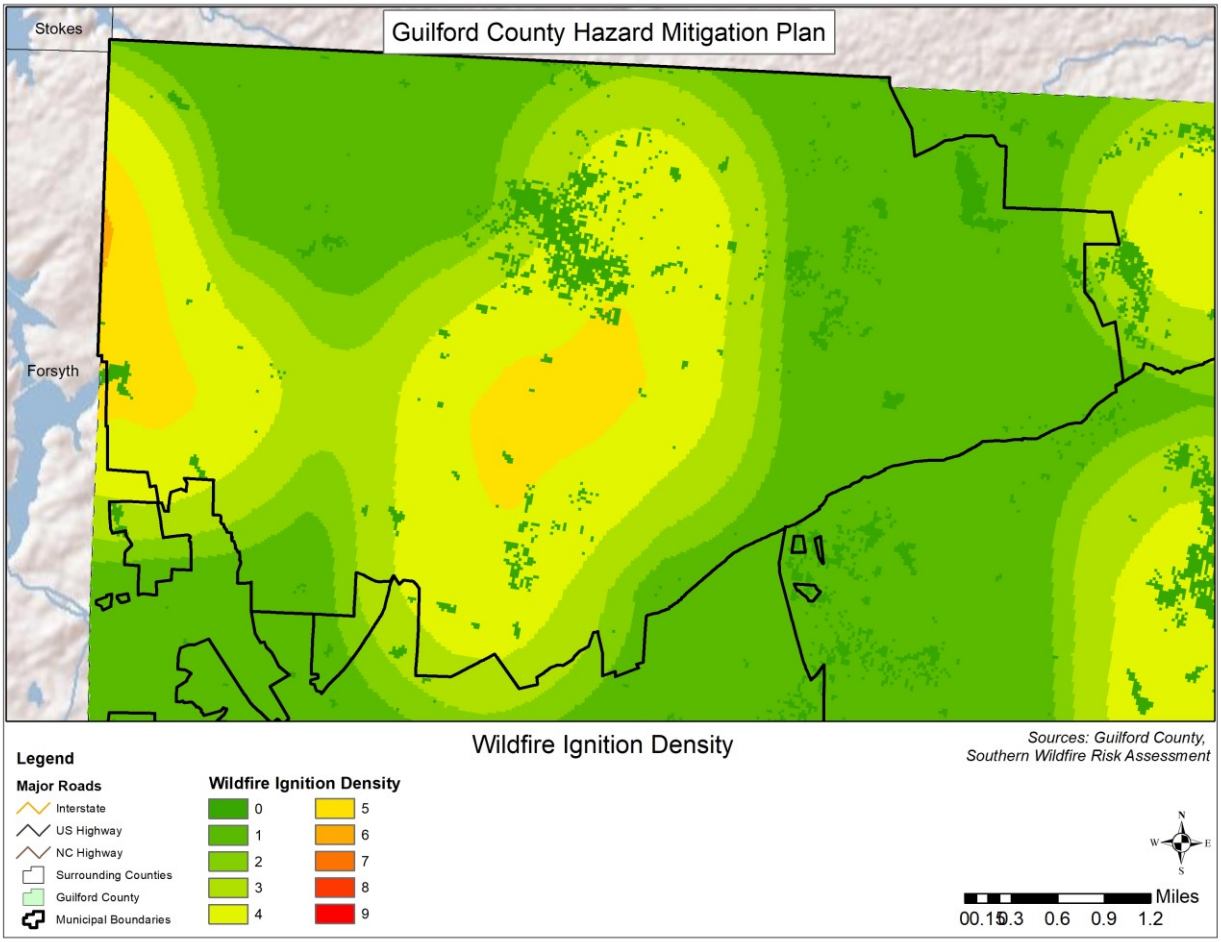
Source: Southern Wildfire Risk Assessment

FIGURE 5.20: WILDFIRE IGNITION DENSITY IN SEDALIA



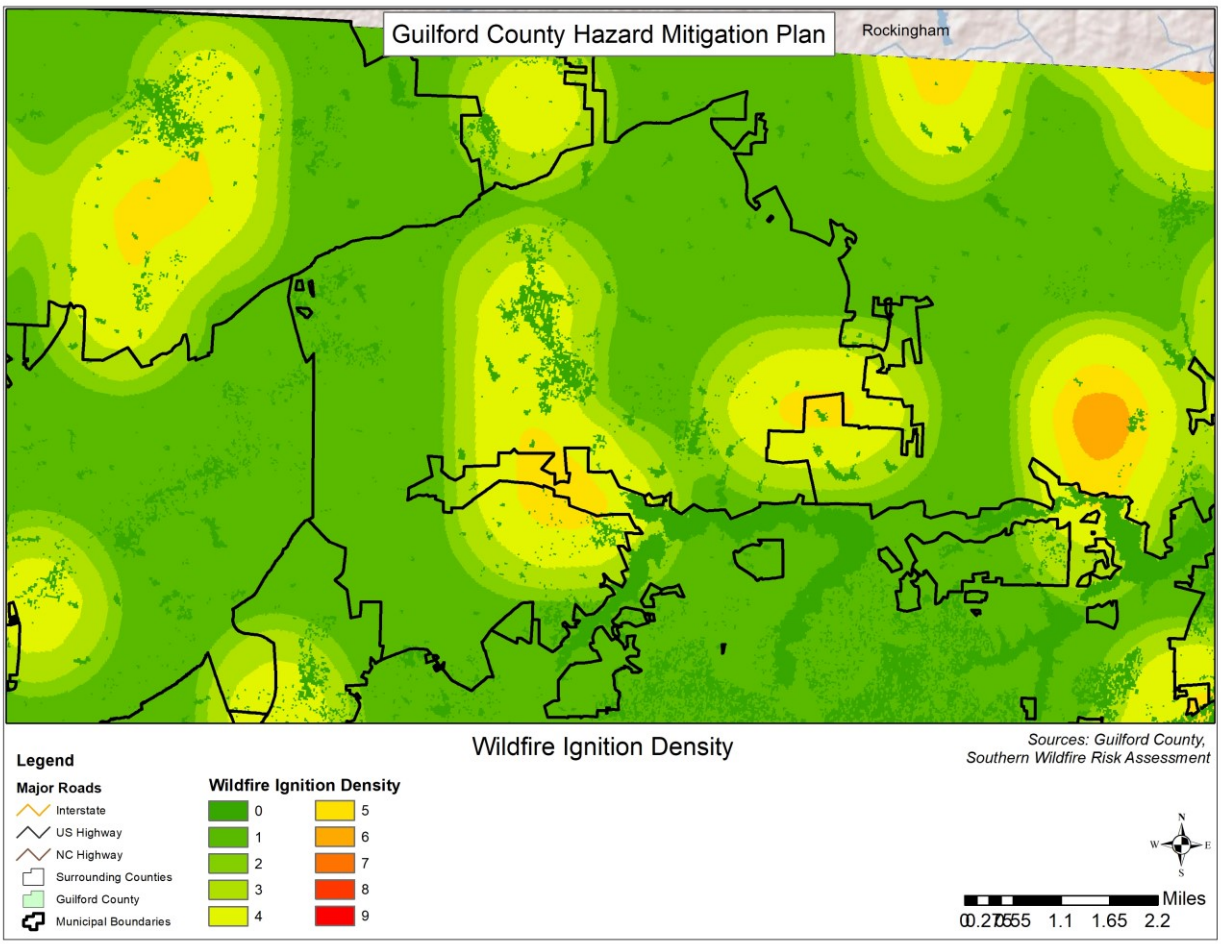
Source: Southern Wildfire Risk Assessment

FIGURE 5.21: WILDFIRE IGNITION DENSITY IN STOKESDALE



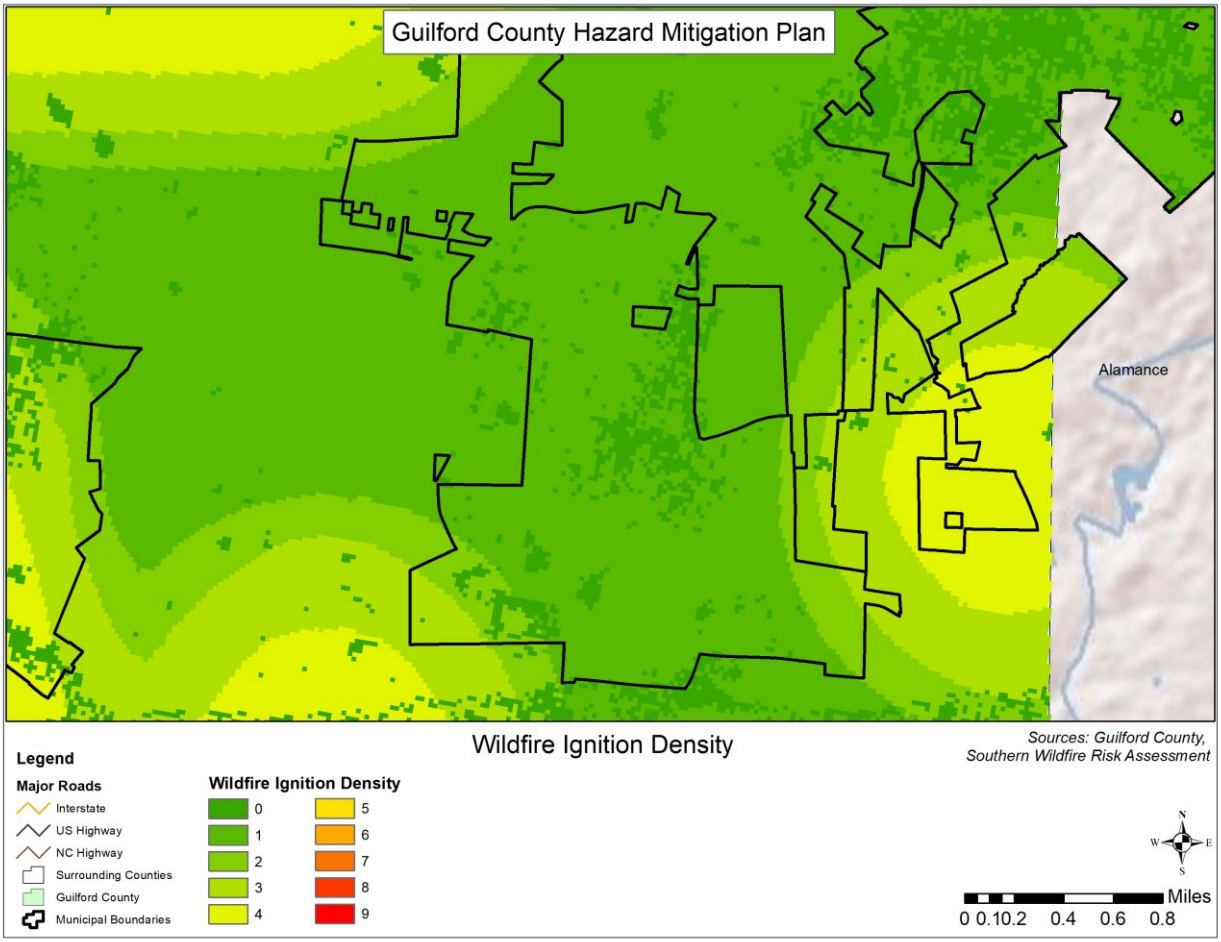
Source: Southern Wildfire Risk Assessment

FIGURE 5.22: WILDFIRE IGNITION DENSITY IN SUMMERFIELD



Source: Southern Wildfire Risk Assessment

FIGURE 5.23: WILDFIRE IGNITION DENSITY IN WHITSETT



Source: Southern Wildfire Risk Assessment

Structure Fire

Structure fires can occur anywhere within the county because there are structures located throughout the county and all structures are potentially vulnerable to a structure fire. A higher concentration of structure fires typically occurs in areas that are more densely populated because there are more structures in those areas, and therefore a higher likelihood that a fire will occur in any given structure. Therefore, areas in Guilford County with the densest concentration of urban development, such as Greensboro, are likely to be impacted most often by structure fires.

5.8.3 Historical Occurrences

Wildfire

Based on data from the North Carolina Forest Service (NCFS) from 2010 to 2019, Guilford County experienced an average of 65 wildfires annually which burn an average of 40.0 acres per year. The data indicates that most of these fires are small, averaging less than 1 acre per fire. **Table 5.18** lists the number of reported wildfire occurrences in the county between the years 2010 and 2019.

TABLE 5.18: HISTORICAL WILDFIRE OCCURRENCES IN GUILFORD COUNTY

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Guilford County										
Number of Fires	27	61	41	52	139	89	61	88	53	42
Number of Acres	17.6	40.9	36.5	42.4	53.8	58.4	33.6	74.3	23.6	19.1

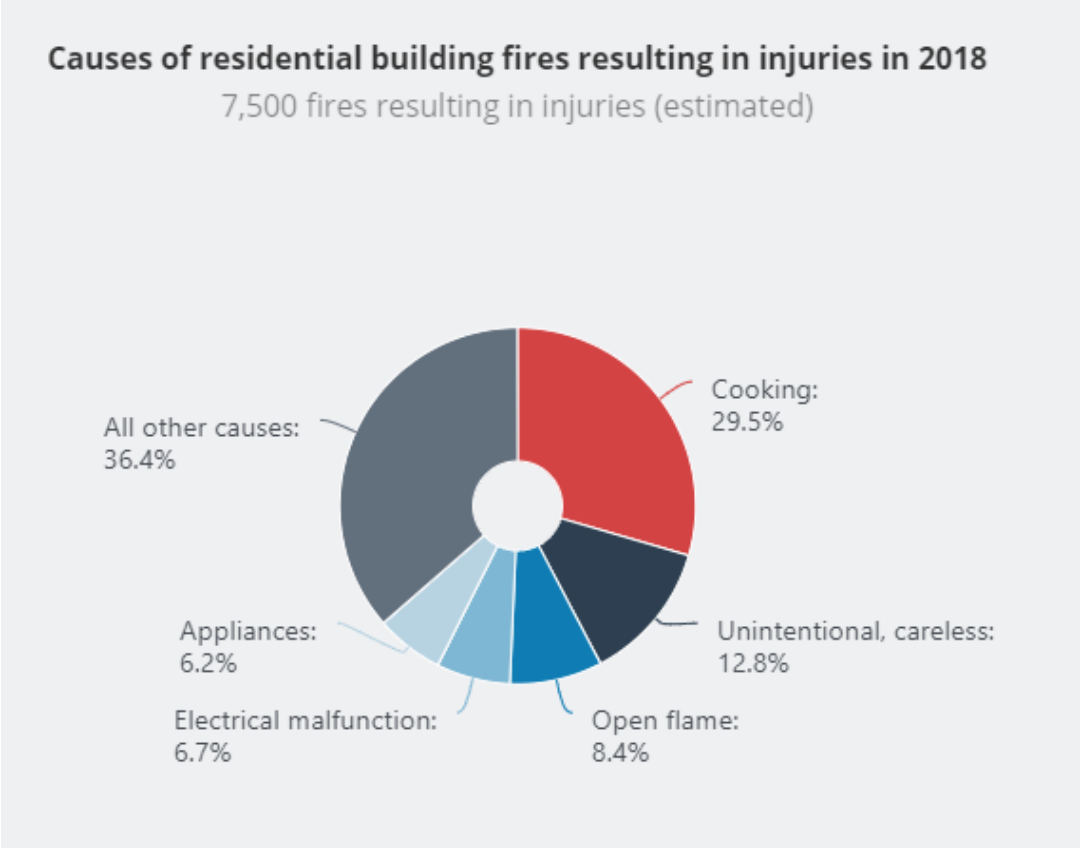
**Through November 1, 2019*
Source: North Carolina Forest Service

Structure Fire

As mentioned above, structure fires occur frequently throughout the United States and in Guilford County. In 2018, the NFPA reported that there were almost 500,000 structure fires in the United States, causing around $11 billion in damages. These numbers are on par with statistics from previous years as there were no less than 480,000 structure fires in any of the ten years prior to 2018.

Figure 5.24 shows the primary causes of building fires in the United States in 2018. As the figure shows, almost one third of these fires are caused by cooking, which is the highest single-identified cause. It is also notable that the United States Fire Association (USFA) reports that the leading property type for fire deaths is residential. The result of this is that most deaths, injuries, and dollar losses from fires across the country occur in residential fires.

FIGURE 5.24: BUILDING FIRE CAUSES IN THE UNITED STATES



Source: United States Fire Association

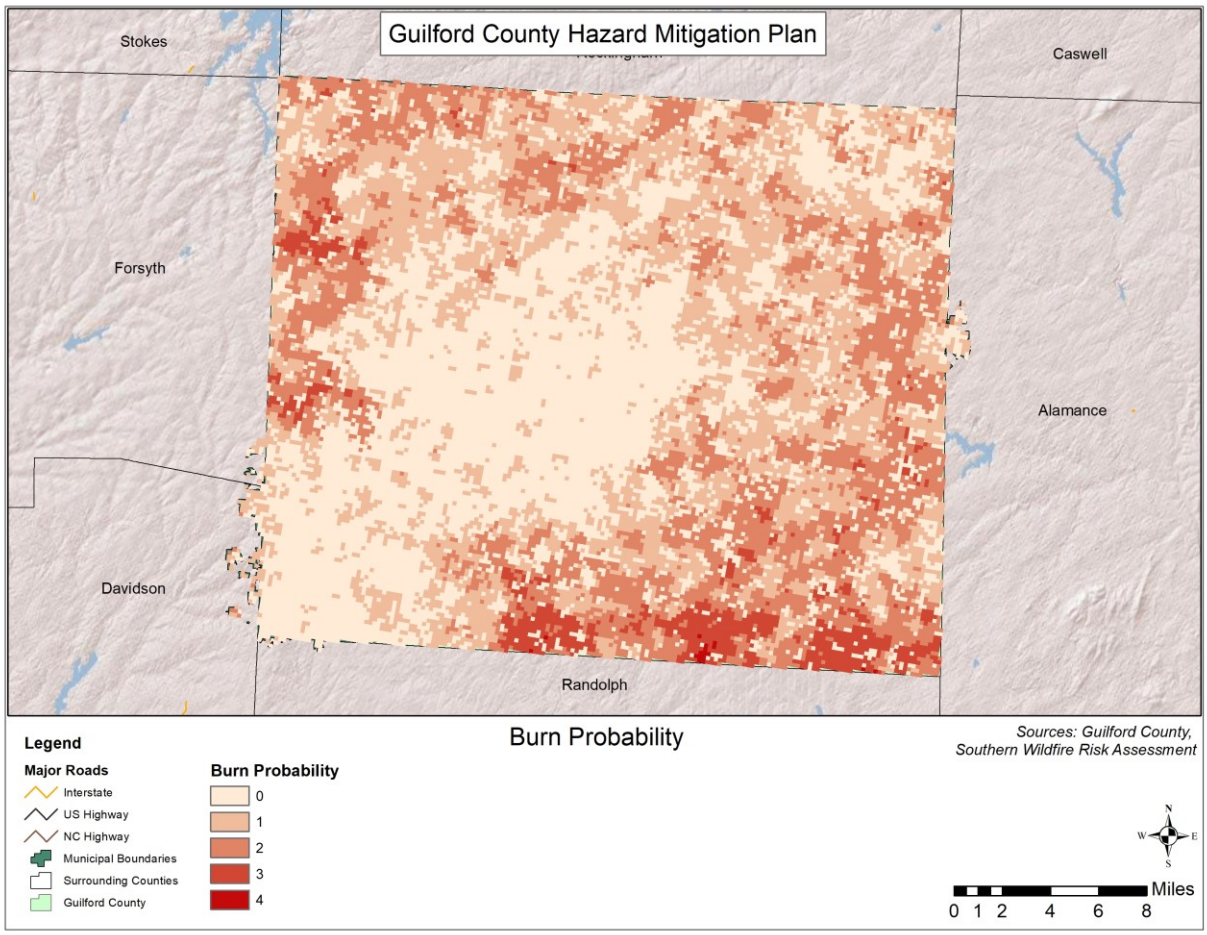
5.8.4 Probability of Future Occurrences

Wildfire

Wildfire events will be an ongoing occurrence in Guilford County. **Figure 5.25** shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly.

It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Guilford County for future wildfire events is likely (10 to 100 percent annual probability). Additionally, according to the *Piedmont Together Climate Adaptation Report*, the increased likelihood of wildfire due to climate change will result in greater structural/property damage and decreased air quality in the county.

FIGURE 5.25: BURN PROBABILITY IN GUILFORD COUNTY



Source: Southern Wildfire Risk Assessment

Structure Fire

Structure fires are very common and have occurred frequently in Guilford County in the past. As the county continues to grow, the built environment will expand and there will be more structures that could potentially be impacted by a fire. This will result in more human lives at risk and the potential for costly property damage. The probability of structure fires in the futures remains high and is likely to continue to increase going forward as the county grows.

5.8.5 Consequence Analysis

People (The Public and Public Confidence)

There are a number of potential losses from a wildland fire in Guilford County. Potential losses include human life, structures, and natural resources. Health hazards from smoke caused by wildland fires within or outside the county can include breathing difficulties and worsening of chronic breathing and/or cardiovascular disease. Smoke and air pollution pose a risk for children, the elderly, and those with respiratory and cardiovascular problems. First responders are also at risk for exposure to dangers from the initial incident and after-effects such as smoke inhalation and/or heat stroke. Wildfire tends to

create some issues with public confidence because of the very visible impacts that the fire has on the community.

Responders

Responders are often at great risk when addressing fires or wildfire, especially firefighters who are responsible for putting out the blaze. All response personnel are potentially at risk when dealing with a wildfire and often changing winds and a number of other factors can cause a fire to spread rapidly. Although much of Guilford County has been urbanized and is not at a high risk to wildfire, the more rural areas that are located in the wildland urban interface may require response personnel to be ready to act. Like the general public, first responders are also at risk for exposure to dangers from the initial incident and after-effects such as smoke inhalation and/or heat stroke. However, their risk is often more prominent as they are often in the middle of an incident through their responsibilities as a responder.

Continuity of Operations

Since wildfire often moves quickly and can affect infrastructure that is important to maintaining continuity of operations, there is some level of concern for maintaining continuity. However, operations in Guilford County, which are generally run from urbanized areas, will probably not be impacted in a major way.

Built Environment (Property, Facilities, and Infrastructure)

Wildland fires have the potential to substantially burn forested areas as well as private residences. Damage and destruction to State, county, private, and municipal structures and facilities are major losses that are attributed to wildland fires. Private residences and communities that are located within the WUI are particularly susceptible to the threat. Population increases in Guilford County's WUI areas, for example, can create significant challenges for firefighters and residents.

Many new homes are constructed without considering community wildland fire planning. This creates neighborhoods with limited accessibility, flammable building construction, and landscaping. A lack of firewise planning can also greatly increase the probability of a wildland fire occurrence with more homes and emergency personnel being threatened.

All types of private property may suffer losses from wildfires. This includes business properties, homes, vehicles, and livestock. Damage to capital goods and equipment as well as evacuation expenses and other losses are directly related to fire and smoke damage. Additional potential losses include building and landscape maintenance expenses, firefighting equipment purchases, and fire-related business closures. Additional post-fire losses include cleanup, rehabilitation and repair expenses, equipment and capital goods replacement, drinking water pollution, smoke damage, deflated real estate values, and an increase in fire insurance premiums.

Economy

Given the fact that a number of homes, businesses, and infrastructure are located in areas that could be impacted by wildfire, there could be some significant economic impacts of a wildfire in the state. If homes or businesses are burned, the cost of rebuilding could be substantial. Impacts to agricultural crops are another economic loss that the state could face in the event of a wildland fire. Wildfires can be particularly damaging to the lumber and Christmas tree farming industries which are important to the state in general and may impact Guilford County.

Environment

Wildland fires have the potential to damage or destroy forage on grazing lands, secondary forest products destruction, and/or degradation and loss of wildlife habitat on public lands. On private lands, vegetation losses could include agricultural crops that are either burned or impacted by wildland fire smoke. Indirect losses could include loss of growing stock as well as irrigation systems. Another potential loss includes damage and destruction to a wide variety of common or protected habitats in Guilford County. Finally, the release of smoke from wildfires can pollute the air and reduce air quality.

Additional factors that contribute to wildland fire susceptibility in Guilford County include long growing seasons with frequent rainfall and wind, which can significantly affect vegetation growth.

It should also be noted, however, that wildfires are a naturally occurring element of the environment and have played an important part in the development of many ecosystems in that they are regenerative and provide vital nutrients for the soil which can help sustain a forest habitat and all of the organisms living within it. Therefore, although there are some negative impacts of wildfire, there are also some positive impacts on the environment.

5.9 FLOODING

5.9.1 Background

Flooding is the most frequent and costly natural hazard in the United States and is a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component.

Floods generally result from excessive precipitation and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time along with storm-induced wave action, and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is typically determined by a combination of several major factors, including stream and river basin topography and physiography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing and impervious surface.

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall or from a sudden release of water held by a retention basin or other stormwater control facility. Although flash flooding occurs most often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as a floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. Flood frequencies, such as the 100-year flood, are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.9.2 Location and Spatial Extent

Special flood hazard areas in Guilford County were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[10] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation) and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 657.6 square miles of land that make up Guilford County, there are 41.3 square miles of land in zone A and AE (1-percent annual chance floodplain/100-year floodplain) and 5.1 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.19**.

TABLE 5.19: SUMMARY OF FLOODPLAIN AREAS IN GUILFORD COUNTY

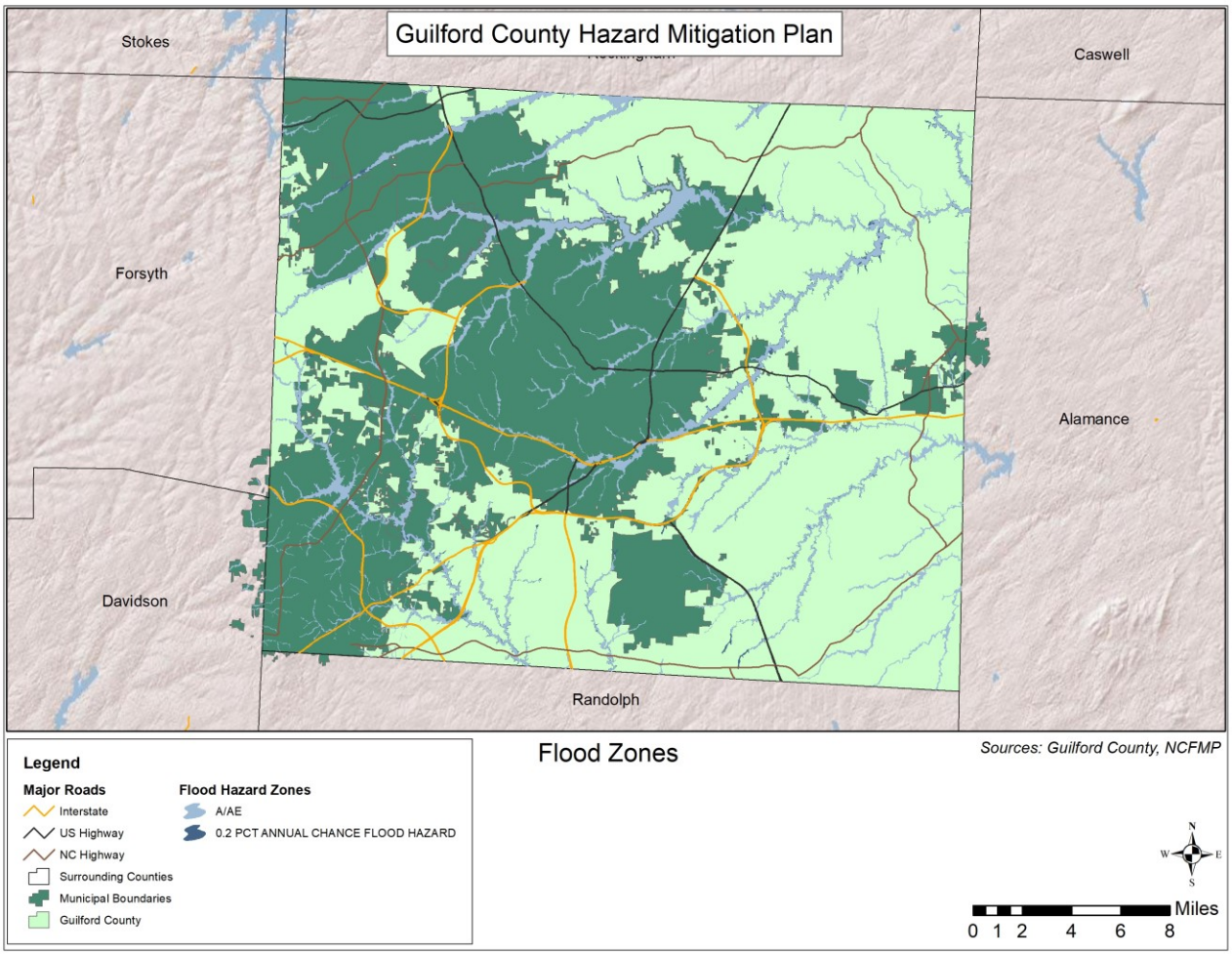
Location	100-year area (square miles)	500-year area (square miles)
Gibsonville	0.5	0.0
Greensboro	15.3	1.0
High Point	6.0	0.5
Jamestown	0.9	0.1
Oak Ridge	1.5	0.3
Pleasant Garden	0.4	0.1
Sedalia	0.1	0.0
Stokesdale	1.0	0.2
Summerfield	2.7	0.3
Whitsett	0.0	0.0
Unincorporated Area	12.9	2.6
GUILFORD COUNTY TOTAL	**41.3**	**5.1**

These flood zone values account for 7.1 percent of the total land area in Guilford County. It is important to note that while NCFMP/FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure 5.26**, **Figure 5.27**, **Figure 5.28**, **Figure 5.29**, **Figure 5.30**, **Figure 5.31**, **Figure 5.32**, **Figure 5.33**, **Figure 5.34**, **Figure 5.35**, and

[10] The county-level DFIRM used for Guilford County was updated in 2009.

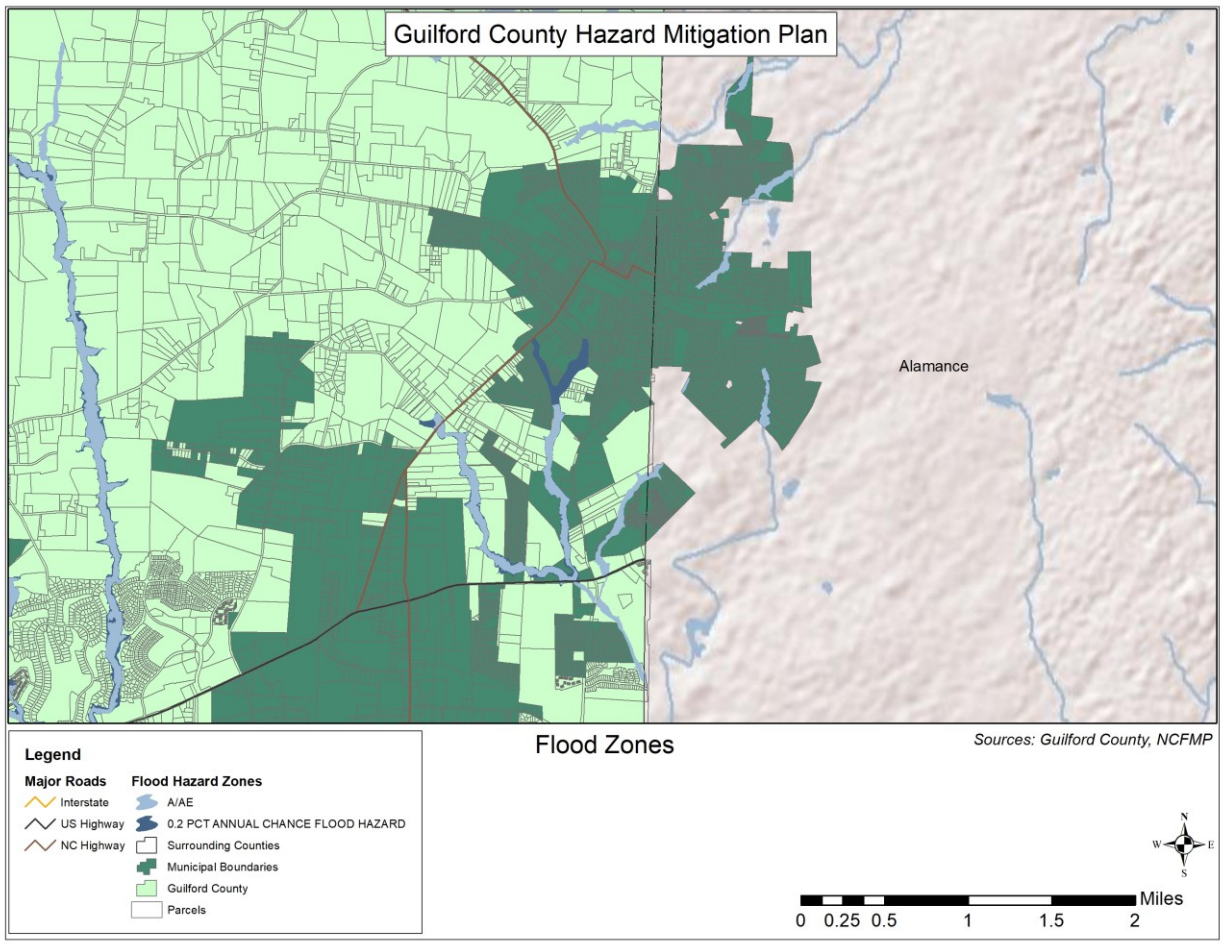
Figure 5.36 illustrate the location and extent of currently mapped special flood hazard areas for Guilford County and its municipalities based on best available NCFMP/FEMA DFIRM data.

FIGURE 5.26: SPECIAL FLOOD HAZARD AREAS IN GUILFORD COUNTY



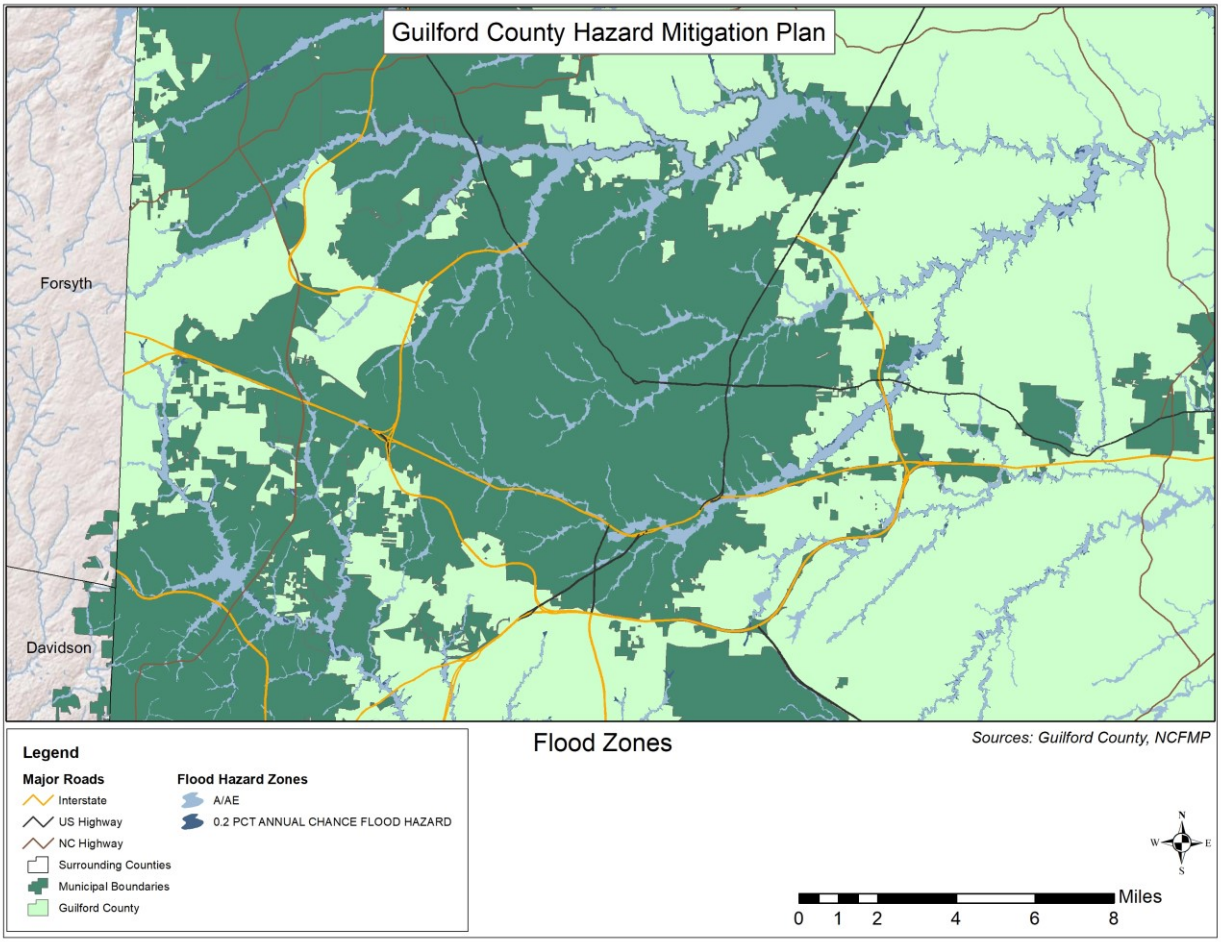
Source: North Carolina Floodplain Mapping Program

FIGURE 5.27: SPECIAL FLOOD HAZARD AREAS IN GIBSONVILLE



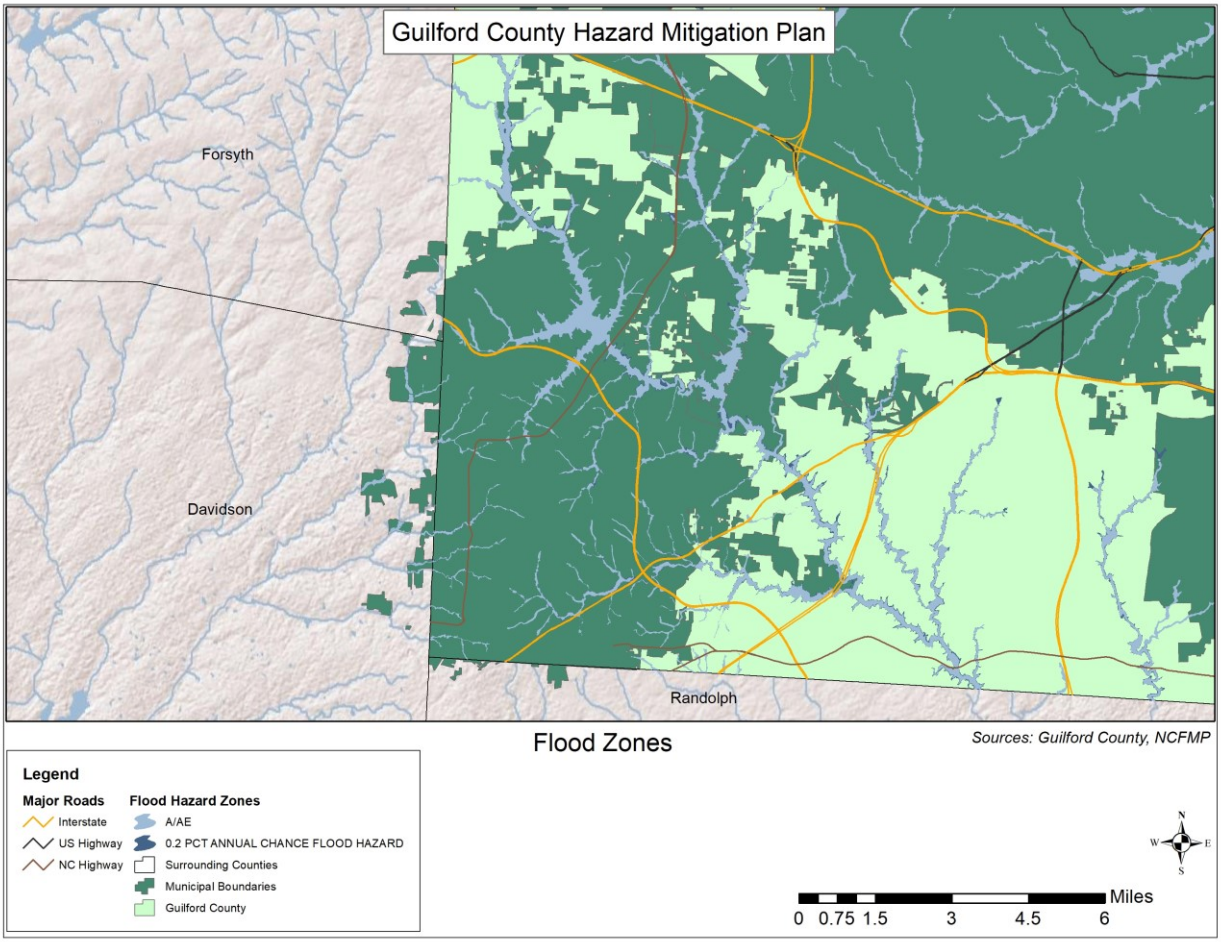
Source: Federal Emergency Management Agency

FIGURE 5.28: SPECIAL FLOOD HAZARD AREAS IN GREENSBORO



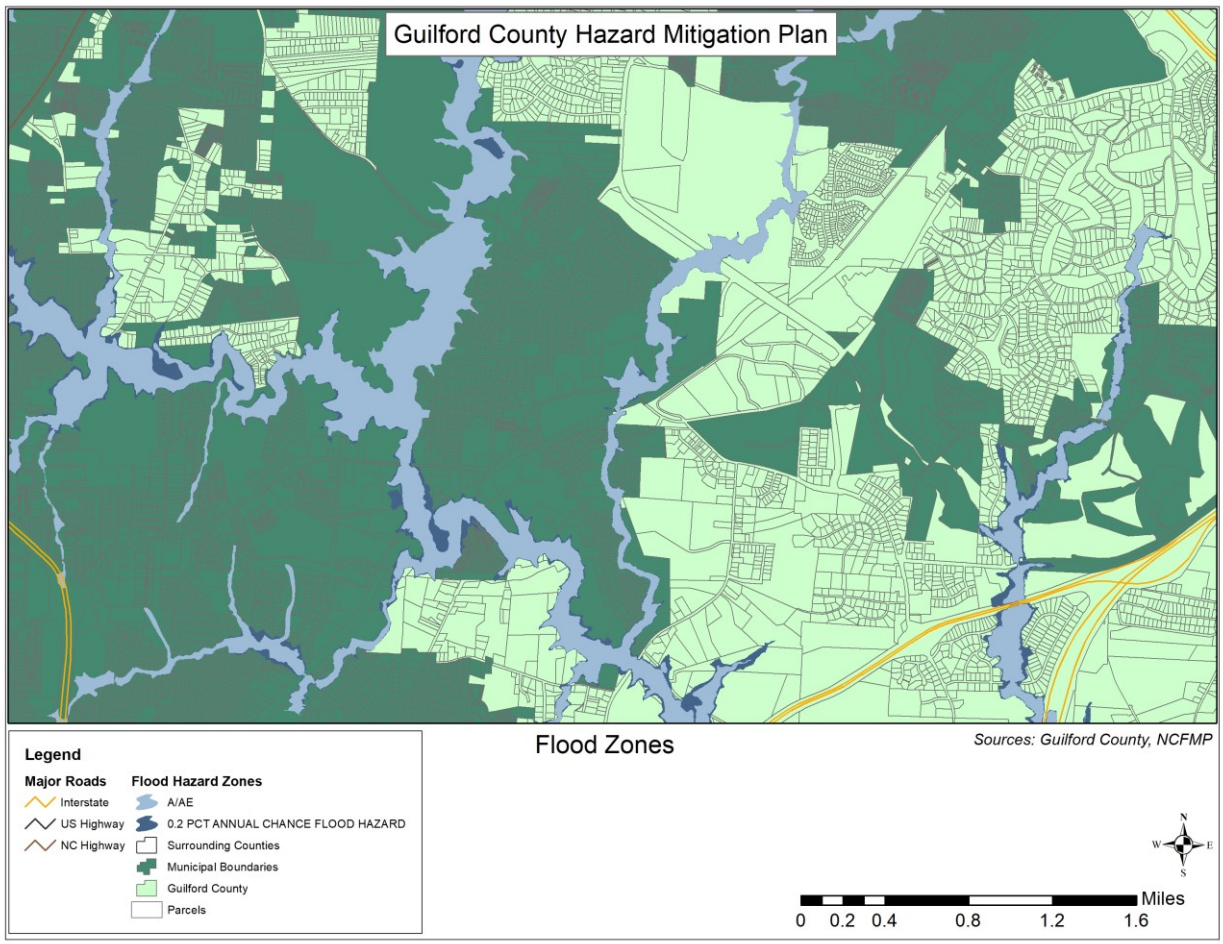
Source: Federal Emergency Management Agency

FIGURE 5.29: SPECIAL FLOOD HAZARD AREAS IN HIGH POINT



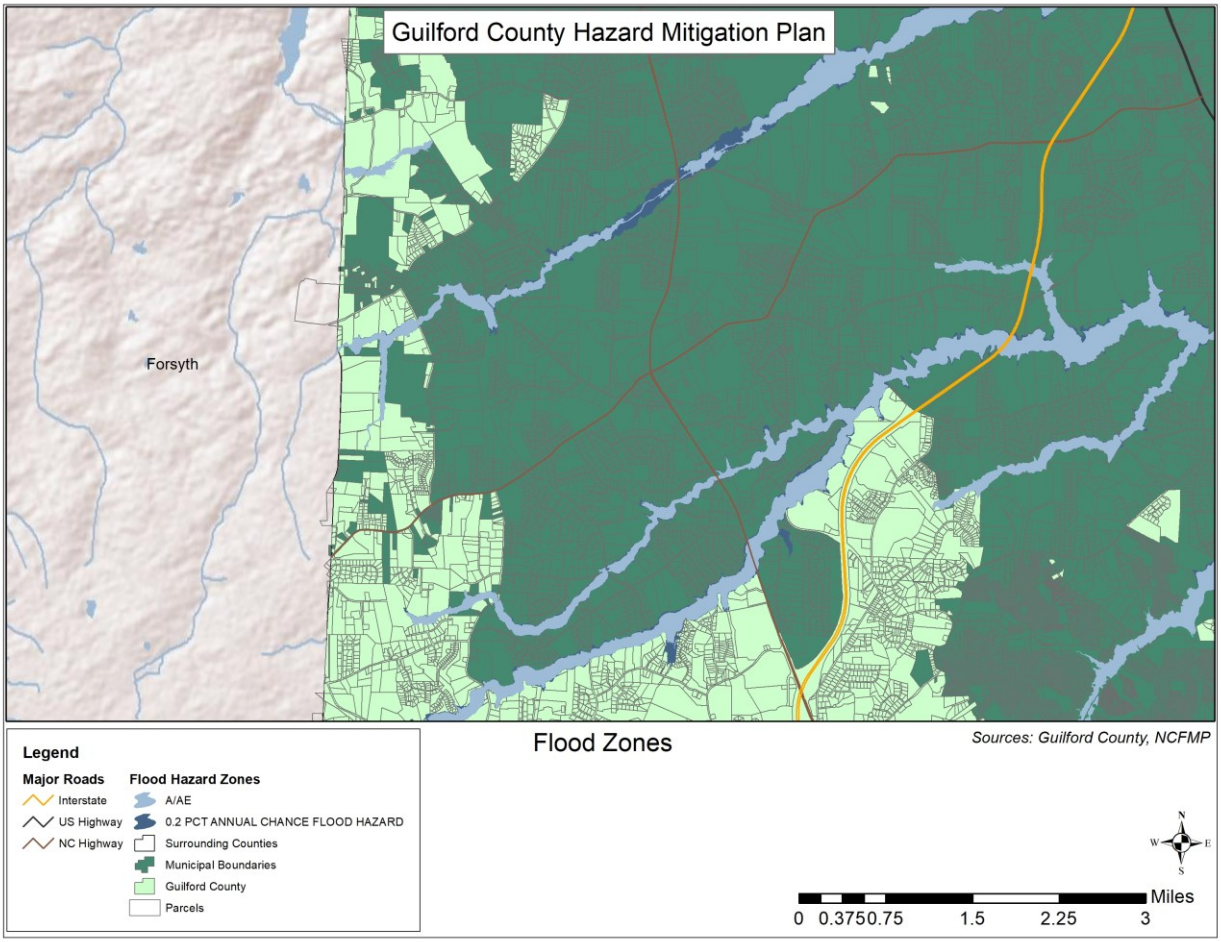
Source: Federal Emergency Management Agency

FIGURE 5.30: SPECIAL FLOOD HAZARD AREAS IN JAMESTOWN



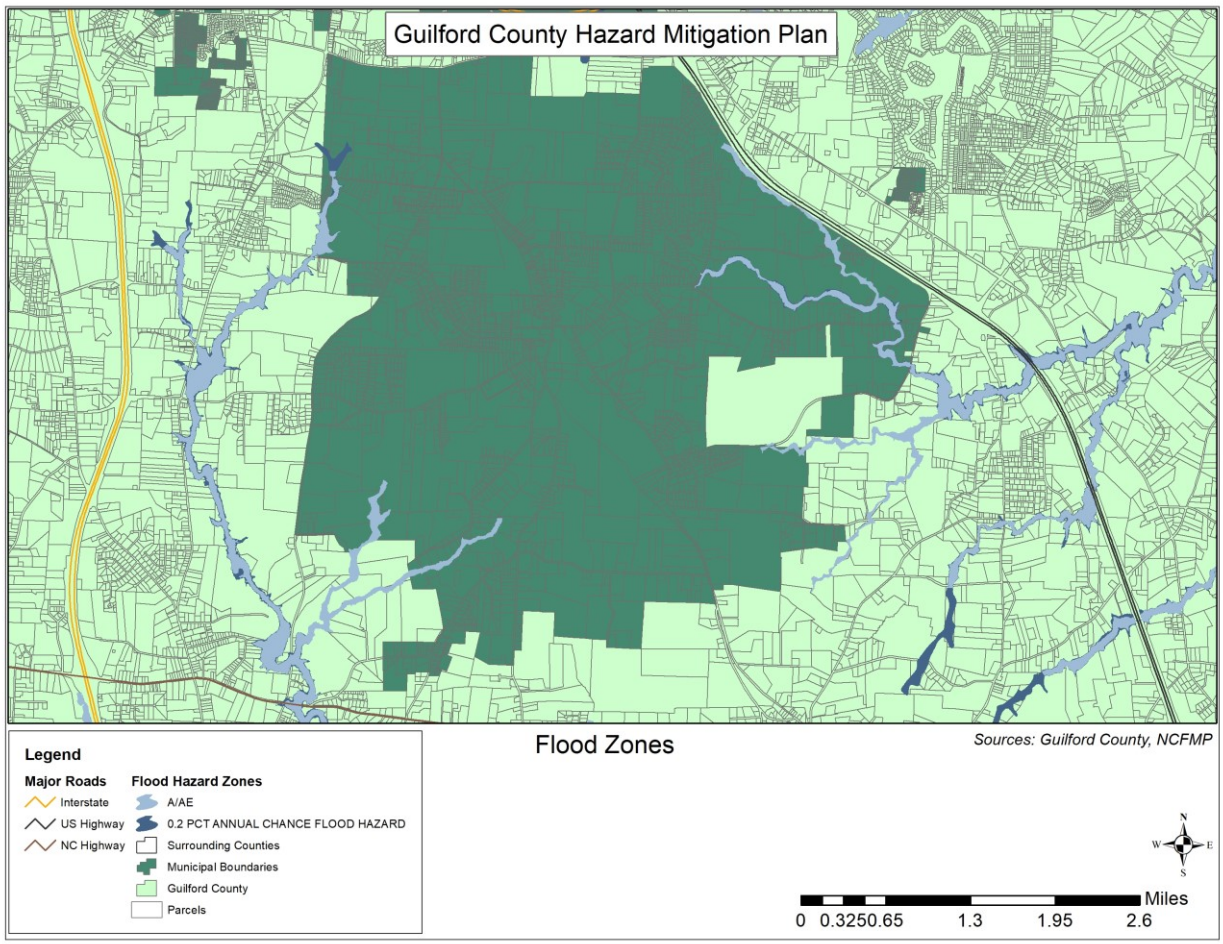
Source: Federal Emergency Management Agency

FIGURE 5.31: SPECIAL FLOOD HAZARD AREAS IN OAK RIDGE



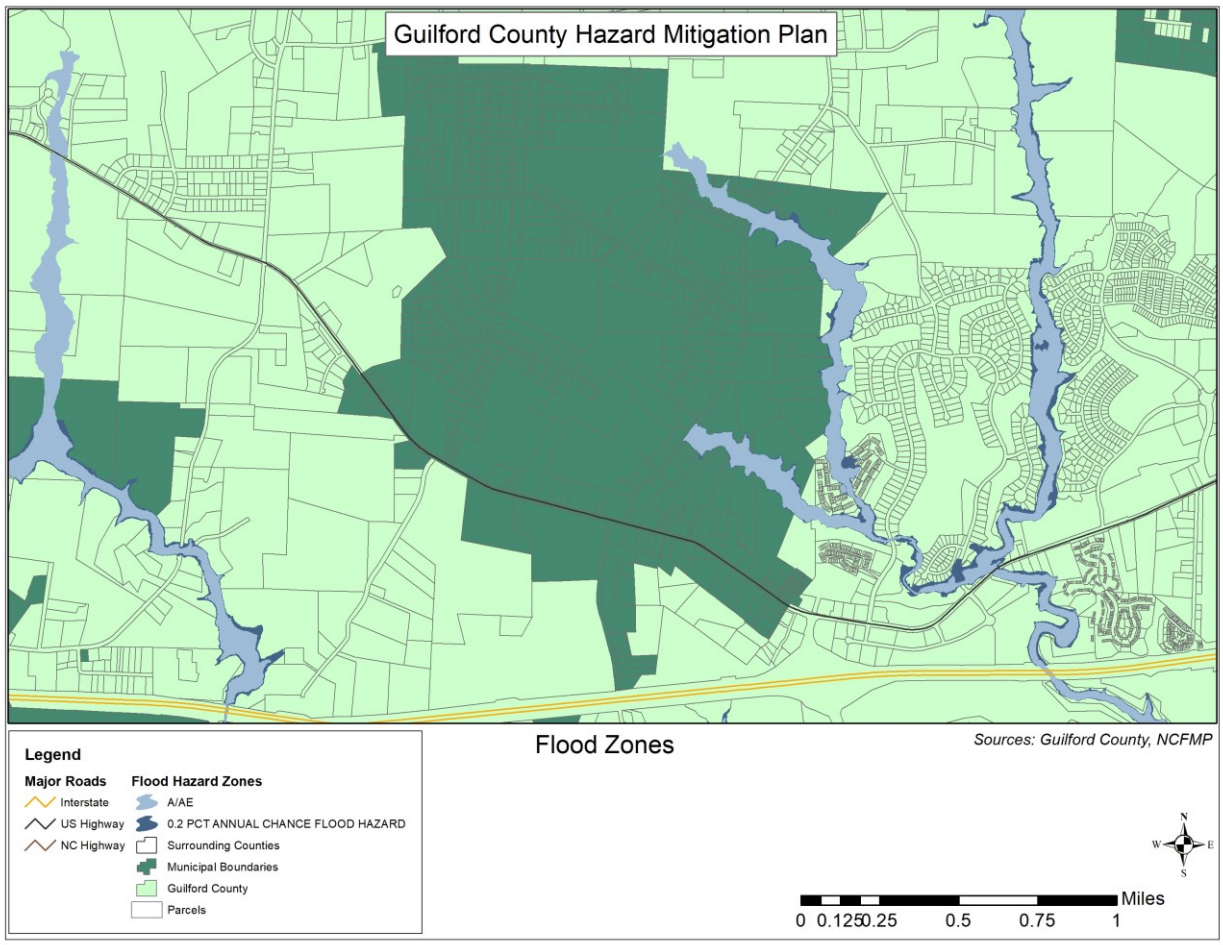
Source: Federal Emergency Management Agency

FIGURE 5.32: SPECIAL FLOOD HAZARD AREAS IN PLEASANT GARDEN



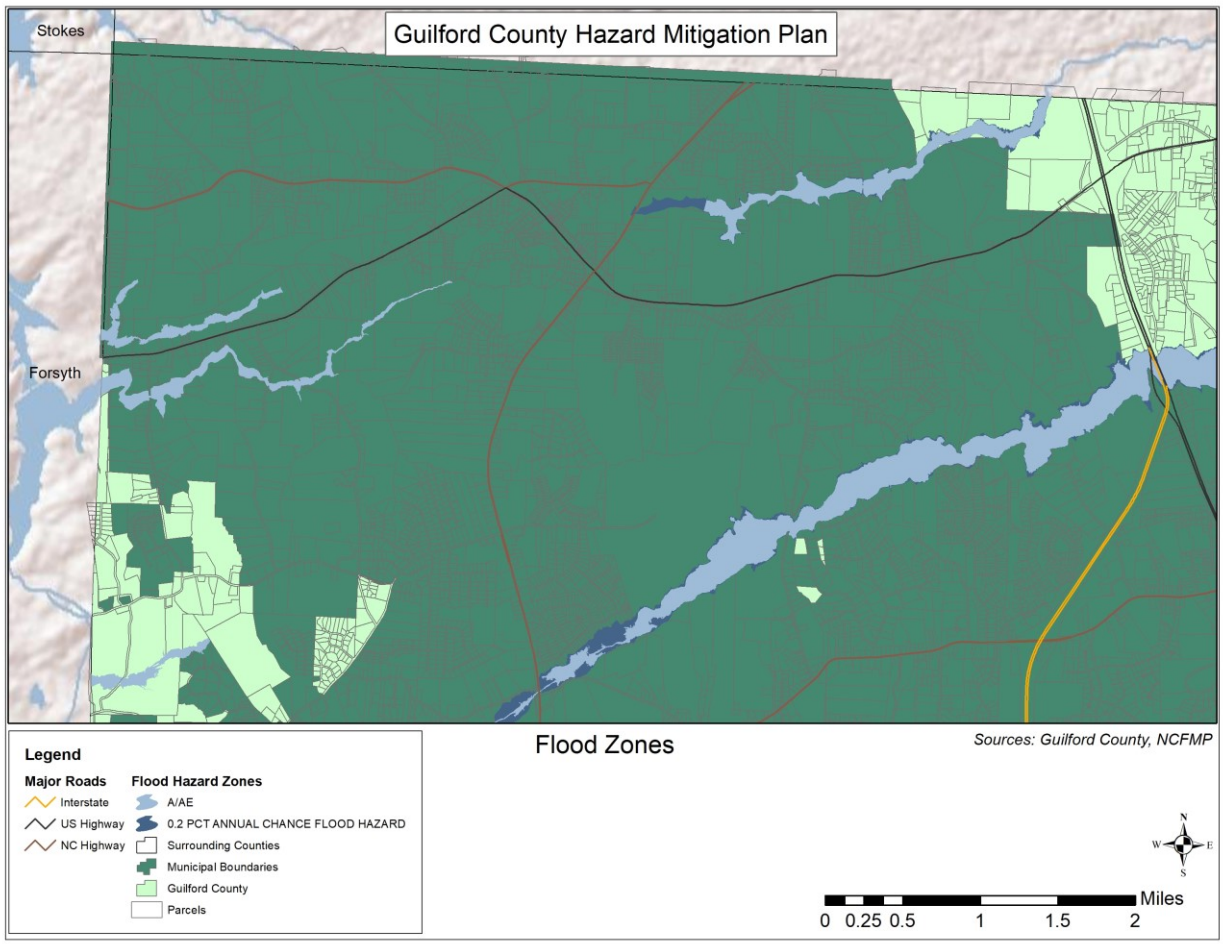
Source: Federal Emergency Management Agency

FIGURE 5.33: SPECIAL FLOOD HAZARD AREAS IN SEDALIA



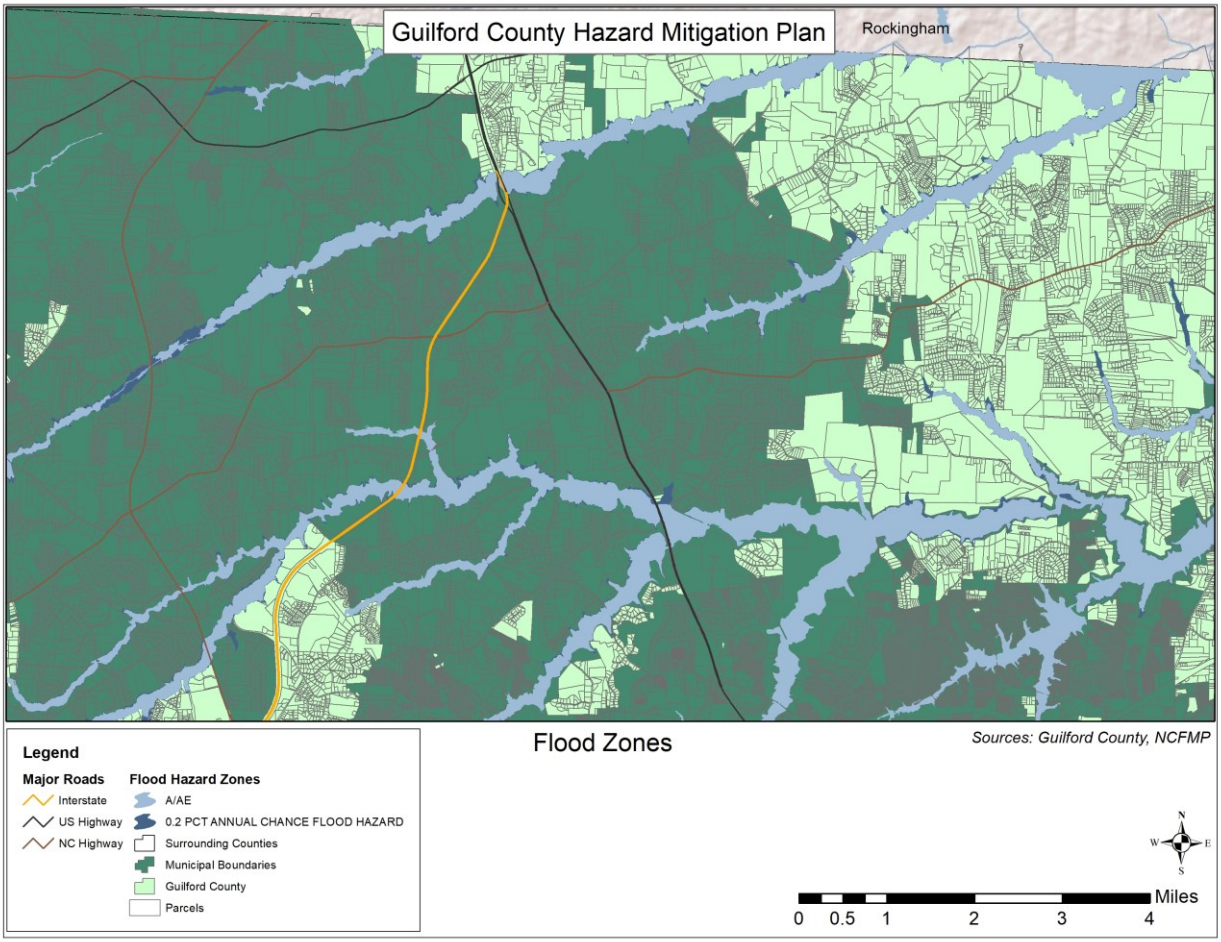
Source: Federal Emergency Management Agency

FIGURE 5.34: SPECIAL FLOOD HAZARD AREAS IN STOKESDALE



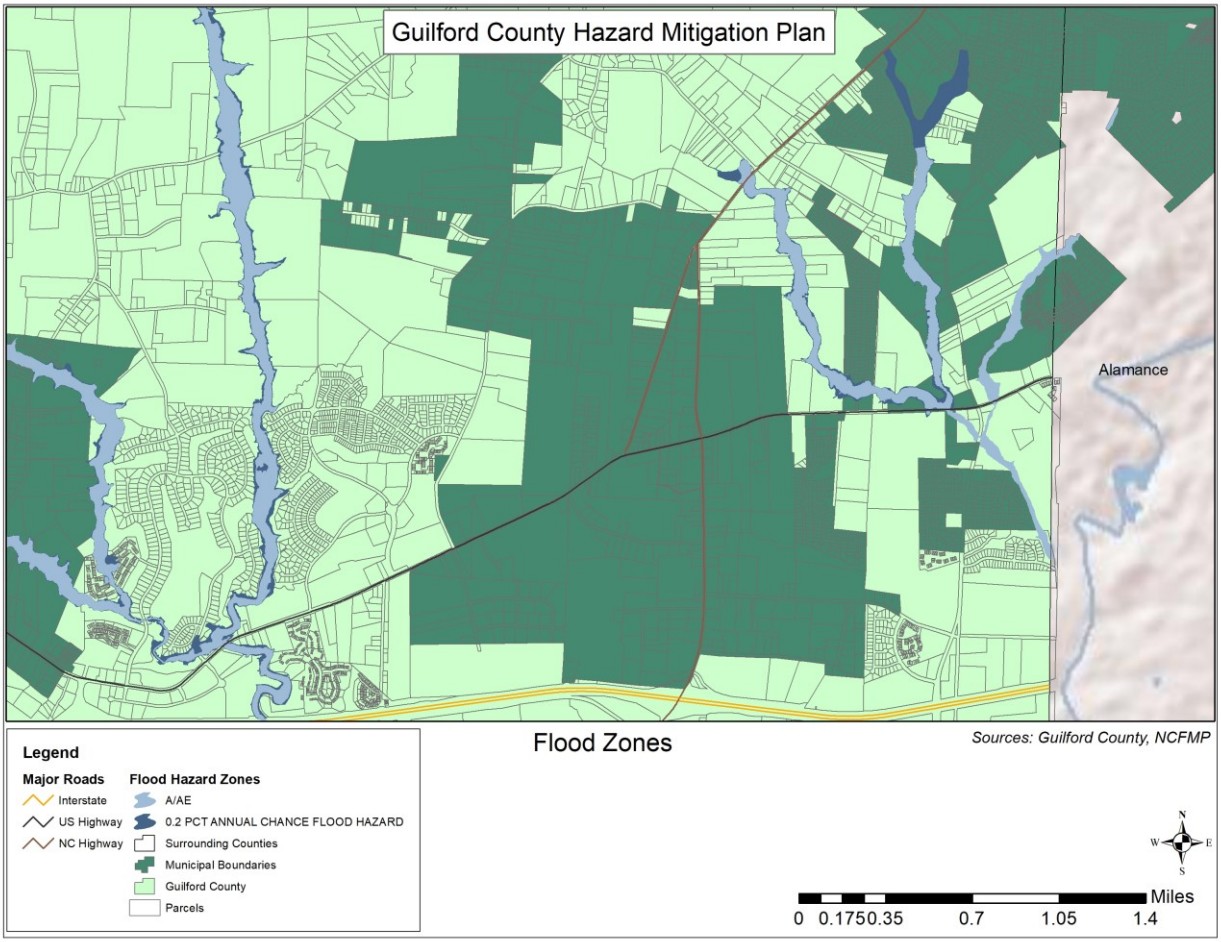
Source: Federal Emergency Management Agency

FIGURE 5.35: SPECIAL FLOOD HAZARD AREAS IN SUMMERFIELD



Source: Federal Emergency Management Agency

FIGURE 5.36: SPECIAL FLOOD HAZARD AREAS IN WHITSETT



Source: Federal Emergency Management Agency

5.9.3 Historical Occurrences

Information from the National Centers for Environmental Information was used to ascertain historical flood events. The National Centers for Environmental Information reported a total of 92 events throughout Guilford County since 1996.[11] A summary of these events is presented in **Table 5.20**. These events accounted for over $18.7 million (2019 dollars) in property damage throughout the county and at least 1 death.[12] Specific information on flood events for each jurisdiction, including date, type of flooding, and deaths and injuries, can be found in **Table 5.21**.

[11] These flood events are only inclusive of those reported by the National Centers for Environmental Information (NCEI) from 1996 through March 2019. It is likely that additional occurrences have occurred and have gone unreported in Guilford County.
[12] Adjusted dollar values were calculated based on the Consumer Price Index for All Urban Consumers (CPI-U) U.S. city average series for all items, not seasonally adjusted. This data represents changes in the prices of all goods and services purchased for consumption by urban households. This monthly index value has been calculated every year since 1913. The 2019 dollar values were calculated based on buying power in May 2019.

TABLE 5.20: SUMMARY OF FLOOD OCCURRENCES IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
Gibsonville	0	0/0	$0	$0
Greensboro	26	1/0	$2,391,245	$66,438,818
High Point	11	0/0	$570,591	$1,307,473
Jamestown	1	0/0	$0	$0
Oak Ridge	2	0/0	$0	$0
Pleasant Garden	2	0/0	$0	$0
Sedalia	0	0/0	$0	$0
Stokesdale	0	0/0	$0	$0
Summerfield	6	0/0	$0	$0
Whitsett	0	0/0	$0	$0
Unincorporated Area	44	0/0	$15,813,140	$148,870
GUILFORD COUNTY TOTAL	**92**	**1/0**	**$18,7774,976**	**$67,895,161**

Source: National Centers for Environmental Information

TABLE 5.21: HISTORICAL FLOOD OCCURRENCES IN GUILFORD COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Gibsonville				
None Reported	--	--	--	--
Greensboro				
GREENSBORO	7/25/1996	Flash Flood	0/0	$0
GREENSBORO	2/3/1998	Heavy Rain	0/0	$0
GREENSBORO	6/19/2000	Flash Flood	0/0	$0
GREENSBORO	8/27/2000	Flash Flood	0/0	$0
GREENSBORO	8/28/2000	Flash Flood	0/0	$0
GREENSBORO	9/1/2000	Flash Flood	0/0	$0
GREENSBORO	7/4/2001	Flash Flood	0/0	$0
GREENSBORO	8/17/2003	Flash Flood	0/0	$16,647
GREENSBORO	8/31/2003	Flash Flood	0/0	$0
GREENSBORO	9/23/2003	Flash Flood	0/0	$0
GREENSBORO	7/17/2004	Flash Flood	0/0	$0
GREENSBORO	9/8/2004	Flash Flood	0/0	$0
GREENSBORO	9/27/2004	Flash Flood	0/0	$0
GREENSBORO	12/10/2004	Flash Flood	0/0	$0
GREENSBORO	6/14/2006	Flash Flood	0/0	$0
GREENSBORO	8/30/2006	Flash Flood	0/0	$0
GREENSBORO	4/15/2007	Flash Flood	0/0	$0
GREENSBORO	6/27/2007	Flash Flood	0/0	$0
GREENSBORO	6/27/2007	Flash Flood	0/0	$0
GREENSBORO	6/27/2007	Flash Flood	0/0	$0
GREENSBORO	6/3/2009	Flash Flood	1/0	$2,374,597
GREENSBORO	11/12/2009	Flash Flood	0/0	$0
GREENSBORO	1/25/2010	Flash Flood	0/0	$0

	Date	Type	Deaths / Injuries	Property Damage*
GREENSBORO	7/13/2010	Flash Flood	0/0	$0
GREENSBORO	8/11/2010	Flash Flood	0/0	$0
GREENSBORO	5/21/2016	Flash Flood	0/0	$0
High Point				
HIGH POINT	7/25/1996	Flash Flood	0/0	$0
HIGH POINT	9/3/1996	Flash Flood	0/0	$32,458
HIGH POINT	4/17/1998	Flood	0/0	$0
HIGH POINT	9/18/2002	Flash Flood	0/0	$0
HIGH POINT	6/23/2006	Flash Flood	0/0	$0
HIGH POINT	6/23/2006	Flash Flood	0/0	$0
HIGH POINT	6/27/2006	Flash Flood	0/0	$0
HIGH POINT	8/30/2006	Flash Flood	0/0	$0
HIGH POINT	9/30/2010	Flash Flood	0/0	$0
HIGH POINT	9/29/2015	Flood	0/0	$538,133
HIGH POINT	5/23/2018	Flash Flood	0/0	$0
Jamestown				
JAMESTOWN	9/30/2010	Flash Flood	0/0	$0
Oak Ridge				
OAK RIDGE	9/14/2000	Flash Flood	0/0	$0
OAK RIDGE ARPT	8/17/2013	Flash Flood	0/0	$0
Pleasant Garden				
PLEASANT GARDEN	9/3/2012	Flash Flood	0/0	$0
PLEASANT GARDEN	6/27/2015	Flash Flood	0/0	$0
Sedalia				
None Reported	--	--	--	--
Stokesdale				
None Reported	--	--	--	--
Summerfield				
SUMMERFIELD	7/13/2003	Flash Flood	0/0	$0
SUMMERFIELD	7/30/2007	Flash Flood	0/0	$0
SUMMERFIELD	7/30/2007	Flash Flood	0/0	$0
SUMMERFIELD	7/30/2007	Flash Flood	0/0	$0
SUMMERFIELD	1/25/2010	Flash Flood	0/0	$0
SUMMERFIELD	11/12/2018	Flash Flood	0/0	$0
Whitsett				
None Reported	--	--	--	--
Unincorporated Area				
SE PTN	4/28/1997	Flash Flood	0/0	$0
WEST PORTION	2/22/2003	Flash Flood	0/0	$0
GUILFORD (ZONE)	3/20/2003	Flood	0/0	$0
GUILFORD (ZONE)	4/10/2003	Flood	0/0	$0
CLIMAX	8/4/2003	Flash Flood	0/0	$0
GUILFORD	6/23/2006	Flash Flood	0/0	$0
TERRA COTTA	6/22/2008	Flash Flood	0/0	$0

	Date	Type	Deaths / Injuries	Property Damage*
(GSO)GREENSBORO RGNL	8/27/2008	Flash Flood	0/0	$35,067
GREENSBORO MAY ARPT	8/27/2008	Flash Flood	0/0	$175,337
HAMILTON LAKES	11/11/2009	Flash Flood	0/0	$0
RANKIN	1/25/2010	Flash Flood	0/0	$0
HAMILTON LAKES	6/16/2010	Flash Flood	0/0	$0
TERRA COTTA	7/27/2010	Flash Flood	0/0	$0
FOUR MILE	9/30/2010	Flash Flood	0/0	$0
DEEP RIVER	9/30/2010	Flash Flood	0/0	$0
BESSEMER	6/11/2011	Flash Flood	0/0	$0
GUILFORD CO.	6/11/2011	Flash Flood	0/0	$0
GREENSBORO MAY ARPT	6/28/2011	Flash Flood	0/0	$0
GUILFORD CO.	6/28/2011	Flash Flood	0/0	$0
BESSEMER	7/8/2011	Flash Flood	0/0	$0
BESSEMER	9/6/2011	Flash Flood	0/0	$0
TERRA COTTA	9/23/2011	Flash Flood	0/0	$0
BATTLE GROUND	6/22/2012	Flash Flood	0/0	$0
HAMILTON LAKES	7/9/2012	Flash Flood	0/0	$111,780
TERRA COTTA	8/19/2012	Flash Flood	0/0	$0
RANKIN	8/22/2012	Flash Flood	0/0	$0
PINECROFT	9/3/2012	Flash Flood	0/0	$0
HAMILTON LAKES	6/10/2013	Flash Flood	0/0	$0
BROADVIEW	6/25/2013	Flash Flood	0/0	$0
GUILFORD	7/10/2013	Flash Flood	0/0	$54,815
BROADVIEW	7/21/2013	Flash Flood	0/0	$21,926
HAMILTON LAKES	8/6/2015	Flash Flood	0/0	$0
HAMILTON LAKES	12/30/2015	Flash Flood	0/0	$0
GUILFORD	7/16/2016	Flash Flood	0/0	$0
BATTLE GROUND	8/5/2016	Flash Flood	0/0	$0
GUILFORD	8/27/2016	Flash Flood	0/0	$0
GUILQUARRY	10/8/2016	Flash Flood	0/0	$0
SEDGEFIELD	6/19/2017	Flash Flood	0/0	$5,227
GUILQUARRY	8/2/2018	Flash Flood	0/0	$10,157
DEEP RIVER	8/2/2018	Flash Flood	0/0	$50,782
BROADVIEW	9/1/2018	Flash Flood	0/0	$0
GUILQUARRY	9/17/2018	Flash Flood	0/0	$0
GUILFORD CO.	9/17/2018	Flood	0/0	$14,841,708
GUILQUARRY	10/11/2018	Flash Flood	0/0	$506,341

*Property damage is reported in 2019 dollars; All damage may not have been reported.
Source: National Centers for Environmental Information

5.9.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of March 2019, there have been 372 flood losses reported in Guilford County through the National Flood Insurance Program (NFIP) since 1978, totaling over $4.9 million in claims payments. A summary of these figures for each jurisdiction is provided in **Table 5.22**. It should be emphasized that these numbers include only those losses to structures that

were insured through the NFIP policies, and the payments columns only include instances in which claims were received. It is likely that many additional instances of flood loss in Guilford County were either uninsured, denied claims payment, or not reported.

TABLE 5.22: SUMMARY OF INSURED FLOOD LOSSES IN GUILFORD COUNTY

Location	Number of Flood Claims	Building Claims Payments ($)	Contents Claims Payments ($)
Gibsonville	5	$56,566	$17,110
Greensboro	439	$4,973,510	$816,310
High Point	86	$271,713	$15,538
Jamestown	3	$47,298	$4,321
Oak Ridge	1	$13,230	$4,720
Pleasant Garden	2	$0	$0
Sedalia	0	$0	$0
Stokesdale	0	$0	$0
Summerfield	0	$0	$0
Whitsett	2	$19,124	$6,452
Unincorporated Area	38	$300,355	$17,638
GUILFORD COUNTY TOTAL	**576**	**$5,681,796**	**$882,089**

Source: Federal Emergency Management Agency, National Flood Insurance Program

5.9.5 Repetitive and Severe Repetitive Loss Properties

FEMA defines a Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

Severe repetitive loss properties are defined as any insurable building for which: 1) four or more claims of more than $5,000, with the cumulative amount of such claims exceeding $20,000, were paid by the NFIP or 2) at least two claims exceeding the market value of the structure were paid by the NFIP, since 1978. A severe repetitive loss property may or may not be currently insured by the NFIP.

As of January 2019, there are 54 repetitive loss properties and 11 severe repetitive loss properties located in Guilford County, which accounted for over 300 losses and over $7 million in claims payments under the NFIP. Most of the properties are single-family residential buildings, and the remaining are a mix of other residential and commercial properties. **Table 5.23** and **Table 5.24** present detailed information on severe repetitive loss and repetitive loss properties and NFIP claims for Guilford County.

TABLE 5.23: SUMMARY OF REPETITIVE LOSS PROPERTIES IN GUILFORD COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Gibsonville	1	1 single-family residential	2	$13,065	$1,111	$14,177	$7,089
Greensboro	49	30 single-family	205	$3,910,497	$565,811	$4,476,308	$21,836

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
		residential; 11 other residential; 2 condo; 6 commercial					
High Point	0	--	0	$0	$0	$0	$0
Jamestown	0	--	0	$0	$0	$0	$0
Oak Ridge	0	--	0	$0	$0	$0	$0
Pleasant Garden	0	--	0	$0	$0	$0	$0
Sedalia	0	--	0	$0	$0	$0	$0
Stokesdale	0	--	0	$0	$0	$0	$0
Summerfield	0	--	0	$0	$0	$0	$0
Whitsett	0	--	0	$0	$0	$0	$0
Unincorporated Area	4	4 single-family residential	17	$243,077	$27,905	$270,982	$1,322
GUILFORD COUNTY TOTAL	**54**		**224**	**$4,166,639**	**$594,828**	**$4,761,466**	**$23,227**

Source: National Flood Insurance Program

TABLE 5.24: SUMMARY OF SEVERE REPETITIVE LOSS PROPERTIES IN GUILFORD COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Gibsonville	0	--	0	$0	$0	$0	$0
Greensboro	11	5 single-family residential; 6 other residential	72	$2,447,857	$25,184	$2,473,040	$34,348
High Point	0	--	0	$0	$0	$0	$0
Jamestown	0	--	0	$0	$0	$0	$0
Oak Ridge	0	--	0	$0	$0	$0	$0
Pleasant Garden	0	--	0	$0	$0	$0	$0
Sedalia	0	--	0	$0	$0	$0	$0
Stokesdale	0	--	0	$0	$0	$0	$0
Summerfield	0	--	0	$0	$0	$0	$0
Whitsett	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
GUILFORD COUNTY TOTAL	**11**		**72**	**$2,447,857**	**$25,184**	**$2,473,040**	**$34,348**

Source: National Flood Insurance Program

5.9.6 FIMAN Gage Data

North Carolina Emergency Management has developed a statewide website that is at the forefront of the field called the Flood Inundation Mapping and Alert Network (FIMAN). The goal of the site is to

provide rain and stage gage data, flood inundation maps, flooding impacts and alerts in real-time to support risk-based decisions regarding flooding.

The site provides a clearinghouse for more than 500 gages across the state and pulls data from gages that are owned and operated at all levels of government. Many are managed by NCEM, while others are operated by USGS, local governments, and private organizations.

One of the key components that the site provides in terms of planning is the inundation mapping at gage sites. Using historic gage data and elevation data, inundation maps have been created around many gage sites and can show the impacts on buildings, roads, and infrastructure from various incremental rises in flood waters. **Table 5.25** presents information on several gages, but additional detailed data is available on the FIMAN website: https://fiman.nc.gov/. **Figure 5.37** shows an example of how the platform looks for the inundation mapping from the South Buffalo Creek near Pomona gage in Greensboro.

TABLE 5.25: FIMAN GAGES WITH INUNDATION MAPPING IN GUILFORD COUNTY

Location	Maximum Historic Gage Height (ft)	FIMAN Scenario #1 Stage (ft)	FIMAN Scenario #1 Elevation (NAVD 88)	FIMAN Scenario #1 Number of Buildings Damaged	FIMAN Scenario #2 Stage (ft)	FIMAN Scenario #2 Elevation (NAVD 88)	FIMAN Scenario #2 Number of Buildings Damaged
South Buffalo Creek near Pomona	15.45	15.4	786.5	17	18.9	790.0	42
South Buffalo Creek at US 220 near Greensboro	16.77	16.7	738.0	2	23.7	745.0	32
N Buffalo Creek at Westover Terrace at Greensboro	14.07	14.0	749.5	8	16.5	752.0	29
N Buffalo Creek at Church St at Greensboro	17.81	17.5	734.5	14	31.5	748.5	165

Source: NC FIMAN

FIGURE 5.37: INUNDATION MAPPING AT THE SOUTH BUFFALO CREEK NEAR POMONA GAGE (STAGE LEVEL 15.4 FT)



Source: NC FIMAN

5.9.7 Dam Failures

A dam failure is a special consideration as it relates to flood risk. Many of the impacts of a dam failure would be similar to those of a major flood event, but may include some distinctions, particularly the velocity of the flood waters.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream. The failure of a dam has the potential to place large numbers of people and great amounts of property in harm's way.

The North Carolina Department of Environmental Quality provides information on dams, including a hazard potential classification. There are three hazard classifications—high, intermediate, and low—that correspond to qualitative descriptions and quantitative guidelines. **Table 5.26** explains these classifications. It should be noted that these classifications do not pertain to the condition of the dam, only the potential impact that the dam would have if it were to fail. So, a high hazard dam is not more likely to fail or breach than a low hazard dam, but its impacts if it were to fail would potentially be greater.

TABLE 5.26: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

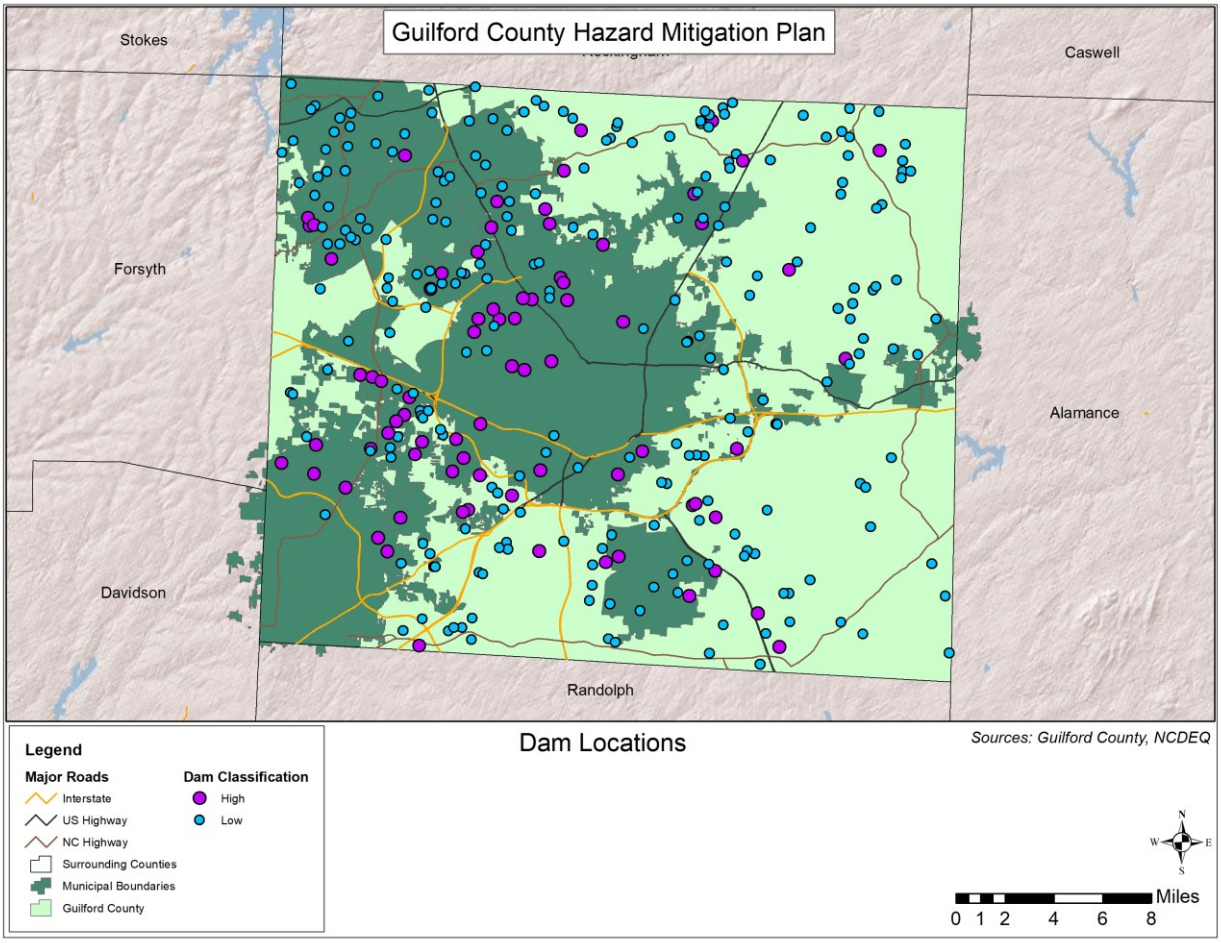
Hazard Classification	Description	Quantitative Guidelines
Low	Damage to low volume roads, Interruption of service	Less than 25 vehicles per day
	Economic damage	Less than $30,000
Intermediate	Damage to primary roads, Interruption of service	25 but less than 250 vehicles per day
	Economic damage	$30,000 to less than $200,000
High	Damage to highways/major roads, Interruption of service	More than 250 vehicles per day
	Economic damage	More than $200,000
	Loss of human life	Probable loss of 1 or more human lives

Source: North Carolina Department of Environmental Quality

According to the North Carolina Department of Environmental Quality, there are 320 dams in Guilford County.[13] **Figure 5.38** shows the dam location and the corresponding hazard ranking for each. Of these dams, 76 are classified as high hazard potential, none as intermediate hazard potential, and 244 as low hazard potential.

[13] The latest update to the North Carolina dam inventory, dated July 16, 2018, was retrieved from the North Carolina Department of Environmental Quality on October 30, 2019: https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permits/dam-safety .

FIGURE 5.38: DAM LOCATION AND HAZARD CLASSIFICATION



Source: North Carolina Department of Environmental Quality, 2018

5.9.8 Probability of Future Occurrences

Flood events will remain a threat in Guilford County, and the probability of future occurrences will remain highly likely (100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figure above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). Additionally, according to the *Piedmont Together Climate Adaptation Report*, the increased likelihood of extreme precipitation events due to climate change will result in greater risks of flash flooding and impacts from stormwater runoff in the county.

It can be inferred from the floodplain location maps, previous occurrences, and severe repetitive loss properties that risk varies throughout Guilford County. For example, Greensboro has more floodplain and thus a higher risk of flood than the other municipalities. Mitigation actions may be warranted, particularly for severe repetitive loss and repetitive loss properties.

5.9.9 Consequence Analysis

People (The Public and Public Confidence)

During flood events, people are often stranded and have to be rescued by first responders. Often lives are lost or people are injured. Even when injuries and fatalities are avoided, the impact on the public can be great as many people will be forced into shelters or will need to find temporary lodging as they wait for flooding to recede. They may be unable to return to their homes if the damage is great and may find their homes uninhabitable if personal property has become waterlogged and is unusable.

Another major impact on the public can be the deteriorating health conditions that result from flooding. After floodwaters recede, homes and personal property that were covered in water may begin to become infested with mold which can create serious health risks. Additionally, waterborne diseases can be pervasive in areas impacted by flooded sewer and water systems. Mosquitoes and other carriers of illnesses often thrive in post-flood conditions, increasing the chances of transmitting vector-borne diseases.

Public confidence is often impacted by flood events, especially when impacted people do not have flood insurance and are not covered by their home insurance policy. This can create public relations issues for the government and a loss of public confidence.

Responders

Responders are often affected by flooding because floods can trap people in their homes or in other locations, forcing responders to put their lives at risk to return members of the public to safety. Often responders in flood situations face blocked roads and have difficulty safely protecting citizens. Water rescues can be some of the most dangerous as rapidly moving flood waters are difficult to navigate. Rescuers are typically at high risk to loss of life or personal injury during flood events, especially compared to other types of natural hazards.

Continuity of Operations

Flooding can impact continuity of operations by knocking out power sources and preventing emergency management personnel from being able to do their jobs properly. Floods typically have some impact on continuity of operations as they can cause severe disruption to normal operations and have done so in the past in Guilford County. Operations would be most impacted at a localized level as areas that are flooded would experience the most disruption to normal operations.

Built Environment (Property, Facilities, and Infrastructure)

Many buildings and structures could be impacted by a flood event, but critical infrastructure and key resources (CIKR) within the county are especially important to identify. When these facilities are located in flood-prone areas, there is a substantial risk to important functions of government such as law enforcement and medical care. This also includes any assets, systems, and networks that are vital to the continued operation of government services such as power generation facilities, transmission infrastructure, and road networks, among others. The incapacitation or destruction of these resources would have a debilitating and costly effect on many aspects of the state's normal functionality.

Often, in the case of flooding, water and wastewater infrastructure are some of the most prominently impacted. Since these types of infrastructure deal directly with water, often they are located in the most flood prone areas and are severely impacted during flood events. When these facilities or infrastructure

are flooded, it complicates recovery and impacts people who are unable to utilize normal water sources for drinking, sanitation, and other everyday uses.

In addition, personal property such as homes and businesses have been impacted to a large degree by past flooding events and are a major concern in future flooding events. Although a great deal of effort has been undertaken to reduce the number of properties at risk through the use of progressively improved risk assessment and mitigation techniques, there are still a significant number of structures throughout the county which are located in flood zones or which have not been properly mitigated to reduce risk. These properties may sustain significant costs due to damage during future flood events and are often a major focus of post-disaster recovery efforts.

Economy

There are a variety of economic impacts that could result from a large-scale flood event. One major impact is on soil that is covered by flood waters, causing the rapid depletion of oxygen, which is essential for plant growth and development. This can hurt agricultural production in areas where that is a key economic driver. Secondly, flooding often causes the shutdown of businesses, many of which never re-open after a flood event. Indeed, FEMA reports that almost 40 percent of small businesses never reopen their doors after a disaster because only small amounts of flood waters can cause thousands of dollars of damage.[14] The shutdown of these small businesses in many communities can be devastating as many communities rely heavily on these small businesses as economic drivers and the base of the local economy.

Environment

The fluctuation of water levels in a wetland, especially flood waters, supports the biological diversity of low-lying areas by releasing nutrients into the soil and germinating wetland flora. Flooding also offers some control of invasive water weeds. Most features of the environment have come to adapt to the effects of a flood event and respond quickly, although it is possible that some species may not be resilient enough to survive and will experience population loss.

However, areas that have been modified by human activity tend to suffer more negative consequences from flooding which can result from modifying stream banks or removing vegetation from riverside. When these modifications are present, flooding can cause unnatural erosion of sediment into the waterway and create an imbalance of nutrients in the water which may harm ecosystems and have a negative impact on downstream water quality.[15]

5.10 HAIL

5.10.1 Background

Hailstorms are a potentially damaging outgrowth of severe thunderstorms (thunderstorms are discussed in a separate section). Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped

[14] FEMA. (2017). *Protecting Your Businesses*. Retrieved October9, 2019, from https://www.fema.gov/protecting-your-businesses
[15] Office of the Queensland Australia Chief Scientist (2017). *What are the consequences of floods?* Retrieved October 9, 2019, from: http://www.chiefscientist.qld.gov.au/publications/understanding-floods/flood-consequences

masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.27** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.27: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 - 0.2	No damage
H1	Potentially Damaging	5-**15**	>20	0.2 - 0.6	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	0.4 - 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	0.8 - 1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	1.0 - 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	1.2 - 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-**60**		1.6 - 2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-**75**		2.0 - 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		1.6 - 3.5	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-**100**		3.0 - 3.9	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100			Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: http://www.torro.org.uk/site/hscale.php

5.10.2 Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Guilford County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms.

5.10.3 Historical Occurrences

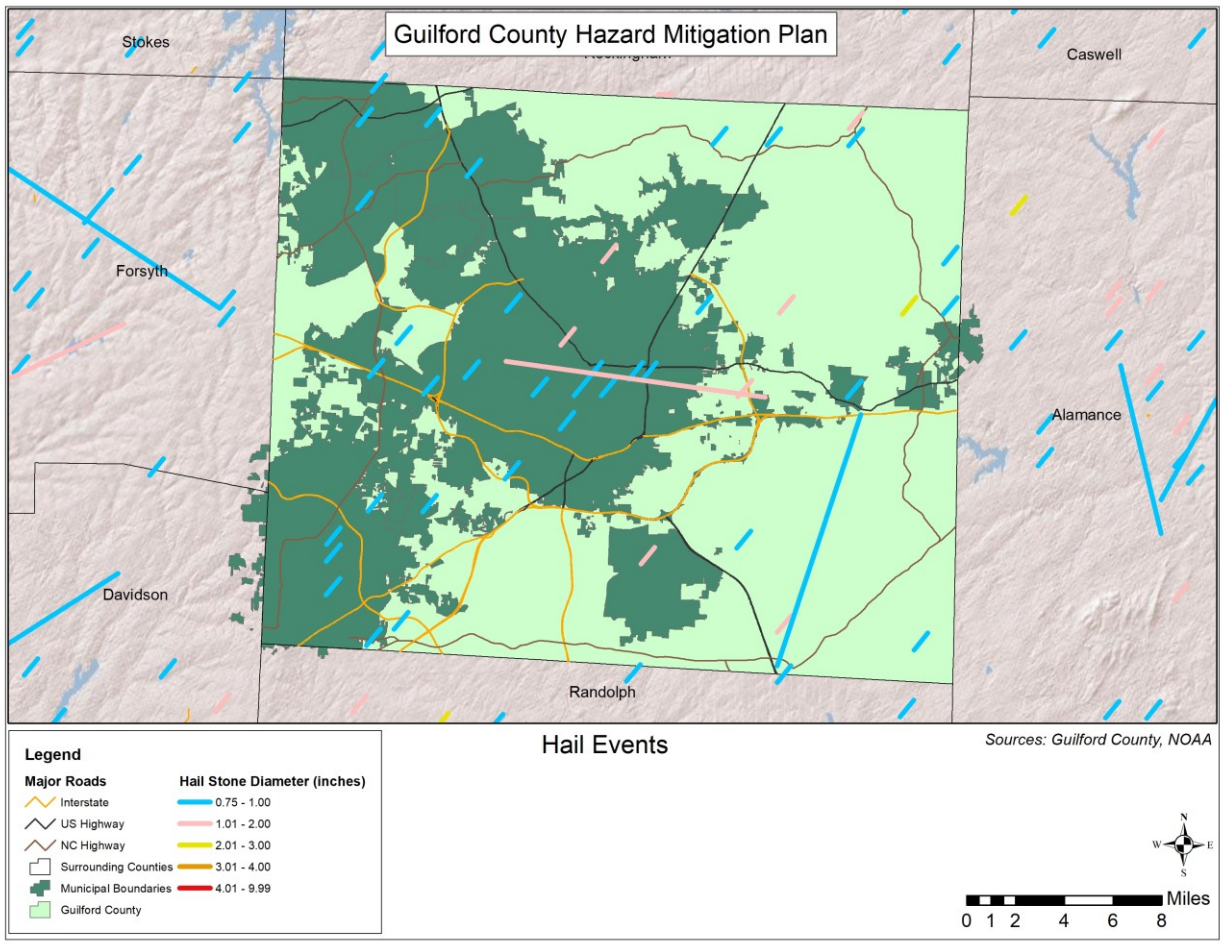
According to the National Centers for Environmental Information, 164 recorded hailstorm events have affected Guilford County since 1967.[16] **Table 5.28** is a summary of the hail events in Guilford County. **Table 5.29** provides detailed information about each event that occurred in the county. **Figure 5.39** illustrates the location and magnitude of historic hailstorms that have occurred in the county.

In all, hail occurrences resulted in around $2,000 (2019 dollars) in recorded property damages.[17] Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other parts of the built environment that may not be reported to the National Centers for Environmental Information. It is likely that damages are greater than the reported value.

[16] These hail events are only inclusive of those reported by the National Centers for Environmental Information (NCEI) from 1950 through March 2019. It is likely that additional hail events have affected Guilford County. In addition to NCEI, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

[17] Adjusted dollar values were calculated based on the Consumer Price Index for All Urban Consumers (CPI-U) U.S. city average series for all items, not seasonally adjusted. This data represents changes in the prices of all goods and services purchased for consumption by urban households. This monthly index value has been calculated every year since 1913. The 2019 dollar values were calculated based on buying power in May 2019.

FIGURE 5.39: HISTORIC HAIL EVENTS (1950-2019)



Source: National Centers for Environmental Information

TABLE 5.28: SUMMARY OF HAIL OCCURRENCES IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
Gibsonville	4	0/0	$0	$0
Greensboro	43	0/0	$0	$0
High Point	16	0/0	$0	$0
Jamestown	1	0/0	$0	$0
Oak Ridge	4	0/0	$0	$0
Pleasant Garden	4	0/0	$0	$0
Sedalia	3	0/0	$0	$0
Stokesdale	7	0/0	$0	$0
Summerfield	5	0/0	$0	$0
Whitsett	1	0/0	$0	$0
Unincorporated Area	89	0/0	$2,019	$39
GUILFORD COUNTY TOTAL	**177**	**0/0**	**$2,019**	**$39**

Source: National Centers for Environmental Information

TABLE 5.29: HISTORICAL HAIL OCCURRENCES IN GUILFORD COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Gibsonville				
GIBSONVILLE	4/3/1998	0.75 in.	0/0	$0
GIBSONVILLE	5/23/2004	0.88 in.	0/0	$0
GIBSONVILLE	5/14/2006	0.88 in.	0/0	$0
GIBSONVILLE	5/14/2006	0.88 in.	0/0	$0
Greensboro				
GREENSBORO	9/13/1996	0.75 in.	0/0	$0
GREENSBORO	3/5/1997	0.75 in.	0/0	$0
GREENSBORO	8/25/1997	0.75 in.	0/0	$0
GREENSBORO	5/20/1998	1.75 in.	0/0	$0
GREENSBORO	5/26/1998	0.75 in.	0/0	$0
GREENSBORO	6/15/1998	0.75 in.	0/0	$0
GREENSBORO	5/25/2001	1.00 in.	0/0	$0
GREENSBORO	5/25/2001	1.00 in.	0/0	$0
GREENSBORO	7/4/2002	0.88 in.	0/0	$0
GREENSBORO	7/4/2002	0.75 in.	0/0	$0
GREENSBORO	4/26/2003	1.25 in.	0/0	$0
GREENSBORO	5/31/2003	1.00 in.	0/0	$0
GREENSBORO	8/5/2003	0.75 in.	0/0	$0
GREENSBORO	8/22/2003	0.88 in.	0/0	$0
GREENSBORO	5/9/2004	0.75 in.	0/0	$0
GREENSBORO	3/23/2005	1.75 in.	0/0	$0
GREENSBORO	4/3/2006	0.75 in.	0/0	$0
GREENSBORO	5/14/2006	0.88 in.	0/0	$0
GREENSBORO	5/14/2006	0.88 in.	0/0	$0
GREENSBORO	5/14/2006	0.88 in.	0/0	$0
GREENSBORO	5/14/2006	1.00 in.	0/0	$0
GREENSBORO	5/14/2006	0.88 in.	0/0	$0
GREENSBORO	5/14/2006	1.00 in.	0/0	$0
GREENSBORO	5/14/2006	1.75 in.	0/0	$0
GREENSBORO	5/14/2006	1.75 in.	0/0	$0
GREENSBORO	5/15/2006	0.75 in.	0/0	$0
GREENSBORO	5/26/2006	1.00 in.	0/0	$0
GREENSBORO	6/11/2006	0.75 in.	0/0	$0
GREENSBORO	6/11/2006	1.50 in.	0/0	$0
GREENSBORO	6/11/2006	0.75 in.	0/0	$0
GREENSBORO	6/23/2006	0.88 in.	0/0	$0
GREENSBORO	6/23/2006	1.00 in.	0/0	$0
GREENSBORO	6/23/2006	1.00 in.	0/0	$0
GREENSBORO	6/23/2006	0.75 in.	0/0	$0
GREENSBORO	8/30/2006	0.75 in.	0/0	$0
GREENSBORO	9/28/2006	0.88 in.	0/0	$0
GREENSBORO	4/15/2007	0.88 in.	0/0	$0
GREENSBORO	6/27/2007	0.75 in.	0/0	$0
GREENSBORO	6/27/2007	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
GREENSBORO	5/31/2008	1.00 in.	0/0	$0
GREENSBORO	8/19/2009	0.75 in.	0/0	$0
GREENSBORO	6/1/2012	1.75 in.	0/0	$0
GREENSBORO	9/28/2016	1.75 in.	0/0	$0
High Point				
HIGH POINT	8/27/1994	0.75 in.	0/0	$0
HIGH POINT	7/18/1996	0.75 in.	0/0	$0
HIGH POINT	4/17/1998	0.88 in.	0/0	$0
HIGH POINT	5/7/1998	0.88 in.	0/0	$0
HIGH POINT	6/3/2000	1.75 in.	0/0	$0
HIGH POINT	7/2/2002	0.88 in.	0/0	$0
HIGH POINT	4/30/2003	0.75 in.	0/0	$0
HIGH POINT	5/2/2003	0.75 in.	0/0	$0
HIGH POINT	7/4/2004	0.75 in.	0/0	$0
HIGH POINT	7/17/2004	1.00 in.	0/0	$0
HIGH POINT	5/14/2006	1.00 in.	0/0	$0
HIGH POINT	6/8/2006	0.75 in.	0/0	$0
HIGH POINT	6/23/2006	0.88 in.	0/0	$0
HIGH POINT	8/30/2006	1.00 in.	0/0	$0
HIGH POINT	8/30/2006	0.75 in.	0/0	$0
HIGH POINT	4/20/2008	1.00 in.	0/0	$0
Jamestown				
JAMESTOWN	4/26/2003	0.88 in.	0/0	$0
Oak Ridge				
OAK RIDGE	5/12/2001	0.88 in.	0/0	$0
OAK RIDGE	3/23/2005	1.00 in.	0/0	$0
OAK RIDGE ARPT	7/20/2009	1.75 in.	0/0	$0
OAK RIDGE ARPT	4/20/2015	1.00 in.	0/0	$0
Pleasant Garden				
PLEASANT GARDEN	7/1/2002	1.50 in.	0/0	$0
PLEASANT GARDEN	8/7/2006	0.75 in.	0/0	$0
PLEASANT GARDEN	5/9/2009	0.88 in.	0/0	$0
PLEASANT GARDEN	4/19/2013	1.00 in.	0/0	$0
Sedalia				
SEDALIA	9/20/2005	0.75 in.	0/0	$0
SEDALIA	9/28/2016	1.00 in.	0/0	$0
SEDALIA	9/28/2016	1.25 in.	0/0	$0
Stokesdale				
STOKESDALE	7/24/1997	1.00 in.	0/0	$0
STOKESDALE	7/3/2002	1.75 in.	0/0	$0
STOKESDALE	7/19/2003	0.88 in.	0/0	$0
STOKESDALE	6/11/2006	0.75 in.	0/0	$0
STOKESDALE	6/11/2006	0.75 in.	0/0	$0
STOKESDALE	7/4/2006	1.00 in.	0/0	$0
STOKESDALE	9/28/2006	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
Summerfield				
SUMMERFIELD	8/18/2000	2.50 in.	0/0	$0
SUMMERFIELD	7/13/2003	0.88 in.	0/0	$0
SUMMERFIELD	10/21/2005	0.75 in.	0/0	$0
SUMMERFIELD	9/28/2006	0.75 in.	0/0	$0
SUMMERFIELD	5/31/2008	0.75 in.	0/0	$0
Whitsett				
WHISTETT	6/22/2008	0.75 in.	0/0	$0
Unincorporated Area				
GUILFORD CO.	8/7/1967	0.75 in.	0/0	$0
GUILFORD CO.	6/22/1978	1.00 in.	0/0	$0
GUILFORD CO.	8/21/1979	1.00 in.	0/0	$0
GUILFORD CO.	4/27/1982	1.00 in.	0/0	$0
GUILFORD CO.	5/29/1982	1.75 in.	0/0	$0
GUILFORD CO.	4/2/1983	2.75 in.	0/0	$0
GUILFORD CO.	4/14/1984	1.75 in.	0/0	$0
GUILFORD CO.	5/6/1984	1.75 in.	0/0	$0
GUILFORD CO.	5/15/1985	0.75 in.	0/0	$0
GUILFORD CO.	5/22/1985	2.50 in.	0/0	$0
GUILFORD CO.	6/3/1985	1.00 in.	0/0	$0
GUILFORD CO.	6/5/1985	1.25 in.	0/0	$0
GUILFORD CO.	6/5/1985	1.00 in.	0/0	$0
GUILFORD CO.	4/12/1987	1.75 in.	0/0	$0
GUILFORD CO.	6/1/1987	1.75 in.	0/0	$0
GUILFORD CO.	5/16/1988	0.75 in.	0/0	$0
GUILFORD CO.	5/17/1988	0.75 in.	0/0	$0
GUILFORD CO.	5/17/1988	0.75 in.	0/0	$0
GUILFORD CO.	5/17/1988	0.75 in.	0/0	$0
GUILFORD CO.	5/17/1988	1.00 in.	0/0	$0
GUILFORD CO.	6/21/1988	0.75 in.	0/0	$0
GUILFORD CO.	7/10/1988	1.75 in.	0/0	$0
GUILFORD CO.	4/27/1989	0.75 in.	0/0	$0
GUILFORD CO.	6/2/1989	1.00 in.	0/0	$0
GUILFORD CO.	5/1/1990	1.00 in.	0/0	$0
GUILFORD CO.	5/1/1990	1.00 in.	0/0	$0
GUILFORD CO.	5/27/1990	1.00 in.	0/0	$0
GUILFORD CO.	5/27/1990	1.75 in.	0/0	$0
GUILFORD CO.	7/1/1990	1.75 in.	0/0	$0
GUILFORD CO.	4/30/1992	0.75 in.	0/0	$0
GUILFORD CO.	6/26/1992	0.75 in.	0/0	$0
JULIAN	10/27/1995	1.50 in.	0/0	$0
JULIAN	5/29/1996	1.75 in.	0/0	$0
JULIAN,CLIMAX	10/18/1996	0.75 in.	0/0	$0
MONTICELLO	5/1/1998	0.75 in.	0/0	$0
GUILFORD	5/20/1998	1.00 in.	0/0	$0
MC LEANSVILLE	6/23/2006	1.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
CLIMAX	3/4/2008	0.75 in.	0/0	$0
GREENSBORO MAY ARPT	3/4/2008	0.75 in.	0/0	$0
COLFAX	3/4/2008	0.75 in.	0/0	$0
BROWNS SUMMIT	5/8/2008	0.75 in.	0/0	$0
BATTLE GROUND	5/8/2008	1.75 in.	0/0	$0
BROWNS SUMMIT	5/9/2008	0.75 in.	0/0	$0
SHERWOOD VLG	5/20/2008	0.88 in.	0/0	$0
BATTLE GROUND	5/31/2008	0.75 in.	0/0	$0
BATTLE GROUND	5/31/2008	0.88 in.	0/0	$0
GUILFORD	5/31/2008	1.00 in.	0/0	$0
BATTLE GROUND	5/31/2008	0.88 in.	0/0	$0
PINECROFT	5/31/2008	1.00 in.	0/0	$0
BATTLE GROUND	5/31/2008	1.25 in.	0/0	$0
BATTLE GROUND	5/31/2008	1.00 in.	0/0	$0
GUILFORD	6/22/2008	0.75 in.	0/0	$0
BATTLE GROUND	6/22/2008	0.75 in.	0/0	$0
HAMILTON LAKES	6/22/2008	0.88 in.	0/0	$0
HAMILTON LAKES	6/22/2008	0.88 in.	0/0	$0
BATTLE GROUND	6/3/2009	1.00 in.	0/0	$0
BROADVIEW	6/3/2009	0.75 in.	0/0	$0
BESSEMER	6/3/2009	1.00 in.	0/0	$0
CLIMAX	6/9/2009	1.00 in.	0/0	$0
HILLSDALE	7/20/2009	0.75 in.	0/0	$0
BROWNS SUMMIT	3/28/2010	1.00 in.	0/0	$1,471
DEEP RIVER	5/15/2010	1.00 in.	0/0	$0
DEEP RIVER	5/15/2010	1.00 in.	0/0	$0
VANDALIA	5/15/2010	1.00 in.	0/0	$0
GREENSBORO ARPT	4/27/2011	0.75 in.	0/0	$0
HAMILTON LAKES	4/27/2011	0.75 in.	0/0	$0
GREENSBORO ARPT	4/27/2011	0.88 in.	0/0	$0
BROWNS SUMMIT	6/9/2011	1.50 in.	0/0	$0
FOUR MILE	9/27/2011	1.00 in.	0/0	$0
GREENSBORO ARPT	3/24/2012	1.00 in.	0/0	$0
GROOMTOWN	3/24/2012	1.00 in.	0/0	$0
CLIMAX	3/24/2012	1.00 in.	0/0	$0
PINECROFT	6/1/2012	1.00 in.	0/0	$0
POMONA	6/25/2013	1.75 in.	0/0	$548
GROOMTOWN	6/10/2014	1.25 in.	0/0	$0
KOONTZVILLE	6/16/2014	1.25 in.	0/0	$0
BRIGHTWOOD	6/16/2014	1.25 in.	0/0	$0
BRIGHTWOOD	6/16/2014	1.75 in.	0/0	$0
BRIGHTWOOD	6/16/2014	1.50 in.	0/0	$0
BROADVIEW	6/16/2014	1.00 in.	0/0	$0
SCALESVILLE	4/28/2016	1.00 in.	0/0	$0
GREENSBORO ARPT	5/2/2016	0.88 in.	0/0	$0
GUILFORD	5/2/2016	0.88 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
(GSO)GREENSBORO RGNL	5/2/2016	1.00 in.	0/0	$0
GUILFORD	5/2/2016	1.00 in.	0/0	$0
GUILQUARRY	5/12/2016	1.00 in.	0/0	$0
GUILQUARRY	6/29/2016	1.00 in.	0/0	$0
OSCEOLA	9/28/2016	1.00 in.	0/0	$0
CLIMAX	4/6/2017	1.00 in.	0/0	$0

*Property damage is reported in 2019 dollars; All damage may not have been reported.
Source: National Centers for Environmental Information

5.10.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that the entire county has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

5.10.5 Consequence Analysis

People (The Public and Public Confidence)
Hail can have a negative impact on the public as it can often cause injury if people are struck by hail stones. Often the impoverished, including homeless populations, are detrimentally impacted if they cannot find shelter, but hail can impact anyone. There would be little negative impact on public confidence.

Responders
Hail can also affect responders who are often more susceptible to hail events due to the nature of their work which often forces police and emergency medical providers to be exposed to the elements. In these cases, responders could be negatively impacted by hail.

Continuity of Operations
Hail would likely have some impacts on continuity of operations as the warning time for these events is usually shorter and hail stones could potentially knock out power supplies or other critical resources which would affect operations.

Built Environment (Property, Facilities, and Infrastructure)
Hail can often have a significant effect on the built environment, depending on the size of the hail stones. Often these can damage roofs or other parts of homes and businesses as they are essentially rocks that are being propelled at high speeds. Hail can affect most any type of facility or infrastructure, causing damage to the structure.

Economy
A hailstorm could negatively impact the economy to some degree if the damage from the storm is large enough. Often hail causes a great deal of damage to personal property such as cars and homes, and these impacts would hurt the overall economy due to recovery efforts.

Environment

Hail often has a serious effect on crops and has been known to cause millions of dollars' worth of damage to farmers. It can also negatively impact livestock, as well as any flora or fauna that is not properly sheltered.

5.11 HURRICANE / OTHER TROPICAL DISTURBANCE

5.11.1 Background

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six.

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Scale (**Table 5.30**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

TABLE 5.30: SAFFIR-SIMPSON SCALE

Category	Maximum Sustained Wind Speed (MPH)	Minimum Surface Pressure (Millibars)
1	74–95	Greater than 980
2	96–110	979–965
3	111–129	964–945
4	130–156	944–920
5	157 +	Less than 920

Source: National Hurricane Center (2012)

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are

classified as "major" hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. **Table 5.31** describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

TABLE 5.31: HURRICANE DAMAGE CLASSIFICATIONS

Storm Category	Damage Level	Description of Potential Damages	Photo Example
1	MODERATE	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.	
2	EXTENSIVE	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.	
3	MAJOR	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.	
4	EXTREME	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.	
5	CATASTROPHIC	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.	

Source: National Hurricane Center

5.11.2 Location and Spatial Extent

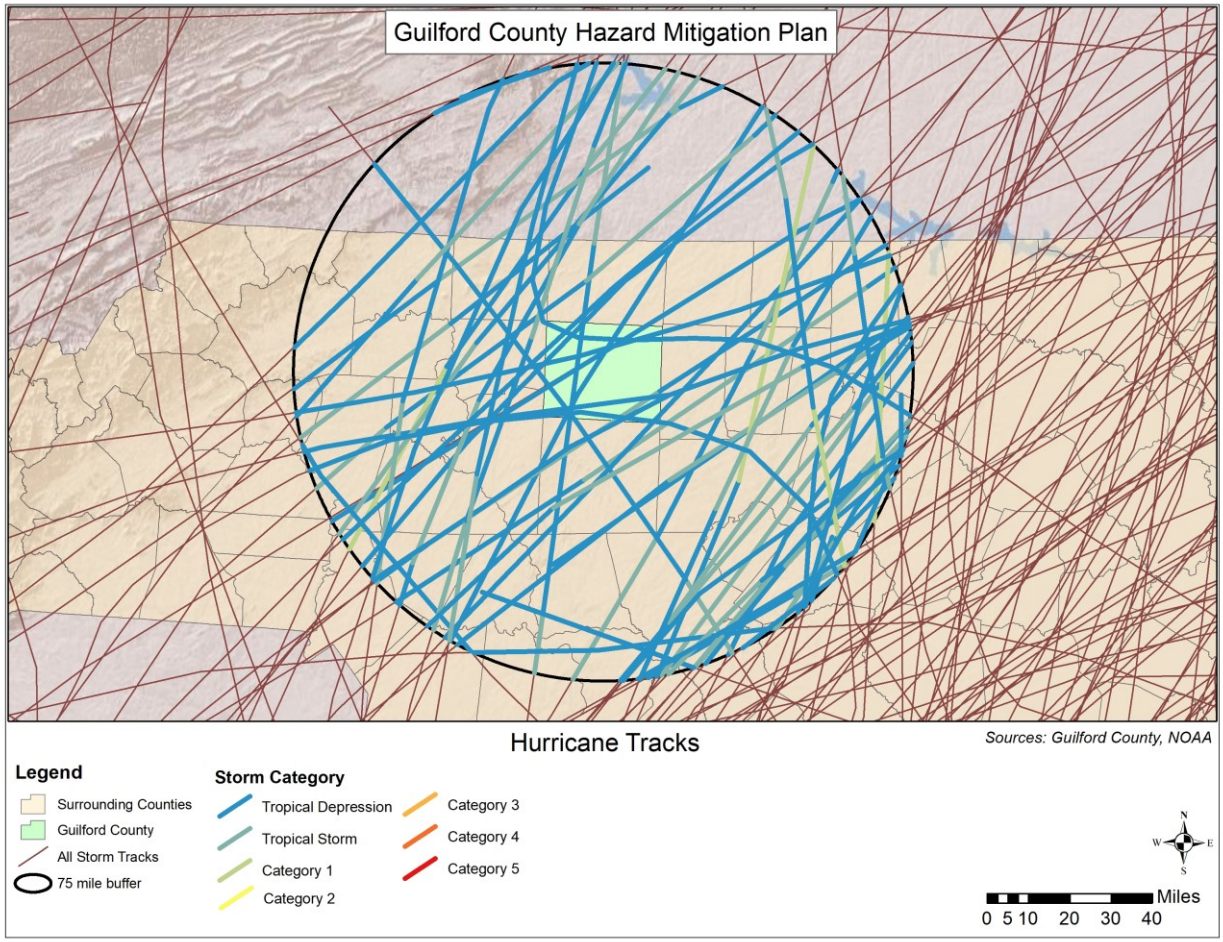
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboards of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Guilford County. All areas in Guilford County are equally susceptible to hurricane and tropical storms.

5.11.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 60 hurricane/tropical storm tracks have passed within 75 miles of Guilford County since 1850.[18] This includes 6 hurricanes, 29 tropical storms, and 25 tropical depressions.

Of the recorded storm events, 13 have traversed directly through Guilford County as shown in **Figure 5.40**. **Table 5.32** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of Guilford County), and Category of the storm based on the Saffir-Simpson Scale for each event.

FIGURE 5.40: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF GUILFORD COUNTY



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

[18] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

TABLE 5.32: HISTORICAL STORM TRACKS WITHIN 75 MILES OF GUILFORD COUNTY (1850-2019)

Date of Occurrence	Storm Name	Maximum Sustained Wind Speed (knots)	Storm Category
9/10/1854	NOT NAMED	40	Tropical Storm
9/17/1859	NOT NAMED	40	Tropical Storm
11/2/1861	NOT NAMED	0	Tropical Depression
9/18/1863	NOT NAMED	0	Tropical Depression
10/2/1863	NOT NAMED	0	Tropical Depression
6/23/1867	NOT NAMED	0	Tropical Depression
9/19/1875	NOT NAMED	0	Tropical Depression
10/4/1877	NOT NAMED	50	Tropical Storm
9/12/1878	NOT NAMED	60	Tropical Storm
9/11/1882	NOT NAMED	40	Tropical Storm
10/13/1885	NOT NAMED	40	Tropical Storm
6/22/1886	NOT NAMED	35	Tropical Storm
7/2/1886	NOT NAMED	40	Tropical Storm
9/10/1888	NOT NAMED	35	Tropical Storm
9/24/1889	NOT NAMED	40	Tropical Storm
8/28/1893	NOT NAMED	65	Category 1
10/13/1893	NOT NAMED	80	Category 1
6/12/1895	NOT NAMED	0	Tropical Depression
9/30/1896	NOT NAMED	70	Category 1
10/31/1899	NOT NAMED	0	Tropical Depression
6/16/1902	NOT NAMED	35	Tropical Storm
10/12/1902	NOT NAMED	35	Tropical Storm
9/14/1904	NOT NAMED	60	Tropical Storm
9/23/1907	NOT NAMED	35	Tropical Storm
8/31/1911	NOT NAMED	25	Tropical Depression
9/3/1913	NOT NAMED	40	Tropical Storm
8/4/1915	NOT NAMED	40	Tropical Storm
9/23/1920	NOT NAMED	35	Tropical Storm
10/3/1927	NOT NAMED	35	Tropical Storm
8/11/1928	NOT NAMED	30	Tropical Depression
10/2/1929	NOT NAMED	50	Tropical Storm
9/6/1935	NOT NAMED	45	Tropical Storm
10/20/1944	NOT NAMED	45	Tropical Storm
9/18/1945	NOT NAMED	45	Tropical Storm
8/29/1949	NOT NAMED	50	Tropical Storm
8/31/1952	ABLE	40	Tropical Storm
8/28/1952	NOT NAMED	30	Tropical Depression
8/17/1955	DIANE	55	Tropical Storm
7/10/1959	CINDY	30	Tropical Depression
8/31/1964	CLEO	25	Tropical Depression
6/9/1968	ABBY	25	Tropical Depression
5/26/1970	ALMA	25	Tropical Depression
9/16/1976	NOT NAMED	25	Tropical Depression
9/5/1979	DAVID	45	Tropical Storm
7/25/1985	BOB	45	Tropical Storm

Date of Occurrence	Storm Name	Maximum Sustained Wind Speed (knots)	Storm Category
8/18/1985	DANNY	25	Tropical Depression
9/8/1987	NOT NAMED	0	Tropical Depression
8/29/1988	CHRIS	20	Tropical Depression
9/22/1989	HUGO*	85	Category 2
9/6/1996	FRAN	65	Category 1
7/24/1997	DANNY	30	Tropical Depression
9/16/1999	FLOYD*	90	Category 2
9/5/1999	DENNIS	30	Tropical Depression
9/19/2000	GORDON	20	Tropical Depression
7/2/2003	BILL	0	Tropical Depression
8/30/2004	GASTON	30	Tropical Depression
9/18/2004	IVAN	20	Tropical Depression
9/28/2004	JEANNE	20	Tropical Depression
7/7/2005	CINDY	20	Tropical Depression
9/7/2018	FLORENCE*	50	Tropical Storm
10/11/2018	MICHAEL	45	Tropical Storm

*Although the track of these storms traversed outside of the 75-mile buffer area, they were included in the hazard history since a federal disaster area was declared for Guilford County as a result of the storm's impact.
Source: National Hurricane Center

The National Centers for Environmental Information reported four events associated with a hurricane or tropical storm in Guilford County since 1996. Additionally, Federal records indicate that five disaster declarations were made in 1989 (Hurricane Hugo), 1996 (Hurricane Fran), 1999 (Hurricane Floyd), 2004 (Hurricane Ivan), 2018 (Hurricane Florence) for the county.[19]

Flooding is often the greatest hazard of concern with hurricane and tropical storm events in Guilford County. Most events do not carry winds that are above that of the thunderstorms and straight line winds received by the county. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Hugo – September 22-24, 1989
Hurricane Hugo was one of the largest storms on record in the Atlantic Basin that produced high winds and dumped heavy rains over much of North Carolina and South Carolina. Hugo reached a peak level of Category 5 on the Saffir-Simpson scale and made landfall near Isle of Palms in South Carolina as a Category 4, eventually passing over Charlotte and much of the surrounding area as a Category 1 storm. Although the storm caused its greatest damage in South Carolina, over 1,000 structures were destroyed or severely damaged in North Carolina, causing over $1 billion dollars in damages. Wind gusts reached over 40 mph and numerous trees were downed throughout much of south and western North Carolina.

Hurricane Fran – September 5-6, 1996
After being hit just a few weeks earlier by Hurricane Bertha, North Carolina was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over 3 billion dollars in

[19] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16, 1999
Hurricane Floyd, combined with the weather conditions before and immediately after this hurricane, resulted in the most severe flooding and devastation in North Carolina history. In North Carolina, the storm resulted in 35 fatalities, over $3 billion in damages, 7,000 destroyed homes, 56,000 damaged homes, 1,500 people rescued from flooded areas, and more than 500,000 customers without electricity. Additionally, the flooding caused an estimated $813 million in agricultural losses affecting 32,000 farmers. There was also significant loss of livestock including 2,860,827 poultry, 28,000 swine, and 619 cattle.

Hurricane Ivan – September 16-17, 2004
Just a week and a half following Tropical Storm Frances, the remnants of Hurricane Ivan hit western North Carolina when many streams and rivers were already well above flood stage. The widespread flooding forced many roads to be closed and landslides were common across the mountain region. Wind gusts reached between 40 and 60 mph across the higher elevations of the Appalachian Mountains resulting in numerous downed trees. More than $13.8 million of federal aid was dispersed across North Carolina following Ivan.

Hurricane Florence – September 12-15, 2018
Florence produced extensive wind damage along the North Carolina coast from Cape Lookout, across Carteret, Onslow, Pender and New Hanover counties. Thousands of downed trees caused widespread power outages to nearly all of eastern North Carolina. The historic legacy of Hurricane Florence will be record breaking storm surge of 9 to 13 feet and devastating rainfall of 20 to 30 inches, which produced catastrophic and life-threatening flooding. The hardest hit areas included New Bern, Newport, Belhaven, Oriental, North Topsail Beach and Jacksonville, along with Downeast Carteret County, or basically south of a line from Kinston to Cedar Island. A storm total rainfall of 34.00 inches was reported in Swansboro, while the NWS office in Newport recorded 25.20 inches. Wind gusts of 106 mph were reported at Cape Lookout with 105 mph at Fort Macon.

5.11.4 Probability of Future Occurrences

Given the inland location of the county, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to Guilford County due to induced events like flooding and erosion. Based on historical evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. However, when the county is impacted, the damage could be catastrophic, threatening lives and property throughout the planning area. Additionally, according to the *Piedmont Together Climate Adaptation Report*, the increased likelihood of hurricanes due to climate change will result in greater wind damage and increased flooding in the county.

5.11.5 Consequence Analysis

People (The Public and Public Confidence)

During previous hurricane events in Guilford County, there have been significant losses of life and injuries to citizens. A number of people may be displaced from their homes and will require accommodations in temporary public shelters due to a hurricane. Many people may also be permanently displaced and require longer term housing after a major event. In addition, many of the same health and property damage effects listed under the flood hazard would also likely occur as a result of a hurricane. A major difference is that hurricanes can also bring negative effects from high winds. High winds can shatter glass and cause personal injury during the event and can cause loss of life if members of the public are not cautious and fail to take proper precautions prior to and during an event.

This hazard could potentially have a large negative effect on public confidence due to the possibility of a high magnitude event and the difficulties that might arise for local governments in terms of response and recovery. As has been the case with several previous events, members of the public who are displaced or whose homes/property are damaged may be frustrated causing a failure of confidence in the government's ability to respond to disasters.

Responders

The impacts on responders from this type of storm could potentially be very high as responders may be physically injured or killed during a storm event by flooding or high winds. In addition, their homes and personal effects could also be impacted which would limit their response capability.

In terms of their actual response capacity, downed trees in the wake of a hurricane often block roads and make ingress and egress difficult, thereby causing issues with response time. This is also often true of the resulting floodwaters. Moreover, due to the large-scale spatial impact of hurricanes and the number of citizens affected by the storm, response time will be reduced because of the number of incidents that require emergency responders.

Continuity of Operations

Continuity of operations in a hurricane event can be severely affected if power is lost or if critical facilities or infrastructure are damaged during an event. Although Guilford County has a plan in place to maintain continuity of operations in the event of a storm, a hurricane with a high magnitude would likely disrupt operations to some degree due to the impacts it would have on personnel. Some may experience damage from the storm themselves and be unable to work putting a strain on staff who are working as they will be forced to take on additional responsibilities during and after an event. In major events, all staff will likely be called on to work additional hours to maintain continuity of operations, which may result in fatigue and a reduced capability of employees in the long run.

Built Environment (Property, Facilities, and Infrastructure)

Many buildings and structures could be impacted by a hurricane or tropical storm event including many local and state critical facilities such as police stations, fire stations, medical facilities, and other key buildings. Large-scale damage to infrastructure such as bridges and roads could occur from flood waters. Stormwater infrastructure such as culverts could also be damaged if they are clogged with debris from the storm or their design capacity is overrun. Many utilities including water/wastewater may be affected as a result of their location near rivers and other water sources. Power lines may be downed by falling

trees or limbs and, due to high demand across the state, utility companies may face challenges in restoring power in a timely manner.

Economy

In general, the economy would be severely impacted by a hurricane or tropical storm event. Due to the massive scale of these events and multiple types of impacts from flooding and high winds, commerce would definitively slow down as efforts to rebuild are undertaken. Businesses may be shut down for long periods as owners try to rebuild after damage from flood waters, downed trees, or wind. Even business owners without direct physical damage to their workplaces may be shut down temporarily by loss of power or because employees are unable to come in to work as a result of roads that are shut down or personal property damage. As mentioned in the flooding analysis, many businesses that shut down after a major disaster never re-open their doors, which can have a major negative impact on local economies, especially in smaller communities.

Environment

Flooding and wind damage are the main impacts that would be felt by a hurricane in North Carolina. Hurricane winds can down trees and cause disruptions to local ecosystems, particularly if damage is heavy in areas where endangered or protected species are present. As mentioned in the flood analysis, flood waters may cause some losses in species population. Hurricane events can also sometimes cause spills of hazardous materials which would have damaging effects on the environment (as detailed further in the hazardous materials analysis below).

5.12 THUNDERSTORM (WIND AND LIGHTNING)

5.12.1 Background

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning (discussed here).[20] Although thunderstorms generally affect a small area, they are very dangerous and may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail at least one inch in diameter, 2) a tornado, or 3) winds of at least 58 miles per hour.

[20]The hail hazard is discussed as a separate hazard in this section.

Wind

Thunderstorm events have the capability of producing straight-line winds that can cause severe destruction to communities and threaten the safety of a population. Such wind events, sometimes separate from a thunderstorm event, are common throughout Guilford County. Therefore, high winds are also reported in this section.

High winds can form due to pressure off the Northeast coast that combines with strong pressure moving through the Ohio Valley. This creates a tight pressure gradient across the region, resulting in high winds which increase with elevation. It is common for gusts of 30 to 60 miles per hour to occur during the winter months.

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud becomes heavier than its surroundings. Thus, air rushes towards the ground in a destructive yet isolated manner. There are two types of downbursts. Downbursts less than 2.5 miles wide, duration less than 5 minutes, and winds up to 168 miles per hour are called “microbursts.” Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as “macrobursts.”

Lightning

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning strikes occur in very small, localized areas. For example, they may strike a building, electrical transformer, or even a person. According to FEMA, lightning injures an average of 300 people and kills 80 people each year in the United States. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure largely by igniting a fire. Lightning is also responsible for igniting wildfires that can result in widespread damages to property.

5.12.2 Location and Spatial Extent

Wind

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Guilford County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is

assumed that Guilford County has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Lightning

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Guilford County is uniformly exposed to lightning.

5.12.3 Historical Occurrences

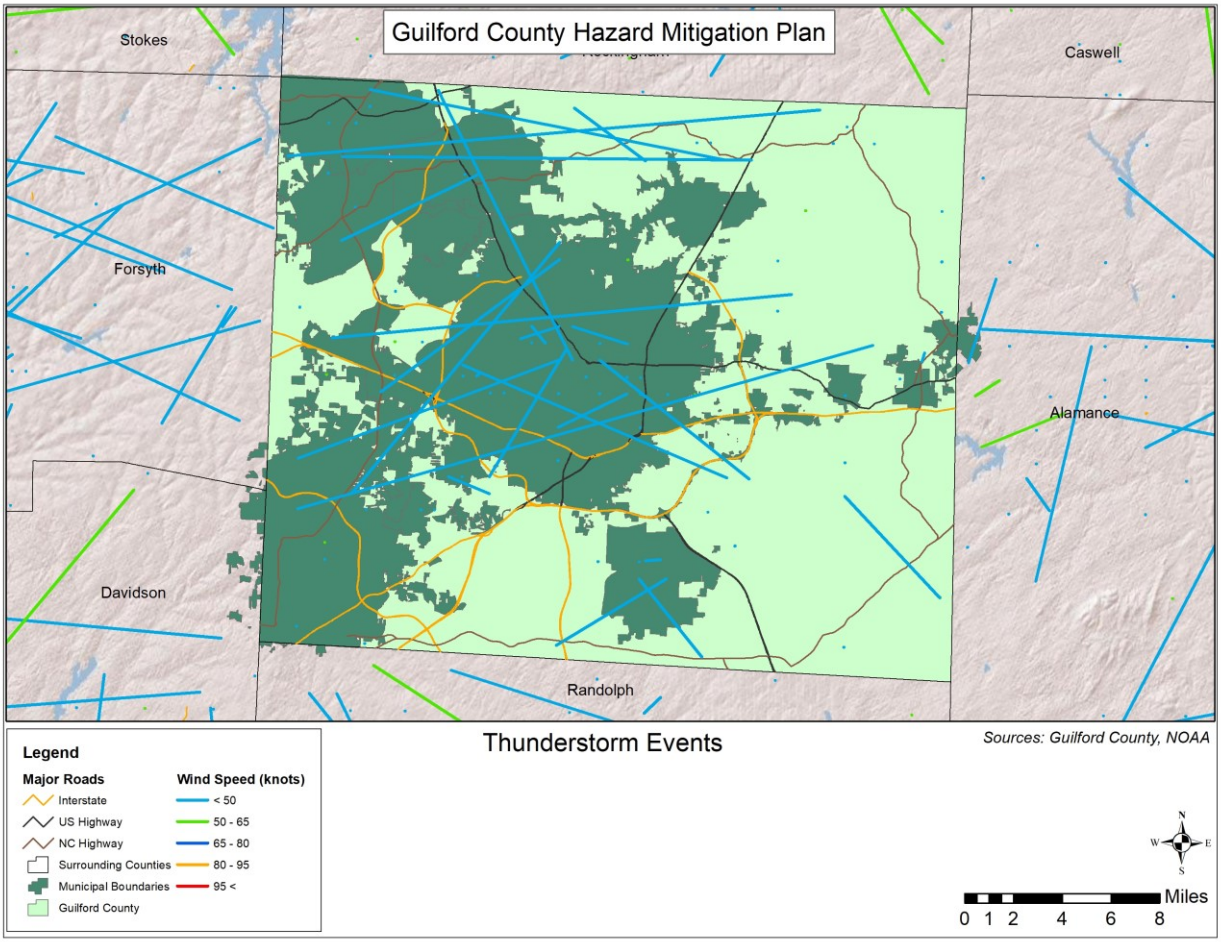
Wind

According to NCEI, there have been 311 reported thunderstorm wind and high wind events since 1950 in Guilford County.[21] These events caused over $2.6 million (2019 dollars) in damages.[22] There were also reports of at least two fatalities and two injuries. **Table 5.33** summarizes this information. **Table 5.34** provides detailed thunderstorm wind and high wind event reports, including date, magnitude, and associated damages for each event. **Figure 5.41** shows historic thunderstorm and high wind events as reported by NCEI.

[21] These thunderstorm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI) from 1955 through March 2019 and these high wind events are only inclusive of those reported by NCEI from 1996 through March 2019. It is likely that additional thunderstorm and high wind events have occurred in Guilford County. As additional local data becomes available, this hazard profile will be amended.

[22] Adjusted dollar values were calculated based on the Consumer Price Index for All Urban Consumers (CPI-U) U.S. city average series for all items, not seasonally adjusted. This data represents changes in the prices of all goods and services purchased for consumption by urban households. This monthly index value has been calculated every year since 1913. The 2019 dollar values were calculated based on buying power in May 2019.

FIGURE 5.41: HISTORIC THUNDERSTORM/HIGH WIND EVENTS (1950-2019)



Source: National Centers for Environmental Information

TABLE 5.33: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
Gibsonville	8	0/0	$50,814	$1,954
Greensboro	38	0/1	$423,050	$16,271
High Point	13	0/0	$312,132	$16,428
Jamestown	5	0/0	$0	$0
Oak Ridge	12	0/0	$2,190	$115
Pleasant Garden	9	0/0	$5,875	$309
Sedalia	4	0/0	$2,541	$159
Stokesdale	5	0/0	$0	$0
Summerfield	10	0/0	$13,881	$631
Whitsett	2	0/0	$0	$0
Unincorporated Area	205	2/1	$1,837,585	$29,168
GUILFORD COUNTY TOTAL	**311**	**2/2**	**$2,648,068**	**$65,036**

Source: National Centers for Environmental Information

TABLE 5.34: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN GUILFORD COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Gibsonville					
GIBSONVILLE	8/26/1993	Thunderstorm Wind	0 kts.	0/0	$0
GIBSONVILLE	5/20/2000	Thunderstorm Wind	60 kts.	0/0	$0
GIBSONVILLE	8/18/2000	Thunderstorm Wind	50 kts.	0/0	$0
GIBSONVILLE	7/20/2006	Thunderstorm Wind	50 kts.	0/0	$0
GIBSONVILLE	6/11/2007	Thunderstorm Wind	50 kts.	0/0	$0
GIBSONVILLE	6/27/2007	Thunderstorm Wind	50 kts.	0/0	$0
GIBSONVILLE	9/2/2012	Thunderstorm Wind	50 kts.	0/0	$0
GIBSONVILLE	6/20/2018	Thunderstorm Wind	50 kts.	0/0	$50,814
Greensboro					
GREENSBORO	8/12/1993	Thunderstorm Wind	0 kts.	0/0	$0
GREENSBORO	8/17/1993	Thunderstorm Wind	65 kts.	0/0	$0
GREENSBORO	8/26/1993	Thunderstorm Wind	0 kts.	0/0	$0
GREENSBORO	4/20/1996	Thunderstorm Wind	0 kts.	0/0	$0
GREENSBORO	5/11/1996	Thunderstorm Wind	60 kts.	0/0	$327,065
GREENSBORO	5/24/1996	Thunderstorm Wind	0 kts.	0/0	$0
GREENSBORO	3/5/1997	Thunderstorm Wind	50 kts.	0/0	$80,029
GREENSBORO	7/28/1997	Thunderstorm Wind	50 kts.	0/0	$15,956
GREENSBORO	6/16/1998	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/30/1998	Thunderstorm Wind	50 kts.	0/1	$0
GREENSBORO	7/7/1999	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	5/25/2000	Thunderstorm Wind	70 kts.	0/0	$0
GREENSBORO	8/10/2000	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/1/2002	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/27/2003	Thunderstorm Wind	52 kts.	0/0	$0
GREENSBORO	6/27/2003	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	4/3/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	4/17/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/11/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/11/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/11/2006	Thunderstorm Wind	52 kts.	0/0	$0
GREENSBORO	6/11/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/11/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	8/3/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	8/30/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	9/28/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	11/16/2006	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	4/15/2007	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/4/2007	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/4/2007	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/4/2007	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/5/2007	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	8/21/2007	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	6/3/2009	Thunderstorm Wind	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
GREENSBORO	6/22/2011	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	7/21/2013	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	5/5/2017	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO	9/1/2018	Thunderstorm Wind	50 kts.	0/0	$0
High Point					
HIGH POINT	5/20/2000	Thunderstorm Wind	60 kts.	0/0	$0
HIGH POINT	5/25/2000	Thunderstorm Wind	60 kts.	0/0	$0
HIGH POINT	3/8/2005	Thunderstorm Wind	54 kts.	0/0	$0
HIGH POINT	4/17/2006	Thunderstorm Wind	50 kts.	0/0	$0
HIGH POINT	4/17/2006	Thunderstorm Wind	50 kts.	0/0	$0
HIGH POINT	7/19/2006	Thunderstorm Wind	50 kts.	0/0	$0
HIGH POINT	7/13/2009	Thunderstorm Wind	50 kts.	0/0	$17,838
HIGH POINT	4/5/2011	Thunderstorm Wind	50 kts.	0/0	$284,666
HIGH POINT	6/1/2012	Thunderstorm Wind	50 kts.	0/0	$0
HIGH POINT	6/19/2014	Thunderstorm Wind	50 kts.	0/0	$0
HIGH POINT	6/19/2014	Thunderstorm Wind	50 kts.	0/0	$0
HIGH POINT	8/5/2015	Thunderstorm Wind	50 kts.	0/0	$4,298
HIGH POINT	5/3/2016	Thunderstorm Wind	50 kts.	0/0	$5,330
Oak Ridge					
OAK RIDGE	6/15/2000	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE	7/4/2006	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE ARPT	6/27/2007	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE	5/26/2011	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE	5/27/2011	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE ARPT	9/8/2012	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE ARPT	4/19/2013	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE ARPT	8/10/2013	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE	8/10/2013	Thunderstorm Wind	50 kts.	0/0	$1,095
OAK RIDGE	8/10/2013	Thunderstorm Wind	50 kts.	0/0	$1,095
OAK RIDGE	6/19/2014	Thunderstorm Wind	50 kts.	0/0	$0
OAK RIDGE ARPT	7/21/2018	Thunderstorm Wind	50 kts.	0/0	$0
Pleasant Garden					
PLEASANT GARDEN	3/11/2000	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	5/22/2001	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	8/7/2006	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	7/8/2008	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	5/9/2009	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	6/23/2010	Thunderstorm Wind	50 kts.	0/0	$5,875
PLEASANT GARDEN	7/20/2010	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	4/28/2011	Thunderstorm Wind	50 kts.	0/0	$0
PLEASANT GARDEN	8/5/2015	Thunderstorm Wind	50 kts.	0/0	$0
Sedalia					
SEDALIA	7/13/2003	Thunderstorm Wind	50 kts.	0/0	$0
SEDALIA	3/8/2005	Thunderstorm Wind	50 kts.	0/0	$0
SEDALIA	7/4/2011	Thunderstorm Wind	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
SEDALIA	7/6/2018	Thunderstorm Wind	50 kts.	0/0	$2,541
Stokesdale					
STOKESDALE	9/14/2000	Thunderstorm Wind	50 kts.	0/0	$0
STOKESDALE	8/12/2004	Thunderstorm Wind	50 kts.	0/0	$0
STOKESDALE	6/19/2007	Thunderstorm Wind	50 kts.	0/0	$0
STOKESDALE	6/27/2007	Thunderstorm Wind	50 kts.	0/0	$0
STOKESDALE	8/21/2007	Thunderstorm Wind	50 kts.	0/0	$0
Summerfield					
SUMMERFIELD	7/28/1997	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	6/15/2000	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	5/13/2002	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	7/28/2006	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	8/30/2006	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	6/24/2010	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	6/24/2010	Thunderstorm Wind	50 kts.	0/0	$11,749
SUMMERFIELD	7/24/2011	Thunderstorm Wind	50 kts.	0/0	$0
SUMMERFIELD	5/21/2016	Thunderstorm Wind	50 kts.	0/0	$2,132
SUMMERFIELD	7/21/2018	Thunderstorm Wind	50 kts.	0/0	$0
Whitsett					
WHITSETT	8/14/2011	Thunderstorm Wind	50 kts.	0/0	$0
WHITSETT	7/21/2012	Thunderstorm Wind	50 kts.	0/0	$0
Unincorporated Area					
GUILFORD CO.	8/2/1956	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/17/1957	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/25/1960	Thunderstorm Wind	60 kts.	0/0	$0
GUILFORD CO.	8/9/1962	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	3/19/1963	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD CO.	7/3/1964	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/13/1964	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	4/27/1965	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/4/1965	Thunderstorm Wind	55 kts.	0/0	$0
GUILFORD CO.	5/1/1966	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/29/1967	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	8/4/1967	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/24/1969	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/4/1970	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/29/1971	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	3/24/1975	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	2/18/1976	Thunderstorm Wind	54 kts.	0/0	$0
GUILFORD CO.	7/15/1976	Thunderstorm Wind	84 kts.	0/0	$0
GUILFORD CO.	8/14/1976	Thunderstorm Wind	60 kts.	0/0	$0
GUILFORD CO.	8/14/1976	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/4/1979	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	8/21/1979	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	8/1/1980	Thunderstorm Wind	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
GUILFORD CO.	8/15/1980	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/6/1981	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/28/1981	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/29/1982	Thunderstorm Wind	52 kts.	0/0	$0
GUILFORD CO.	3/6/1983	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/10/1984	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD CO.	7/26/1984	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/26/1984	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/3/1985	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/5/1985	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/5/1985	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/4/1985	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/4/1985	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/10/1985	Thunderstorm Wind	55 kts.	0/0	$0
GUILFORD CO.	10/15/1985	Thunderstorm Wind	52 kts.	0/0	$0
GUILFORD CO.	10/15/1985	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/28/1986	Thunderstorm Wind	52 kts.	0/0	$0
GUILFORD CO.	7/29/1986	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/29/1986	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	4/15/1987	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/1/1987	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	9/10/1987	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/10/1988	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/17/1988	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/23/1988	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD CO.	6/26/1988	Thunderstorm Wind	0 kts.	1/0	$0
GUILFORD CO.	7/10/1988	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/10/1988	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	4/26/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/5/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/5/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/6/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/6/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/6/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/23/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	6/16/1989	Thunderstorm Wind	0 kts.	1/0	$0
GUILFORD CO.	6/16/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/12/1989	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	2/10/1990	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	5/1/1990	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/1/1990	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	7/11/1990	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	8/29/1990	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	10/18/1990	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	4/9/1991	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	4/29/1991	Thunderstorm Wind	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
GUILFORD CO.	7/3/1991	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD CO.	7/3/1991	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	3/10/1992	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	3/10/1992	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	4/24/1992	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	8/11/1992	Thunderstorm Wind	0 kts.	0/0	$0
GUILFORD CO.	8/11/1992	Thunderstorm Wind	57 kts.	0/0	$0
GUILFORD CO.	11/22/1992	Thunderstorm Wind	0 kts.	0/0	$0
BROWNES SUMMIT	6/8/1995	Thunderstorm Wind	0 kts.	0/0	$0
JULIAN	10/27/1995	Thunderstorm Wind	0 kts.	0/0	$0
COUNTYWIDE	1/19/1996	Thunderstorm Wind	0 kts.	0/0	$0
CLIMAX	7/16/1997	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	2/16/1998	High Wind	45 kts.	0/0	$0
GREENSBORO ARPT	5/25/2000	Thunderstorm Wind	71 kts.	0/0	$0
GREENSBORO ARPT	9/14/2000	Thunderstorm Wind	52 kts.	0/0	$0
COLFAX	8/17/2003	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	3/7/2004	High Wind	50 kts.	0/0	$0
MONTICELLO	7/13/2005	Thunderstorm Wind	50 kts.	0/0	$0
CLIMAX	5/18/2006	Thunderstorm Wind	50 kts.	0/0	$0
MC LEANSVILLE	7/19/2006	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	4/16/2007	High Wind	54 kts.	0/0	$0
MC LEANSVILLE	6/27/2007	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	2/10/2008	Strong Wind	43 kts.	0/0	$6,049
GUILFORD	3/4/2008	Thunderstorm Wind	52 kts.	0/0	$0
DEEP RIVER	3/4/2008	Thunderstorm Wind	51 kts.	0/0	$0
HAMILTON LAKES	3/4/2008	Thunderstorm Wind	50 kts.	0/0	$0
(GSO)GREENSBORO RGNL	5/8/2008	Thunderstorm Wind	54 kts.	0/0	$0
MONTICELLO	5/8/2008	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO MAY ARPT	6/23/2008	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	1/7/2009	Strong Wind	39 kts.	0/0	$1,213
COLFAX	5/6/2009	Thunderstorm Wind	50 kts.	0/0	$0
RUDD	6/3/2009	Thunderstorm Wind	50 kts.	0/0	$0
HAMILTON LAKES	6/3/2009	Thunderstorm Wind	50 kts.	0/0	$0
DEEP RIVER	6/3/2009	Thunderstorm Wind	58 kts.	0/0	$0
GUILQUARRY	6/10/2009	Thunderstorm Wind	50 kts.	0/0	$0
CLIMAX	8/5/2009	Thunderstorm Wind	50 kts.	0/0	$0
BRIGHTWOOD	8/20/2009	Thunderstorm Wind	50 kts.	0/0	$0
BROWNS SUMMIT	9/28/2009	Thunderstorm Wind	50 kts.	0/0	$0
BROWNS SUMMIT	9/28/2009	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	11/11/2009	Strong Wind	35 kts.	0/0	$1,184
GUILFORD (ZONE)	12/9/2009	Strong Wind	40 kts.	0/0	$1,186
GUILFORD (ZONE)	2/10/2010	High Wind	50 kts.	0/0	$1,182
COLFAX	4/8/2010	Thunderstorm Wind	50 kts.	0/0	$0
POMONA	6/14/2010	Thunderstorm Wind	50 kts.	0/0	$1,175

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
PINECROFT	6/14/2010	Thunderstorm Wind	50 kts.	0/0	$0
SCALESVILLE	6/15/2010	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO MAY ARPT	6/15/2010	Thunderstorm Wind	50 kts.	0/0	$0
HAMILTON LAKES	6/16/2010	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD	7/13/2010	Thunderstorm Wind	50 kts.	0/0	$0
DEEP RIVER	7/16/2010	Thunderstorm Wind	50 kts.	0/0	$5,873
HILL TOP	8/5/2010	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO ARPT	8/11/2010	Thunderstorm Wind	50 kts.	0/0	$0
COLFAX	11/16/2010	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	2/25/2011	Strong Wind	44 kts.	0/0	$1,157,169
HILLSDALE	4/28/2011	Thunderstorm Wind	50 kts.	0/0	$0
BESSEMER	4/28/2011	Thunderstorm Wind	50 kts.	0/0	$0
MONTICELLO	4/28/2011	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	4/28/2011	Strong Wind	49 kts.	0/0	$1,139
GREENSBORO MAY ARPT	5/26/2011	Thunderstorm Wind	50 kts.	0/0	$0
MC LEANSVILLE	6/11/2011	Thunderstorm Wind	50 kts.	0/0	$0
HILLSDALE	6/18/2011	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO MAY ARPT	6/18/2011	Thunderstorm Wind	50 kts.	0/0	$0
BESSEMER	6/22/2011	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD CO.	6/28/2011	Thunderstorm Wind	50 kts.	0/0	$0
COLFAX	7/24/2011	Thunderstorm Wind	50 kts.	0/0	$0
GUILQUARRY	2/22/2012	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO MAY ARPT	2/22/2012	Thunderstorm Wind	50 kts.	0/0	$0
BATTLE GROUND	2/24/2012	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO ARHRBR AR	3/24/2012	Thunderstorm Wind	50 kts.	0/0	$0
TERRA COTTA	6/1/2012	Thunderstorm Wind	50 kts.	0/0	$16,740
BATTLE GROUND	6/22/2012	Thunderstorm Wind	50 kts.	0/0	$0
CLIMAX	7/20/2012	Thunderstorm Wind	50 kts.	0/0	$0
GBSNVLL MC LEAN ARPT	8/8/2015	Thunderstorm Wind	50 kts.	0/0	$0
BATTLE GROUND	9/2/2012	Thunderstorm Wind	50 kts.	0/0	$0
PINECROFT	9/2/2012	Thunderstorm Wind	50 kts.	0/0	$0
HILLSDALE	10/18/2012	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	1/30/2013	Strong Wind	40 kts.	0/0	$2,224
DEEP RIVER	1/30/2013	Thunderstorm Wind	50 kts.	0/0	$556
GROOMTOWN	4/19/2013	Thunderstorm Wind	50 kts.	0/0	$551
GUILFORD	6/10/2013	Thunderstorm Wind	50 kts.	0/0	$0
GUILQUARRY	6/13/2013	Thunderstorm Wind	50 kts.	0/1	$219,347
BATTLE GROUND	6/25/2013	Thunderstorm Wind	50 kts.	0/0	$0
SEDGEFIELD	6/28/2013	Thunderstorm Wind	50 kts.	0/0	$2,193
SEDGEFIELD	8/10/2013	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD CO.	9/1/2013	Thunderstorm Wind	50 kts.	0/0	$1,094

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
HAMILTON LAKES	2/21/2014	Thunderstorm Wind	50 kts.	0/0	$3,272
(GSO)GREENSBORO RGNL	3/12/2014	Thunderstorm Wind	53 kts.	0/0	$5,419
HAMILTON LAKES	6/10/2014	Thunderstorm Wind	50 kts.	0/0	$1,074
BRIGHTWOOD	6/16/2014	Thunderstorm Wind	50 kts.	0/0	$0
GUILQUARRY	6/19/2014	Thunderstorm Wind	50 kts.	0/0	$0
BATTLE GROUND	9/16/2014	Thunderstorm Wind	50 kts.	0/0	$0
HILLSDALE	4/20/2015	Thunderstorm Wind	50 kts.	0/0	$0
DEEP RIVER	6/30/2015	Thunderstorm Wind	52 kts.	0/0	$26,829
MC LEANSVILLE	6/30/2015	Thunderstorm Wind	50 kts.	0/0	$0
(GSO)GREENSBORO RGNL	7/13/2015	Thunderstorm Wind	64 kts.	0/0	$0
SEDGEFIELD	8/5/2015	Thunderstorm Wind	50 kts.	0/0	$0
VANDALIA	8/5/2015	Thunderstorm Wind	50 kts.	0/0	$0
GREENSBORO MAY ARPT	8/5/2015	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	10/2/2015	Strong Wind	35 kts.	0/0	$538
GUILFORD (ZONE)	10/2/2015	Strong Wind	35 kts.	0/0	$538
GUILFORD (ZONE)	10/2/2015	Strong Wind	35 kts.	0/0	$538
GUILFORD (ZONE)	10/3/2015	Strong Wind	35 kts.	0/0	$538
SEDGEFIELD	2/24/2016	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	4/9/2016	Strong Wind	41 kts.	0/0	$21,407
GUILFORD	5/2/2016	Thunderstorm Wind	50 kts.	0/0	$5,330
BATTLE GROUND	5/2/2016	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD	5/2/2016	Thunderstorm Wind	50 kts.	0/0	$26,651
GREENSBORO MAY ARPT	5/12/2016	Thunderstorm Wind	50 kts.	0/0	$1,066
OSCEOLA	6/24/2016	Thunderstorm Wind	50 kts.	0/0	$531
BATTLE GROUND	7/8/2016	Thunderstorm Wind	50 kts.	0/0	$0
COLFAX	7/8/2016	Thunderstorm Wind	50 kts.	0/0	$0
GUILQUARRY	7/27/2016	Thunderstorm Wind	50 kts.	0/0	$5,321
COLFAX	7/27/2016	Thunderstorm Wind	50 kts.	0/0	$0
FOUR MILE	8/27/2016	Thunderstorm Wind	50 kts.	0/0	$2,658
VANDALIA	8/27/2016	Thunderstorm Wind	50 kts.	0/0	$0
GUILFORD (ZONE)	10/8/2016	Strong Wind	30 kts.	0/0	$105,942
BATTLE GROUND	5/5/2017	Thunderstorm Wind	50 kts.	0/0	$10,464
MONTICELLO	5/5/2017	Thunderstorm Wind	50 kts.	0/0	$10,464
BROWNS SUMMIT	5/5/2017	Thunderstorm Wind	50 kts.	0/0	$104,641
TERRA COTTA	5/5/2017	Thunderstorm Wind	50 kts.	0/0	$0
HILLSDALE	5/5/2017	Thunderstorm Wind	50 kts.	0/0	$10,464
OSCEOLA	5/31/2017	Thunderstorm Wind	50 kts.	0/0	$2,093
GUILQUARRY	6/13/2017	Thunderstorm Wind	50 kts.	0/0	$10,455
GUILFORD	6/13/2017	Thunderstorm Wind	50 kts.	0/0	$3,136
BATTLE GROUND	6/14/2017	Thunderstorm Wind	50 kts.	0/0	$5,227
ALLEN JAY	6/18/2017	Thunderstorm Wind	50 kts.	0/0	$523
PINECROFT	6/18/2017	Thunderstorm Wind	50 kts.	0/0	$0
MC LEANSVILLE	7/13/2017	Thunderstorm Wind	50 kts.	0/0	$5,231

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
HILL TOP	7/23/2017	Thunderstorm Wind	50 kts.	0/0	$5,231
GUILFORD (ZONE)	1/23/2018	Strong Wind	35 kts.	0/0	$10,332
GUILFORD (ZONE)	3/2/2018	Strong Wind	35 kts.	0/0	$20,524
GUILFORD (ZONE)	3/2/2018	Strong Wind	35 kts.	0/0	$8,210
BESSEMER	7/6/2018	Thunderstorm Wind	50 kts.	0/0	$0
MONTICELLO	7/22/2018	Thunderstorm Wind	50 kts.	0/0	$2,541
MC LEANSVILLE	8/7/2018	Thunderstorm Wind	50 kts.	0/0	$0
BROADVIEW	9/1/2018	Thunderstorm Wind	50 kts.	0/0	$1,522

*Property damage is reported in 2019 dollars; All damage may not have been reported.
Source: National Centers for Environmental Information

Lightning

According to the National Centers for Environmental Information, there have been a total of nine recorded lightning events in Guilford County since 1996, as listed in summary **Table 5.35**.[23] These events resulted in over $2.6 million (2019 dollars) in damages.[24] Detailed information on historical lightning events can be found in **Table 5.36**.

It is certain that more than nine events have occurred within the county. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE 5.35: SUMMARY OF LIGHTNING OCCURRENCES IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
Gibsonville	0	0/0	$0	$0
Greensboro	1	0/0	$315,102	$18,535
High Point	1	0/0	$9,954	$586
Jamestown	0	0/0	$0	$0
Oak Ridge	2	0/0	$7,118	$324
Pleasant Garden	0	0/0	$0	$0
Sedalia	0	0/0	$0	$0
Stokesdale	0	0/0	$0	$0
Summerfield	0	0/0	$0	$0
Whitsett	0	0/0	$0	$0
Unincorporated Area	5	0/0	$2,325,236	$136,779

[23] These lightning events are only inclusive of those reported by the National Centers for Environmental Information (NCEI) from 1997 through March 2019. It is certain that additional lightning events have occurred in Guilford County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.
[24] Adjusted dollar values were calculated based on the Consumer Price Index for All Urban Consumers (CPI-U) U.S. city average series for all items, not seasonally adjusted. This data represents changes in the prices of all goods and services purchased for consumption by urban households. This monthly index value has been calculated every year since 1913. The 2019 dollar values were calculated based on buying power in May 2019.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
GUILFORD COUNTY TOTAL	**9**	**0/0**	**$2,657,410**	**$156,223**

Source: National Centers for Environmental Information

TABLE 5.36: HISTORICAL LIGHTNING OCCURRENCES IN GUILFORD COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Gibsonville				
None Reported	--	--	--	--
Greensboro				
GREENSBORO	3/26/2002	0/0	$315,102	Lightning started a fire that destroyed the third floor of a home.
High Point				
HIGH POINT	7/1/2002	0/0	$9,954	A lightning strike caused minor damage to a public library.
Jamestown				
None Reported	--	--	--	--
Oak Ridge				
OAK RIDGE	7/28/1997	0/0	$0	LIGHTNING HIT A HOME IN OAK RIDGE. NO DAMAGE DETAILS WERE AVAILABLE.
OAK RIDGE	6/26/2002	0/0	$7,118	At least four house fires were started by lightning strikes in the Oak Ridge area.
Pleasant Garden				
None Reported	--	--	--	--
Sedalia				
None Reported	--	--	--	--
Stokesdale				
None Reported	--	--	--	--
Summerfield				
None Reported	--	--	--	--
Whitsett				
None Reported	--	--	--	--
Unincorporated Area				
SEDGEFIELD	5/1/2002	0/0	$427,295	A lightning strike started a fire that severely damaged a historic home.

	Date	Deaths / Injuries	Property Damage*	Details
HAMILTON LAKES	6/12/2010	0/0	$1,762,384	Lightning struck a large fuel tank at the Colonial Pipeline gasoline tank farm resulting in a large fire destroying the tank and resulting in the closure of Interstate 40 for four hours. The tank contained 840,000 gallons of gasoline at the time of the fire.
(GSO)GREENSBORO RGNL	6/16/2010	0/0	$117,492	Lightning struck the runway at the Piedmont Triad International Airport creating a hole two feet wide and 18 inches deep in the runway.
DEEP RIVER	8/11/2010	0/0	$17,596	A home on Windstream Court in High Point sustained roof damage due to a lightning strike. The damages were estimated.
BESSEMER	8/11/2010	0/0	$469	A lightning strike damaged an outbuilding at 3865 Arbor Drive in Greensboro. The damage was estimated at $300 and the content loss was $100.

*Property Damage is reported in 2019 dollars; all damage may not have been reported.
Source: National Centers for Environmental Information

5.12.4 Probability of Future Occurrences

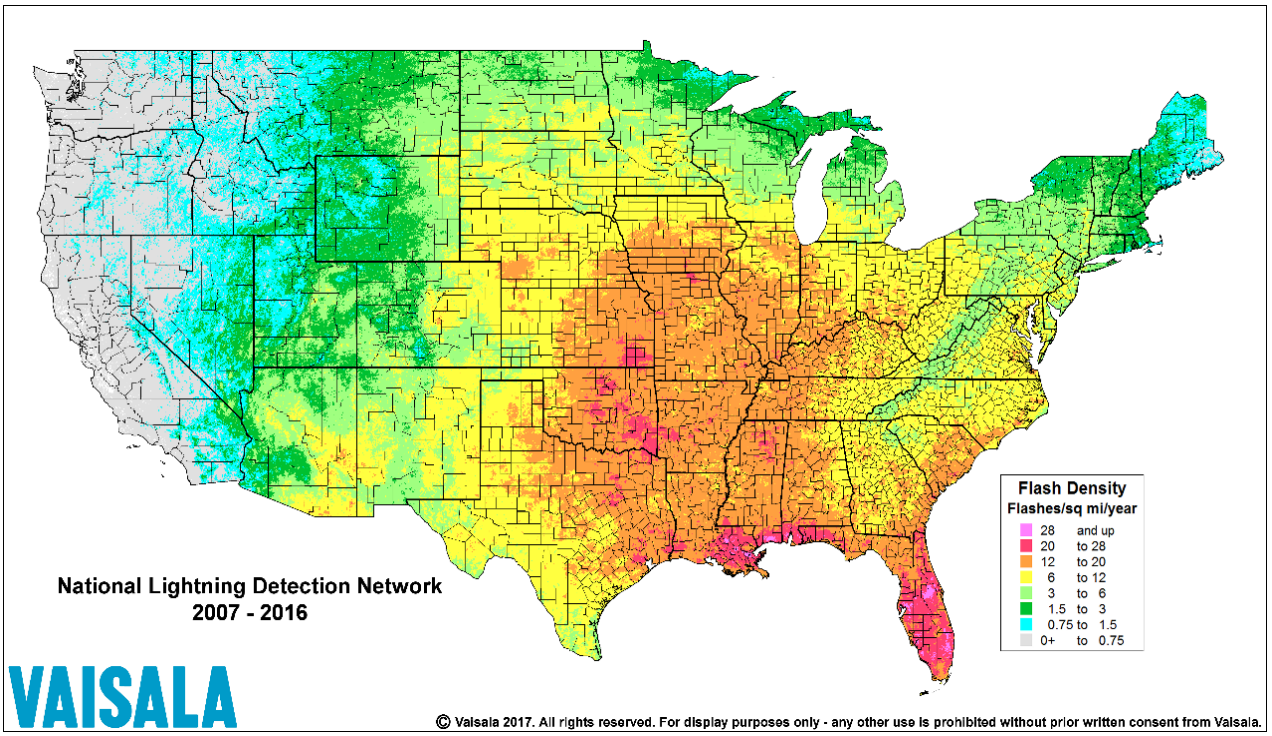
Wind

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county. Additionally, according to the *Piedmont Together Climate Adaptation Report*, storm wind speeds are estimated to increase at a proportional rate of 1-8 percent based upon rising global ocean temperatures.

Lightning

Although there was not a high number of historical lightning events reported throughout Guilford County via NCEI data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. **Figure 5.42** shows the lightning flash density map for the years 2007-2016 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®). Guilford County is located in an area of the country that experienced an average of 6 to 12 lightning flashes per square mile per year between 2007 and 2016.

FIGURE 5.42: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala United States National Lightning Detection Network

Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

5.12.5 Consequence Analysis

People (The Public and Public Confidence)

Wind

Thunderstorms are generally associated with several other hazards such as high wind and flooding, the latter of which is caused by torrential rain. As such, the public could be impacted in a number of ways by a thunderstorm event. High wind can cause trees to fall and potentially result in injuries or death and rising floodwaters can lead to drowning or other serious injury. Although often not as severe as hurricanes or tornadoes, the impacts on the public from thunderstorms can be significant. However, the public confidence is usually not affected to a large degree as a result of thunderstorms.

Lightning

Although relatively rare when compared to other hazards, the impacts of lightning on people can be severe, resulting in death or severe injury if a person is struck. Fatalities and injuries from lightning events most often occur when a person is exposed and in outdoor conditions during a thunderstorm. Exposure to water and open areas also increases the likelihood that a person will be struck. Lightning generally has a low probability of impacting public confidence.

Responders

Wind

Responders are not generally affected to any great degree by thunderstorm events, although it should be noted that they could be impacted in many of the same ways as the public. Otherwise, responders could be affected by road blockages caused by downed trees or floodwaters, which would ultimately increase their response time.

Lightning

Although responders are generally aware of the effects of lightning and take precautions to avoid being impacted by a lightning strike, it is possible that they could be struck. Moreover, taking the necessary precautions to avoid a lightning strike can often increase response times as staying inside and away from lightning is the best way to avoid injury from the hazard.

Continuity of Operations

Wind

In general, continuity of operations during a thunderstorm event can be maintained. Thunderstorm events often affect power in much the same way as tornadoes and hurricanes, which ultimately may impact operations. However, thunderstorm events are typically not large enough and their impacts are not wide enough to disrupt continuity of operations in Guilford County.

Lightning

Most critical facilities and infrastructure are protected against lightning via surge protectors and lightning rods. However, if lightning were to shut down large parts of the power grid due to blowing a transformer, operations would be detrimentally impacted. In general, however, continuity of operations during a lightning event would not be affected.

Built Environment (Property, Facilities, and Infrastructure)

Wind

Thunderstorms often have their greatest impact on the built environment as they can cause damage to homes via strong winds or flooding and will often impact facilities and infrastructure in the same way. Power losses often occur due to damage to power lines and roads can flood and cause damage as well. In fact, thunderstorms are often considered one of the greater hazards of concern even though any given event will cause relatively little damage, because damaging events occur so frequently.

Lightning

Lightning generally does not have a major impact on property, facilities, or infrastructure. However, it has been known to affect power and energy sources through strikes which can shut down power for hours and sometimes days. Lightning is also responsible for igniting fires that can result in widespread damage to property.

Economy

Wind

Economic impacts from thunderstorm events can often be far reaching as the damage from these events are often widespread, affecting both homes and businesses. This damage can result in business and economic disruption through the recovery process.

Lightning
Since lightning events generally pass through the area quickly and cause relatively little property damage when compared to other hazards, effects on the economy will likely be minimal. Nevertheless, if power-related infrastructure is damaged, this could cause some economic strain to replace and get the system back to full capacity.

Environment
Wind
Thunderstorms can impact crops via high wind and flooding and can also impact the natural environment through these elements. Flooding can kill plants and animals as well as contaminate drinking water supplies for human populations. High wind can harm forests by bringing down trees and cause fires from downed power lines that impact the environment.

Lightning
The environmental effects of lightning are relatively minimal, although lightning has been known to cause wildfires which can lead to widespread damage. For more details on these impacts, please see this section of the wildfire hazard.

5.13 TORNADO

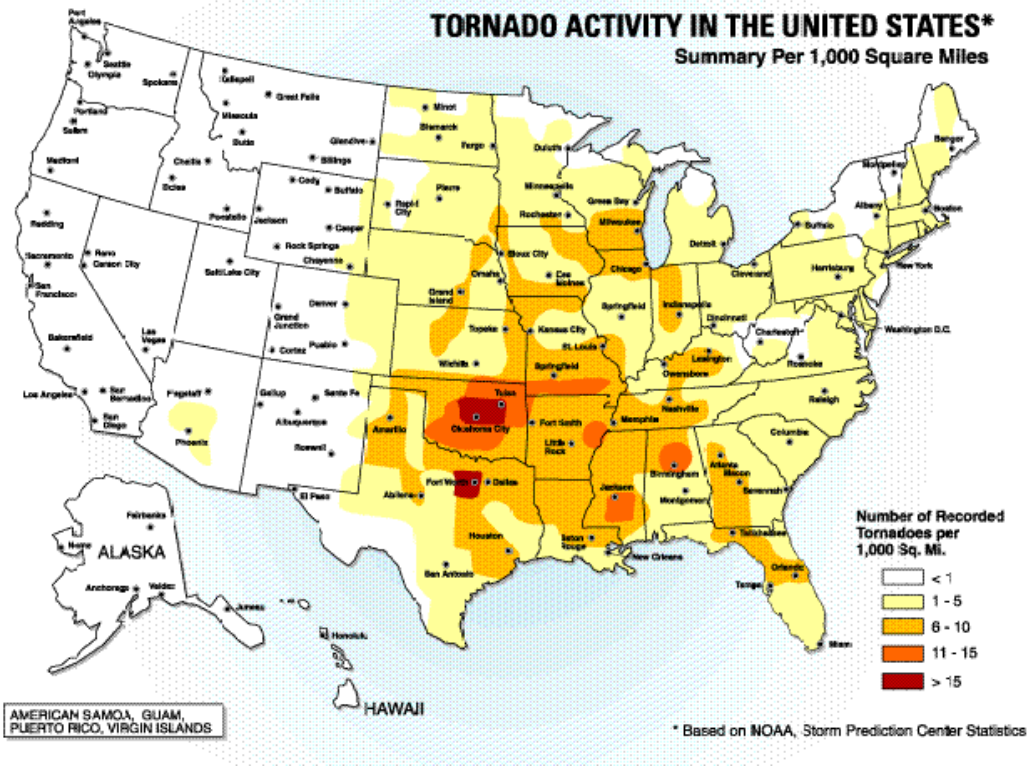
5.13.1 Background

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.[25] According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas, and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of "tornado alley"), many other states experience severe and frequent tornadoes as well. **Figure 5.43** shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

[25] NOAA, 2009.

FIGURE 5.43: TORNADO ACTIVITY IN THE UNITED STATES



Source: Federal Emergency Management Agency

Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (**Table 5.37**). Tornado magnitudes that occurred in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.38**).

TABLE 5.37: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

F-SCALE NUMBER	INTENSITY	WIND SPEED	TYPE OF DAMAGE DONE
F0	GALE TORNADO	40–72 MPH	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE TORNADO	73–112 MPH	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT TORNADO	113–157 MPH	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE TORNADO	158–206 MPH	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING TORNADO	207–260 MPH	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE TORNADO	261–318 MPH	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	INCONCEIVABLE TORNADO	319–379 MPH	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Source: National Weather Service

TABLE 5.38: THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

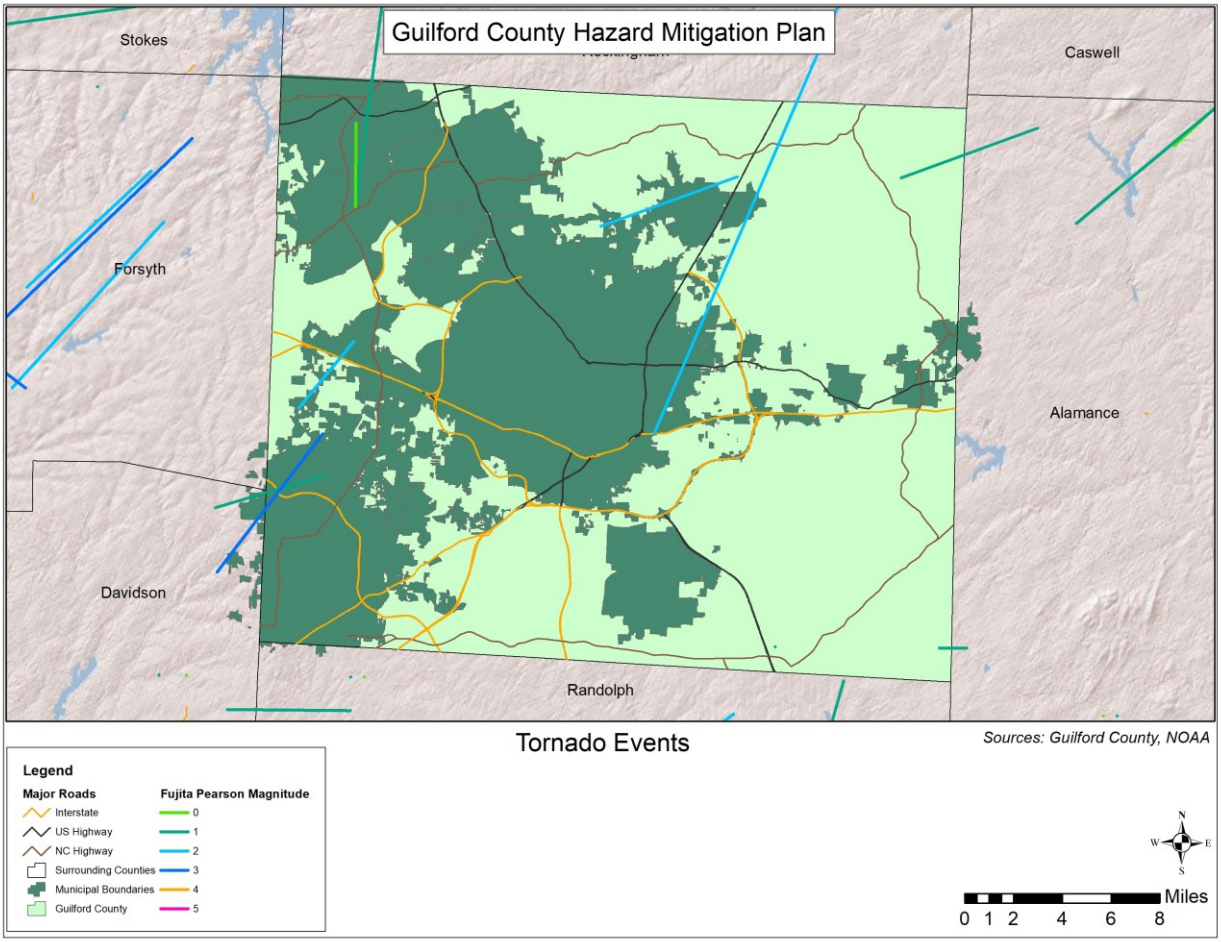
EF-SCALE NUMBER	INTENSITY PHRASE	3 SECOND GUST (MPH)	TYPE OF DAMAGE DONE
EF0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	MODERATE	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

5.13.2 Location and Spatial Extent

Tornadoes occur throughout the State of North Carolina, and thus in Guilford County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random, and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Guilford County is uniformly exposed to this hazard. With that in mind, **Figure 5.44** shows tornado track data for many of the major tornado events that have impacted the county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE 5.44: HISTORICAL TORNADO TRACKS IN GUILFORD COUNTY



Source: National Centers for Environmental Information

5.13.3 Historical Occurrences

Tornadoes were responsible for two disaster declarations in Guilford County in 1989 and 2018.[26] According to the National Centers for Environmental Information, there have been a total of 15 recorded tornado events in Guilford County since 1950 (**Table 5.39**), resulting in $87.9 million (2019 dollars) in property damages.[27] [28] In addition, one death and five injuries were reported (**Table 5.40)**. The magnitude of these tornadoes ranges from EF0 to EF3 in intensity, although an EF4 or EF5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that at least some occurrences have gone unreported.

[26] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[27] These tornado events are only inclusive of those reported by the National Centers for Environmental Information (NCEI) from 1950 through March 2019. It is likely that additional tornadoes have occurred in Guilford County. As additional local data becomes available, this hazard profile will be amended.
[28] Adjusted dollar values were calculated based on the Consumer Price Index for All Urban Consumers (CPI-U) U.S. city average series for all items, not seasonally adjusted. This data represents changes in the prices of all goods and services purchased for consumption by urban households. This monthly index value has been calculated every year since 1913. The 2019 dollar values were calculated based on buying power in May 2019.

TABLE 5.39: SUMMARY OF TORNADO OCCURRENCES IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
Gibsonville	0	0/0	$0	$0
Greensboro	1	0/0	$66,438,818	$66,438,818
High Point	1	0/0	$11,767,257	$1,307,473
Jamestown	0	0/0	$0	$0
Oak Ridge	2	0/0	$0	$0
Pleasant Garden	0	0/0	$0	$0
Sedalia	0	0/0	$0	$0
Stokesdale	1	0/0	$0	$0
Summerfield	0	0/0	$0	$0
Whitsett	0	0/0	$0	$0
Unincorporated Area	10	1/5	$9,676,555	$148,870
GUILFORD COUNTY TOTAL	**15**	**1/5**	**$87,882,630**	**$67,895,161**

Source: National Centers for Environmental Information

TABLE 5.40: HISTORICAL TORNADO OCCURRENCES IN GUILFORD COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Gibsonville					
None Reported	--	--	--	--	--
Greensboro					
GREENSBORO	4/15/2018	EF2	0/0	$66,438,818	The tornado initially touched down on the north side of I-40 near where Willow Road crosses I-40. Damage at this point consisted of snapped trees and was consistent with 90 mph wind speeds, or EF-1 on the Enhanced Fujita Scale. The tornado remained on the ground as it traveled north toward Peeler Elementary School. Numerous homes in this area were damaged along with substantial tree damage. The tornado wind speeds at this location were estimated to be approximately 100 mph. The tornado continued traveling north and reached a peak intensity and maximum path width in the Hampton Community and near Hampton Elementary School. At this school a large portion of the roof was blown off and three adjacent portable classroom buildings (manufactured buildings) were completely destroyed and leveled. The damage to the main school building was consistent with wind speeds around 110 mph (DI 15/DOD 6), while the damage to the adjacent portable units was

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					consistent with wind speeds of 135 mph (DI 4/DOD 12), which is a high-end EF2 on the Enhanced Fujita Scale. It is worth noting that the neighborhoods adjacent to this school experienced a wide and substantial path of devastation which included snapped and uprooted trees, snapped power poles, homes that were pushed off of their foundation, numerous homes that lost most or all of their roof cover, and several homes with exterior walls blown out. The survey found the width of the tornado, and particularly the width of the EF1 and EF2 wind speeds, contributed to a particularly wide path of destruction. The tornado then continued north-northeast and mostly remained on the ground all the way to the Guilford/Rockingham County line. Along the way, the damage consisted mostly of snapped and uprooted trees, and roof and siding damage to several additional homes. The tornado appeared to produce minor tree damage (with wind speeds 80 mph or less) just before crossing into Rockingham County. Finally, the aforementioned path length (16 miles) consists of just the Guilford County path. The tornado continued into Rockingham County, and remained on the ground for an additional 17.6 miles.
High Point					
HIGH POINT	3/28/2010	EF3	0/0	$11,767,257	The tornado initially touched down as an EF1 with winds around 100 mph near Old Plank Road in southwest Guilford County. It was in this area where the Apple Tree Academy sustained significant damage and two vehicles including a small bus were rolled 50 yards across the street. From this point the tornado continued northeast across Highway 311. The next area to experience damage was just north of Highway 311 and south of Old Mill Road along Langdale, Imperial and Impala Drives. Tornado damage in this area continued to indicate EF1 winds with numerous trees down along with a number of home with roof and siding

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					damage. The tornado intensified to an EF2 as it crossed Old Mill Road towards Johnson Street. The EF2 tornado severely damaged numerous homes along Brandon Drive. In one instance, an entire bedroom was blown off a single story home. Three individuals who were taking shelter in a bedroom closet were carried 50 feet and were buried under the debris. One individual experienced several broken bones but overall injuries were not serious. The remainder of the house was shifted off the foundation approximately 8 inches. EF2 tornado damage continued north of Old Mill Road to Skeet Club Road along either side of Johnson Road with winds around 130 mph for most of its duration but briefly reached EF3 intensity with winds of 138 mph near Hampton Park Drive at 1278 Silverstone Court where the upper level of a two story home was blown off. Fifty to sixty homes along Hampton Park Drive, Scarlet Drive, Ruskin Drive and Johnson Road were severely damaged. The tornado crossed Johnson Road as an EF2 crossing Elmwood Avenue, Oakforest Drive and Maplewood Avenue. Nearly every home in this highly urbanized area experienced minor to moderate damage. The upper floor of a two story home on Elmwood Avenue was blown off. The tornado weakened to an EF1 as it crossed Maplewood Avenue and Wellingham Lane, where numerous homes experienced roof and siding damage. The tornado finally lifted off the ground north of Kendale Road. In total 603 single family homes were damaged with 21 homes being completely destroyed. Thirty-one multifamily homes were damaged with 16 reported destroyed. Finally, eleven businesses sustained damage, with 3 businesses completely destroyed.
Jamestown					
None Reported	--	--	--	--	--
Oak Ridge					
OAK RIDGE	7/7/2005	F0	0/0	$0	A tornado blew down trees from Oak

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					Ridge to Stokesdale.
OAK RIDGE	9/14/2007	Funnel Cloud	0/0	$0	A funnel cloud was reported by the public at Highway 150 and Union Grove Road near Oak Ridge.
Pleasant Garden					
None Reported	--	--	--	--	--
Sedalia					
None Reported	--	--	--	--	--
Stokesdale					
STOKESDALE	9/17/2004	F1	0/0	$0	A tornado touched down near the intersection of Harrell Road and Lee's Glen Road. Three garages lost their roofs and numerous trees were snapped or uprooted. The tornado then tracked north across Meadows Drive and Haw Meadows Drive where falling trees caused significant damage to at least three well-built homes, one of which was a total loss. The tornado continued north to Prince Edward road where about 70 percent of the trees in a heavily wooded area were snapped or downed. Along Kelly Court, a garage was destroyed. At South Point Drive, the roof was blown off a house resulting in major structural damage. Other houses lost shingles, siding and porches. The tornado then continued across the county line into Rockingham County. In Guilford County, three houses suffered total losses, nine homes sustained major damage, and 52 sustained minor damage.
Summerfield					
None Reported	--	--	--	--	--
Whitsett					
None Reported	--	--	--	--	--
Unincorporated Area					
GUILFORD CO.	6/16/1954	F2	0/1	$23,800	--
GUILFORD CO.	4/5/1957	F1	0/1	$2,294,731	--
GUILFORD CO.	9/29/1959	F1	0/0	$218,509	--
GUILFORD CO.	6/12/1962	F1	0/0	$21,200	Small tornado near McLeansville. Funnel moved northeastward, remaining just above ground level and making a noise like a diesel locomotive. Trees broken off above ground, roofs damaged. No evidence of high winds outside immediate path of storm.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
GUILFORD CO.	4/17/1967	F1	0/0	$193,423	Storm moved southwest-northeast across field near Whitsett. Porch ripped off a home, several outbuildings demolished. Apple orchard severely damaged. Hail and heavy rain with storm. Meteorologist visited scene, reported damage apparently caused by tornado moving on a skipping path.
GUILFORD CO.	5/14/1967	F1	0/0	$1,928,404	--
GUILFORD CO.	10/8/1976	F1	0/0	$110,575	A tornado skipped along near Vickery Chapel Road off Highway I-85 near Greensboro. A trailer truck was damaged, trees, and some homes. Damage about $15,000.
GREENSBORO ARPT	5/7/1998	F1	0/0	$157,305	A tornado touched down approximately 1 mile southeast of the Piedmont-Triad International Airport near Greensboro. The first damage occurred just south of West Friendly Avenue. The tornado moved to the southeast and lifted at Jamestown Road approximately 1.5 miles from its initial touchdown. Damage was rated at F1 initially and F0 at the point it rose back into the thunderstorm. This tornado was produced by the same parent storm that produced the Clemmons tornado less than an hour before this one.
CLIMAX	5/7/1998	F1	0/0	$0	A tornado touched down in extreme southeast Guilford county and tracked to the southeast for approximately 2.5 miles. It moved into extreme northeast Randolph county before lifting about 2 miles north of Liberty. The tornado produced F1 damage. The exact path stretched from Lake Juno Road to Liberty Grove Road.
DEEP RIVER	5/8/2008	EF2	1/3	$4,728,609	The tornado, originally an EF-0, initially touched down just north of Squire Davis Park near the intersection of Sandy Ridge Road and Johnson Street. From there the tornado tracked northeast and intensified to EF-1 intensity as it approached the Farmers Market and Interstate 40. The tornado overturned several cars and tractor trailers as it crossed Interstate 40. A roof was blown off of an office building just north of the interstate

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					as the tornado continued to intensify. As the tornado moved further northeast into an industrial complex, it further strengthened to EF-2 with winds estimated around 130 mph based on damage to warehouses. Numerous warehouses along Little Santee Road, Capital Drive, and West Market Street sustained significant damage. Numerous vehicles and tractor trailers were also overturned in the industrial complex. At its widest point, the tornado was just over 200 yards wide. The tornado quickly lifted off of the ground after crossing West Market Street near the post office. The tornado was on the ground for about four miles. One fatality occurred along West Market Street next to the Lamination Service Building located at 8717 West Market Street. The fatality occurred as a 51 year old man slept in the rig of his tractor trailer. Three other injuries were reported, two of which occurred in automobiles and another in the I.H. Caffey Warehouse Distribution Center.

*Property damage is reported in 2019 dollars; All damage may not have been reported.
Source: National Centers for Environmental Information

5.13.4 Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. However, given the county's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Guilford County experience a direct tornado strike. The probability of future tornado occurrences affecting Guilford County is likely (10 to 100 percent annual probability).

5.13.5 Consequence Analysis

People (The Public and Public Confidence)

The entire Guilford County population is vulnerable to the impacts of a tornado regardless of the measured magnitude. Because it cannot be predicted where a tornado will touch down, it cannot be said which areas of the population within the county are most vulnerable. However, injuries as well as deaths resulting from tornadoes are the most significant impacts. Tornadoes often have a high likelihood of affecting public confidence due to their destructive and highly visible impacts.

Responders

Responders could be critically affected by tornado events as the onset is often very rapid and unpredictable, thereby putting response personnel potentially in harm's way. Due to the unpredictability of such events, response may also be hindered as responders may be unable to access those that have been affected if storm conditions persist and they are unable to safely enter affected areas.

Continuity of Operations

Continuity of operations could be greatly impacted by a tornado as personnel may be harmed and critical resources damaged or destroyed during a tornado. In many ways, since the impacts of a tornado are unpredictable, it is also difficult to predict and plan for the appropriate ways to ensure a continuity of operations. Although Guilford County is well prepared for such an event, disruption of operations will likely take place to some degree.

Built Environment (Property, Facilities, and Infrastructure)

Building Inventory

According to the NCEI, North Carolina has been impacted by tornadoes ranging in intensity from F0/EF0 to F4/EF4 based on the Fujita scale. An F5/EF5 has never been experienced, but it is certainly possible. Because it cannot be predicted where a tornado may touch down, all buildings, facilities, and infrastructure within Guilford County are considered exposed to the hazard and at risk for being impacted. Older buildings that are constructed with less-advanced building techniques are at higher risk, as are mobile homes.

Building materials play a role in how well a structure can withstand tornado force winds. Buildings that use structural steel, reinforced concrete, or load-bearing masonry have the best change of withstanding a tornado event. Homes constructed of wood or manufactured material are most at risk. Non-engineered structures are far more vulnerable than engineered buildings to damage from tornado winds. It is also notable that materials that are well-tied to all other building components are also more likely to survive extreme wind events.[29] The magnitude of the tornado will determine the extent of damage and impacts that are felt throughout the county. These impacts can include structural failure, debris damage, and loss of facility functionality.

Critical Infrastructure

The state's infrastructure system is also vulnerable to the impacts of a tornado. This includes critical infrastructure such as roads, railroads, bridges, utilities (power and gas), and pipelines. Any number of these infrastructure systems could be damaged in the event of a tornado, although often power lines are the most common assets that are affected during a tornado. Impacts could include structural damage, impassable or blocked roadways, failed utility lines, railway failure, and impassable bridges.

Economy

A tornado can impact any area of Guilford County at any time and bring with it significant property damage costs to individual citizens and the disrupt the regular functioning of the local economy. After past events, there has been a substantial halt to many economic activities and losses to businesses have

[29] Federal Emergency Management Agency. *Tornado Protection: Selecting Refuge Areas in Buildings. FEMA P-431, Second Edition, October 2009.* Retrieved August 21, 2017 from: https://www.fema.gov/media-library-data/20130726-1456-20490-4099/fema_p_431.pdf

often been high. The loss of power can also interrupt local economies and have a strong negative impact on daily functioning of business activities.

Environment

Downed trees and other forms of vegetation are often one of the most visible impacts to the environment from a tornado. Additionally, building material or other debris can be carried or thrown great distances by the force of wind and end up spread out in unexpected places such as natural areas. Coordinated statewide cleanup efforts after a tornado can include removal of debris, but much debris ends up remaining in local habitats. Finally, if hazardous materials facilities are impacted by the tornado, these may release dangerous chemicals into the environment that can cause long-term harm.

5.14 WINTER STORM

5.14.1 Background

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings. All winter storm events have the potential to present dangerous conditions to the affected area.

Snow Storms

Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 of more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least 3 hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice Storms

Ice storms, which are much more common in Guilford County than snow storms, are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces.

All of the winter storm elements – snow, sleet, ice, etc. – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and tree limbs and create hazardous driving conditions. Furthermore, communication and power may be disrupted for days.

5.14.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Guilford County is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

5.14.3 Historical Occurrences

Winter weather has resulted in six disaster declarations in Guilford County. This includes the Blizzard of 1996, one subsequent 1996 winter storm, a severe winter storm in 2000, ice storms in 2002 and 2003, and a severe ice storm in 2014.[30] The National Centers for Environmental Information does not report winter storm events at the municipal level, however, there have been a total of 69 recorded winter storm events in Guilford County since 1996 (**Table 5.41**).[31] These events resulted in over $9.4 million (2019 dollars) in damages.[32] Detailed information on the recorded winter storm events can be found in **Table 5.42**.

TABLE 5.41: SUMMARY OF WINTER STORM EVENTS IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2019)	Annualized Property Loss
Guilford County	69	0/0	$9,407,685	$409,030

Source: National Centers for Environmental Information

TABLE 5.42: HISTORICAL WINTER STORM EVENTS IN GUILFORD COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Guilford County				
GUILFORD (ZONE)	1/6/1996	Heavy Snow	0/0	$0
GUILFORD (ZONE)	1/11/1996	Ice Storm	0/0	$0
GUILFORD (ZONE)	2/2/1996	Ice Storm	0/0	$0
GUILFORD (ZONE)	2/16/1996	Heavy Snow	0/0	$0
GUILFORD (ZONE)	1/8/1997	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/13/1997	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/29/1997	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/23/1998	Ice Storm	0/0	$0
GUILFORD (ZONE)	1/2/1999	Ice Storm	0/0	$0
GUILFORD (ZONE)	1/18/2000	Winter Storm	0/0	$0

[30] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[31] These ice and winter storm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI) from 1996 through March 2019. It is likely that additional winter storm conditions have affected Guilford County.
[32] Adjusted dollar values were calculated based on the Consumer Price Index for All Urban Consumers (CPI-U) U.S. city average series for all items, not seasonally adjusted. This data represents changes in the prices of all goods and services purchased for consumption by urban households. This monthly index value has been calculated every year since 1913. The 2019 dollar values were calculated based on buying power in May 2019.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
GUILFORD (ZONE)	1/20/2000	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/22/2000	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/24/2000	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/28/2000	Winter Storm	0/0	$0
GUILFORD (ZONE)	11/19/2000	Heavy Snow	0/0	$0
GUILFORD (ZONE)	2/12/2001	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/3/2002	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/6/2002	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/4/2002	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/16/2003	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/27/2003	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/13/2003	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/26/2004	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/15/2004	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/26/2004	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/30/2005	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/15/2005	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/18/2007	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/21/2007	Winter Weather	0/0	$0
GUILFORD (ZONE)	12/7/2007	Winter Weather	0/0	$24,386
GUILFORD (ZONE)	1/17/2008	Winter Weather	0/0	$0
GUILFORD (ZONE)	2/13/2008	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/22/2009	Winter Weather	0/0	$0
GUILFORD (ZONE)	2/3/2009	Winter Weather	0/0	$0
GUILFORD (ZONE)	3/1/2009	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/18/2009	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/30/2009	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/29/2010	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/5/2010	Winter Storm	0/0	$59,078
GUILFORD (ZONE)	2/12/2010	Winter Weather	0/0	$0
GUILFORD (ZONE)	3/2/2010	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/4/2010	Winter Weather	0/0	$0
GUILFORD (ZONE)	12/16/2010	Winter Weather	0/0	$0
GUILFORD (ZONE)	12/25/2010	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/10/2011	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/17/2013	Winter Storm	0/0	$0
GUILFORD (ZONE)	11/26/2013	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/21/2014	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/28/2014	Winter Weather	0/0	$0
GUILFORD (ZONE)	2/12/2014	Winter Storm	0/0	$0
GUILFORD (ZONE)	3/3/2014	Winter Weather	0/0	$0
GUILFORD (ZONE)	3/6/2014	Winter Storm	0/0	$0
GUILFORD (ZONE)	3/6/2014	Ice Storm	0/0	$8,778,699
GUILFORD (ZONE)	3/17/2014	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/13/2015	Winter Weather	0/0	$0
GUILFORD (ZONE)	2/16/2015	Winter Storm	0/0	$0

	Date	Type of Storm	Deaths / Injuries	Property Damage*
GUILFORD (ZONE)	2/24/2015	Winter Weather	0/0	$0
GUILFORD (ZONE)	2/25/2015	Winter Storm	0/0	$545,522
GUILFORD (ZONE)	3/1/2015	Winter Weather	0/0	$0
GUILFORD (ZONE)	1/22/2016	Winter Storm	0/0	$0
GUILFORD (ZONE)	2/14/2016	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/6/2017	Winter Storm	0/0	$0
GUILFORD (ZONE)	12/8/2017	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/17/2018	Winter Storm	0/0	$0
GUILFORD (ZONE)	3/12/2018	Winter Storm	0/0	$0
GUILFORD (ZONE)	3/21/2018	Winter Weather	0/0	$0
GUILFORD (ZONE)	3/24/2018	Winter Weather	0/0	$0
GUILFORD (ZONE)	12/9/2018	Winter Storm	0/0	$0
GUILFORD (ZONE)	1/12/2019	Winter Storm	0/0	$0

*Property damage is reported in 2019 dollars; All damage may not have been reported.
Source: National Centers for Environmental Information

There have been several severe winter weather events in Guilford County. The text below describes two of the major events (one snow and one ice event) and associated impacts. Similar impacts can be expected with most severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

2014 Ice Storm – March 7, 2014
A significant ice storm impacted the region with between a tenth and a half of an inch of ice accumulation across the county along with between a trace and 7 inches of snow. The county was quickly affected by hazardous road conditions and numerous downed trees and power lines. Based on the number of reported power outages, a warming center was opened in the City of Greensboro and this eventually transitioned over to an emergency shelter that remained open for several days, finally closing on Monday, March 10th in the evening. A Point of Distribution (POD) was established on March 9th in Pleasant Garden to provide bottled water for the community. Over 5,000 gallons of bottled water was provided over a two-day period. As a result of this incident Guilford County received a presidential disaster declaration for Public Assistance (PA).

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and

power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

5.14.4 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in Guilford County due to its location in the western half of the state. According to historical information, Guilford County generally experiences several winter storm events each year. Therefore, the annual probability is highly likely (100 percent). Additionally, according to the *Piedmont Together Climate Adaptation Report*, the increased likelihood of ice storms due to climate change will result in a higher number of automobile accidents (injuries, fatalities, and traffic jams) as well as more power outages in the county.

5.14.5 Consequence Analysis

People (The Public and Public Confidence)

Winter storms most often impact people indirectly. Winter storms can create dangerous driving conditions by limiting visibility for drivers or creating slick conditions that make maneuverability difficult. Loss of power can create very cold conditions for residents, making it difficult to stay warm. Residents may try to heat their home using alternative means, which runs the risk of carbon monoxide poisoning caused by improperly ventilated heating sources. In addition, dangerously cold temperatures increase the risk of wind chill, frostbite, and hypothermia.

Another indirect impact of winter weather on the public is its potential to impact public and private school schedules through closings and delays. Poor driving conditions, lack of power and heat, and mechanical problems with school buses and equipment due to cold weather conditions are potential concerns. School closures and delays can lead to logistical problems for teachers and school administrators, especially in the event of end-of-term exams and standardized testing schedules. It can also result in logistical problems for making up school days.

Winter storms generally do not have a large impact on public confidence, but it could be impacted if road clearing or response operations are slow.

Responders

Responders in winter storm and freeze events face a variety of hazards themselves including slick or icy roads that could cause harm to responders if they are attempting to quickly respond to an emergency as is often the case. Crashed emergency vehicles and injuries to responders are always a possibility, but their chances increase during a winter storm event. Winter storms can also make it difficult to access more rural areas if roads are snowed over and vehicles cannot pass through.

Continuity of Operations

Generally, continuity of operations can be maintained during a winter storm event in Guilford County. However, winter weather does have the potential to affect power transmission as the weight of ice and snow can cause trees and limbs to fall and damage transmission lines. Winter precipitation can also freeze to roadways or create slick conditions that make it difficult for local government employees to get to work. As a result, there will likely be some disruption of operations during a winter weather event.

Built Environment (Property, Facilities, and Infrastructure)

One of the primary identified impacts of winter weather in North Carolina is the disruption of utilities. Utilities that are at risk of being affected include telephone, internet, cable, and water. Newspaper reports typically cite trees falling on electrical wires—as well as trees that have already been damaged from previous incidents that fall during a winter storm—or the stress caused by ice accumulation as main causes for power outages. Damage to this infrastructure is one of the major consequences of a winter weather event in the state and can lead to life-threatening situations if the public is unable to utilize central heating systems to keep warm during the concurrent cold weather that often accompanies winter weather.

Winter weather also has the potential to create hazardous driving conditions leading to accidents on roadways. The North Carolina Climate Office reports that 70 percent of winter-weather–related injuries are a result of accidents on the road.[33] The North Carolina Highway Patrol call volume can double during a winter storm compared to a typical 24-hour period. This creates significant problems for emergency workers. Accidents can cause highways to become "large parking lots" as well as cause motorists to strand their vehicles, making it difficult for emergency workers to reach those who need assistance. In general, major and local roadways become severely impacted when temperatures drop, making pre-treatment solutions ineffective. Transportation impacts can be minimized during early- and late-season events when paved surfaces are able to warm sufficiently to prevent winter precipitation accumulation. Winter weather can also cause delays and cancellations of flights at airports in the state due to slick conditions on runways. There is also the potential of a loss of power that can close the airport.

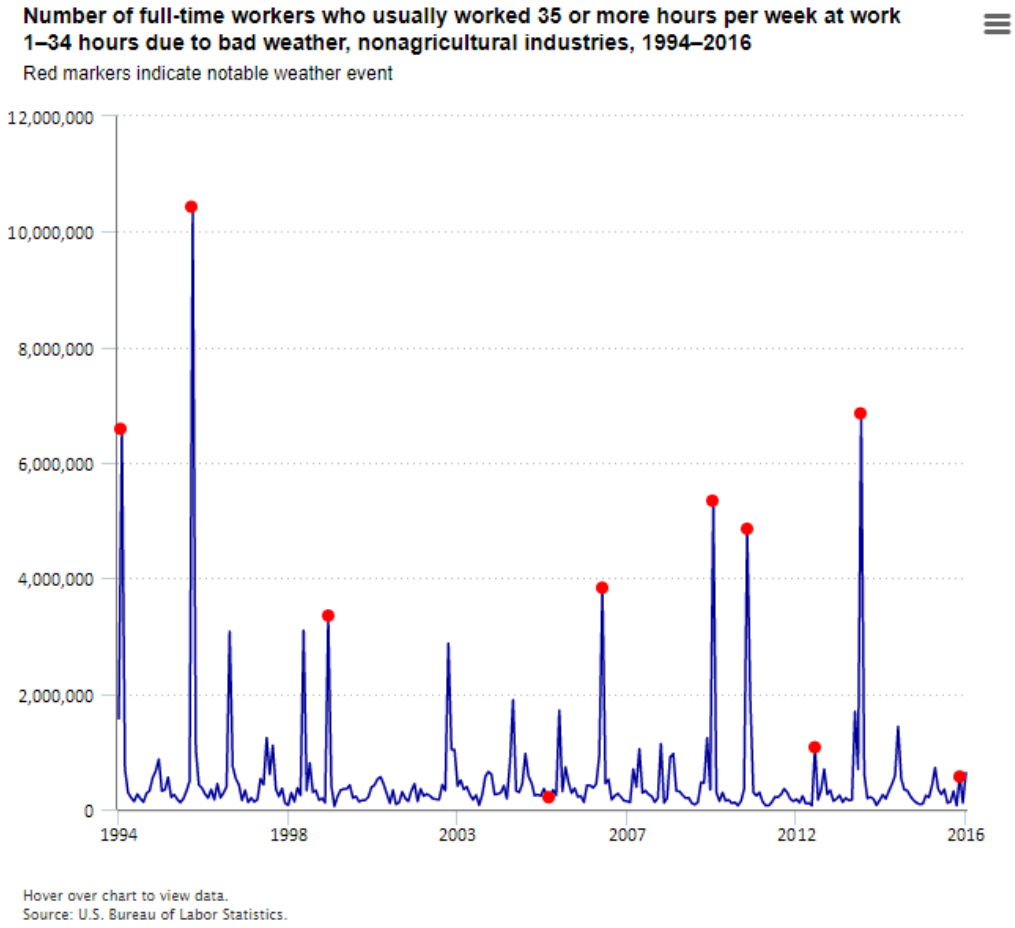
Economy

In the event of winter weather, there is a high potential of business and office closures, modified business and office hours, and cancellation or postponement of sporting and other planned events in the state. This can be attributed to poor road conditions (including icy and slick conditions) that result in fewer people using the roads to get to their destination or a loss of power and heat that result in a loss of operations at specific facilities. In general, absenteeism is higher during winter weather events as many employers rightly encourage employees to stay home and avoid potential injury in unsafe driving conditions. As can be seen in **Figure 5.45** below, the Bureau of Labor Statistics[34] notes that although any major weather event can cause absences at work, workers are more likely to be absent because of bad weather during winter months because winter weather tends to impact much larger areas and makes travel difficult throughout much more of the transportation network.

[33] State Climate Office of North Carolina. *Winter weather—impacts*. Retrieved August 21, 2017, from http://www.nc-climate.ncsu.edu/climate/winter_wx/Impacts.php

[34] United States Bureau of Labor Statistics. *Work Absences Due to Bad Weather from 1994 to 2016*. Retrieved August 21, 2017, from https://www.bls.gov/opub/ted/2017/work-absences-due-to-bad-weather-from-1994-to-2016.htm

FIGURE 5.45: IMPACTS FROM WINTER WEATHER ON WORKER ABSENTEEISM



Source: United States Bureau of Labor Statistics

Environment

Winter storms have an impact on the environment through the clearing of roadways. Snow on the roads can pick up contaminants from chemicals and oil products in traffic as well as the salt mixture that is used to de-ice the roads. These contaminants can be carried to nearby waterways, which, contaminates water sources and is absorbed by groundwater. In addition, vegetation can be damaged by these storm types. Vegetation destruction reduces available habitats and may threaten wildlife.

Biological Hazards

5.15 BIOTERRORISM

5.15.1 Background

While there are many biological agents to be concerned with as they exist in nature, there are some that can also be used as a weapon. It is very difficult to spread many of these diseases to large populations of people. There have been few instances of bioterrorism to this point. While it is likely that another

bioterrorism event will be attempted, it is unlikely that a large population will be exposed or that it will affect Guilford County and its citizens. However, consideration and planning must still address the possibility, no matter how slight.

Examples of agents identified by the Centers for Disease Control and Prevention (CDC) that have been or have the potential to be used in bioterrorism form include anthrax, botulism, brucellosis, plague, smallpox, tularemia, and viral hemorrhagic fevers, among others.

Anthrax, a serious disease caused by Bacillus anthracis, a bacterium that forms spores, was used as a biological weapon in the United States in 2001 when it was deliberately spread through the postal system. Botulism, a muscle-paralyzing disease caused by a toxin made by a bacterium called Clostridium botulinum, could potentially be released into food sources, causing foodborne illnesses. Brucellosis is a rare infectious disease caused by the bacteria Brucella; used a biological weapon, the bacteria could also be introduced into a food source for human consumption.

Plague, a disease caused by Yersinia pestis, a bacterium found in rodents and their fleas in many areas around the world, could be used in an aerosol attack through its pneumonic form. Because of the delay in exposure and becoming sick, those infected with the disease could travel around the globe transmitting the disease to others before knowing they were sick. This could have dire consequences in controlling the outbreak of the disease in large populations.

Smallpox is a serious, contagious infectious disease caused by the variola virus; no treatment exists and the only prevention is vaccination. According to the CDC, the disease is now eradicated after a successful worldwide vaccination program; however, there is still concern that the variola virus could still be used as an agent of bioterrorism through the development of the disease in a laboratory setting.

Tularemia is a highly infectious disease caused by the bacterium Francisella tularensis, which is found in animals. Used as a biological weapon, the bacteria would likely be made airborne for exposure by inhalation. Because the bacterium is widely found in nature, the disease could be grown in large quantity in a laboratory; however, an effective aerosol weapon has yet to be manufactured to release it in a bioterrorism event.

Viral hemorrhagic fevers (VHFs) refer to illnesses caused by specific viruses that cause severe multisystem syndromes. Many of these have been considered for bioterrorism. The Marburg and Ebola viruses are well-known examples of VHFs.

5.15.2 Location and Spatial Extent

Due to the nature of a bioterrorism event, it would be difficult to predict a precise location where this type of event would occur. Moreover, a large-scale event may have impacts that spread throughout the county. Therefore, all areas in Guilford County are considered equally susceptible to bioterrorism.

5.15.3 Historical Occurrences

No major incidents have ever been recorded as affecting those within the bounds of Guilford County.

5.15.4 Probability of Future Occurrence

Although no incidents have been recorded in Guilford County, future occurrences are considered possible.

5.15.5 Consequence Analysis

Additional details on consequences of disease threats and terrorist events are described in the Public Health/Emerging Disease Threat and Terrorism sections below. Most of the consequences outlined in those sections are also applicable to a Bioterrorism event.

People (The Public and Public Confidence)

The general public can be exposed to emerging diseases through different means based on the particular threat and its potential transmission routes. Vaccinations, when available, are the best means of preventing transmission and infection. Public Health information messages will be disseminated via the media in order to provide preventive measures to limit or avoid exposure.

A bioterrorism event may or may not elicit a large-scale response from government and nongovernmental organizations, dependent on the scope of the attack. For major incidents, public notification and information will be important to prevent further exposure and ensure the public that efforts are underway to handle the situation. Communicating with the media will not only assist in this dispersal of information, but also ensure that appropriate information is getting out. These efforts can help bring about positive outcomes and positive public perception.

Responders

During a disease outbreak, responders can expect an increase in workload and should practice a higher level of precaution toward exposure than they would normally. Plans exist for first response and health care to address the needs of such situations. Communication between these agencies regarding plans and procedures maximize the efficiency and effectiveness of the combined efforts.

Continuity of Operations

Continuity of operations may be impacted if those in governmental or other key roles are impacted by the bioterrorism event and cannot perform their normal duties. Although plans are in place to ensure continuity of operations, a large-scale event or one that has significant impacts on operational-level staff could affect continuity of operations.

Built Environment (Property, Facilities, and Infrastructure)

Hospitals are a key component of the built environment that may be impacted by a bioterrorism event. The primary impacts for hospitals during bioterrorism events are an increase in patients due to infected and exposed individuals and the spread of the biological substance within the facility. Additionally, the workload of emergency services may be increased as individuals infected and exposed to the biological substance may require transport to a hospital facility.

Economy

The economic impact of a bioterrorism event is dependent on where it took place, the severity of the incident, and if the threat of another event seems likely. Tourism could be significantly impacted in some areas, affecting commerce and large public gatherings.

Environment

The environmental impact is dependent on whether the particular biological substance being transmitted can impact/infect animal or plant life, or if it can be distributed through the water supply. Also, the delivery method of the agent's release could cause physical harm to the environment as well.

5.16 PUBLIC HEALTH EMERGING DISEASE THREAT

5.16.1 Background

Communicable, or infectious, diseases are conditions that result in clinically evident illness which are transmissible directly from one person to another or indirectly through vectors such as insects, air, water, blood or other objects. The impact of communicable disease can range from the mild effects of the common cold to the extreme lethality of pneumonic plague or anthrax. The public health system in the United States was developed in large part as a response to the often urgent need to respond to or prevent outbreaks of communicable diseases. Through public health methods of disease reporting, vaccinations, vector control, and effective treatments, most communicable diseases are well controlled in the United States and Guilford County. However, control systems can fail and when people come together from locations outside of the county, state, and the country, outbreaks can occur, even in the most modern of communities. In this section, some of the more significant potential communicable disease concerns are described.

The threats discussed in this section usually do not occur on a regular basis, though some are more frequent. The diseases described herein do not originate from intentional exposure (such as through terrorist actions) but do present significant issues and concerns for the public health community. There are numerous infectious diseases that rarely, if ever, occur in Guilford County, such as botulism or bubonic plague. Some highly dangerous diseases which could potentially be used as biological weapons, such as anthrax, pneumonic plague, and smallpox, are safely housed and controlled in laboratory settings such as at the Centers for Disease Control and Prevention (CDC). Other diseases have not (yet) mutated into a form that can infect humans, or otherwise lie dormant in nature. Many of these threats were discussed in the "Bioterrorism" section.

Below, several types of threats are described that may face the county. All may be of national and international importance as any emerging disease threat may impact large populations beyond the immediate areas where the threat originated.

Viral outbreaks, such as the West Nile Virus, are typically passed to humans or animals by mosquitoes and can often be spread widely as many of those infected experience no symptoms. Those who do may experience fever, fatigue, or, in serious cases, central nervous system inflammation. Another example of a virus that has had impacts on large populations is Severe Acute Respiratory Syndrome (SARS), which is a respiratory syndrome that is transmitted by airborne droplets. This virus was first reported in Asia in the early 2000s and while both of these conditions caused a great deal of public health concern when they were first identified, SARS has all but disappeared, while West Nile Virus occurs with low frequency and causes serious disease in only a very small percentage of cases.

Other communicable diseases pose a greater threat to the residents of Guilford County. Some of the infectious diseases of greatest concern include influenza, particularly in a pandemic form, as well as

norovirus, and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as "flu") can result in serious illness and even death in young children, the elderly and immune-compromised persons. But there is always the potential risk of the emergence of influenza in one of the pandemic H1N1 forms, such as in the "Spanish Flu" outbreak of 1918-19, which killed over 50 million people worldwide. Every year, Guilford County sees hundreds of cases of influenza, leading to hundreds of hours of lost productivity in businesses due to sick employees. Of note, a vaccine for influenza is produced every year and, according to the CDC, is highly effective in preventing the disease.

Norovirus is recognized as the leading cause of foodborne-disease outbreaks in the United States. The virus can cause diarrhea, vomiting, and stomach pain, and is easily spread from person to person through contaminated food or water and by surface to surface contact. Especially vulnerable populations to this virus include those living or staying in nursing homes and assisted living facilities and other healthcare facilities such as hospitals. Norovirus could also be a threat in the event of large public gatherings such as sporting events, concerts, festivals, and so forth. Guilford County and the state of North Carolina experience numerous norovirus outbreaks every year. No vaccine or treatment exists for the Norovirus, making it especially dangerous for the public in the event of an outbreak.

Tuberculosis (TB) is a bacterial infection that originates from airborne exposure. Currently there are only a couple of dozen new tuberculosis cases in Guilford County each year. However, multiple drug-resistant strains, and even new extreme drug-resistant strains, are showing up with increasing frequency. Since Guilford County has a large and varied immigrant and refugee population of persons coming from countries with drug-resistant strains, TB is a disease that could become a cause of greater concern in coming years.

Public health threats can occur at any time and can have varying impacts. Discussions between public health professionals, planning officials, and first response agencies are essential in order to facilitate safe, effective, and collaborative efforts toward outbreaks.

5.16.2 Location and Spatial Extent

Due to the nature of a public health/emerging disease event, it would be difficult to predict a precise location where this type of event would occur. Moreover, a large-scale event may have impacts that spread throughout the county and beyond. Therefore, all areas in Guilford County are considered equally susceptible to public health/emerging diseases.

5.16.3 Historical Occurrences

In 2003, the SARS outbreak that began in Southeast Asia began showing up in the United States. There was a single confirmed case of SARS in North Carolina in 2003, with 8 suspected cases, as described by Guilford County Department of Public Health.

An outbreak of the West Nile Virus began showing up in the United States in 1999, with Guilford County reporting its first infected bird in 2000. One individual with ties to Guilford County was confirmed as being infected with West Nile Virus in South Carolina in 2002. No other cases have been reported in Guilford County.

As stated previously, influenza, norovirus, and tuberculosis are regularly occurring health issues in Guilford County. With the exception of tuberculosis, these conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. However, these diseases are monitored through local epidemiological surveillance systems in hospitals and health departments, and any potential outbreaks are investigated promptly.

During events involving outbreaks, as stated in NCGS § 130A – 145, the State Health Director and a local health director are empowered to exercise quarantine and isolation authority. Quarantine and isolation authority shall be exercised only when and so long as the public health is endangered, all other reasonable means for correcting the problem have been exhausted, and no less restrictive alternative exists.

5.16.4 Probability of Future Occurrence

Due to some recent incidents that have been recorded in Guilford County, the probability of a major outbreak is considered possible.

5.16.5 Consequence Analysis

People (The Public and Public Confidence)

The general public can be exposed to infectious diseases through different means based on the particular threat and its potential transmission routes. Vaccinations, when available, are the best means of preventing transmission and infection. Public health information messages will be disseminated via the media in order to provide preventative measures to limit or avoid exposure. According to the North Carolina Public Health Department, in terms of vaccine-preventable diseases, in 2016 there was a slightly higher occurrence rate of Hepatitis A and Mumps in 2016 compared to the five-year average from 2011-2015.[35] There were also increased rates of non-vaccine-preventable diseases like Zika which have become more prominent across the United States in recent years.

Public confidence in government organizations may be impacted by public health outbreaks. The level of confidence the public possesses is based upon societal expectations, media influence, and past experience following other outbreaks. An effective response to the outbreak can help to guide public confidence toward a favorable level. Collaboration with media outlets can also assist in keeping the public informed and helping to protect them from exposure.

Responders

During a disease outbreak, responders can expect an increase in workload and should practice a higher level of precaution toward exposure than they would normally. Plans exist for first response and health care to address the needs of such situations. Communication between these agencies regarding plans and procedures maximizes the efficiency and effectiveness of these combined efforts. Responders are much more likely on the whole to be impacted by an infectious disease since they will be working directly with those affected to help treat the disease (especially EMS personnel). This will make them more susceptible to becoming infected and, as such, it is critical that they wear the appropriate personal

[35] North Carolina Department of Public Health (2016). Vaccine-Preventable Diseases Reported in North Carolina, 2016. Retrieved August 21, 2017 from: http://epi.publichealth.nc.gov/cd/figures.html

protective equipment to minimize their risk and ensure they can continue providing the care and assistance that is needed to help the public.

Continuity of Operations

Continuity of operations may be impacted if those in governmental or other key roles are impacted by the disease or public health threat and cannot perform their normal duties. Although plans are in place to ensure continuity of operations, a large-scale event or one that has significant impacts on operational-level staff could negatively affect continuity of operations. Since many diseases are spread through some form of contact with others who have already been infected, a disease event could rapidly disable many of those who are working together to carry out normal operations. Due to their close proximity to one another and need to communicate and coordinate on a daily basis, it is incredibly important to try to reduce the spread of the disease among key personnel once an outbreak has been identified.

Built Environment (Property, Facilities, and Infrastructure)

An infectious disease would likely have little direct impact on the built environment itself as the disease would not affect the structural stability of any buildings or infrastructure. However, an infectious disease would have a major impact on the functioning of many structures that would be operating at a high capacity during an infectious disease event, especially medical care facilities.

Hospitals and Medical Care Facilities

The primary impacts for hospitals/medical facilities during disease outbreaks are an increase in patients and the spread of disease within hospitals. It is highly likely that those affected by the disease will make their way to a medical care facility and it may be necessary to implement quarantines or other measures to reduce the risk of disease spreading. Hospitals and other medical care facilities should have plans in place to deal with such a scenario and also reduce risk of spreading the disease to medical care providers whose workload may be increased as individuals infected with disease may require treatment.

Economy

One of the more significant economic impacts that could be seen in Guilford County involves absenteeism at local businesses which could have a significant impact as the absence of several employees at a small business could force temporary shutdowns or reduced hours of availability. There would also likely be an impact on the local government budget as officials try to respond to the disease and assist those impacted.

City centers and downtown areas tend to be where large masses of people congregate and thus may be where the likelihood of disease spread is more prominent. Many people may realize this and avoid these key economic hubs which would result in reduced revenue and a negative impact on the economy overall. Additionally, large events may have to be cancelled if the outbreak is large enough or has the potential to be spread easily and quickly. This would also reduce revenue for many local economies.

Environment

The environmental impact is dependent on whether the particular biological substance or disease is transmittable to animal or plant life or if it can be distributed through the water supply. If the infectious disease in question can be transmitted to other species, there could be an extremely negative impact on species populations. Since animal life does not have the same capacity as humanity to understand the

spread of disease and reduce transmission rates, the disease may spread more quickly through animal populations and cause larger-scale loss of life.

Technological Hazards

5.17 BUILDING / STRUCTURE COLLAPSE

5.17.1 Background

A building or structure collapse, also called a structural failure, can be defined as any significant compromise of a standing, built enclosure, including its roof, walls, floors (in multi-story structures), or other large areas. Any material used to build structures has a strength limit that once passed can lead to a structural failure.

Building/structure collapses have a variety of causes, typically occurring as a secondary impact following the incidence of another hazard. The most common occurrences of structure collapse are external in nature, including explosions (both accidental and purposeful) and vehicles striking the structure and destroying key supports. Buildings that are under construction are more likely to experience a structure collapse from the effects of another hazard.

5.17.2 Location and Spatial Extent

A building or structure collapse is an uncommon occurrence anywhere, especially as structural engineering has continued to progress throughout time. Most of the structure collapses that occur are at construction sites but occasionally can be due to outside forces. Some areas near fault lines or other hazards are more prone to collapse, as not all residences and businesses are built to withstand the hazard(s) that are associated with fault lines.

5.17.3 Historical Occurrences

Collapses in general are especially uncommon in Guilford County. Several calls per year include vehicles striking structures, where a rescue of those within the vehicle or structure is necessary. Most of these collapses do not cause significant impact to the county as a whole, but there is potential for greater impact if the incidence were at a location of interest such as one of the hospitals, the Greensboro Coliseum, a large employer during business hours, or a mall.

5.17.4 Probability of Future Occurrence

There have been few past incidents of structure collapse in Guilford County, though future occurrences are considered possible.

5.17.5 Consequence Analysis

People (The Public and Public Confidence)

The collapse of an occupied building is a highly dangerous situation to occupants and passersby. Falling debris and debris that is carried out by the pressure of the collapse can injure those outside the building.

Those persons who are inside the structure are most likely to be injured. Generally, these occupants will have more severe injuries, which can include death. Following a collapse anyone inside the structure is likely to be trapped and could suffer further injury while awaiting rescue and removal from the structure.

During and after a building collapse, the public will be influenced by the perceived effectiveness of the response to the collapse. This perception could be impacted by eyewitness accounts, victims, and in particular the reporting of the event by the media. Expectations may or may not be met, affecting public confidence in the ability of government and other involved entities to make decisions and act in emergency situations.

Responders

First responders will be impacted by a building collapse, as they are required to respond to such incidents. The possibility exists for secondary collapses to occur during rescue operations. If such secondary instances occur, rescuers could be injured and the condition of those trapped may worsen. Highly-trained teams such as Urban Search and Rescue teams exist for these situations and should be activated early and utilized fully to minimize the impact. Until these teams arrive, rescuers must be cognizant of the dangers associated with secondary collapses and proceed with caution.

Continuity of Operations

Generally, continuity of operations can be relatively easily maintained during a structure collapse in Guilford County. Since the effects will be very localized and are not likely to directly impact availability of personnel, there is a low risk of impact on continuity of operations.

Built Environment (Property, Facilities, and Infrastructure)

Building Stock

In cases of structure collapse, homes may become uninhabitable or require significant repair and displace residents. Building collapses in business settings could lead to disruptions to normal operations or closures and work stoppages. Structural issues at hazardous materials sites could not only bring about the operational issues noted in business settings but could also cause hazardous material releases or spills.

Critical Facilities and Personnel

Structural issues at a hospital or key medical facility could significantly impact operations. Some departments may close completely and force patients to be sent to other facilities. In some areas, biohazards or other hazardous materials may be released or spilled. Structural failures in emergency services facilities could lead to the use of alternative operating areas or the need for mutual aid assistance. In some buildings, critical systems may be housed and could experience disruptions. Shelters may be activated if there are numerous displaced persons from large businesses or residential areas that experience collapses (for example, due to an earthquake).

Critical Utilities

There can be impacts if the building that collapses is directly tied to the functioning or management of power or other utilities. If the building collapses on equipment or structures that are part of the distribution network, it could also have significant impact on the delivery of services.

Economy

The economic impact of a building collapse is ultimately dependent on what structures collapse and the extent of the damage. If the collapse occurs in a business district and forces other businesses to be closed for cleanup or inspected for possible damage, this could have impacts on the local economy. Of greatest economic concern are large employers that have a significant stake in the local economy such as any of the hospitals, schools, or colleges. A structural collapse at a financial institution could also be especially problematic to the local economy, depending on what equipment and systems are impacted.

It should also be noted that building collapses in city centers could lead to disruptions in everyday commerce or bring about closures and work stoppages. Similarly, a collapse of a large arena or event center can have a significant impact on the local economy, as significant revenue is generated by large events.

Environment

The environmental impact of a building collapse would most likely be minimal. Run off from the collapsed building could contaminate nearby wildlife and/or water supplies if it is not controlled.

5.18 COMMUNICATIONS SYSTEM DISRUPTION / FAILURE

5.18.1 Background

The widespread failure or disruption of communications systems is uncommon. In most cases, there are backup systems in place to keep communication lines flowing. Extreme situations or the presence of several significant hazards would be necessary for an incident that would affect multiple communications systems. Communications infrastructure is designed to withstand high winds and other weather elements; however, failure is always a possibility and must be planned for regardless of the unlikelihood. In Guilford County, one issue that can cause or exacerbate a communications system disruption is that numerous facilities in the county are constructed in a way that radio coverage is greatly diminished within the building. This kind of disruption can occur without a precipitating event and result in similar impacts to communication among response personnel.

Disruptions are more likely to occur than actual failures. Overloaded systems due to other hazards or disaster circumstances may cause temporary connectivity issues, especially in cell phone networks. The public, government, and business operations have become more reliant on cell phones for communicating. During large-scale events or emergencies when cell phone traffic is high, it can cause overload situations and disruptions could result.

5.18.2 Location and Spatial Extent

Since a communications disruption/failure would generally have impacts throughout the county's entire network, the location for this hazard is considered countywide.

5.18.3 Historical Occurrences

In Wilmington, North Carolina, Hurricane Floyd caused a temporary outage of the county's 800 megahertz (MHz) radio system. Guilford County had a similar instance in the spring of 2011 when the 800 MHz radio system entered into Failsoft mode. This significantly impacted radio transmissions as

multiple sets of talk groups were consolidated into single channels, a result of the system losing "trunking" capability. Occasional impediments in radio transmissions can be expected in these situations. Many digital talk groups in Greensboro had disruptions, especially those associated with law enforcement. Decision makers may ultimately decide to switch operational communications over to a backup system until the primary system's issues are corrected.

During and immediately after Hurricane Katrina, the city of New Orleans, Louisiana and adjacent areas experienced significant communications issues as flooding impacted multiple systems. Cell phone towers and their generators, landline infrastructure, and other communications equipment and structures were temporarily out of service. Much of this scenario was due to the strength of the storm and the area's topographical characteristics. A similar incident is unlikely to occur in Guilford County due to its geographic location and topography.

5.18.4 Probability of Future Occurrence

Since there have been some previous occurrences of communication disruption/failure and communications are becoming more and more integrated into daily life, the probability is considered to be likely.

5.18.5 Consequence Analysis

People (The Public and Public Confidence)

The public has become increasingly reliant on cell phone communications, with many households deciding to forgo landline services completely in exchange for cell phones. In large-scale emergencies, many calls will be made to dispatch centers, loved ones, etc. that may cause overloading of the cell phone networks. These disruptions can cause issues that range from slight nuisances for the end user to preventing an emergency from being reported. Extended disruptions or complete outages can significantly impact communications and in extreme cases, put people in danger during emergencies as responders will be delayed or may not receive notification at all.

Public confidence may be impacted based upon societal expectations, media influence, and past experience with issues or failures in communication systems. Public confidence can be gained when the public's expectations of response and recovery services are met or exceeded. Public confidence may be impacted by media interpretation and reporting of the event, whether positively or negatively. Lastly, the public's experience with prior incidents of similar type and scope will affect confidence because the public may compare services rendered from one communications interruption or failure to another.

Responders

The impact to responders may center more on operational information passing rather than performing physical tasks such as rescue, patient care, and firefighting. Communication is vital to efficient and effective service, and disruptions or breakdowns could impact the service provided. Backup forms of communication must be identified and maintained in order to provide a means for critical communications while primary systems are repaired and restored. Once the primary systems are operational, an appropriate transition away from the backup systems should be implemented to lessen the transition's impact on ongoing operations.

Continuity of Operations

A communications disruption/failure would potentially have extensive impacts on continuity of operations because of the loss of ability for local government operations to communicate effectively. This could cause a great deal of stress to operations and create some level of disorder in terms of continuity.

Built Environment (Property, Facilities, and Infrastructure)

Most of the built environment (e.g. homes, buildings, roadways) would not be directly impacted in any way by this type of event. However, if power or communications systems are damaged or temporarily shut down, some aspects of the built environment may be impacted such as traffic lights, street lights, and cell phone towers that may rely on communications equipment to function properly. At many key facilities, there are backup systems in place and many facilities utilize radios that allow for continued communication within the facility. There may be more significant impacts when trying to communicate outside of the facility.

Airports and other transportation facilities can be particularly impacted by communications issues, especially if the communication failure is internal. Such communications failures could impact travel locally, regionally, and potentially at a national level, especially if the failures are widespread. External communications failures may delay the reporting of general conditions or promote compounding incidents and in turn delay the dispatch of appropriate personnel.

Economy

Significant economic impact is unlikely unless communications systems are down for extended periods of time. Days or weeks of outages will affect businesses and commerce significantly and may require numerous resources to fix, replace, or temporarily take the place of the current system in place. Large employers can be significantly impacted depending on the communications system involved and the length of the incident. Backup systems may limit or eliminate any impact but will still cause some disruption.

Environment

There will likely be relatively minimal impacts on the environment from a communications system failure. These types of events do not directly impact plants or animals and typically do not have any effect on water systems or other natural areas. There may be indirect impacts if, for example, communications systems are damaged at facilities that house hazardous materials which, in turn, results in releases into the environment. However, the likelihood of this occurring is relatively low.

5.19 ENERGY / POWER / UTILITY FAILURE

5.19.1 Background

A failure in the power distribution network can happen for varying reasons. Some possible examples include the physical failure of power lines due to hazards as discussed in the Critical Utilities sections throughout this document, as well as problems within the network itself including faults at a power station, shorts or overloading in a circuit(s), or physical damages at a substation.

There are three different types of power outages - transient faults, brownouts, and blackouts. A transient fault is a brief outage caused by a fault in a power line. The issue is corrected when the power

flow clears the faulty part of the circuit, and power is returned. A brownout occurs when voltage falls to an inadequate level. A blackout occurs when there is a complete loss in the power supply. Blackouts are generally longer lasting outages than the previous two examples and may involve significant repairs. These outages can range from minutes to weeks or more depending on the significance of the failure in the network.

5.19.2 Location and Spatial Extent

Due to the unpredictable nature of where exactly a power or utility outage will occur, the entire county is considered to be equally susceptible to this hazard. However, it should be noted that in more urbanized areas, the effects of an outage at a single location or facility would likely impact larger numbers of people.

5.19.3 Historical Occurrences

Most of the lengthy power outages that have occurred in Guilford County have been due to winter storms with ice accumulation, as the area occasionally experiences this type of weather during the winter months. This accumulation can make travel dangerous and also cause branches, trees, and power lines to break or fall, causing power disruptions or outages in the affected area. Power outages can vary depending on the amount of precipitation, its location, and its form.

On February 25, 2010, one such ice accumulation event occurred, as ¼ of an inch of icing followed a 3-inch snowfall. The weight of the icepack and snow during this storm caused the downing of trees and power lines, resulting in over 12,000 homes without power. More recently, in 2014 a major ice storm impacted the county and many areas of the state knocking down power lines and causing power outages for several days in some cases. In 2018, Hurricanes Florence and Michael caused widespread outages in the county as hundreds of thousands lost power in these storms.

Guilford County experienced record power outages during an ice storm on December 4, 2002. Almost a million people in central North Carolina lost power due to ½ an inch to an inch of ice accumulation causing power line failures and downed trees. Some areas lost power for a week or more in this event. Power outages do not occur only during weather-related events.

In 2003, the Northeast Blackout showed how vulnerable large networks are to widespread outage. An estimated 55 million people were without power after a critical failure in the system, as many power plants in Ontario, Canada and the Northeast went offline. A single cause could not be attributed to this incident, but several issues led to a cascading failure. Overload protection was unable to keep a small problem in the system from affecting other parts of the system, which led to the power outage affecting a larger area.

In October 2018, Guilford County experience a widespread power outage due to Tropical Storm Michael. More than 145,000 power outages were reported in the Greensboro area following the impact of the storm.

5.19.4 Probability of Future Occurrence

Based on the high number of outages that have occurred in past years, the probability of a power or utility failure is considered likely.

5.19.5 Consequence Analysis

People (The Public and Public Confidence)

Some issues that need to be considered during a power outage include transportation tie-ups and accidents, medical emergencies, and communications disruptions. The transportation problems would likely be related to traffic lights and signals not working or from decreased visibility during the night. Medical emergencies could stem from homes not having power to operate heating and air conditioning systems, particularly during conditions of extreme temperatures. Also, medical equipment that relies on power could shut off, no longer providing a patient with treatment he or she requires. Communications issues could prevent the public from being able to call emergency services. Business disruptions could also impact services that the public wants or needs. Lastly, well pumps would not function without power unless on backup generator power.

Public perception during any incident involving public utility systems depends on the impacts that are presented and how government and nongovernmental entities act. Extended, widespread outages could lead to negative perception from the public. The media's reporting of the incident and the response could significantly influence public expectations and perception. Passing information to the public about ongoing efforts and when service restoration can be expected could assist in maximizing the confidence and satisfaction of the public.

Responders

As mentioned above, there may be issues relating to transportation, medical equipment, extreme weather temperatures, and communications issues in the event of a power outage or other utility loss. Any of these issues could impact the call volume for emergency responders. If communications disruptions are present, it could affect notification processes and increase response times. Until power is restored, some critical facilities may need generators to provide backup power. Law enforcement may become strained if additional personnel are needed to deal with unusual circumstances such as unrest, looting, or traffic control when signals are not operating appropriately.

Continuity of Operations

Generally, continuity of operations can be maintained during a power or utility outage event in Guilford County. However, when utilities go down, it can make it difficult for local government employees to get to work. Furthermore, there is a limited supply of both permanent and mobile emergency generators available in the county to maintain power during an outage. As a result, there will likely be some disruption of operations during an outage.

Built Environment (Property, Facilities, and Infrastructure)

Many residential structures do not have backup generators in place. If power fails, the residents of these homes may not be able to refrigerate their food, regulate medical equipment properly (such as oxygen), etc. until power is restored. Power outages can also sometimes lead to sparks that may rarely ignite fires or damage other components of the electric grid, causing extensive damage. Other utility failures may

also cause damage when they go down, such as sewer systems. Shut downs or damage to these systems can result in hazardous environments that expose the built environment to waste products.

In terms of transportation infrastructure, airports may have to ground flights and suspend operations as a result of a power outage until power can be restored. Extended outages may cause more significant impacts on flight patterns. Signals at railroad crossings may not work appropriately and in more severe cases, networks may be stopped until power is restored to prevent incidents.

Communications infrastructure may also be damaged or disrupted. Cellular telephone towers generally have backup power to function during power outages. However, depending on the presence of other hazards or lengthy outages, cell phone reception may be impacted. Internet connections that originate from or are linked to energy sources in affected areas will likely see effects from a power outage.

Economy

Extended utilities outages could shut down businesses and have significant financial impacts depending on the area of the outage, the period of time the outage occurs, and the nature of the business(es) that are affected. Outages would have particularly major effects if they occur during business hours. Power outages could also have a significant impact on facilities like the Greensboro Coliseum if an event is taking place and is disrupted. This could deprive the local economy of a great deal of commercial activity.

Environment

The impacts to the environment from a utility outage will likely be minimal. Most utility outages do not affect environmental features, despite having a major effect on humans and the built environment. It is possible that some outages may cause spillover effects from cascading events such as fires or sewer backups, but these would likely have a relatively minor impact.

5.20 HAZARDOUS MATERIALS INCIDENT

5.20.1 Background

Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways, and on the water. HAZMAT incidents are caused when solid, liquid, and/or gaseous contaminants are released from fixed or mobile containers, whether by accident or by design (as with an intentional terrorist attack). A HAZMAT incident can last hours to days, and some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur as a result of, or in tandem with, natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes. In addition to causing incidents, these can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread toxological concern.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

5.20.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency (EPA) provides public information on hazardous materials. One facet of this program is to collect information from industrial facilities on the releases and transfers of certain toxic agents. In addition, a number of other environmental laws (CAA, CWA, RCRA, etc) require facilities to report on the housing of potentially hazardous materials. The information collected through this reporting process is housed in the Facility Registry Service (FRS). FRS sites indicate where hazardous materials or places of environmental interest are located.

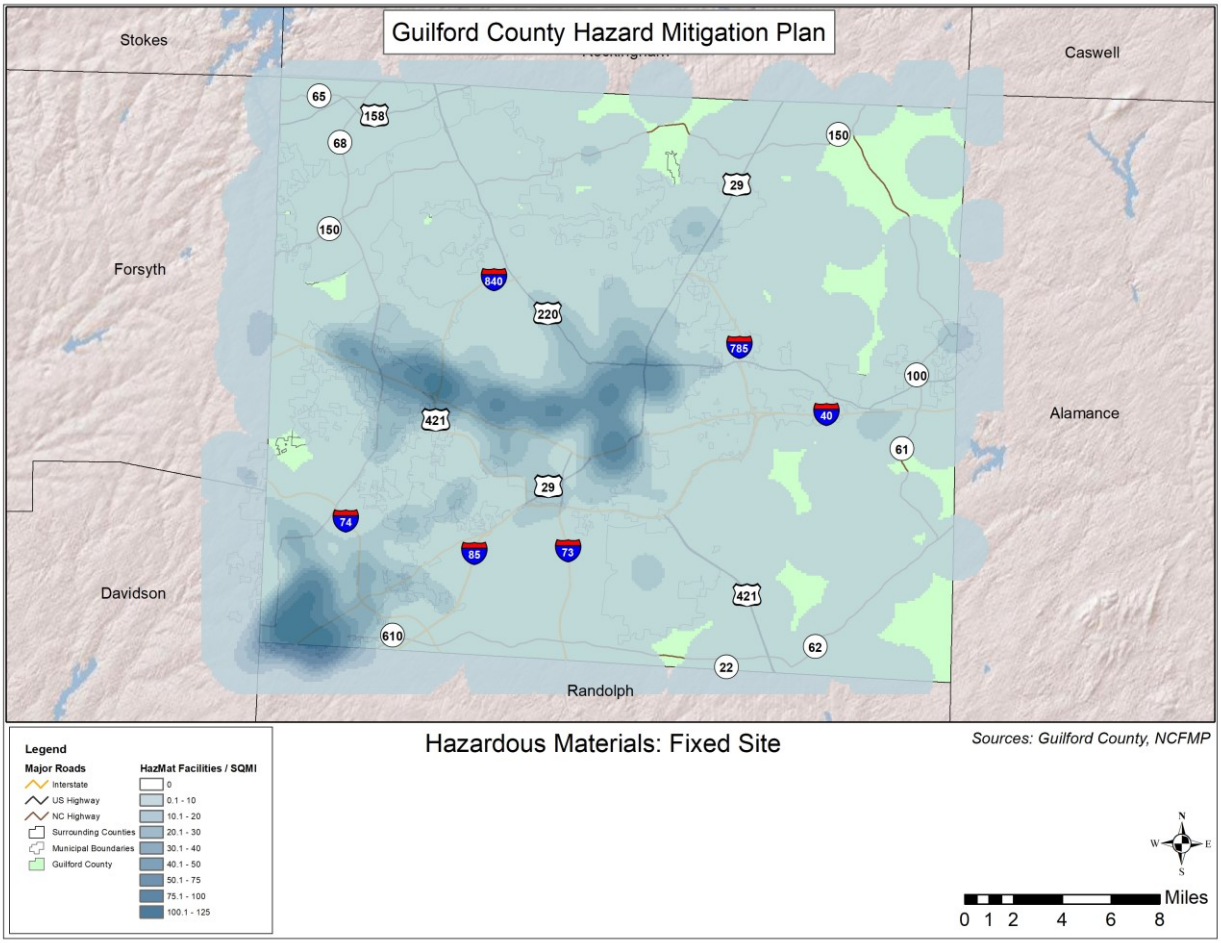
Guilford County currently has thousands of sites listed on the FRS. As such, it would be overwhelming to list all of these facilities in the plan or show them all on a single map. Instead, all of these fixed hazardous materials sites are summarized in **Table 5.43** and shown in **Figure 5.46.** Additionally, facilities that use extremely hazardous substances are required to develop a Risk Management Plan (RMP) that must be revised and resubmitted to the EPA ever five years. There are 13 RMP facilities in Guilford County and these are identified as critical facilities and are assessed in that section of the plan.

TABLE 5.43: SUMMARY OF FACILITY REGISTRY SERVICE SITES IN GUILFORD COUNTY

Location	FRS Facilities
Gibsonville	33
Greensboro	2,904
High Point	1,458
Jamestown	52
Oak Ridge	27
Pleasant Garden	47
Sedalia	2
Stokesdale	48
Summerfield	28
Whitsett	4
Unincorporated Area	944

Location	FRS Facilities
GUILFORD COUNTY TOTAL	5,547

FIGURE 5.46: FACILITY REGISTRY SERVICE SITES HEAT MAP



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

5.20.3 Historical Occurrences

The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) lists historical occurrences throughout the nation. A "serious incident" is a hazardous materials incident that involves:

- a fatality or major injury caused by the release of a hazardous material,
- the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire,
- a release or exposure to fire which results in the closure of a major transportation artery,

- the alteration of an aircraft flight plan or operation,
- the release of radioactive materials from Type B packaging,
- the release of over 11.9 gallons or 88.2 pounds of a severe marine pollutant, or
- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

However, prior to 2002, a hazardous materials "serious incident" was defined as follows:

- a fatality or major injury due to a hazardous material,
- closure of a major transportation artery or facility or evacuation of six or more person due to the presence of hazardous material, or
- a vehicle accident or derailment resulting in the release of a hazardous material.

There has been a total of 2,739 recorded HAZMAT incidents in Guilford County since 1971 (**Table 5.44**). These events resulted in over $2.9 million of property damage as well as 1 death and 30 injuries. **Table 5.45** presents detailed information on historical HAZMAT incidents in Guilford County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA). However, due to the high number of reported incidents, detailed information is only provided for those incidents that are classified as serious incidents.

TABLE 5.44: SUMMARY OF HAZMAT INCIDENTS IN GUILFORD COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Gibsonville	2	0/0	$28,462
Greensboro	2,610	1/27	$2,380,529
High Point	113	0/3	$12,719
Jamestown	8	0/0	$328,600
Oak Ridge	0	0/0	$0
Pleasant Garden	0	0/0	$0
Sedalia	1	0/0	$2,800
Stokesdale	2	0/0	$194,500
Summerfield	0	0/0	$0
Whitsett	3	0/0	$0
Unincorporated Area	10	0/0	$16,768
GUILFORD COUNTY TOTAL	**2,749**	**1/30**	**$2,964,378**

Source: Untied States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE 5.45: SERIOUS HAZMAT INCIDENTS IN GUILFORD COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)	Quantity Released
Gibsonville							
None Reported	--	--	--	--	--	--	--
Greensboro							
I-1976030738	3/1/1976	GREENSBORO	Highway	Yes	0/0	$0	300 LGA
I-1977070198	6/28/1977	GREENSBORO	Highway	Yes	0/0	$0	300 LGA
I-1979041231	4/14/1979	GREENSBORO	Highway	Yes	0/0	$0	300 LGA
I-1979061010	5/1/1979	GREENSBORO	Highway	Yes	0/0	$0	385 LGA

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)	Quantity Released
I-1979120614	11/8/1979	GREENSBORO	Highway	Yes	0/0	$0	805 LGA
I-1980090308	8/18/1980	GREENSBORO	Highway	Yes	0/0	$0	563 LGA
I-1980100440	9/20/1980	GREENSBORO	Highway	Yes	0/0	$0	5,869 LGA
I-1980101010	9/25/1980	GREENSBORO	Highway	Yes	0/0	$0	930 SLB
I-1982030735	2/20/1981	GREENSBORO	Highway	Yes	0/0	$0	750 LGA
I-1982100088	9/22/1982	GREENSBORO	Highway	Yes	0/0	$0	0
I-1982100088	9/22/1982	GREENSBORO	Highway	Yes	0/0	$0	13,000 SLB
I-1987110100	10/30/1987	GREENSBORO	Highway	Yes	1/4	$0	8,000 LGA
I-1990080042	7/26/1990	GREENSBORO	Highway	Yes	0/0	$0	600 LGA
I-1991090582	9/8/1991	GREENSBORO	Highway	Yes	0/0	$0	129 LGA
I-1991110412	9/26/1991	GREENSBORO	Highway	Yes	0/0	$0	55 LGA
I-1992090751	8/20/1992	GREENSBORO	Highway	Yes	0/0	$0	700 LGA
I-1993090117	8/24/1993	GREENSBORO	Highway	Yes	0/0	$0	5,000 LGA
I-1995071369	7/5/1995	GREENSBORO	Highway	Yes	0/0	$0	0.264172 LGA
I-1997100017	9/4/1997	GREENSBORO	Highway	Yes	0/0	$36,983	1,300 LGA
I-1997100623	9/5/1997	GREENSBORO	Highway	Yes	0/0	$0	200 LGA
I-1999101169	9/30/1999	GREENSBORO	Highway	Yes	0/1	$0	9,000 LGA
I-2000040521	3/30/2000	GREENSBORO	Rail	Yes	0/3	$0	5,300 LGA
I-2001060345	11/13/2000	GREENSBORO	Highway	Yes	0/0	$0	4,500 LGA
I-2003050215	8/28/2002	GREENSBORO	Highway	Yes	0/0	$0	5,500 LGA
I-2003090170	1/30/2003	GREENSBORO	Highway	Yes	0/0	$0	260 LGA
I-2003100511	9/25/2003	GREENSBORO	Highway	Yes	0/0	$0	324.14 LGA
I-2003120134	10/2/2003	GREENSBORO	Highway	Yes	0/0	$0	175 LGA
E-2009020080	12/23/2008	GREENSBORO	Highway	Yes	0/0	$0	500 LGA
E-2009110327	10/27/2009	GREENSBORO	Highway	Yes	0/0	$0	387.5 LGA
I-2011010037	12/10/2010	GREENSBORO	Highway	Yes	0/0	$0	300 LGA
I-2012040248	11/29/2011	GREENSBORO	Highway	Yes	0/0	$0	200 LGA
I-2012040248	11/29/2011	GREENSBORO	Highway	Yes	0/0	$0	1,000 LGA
I-2014120003	11/14/2014	GREENSBORO	Highway	Yes	0/0	$2,450	200 LGA
I-2015040484	12/5/2014	GREENSBORO	Highway	Yes	0/0	$59,806	2021 LGA
I-2016100044	9/7/2016	GREENSBORO	Highway	Yes	0/0	$73,512	57.1875 LGA
I-2016100044	9/7/2016	GREENSBORO	Highway	Yes	0/0	$73,512	108.25 LGA
E-2019010304	12/13/2018	GREENSBORO	Highway	Yes	0/0	$153,000	8499 LGA
E-2019050725	4/8/2019	GREENSBORO	Highway	Yes	0/0	$0	130 LGA
I-2019070105	4/30/2019	GREENSBORO	Highway	Yes	0/0	$4,500	150 LGA
E-2019070319	5/9/2019	GREENSBORO	Highway	Yes	0/0	$0	249 LGA
High Point							
I-1977010157	12/31/1976	HIGH POINT	Highway	Yes	0/0	$0	5,200 LGA
I-1985060263	5/29/1985	HIGH POINT	Highway	Yes	0/0	$0	150 LGA
I-2011010135	11/10/2010	HIGH POINT	Highway	Yes	0/0	$0	181 LGA
Jamestown							
I-1989040054	3/15/1989	JAMESTOWN	Rail	Yes	0/0	$0	2,600 LGA
I-2001050986	3/19/2001	JAMESTOWN	Highway	Yes	0/0	$4,022	300 LGA
E-2013030384	3/27/2013	JAMESTOWN	Highway	Yes	0/0	$0	100 LGA

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)	Quantity Released
Oak Ridge							
None Reported	--	--	--	--	--	--	--
Pleasant Garden							
None Reported	--	--	--	--	--	--	--
Sedalia							
None Reported	--	--	--	--	--	--	--
Stokesdale							
I-1978020301	1/31/1978	STOKESDALE	Highway	Yes	0/0	$0	6,000 LGA
I-2002120039	11/12/2002	STOKESDALE	Highway	Yes	0/0	$13,198	4,000 LGA
Summerfield							
None Reported	--	--	--	--	--	--	--
Whitsett							
None Reported	--	--	--	--	--	--	--
Unincorporated Area							
None Reported	--	--	--	--	--	--	--

Source: Untied States Department of Transportation Pipeline and Hazardous Materials Safety Administration

5.20.4 Probability of Future Occurrence

Given the location of numerous FRS and RMP facilities in Guilford County as well as prior roadway, railway, air, and other incidents it is highly likely that a hazardous material incident may occur in the county (100 percent annual probability). However, county and municipal officials are mindful of this possibility and take precautions through pre-planning to respond to an occurrence.

5.20.5 Consequence Analysis

People (The Public and Public Confidence)

The accidental or intentional release of a hazardous material could have both immediate and long-lasting effects on the health of the public. Any release needs to be quickly identified and the proper response guidelines followed to reduce the possible impact on the public. Evacuation is always a consideration when dealing with harmful substances. The public should be aware that hazards exist from the presence of hazardous substances and should take preparedness actions at home and in the workplace to act should a release of substances occur.

Hazardous materials incidents can have a significant effect on public confidence in government as incidents often cause serious harm to people via long-term health impacts, contamination of soil or drinking water, and even death. Because of the dangers associated with many hazardous materials and the level of control that humans have over hazardous material incidents compared to natural hazards, public confidence could be damaged severely in the event of an incident.

Responders

First responders must be vigilant when hazardous materials are suspected to be involved. The proper protective apparel must be worn and protocols must be followed to ensure that contaminated individuals and objects go through appropriate decontamination procedures prior to being moved away

from the incident, regardless of the situation. Contamination of other responders or citizens must be avoided. The appropriate personnel, such as Hazardous Materials teams, must be notified to ensure that the proper measures are taken to prevent further harm and other related impacts.

Continuity of Operations

During a hazardous materials incident, normal operations could likely be maintained with some additional stress on daily operations. In the event of a larger scale hazardous materials spill, there could be some loss of continuity of operations as a result of strain on personnel and equipment, but typically this will not be the case.

Built Environment (Property, Facilities, and Infrastructure)

Hazardous Materials Facilities

A hazardous materials event is most likely to take place where the substance is created or stored. Hazardous materials facilities have their own highly-trained personnel for handling and cleaning up the particular materials stored onsite. The facility's plans are highly specific to the substances stored there, thus providing for effective responses to incidents that involve these substances. Some facilities contain hazardous materials that can spread or leak quickly or are held in extremely dangerous concentrations. There can still be significant effects on workers and others in close proximity despite having good planning in place.

Utilities

Natural gas distribution lines can be problematic with some hazardous substances if contact is made with the natural gas supply. Most of the natural gas infrastructure is located underground, making exposure highly unlikely. However, natural gas itself can be the hazardous substance involved in the incident. One example of how this may occur is if a utility, work crew, or citizen strikes a gas line causing a leak. Degradation of the line may also be the cause of a release. A gas leak would cause an immediate threat and explosions and fires would be significant concerns for the immediate vicinity.

Transportation Systems

Hazardous substances can have an impact on transportation infrastructure if a release occurs on or in the vicinity of a roadway, which may be the case if a truck or other vehicle carrying hazardous materials is involved in a traffic accident. Significant traffic disruptions may occur, slowing commerce or forcing alternative routing and further congestion of other areas. Similarly, rail lines are one of the more prominent places that hazardous substances are transported. A hazardous substance event on the rail system can impact rail traffic and the overall system. Cleanup efforts wherever the event occurred could be costly and go on for extended periods, shutting down that part of the rail system for a time.

Critical Facilities

Hospitals utilize and store some hazardous substances on site. Biological materials and radioactive wastes are the primary concerns in a hospital setting. Plans are in place to manage these concerns in both routine and emergency situations. An external hazardous materials event that occurs near the hospital or directly impacts a hospital could create service disruptions such as patient care. A large event may also create a high demand on hospital services and cause an overload on resources. Similarly, some emergency services facilities such as emergency shelters may be opened if homes have been exposed to hazardous substances and evacuations occur.

Other Structures
Commercial, industrial, and residential buildings all may have hazardous substances contained within them that are not reported through the official facility reporting system but which could still present a smaller scale hazard. Proper containers and labeling can prevent inappropriate use, but accidents can still cause workers to be exposed. Cleaning products, fertilizers, and pesticides are common examples of supplies that are considered hazardous substances and which could cause a smaller incident.

Economy
The economic impact of a hazardous materials related incident can be significant locally. Affected commerce is the greatest concern, as spills and releases can force businesses such as shopping centers, markets, and financial centers to be shut down for indeterminate periods of time. Contaminated water can be especially problematic as it can cause extensive shutdowns and put many people in danger. The overall costs depend on the substance(s) involved, how much is released, the processes and time used to manage the spill or release, who or what is contaminated, whether a fire takes place, etc. Cleanup can be a less significant cost and is typically handled by the party responsible for the spill or release.

A hazardous materials incident could occur at any large gathering if it was the target of a terrorism event (see Terrorism below). Also, a large event arena could be forced to deal with a hazardous substance incident if it is located in close proximity to them. Arenas and other major event venues may be at significant threat as they are often situated along transportation routes where vehicles transporting such substances could become involved in an accident.

Environment
The environmental impact is highly dependent on the location and the severity of the event. Some of the substances involved in these incidents can be cleaned up or do not have lasting impacts on the areas affected. Others may cause crops and other vegetation to be destroyed, sometimes beyond the ability to grow back, and animal populations may become displaced or killed. Some areas may be deemed uninhabitable or not fit for development. Water sources may also be impacted by hazardous materials releases or spills, which can affect fish, animal, and plant populations as well as humans that come in contact with contaminated water. The threat to water sources is perhaps the greatest potential threat of a hazardous materials spill on the environment. Water can rapidly transport the substance great distances and expand the scope of the incident. This can make it difficult to respond to the incident and cause serious health impacts.

5.21 NUCLEAR POWER PLANT EMERGENCY

5.21.1 Background

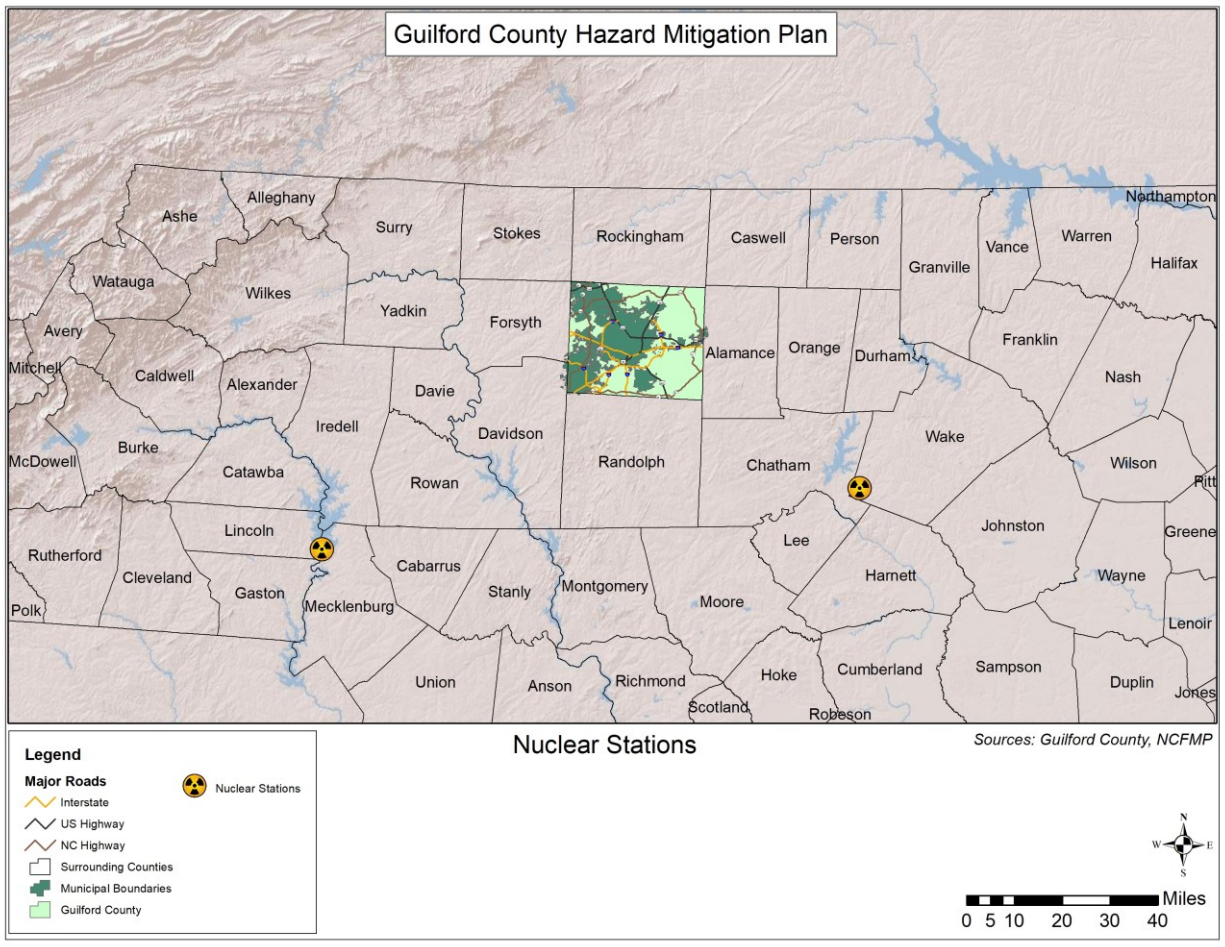
A nuclear and radiation accident is defined by the International Atomic Energy Agency as “an event that has led to significant consequences to people, the environment or the facility.” This type of incident may result from damage to the reactor core of a nuclear power plant which can release radioactivity into the environment. The degree of exposure from nuclear accidents has varied from serious to catastrophic.

By some estimates, over 50 percent of nuclear accidents that have ever occurred were in the United States.[36] However, it is also important to note that generally, nuclear accidents are a rare occurrence. Many incidents are extremely well known due to their large-scale impact and serious effects on people and the environment.

One of the most notorious accidents in the United States was the Three Mile Island accident which occurred in 1979 and released small amounts of radioactive gases and iodine into the environment. Although no deaths have been directly attributed to the accident, it invoked a strong public reaction and demonstrated the potential dangers associated with nuclear power generation.

Shearon Harris Nuclear Power Plant, which is the plant located closest to Guilford County, is a 2,948 megawatt power plant that began commercial operation in 1987. It has pressurized water reactors and operates with a very high level of security. **Figure 5.47** shows the plants' locations in relation to Guilford County.

FIGURE 5.47: NUCLEAR POWER PLANTS LOCATED NEAR GUILFORD COUNTY



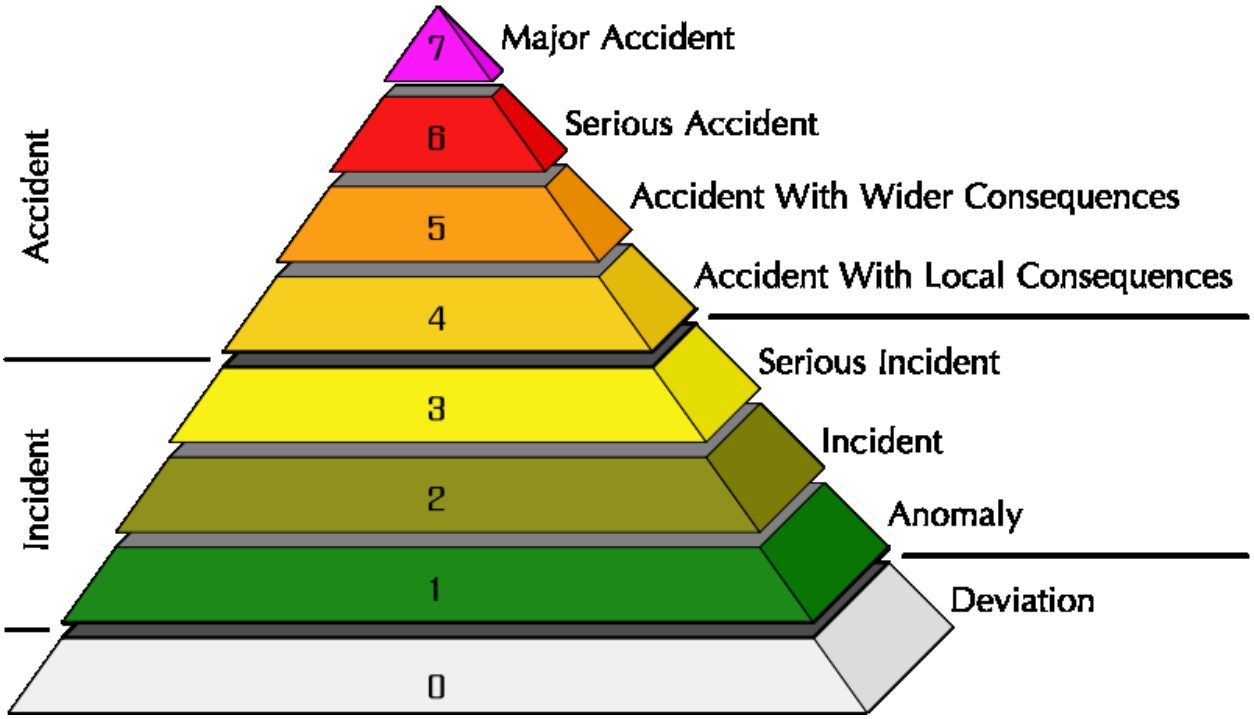
Source: International Atomic Energy Agency

[36] Benjamin K. Sovacool. A Critical Evaluation of Nuclear Power and Renewable Electricity in Asia *Journal of Contemporary Asia*, Vol. 40, No. 3, August 2010, pp. 393–400.

5.21.2 Location and Spatial Extent

The southeastern portion of Guilford County is at risk to impacts from a nuclear incident at the Shearon Harris Nuclear Power Plant. Areas in this part of the county are susceptible due to their relative proximity to the Shearon Harris Nuclear Power Plant. The International Atomic Energy Association has developed a scale called the International Nuclear and Radiological Event Scale (INES) which provides a quantitative means of assessing the extent of a nuclear event. This scale, like the MMI used for earthquakes, is logarithmic which means that each increasing level on the scale represents an event 10 times more severe than the previous level (**Figure 5.48**).

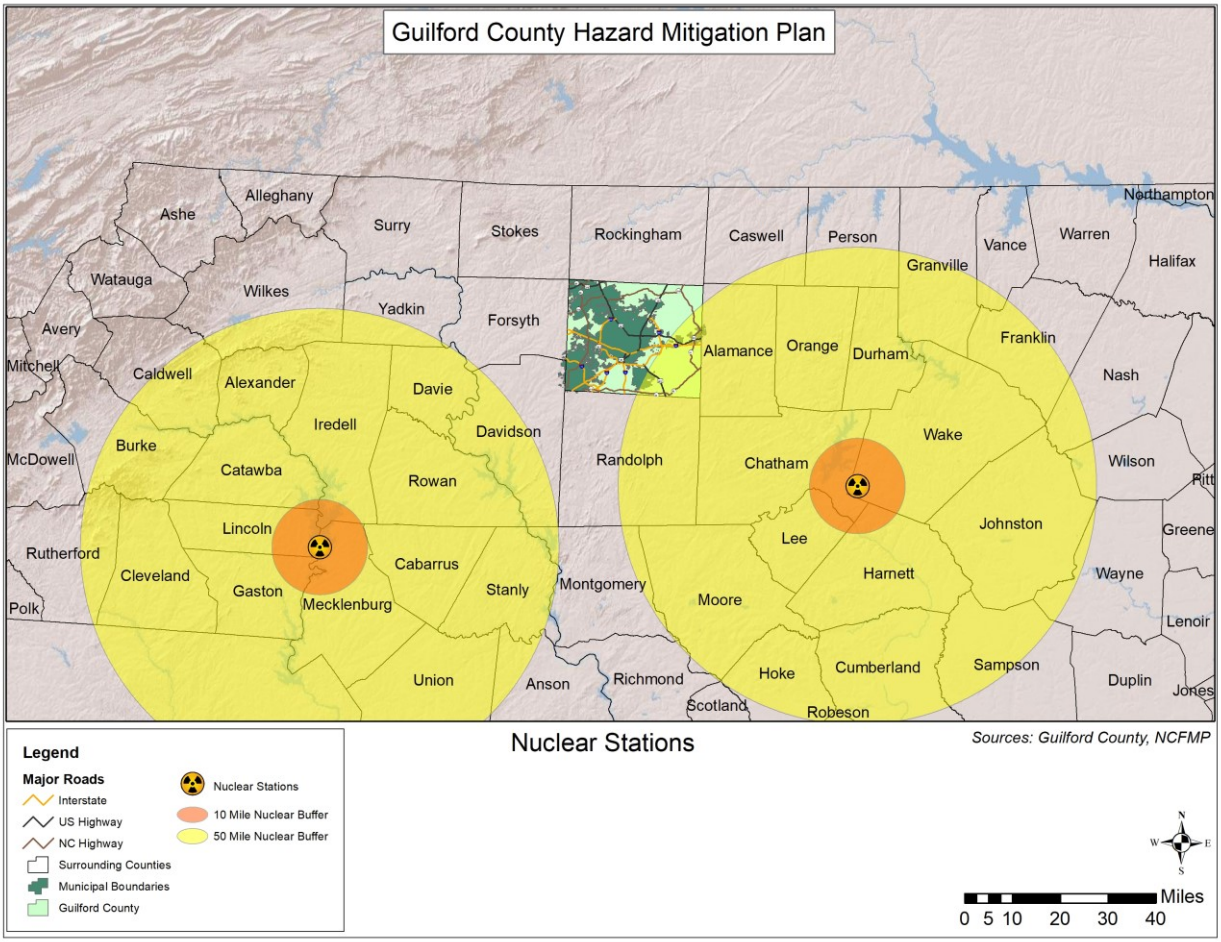
FIGURE 5.48: INTERNATIONAL NUCLEAR EVENT SCALE



Source: International Atomic Energy Agency

The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and this radius is the designated evacuation radius recommended by the Nuclear Regulatory Commission. Within the 10-mile zone, the primary concern is exposure to and inhalation of radioactive contamination. The most concerning effects in the secondary 50-mile zone are related to ingestion of food and liquids that may have been contaminated. None of the county is located within the 10-mile radius of the power plant; however, a portion of the county is located within this 50-mile radius which is still considered to be at risk from a nuclear incident (**Figure 5.49**).

FIGURE 5.49: NUCLEAR POWER PLANT EXPOSURE ZONES IN RELATION TO GUILFORD COUNTY



Source: International Atomic Energy Agency

5.21.3 Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Power Plant, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world.

5.21.4 Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

5.21.5 Consequence Analysis

People (The Public and Public Confidence)

In the 50-mile zone, the public would be most impacted from ingesting the material(s) through home grown crops, milk produced from livestock which have fed on contaminated grasses, and consuming

contaminated surface water. Ingestion of radiological materials may result in internal contamination if ionizing radiation is released in the body. This can cause serious health risks, especially if critical organs are affected. Some organs such as the thyroid take in certain isotopes. It is extremely difficult to purge the material from the body.

The public will be extremely concerned about their health and safety during and after a nuclear incident. Confidence will be dependent upon the availability of information and perceived quality of response by government and non-government service providers, but it is likely that confidence in the county's governance will be a significant concern.

Responders

First responders are vulnerable to the same impacts as the general public but also may be at greater risk due to their need to function outdoors and operate in contaminated environments. These responders will likely need to operate in personal protective equipment and limit their outdoor exposure. Proper decontamination is likely to be necessary to reduce the spread of contamination. Since responders will be first on the scene and directly dealing with the issues of an incident, their risk will potentially be very high.

Continuity of Operations

In the wake of a nuclear accident, continuity of operations in Guilford County would likely be maintained relatively well since the county is only impacted in some areas by the 50-mile buffer area. Generally, operations may need to proceed from outside their normal location, as there are plans at all stations for setting up command posts outside of high-risk areas when incidents occur. This will likely impact continuity of operations to some degree, though exercises on incidents are carried out frequently by government officials in conjunction with plant operators.

Built Environment (Property, Facilities, and Infrastructure)

It is unlikely that a radiological incident would cause the kind of damage that is typical of many other hazards identified in this plan as there would be minimal destruction of buildings and other infrastructure as a result of this type of incident. However, many structures and facilities could potentially be contaminated with radioactivity, rendering it extremely dangerous for humans to be near them or live/work there. In this sense, a major nuclear event may cause significant damage to the built environment and result in large areas that must be quarantined or considered off-limits to the public after an incident, though that is less likely in Guilford County than in counties closer to nuclear facilities. Further, checkpoints and decontamination stations may need to be set up along routes that leave the evacuation zones, resulting in increased travel times along major roadways and necessitating traffic re-routes.

Economy

Economies within and nearby the risk zones are likely to see decreased spending as evacuation takes place. Travel and tourism across the region may be limited for an extended period of time due to travelers associating the entire area with the incident. Interstate commerce may be impacted as decontamination stations may need to be established and some drivers may elect to attempt to circumnavigate the region altogether, extending travel times and increasing the time to market for products on a regional and statewide level. Employers in the surrounding areas may see increased absenteeism and requests for leaves of absence to deal with the aftermath of the event and some employees may self-evacuate, resulting in a loss of productivity.

Environment

Environmental impacts as a result of a nuclear incident may be very serious. Contaminants may impact the land and water for many years and wildlife may experience increased likelihood of cancer and other health problems. In general, habitats and ecosystems will suffer long-term from a radiological incident as the organisms within these areas will face similar impacts to those that humans experience, but since they are unable to evacuate or permanently migrate to new locations, they will be exposed for longer periods and be impacted to a greater degree.

5.22 PIPELINE FAILURE

5.22.1 Background

Pipelines in the United States are used to transport and distribute a number of products from their extraction point to sites where those materials are utilized throughout the country. Pipelines are most commonly used to transport energy sources such as natural gas and petroleum products but are also often used in the transportation of other hazardous liquids. Transportation of these products via pipeline is abundant in the United States due to the cost-effectiveness of the process which allows quick movement with relatively minimal cost.

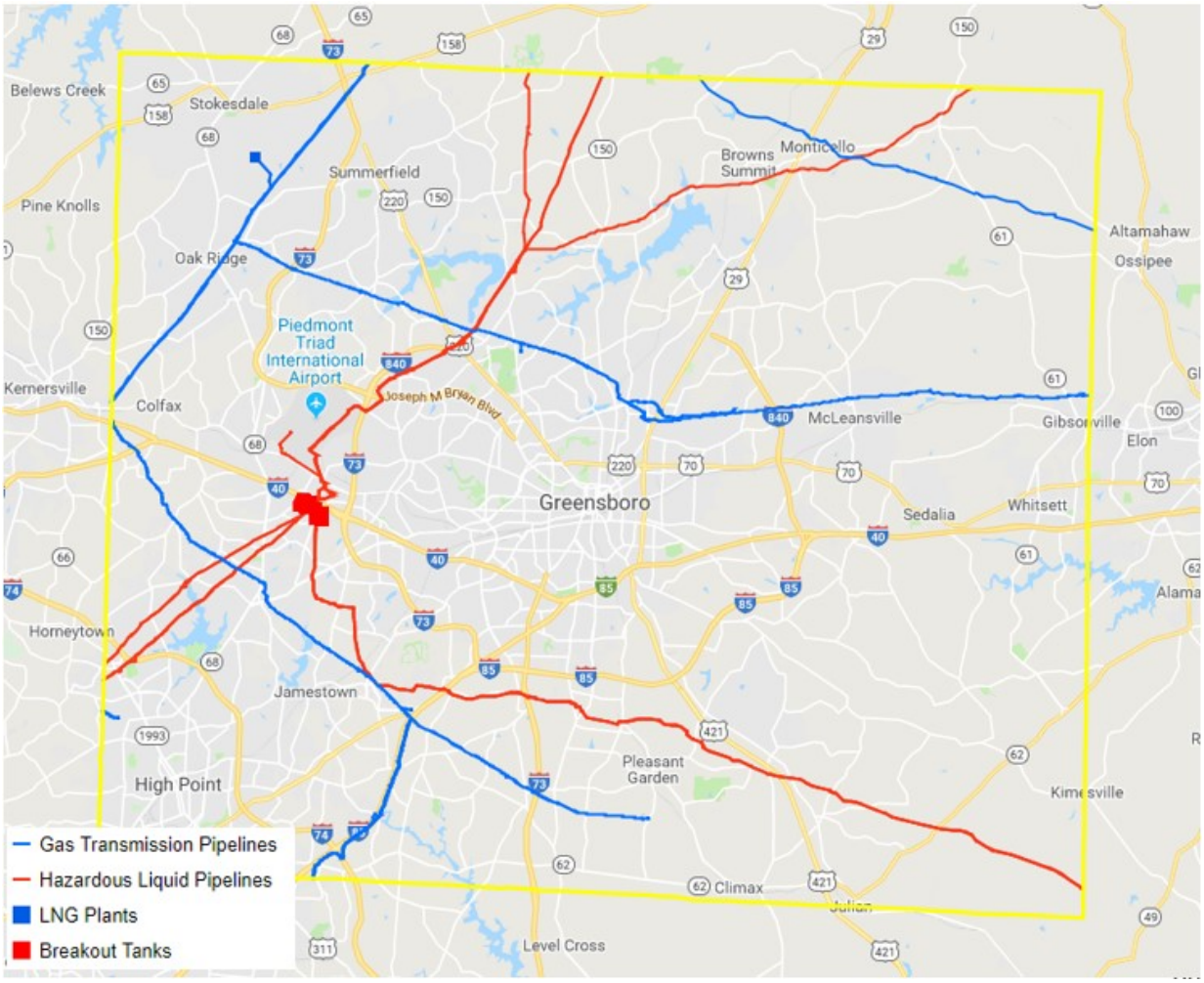
Generally, pipelines are safe and effective, transporting materials where they are needed without incident. However, many pipelines in the United States were installed over 60 years ago and were made with materials such as cast and wrought iron or bare steel which degrade over time. This presents a definitive danger to people and property as a leak or spill of hazardous products from a degraded pipeline could prove disastrous, causing costly damage to property and injury or death.

As a result, there has been a recent movement to replace many of these older pipelines with newer materials such as plastics that can reduce the risk of a pipeline failure and a hazard incident. In 2011, the Pipeline Safety, Regulatory Certainty, and Job Creation Act was passed and called for the US Department of Transportation to conduct a state by state survey of pipelines and accelerate repairs of aging infrastructure. The following website provides a state by state update of the progress of this initiative: http://primis.phmsa.dot.gov/comm/states.htm?nocache=4496.

5.22.2 Location and Spatial Extent

Pipelines exist throughout the state of North Carolina and in Guilford County. Across the state, there are over 192,000 miles of hazardous liquid line, 17,591 miles of gas transmission gathering lines, and 1,263,987 miles of gas distribution main lines. In Guilford County, there are 1,248 miles of gas lines and 822 miles of hazardous liquid lines. For more specific description of the location of pipelines in Guilford County, see **Figure 5.50** below.

FIGURE 5.50: PIPELINES IN GUILFORD COUNTY



Source: Pipeline and Hazardous Material Safety Administration

5.22.3 Historical Occurrences

There have been some reported incidents of pipeline disruptions/failures within Guilford County, dating back to the 1970s. In 1978 there were two spills that occurred on a line connected to the Greensboro tank farm. As a result of these spills, 14,700 gallons and 8,400 gallons of gas were spilled, respectively. In 1987, a 17,000 gallon spill occurred near Lake Brandt on the Plantation Pipeline that was caused by digging in the area. As a result, there was leakage into the nearby neighborhood of Guilford Green, although fortunately the fuel did not reach the lake itself.

Additionally, the events of Hurricane Katrina in September 2005 led to significant disruptions in the distribution networks of both liquid petroleum products and natural gas throughout the Southeast, including Guilford County. The impacts were significant as motorists lined up at gas stations trying to acquire fuel while it was available. Some stations could not keep up with the demand and ran out of

fuel.[37] Natural gas customers experienced significant price hikes as a result of the pipeline disruptions and other network damages caused by the hurricane.

Finally, in 2010, a lightning strike near one of the storage tanks along Interstate 40 in Greensboro caused a fire in the early hours of June 13. The fire was brought under control quickly but caused closures of several roads and destroyed the tank that was impacted and which contained over 800,000 gallons of gasoline.

5.22.4 Probability of Future Occurrence

Since there have been some reported incidents of major pipeline disruptions or failures within Guilford County, future occurrences are possible.

5.22.5 Consequence Analysis

People (The Public and Public Confidence)

The main concerns for the public with natural gas/pipeline incidents include fire ignition, explosions, and service loss. Any part of the distribution network that contains product may experience some form of failure as discussed above. The release of natural gas has the potential to spark fires or cause explosions due to the material's characteristics. This is especially hazardous in residential or other populated areas.

Public confidence will be impacted depending on the severity of the incident and location. If the incident occurs in an area where it has major impacts on the population and there are fatalities or injuries, there may be a loss of confidence in the government. Smaller incidents that only impact transmission or storage facilities of the product will likely result in less impact on public confidence.

Responders

First responders would be primarily tasked with evacuating people within potentially hazardous environments, treating and transporting patients, containing any releases, and preventing and/or extinguishing fires or explosions. Responders will likely be the first on the scene to these types of events and so will likely face the most potential impacts as they try to assist in efforts to address the incident.

Continuity of Operations

Continuity of operations can typically be maintained during a pipeline event in Guilford County. However, a large-scale pipeline explosion or failure would certainly put a strain on operations, requiring a great deal of attention from responders. This would certainly disrupt continuity of operations to some degree.

Built Environment (Property, Facilities, and Infrastructure)

Building Stock

The primary concerns with residential buildings during a pipeline failure include gas inhalation, fires, explosions, and loss of heating. Natural gas leaks could lead to asphyxia in some cases. The natural gas that is used in home heating has the compound mercaptan, which has a distinctly strong odor that can detect a leak before the environment becomes hazardous to health. The fire and explosion risks are

[37] Jad Mouawad, 2005. "Katrina's Shock to the System," *New York Times*. http://www.nytimes.com/2005/09/04/business/04oil.html?pagewanted=all

present due to the presence of methane in natural gas, which is highly flammable and can be explosive in certain conditions. Gasoline is also flammable but is not an explosive risk. Lastly, some homes may lose their primary heat source when natural gas service is disrupted.[38]

Some businesses in Guilford County have natural gas heating systems or rely on natural gas for some of their food preparation processes. A pipeline failure would interrupt these processes, thus having a negative impact on business. If a facility or business containing hazardous materials is located near a natural gas release, the potential exists for interactions between the hazardous materials stored on the site and the natural gas. Also, any fires or explosions caused by a release of fuels or natural gas could cause containment failures for the hazardous materials on the site(s). The I-40 Fuel Farm is a key facility in the distribution of these materials and could potentially be the site of an incident in the future as it has experienced incidents in the past.

If there is a pipeline break near an interstate or other component of the transportation infrastructure, responders may have to shut traffic down until the release is contained. Lanes of travel may be blocked by vehicles that run out of fuel during shortages.

Economy

A major concern with the pipelines in Guilford County is the distribution and availability of fuels. A shortage in gasoline and/or diesel could have drastic impacts on the local economy and potentially the national economy depending on the breadth or duration of the shortage. Much of the impact would be from lost commerce, as the travel of cargo, workers, and visitors could be limited or completely stopped depending on the severity of the supply issues. The primary financial effects of a significant natural gas incident in the pipeline system would be on the natural gas industry and businesses that rely on natural gas for heating or other services. The costs of lost service and repairs could be severe in the case of a pipeline failure for the natural gas providers. Business closures could have a significant impact on the local economy. Some restaurants may rely on natural gas for some of their food preparation as well.

Environment

Impacts would be confined to the immediate area of the pipeline failure, including exposure of vegetation and wildlife. Fires or other contamination on the environment may have similar impacts as those described in the Hazardous Materials Incident section above.

5.23 RESOURCE SHORTAGE (WATER / FUEL)

5.23.1 Background

Society relies on many resources to conduct routine activities. Without the most critical resources in ample supply, the public's way of life can be severely hampered. Water, electricity, and fuel are among the most critical resources and occasionally may be subject to supply issues. Electrical disruptions and outages were addressed in the Energy/Power/Utility Failure section. This section will address water and fuel shortages.

[38] National Institute of Health, 2011, *What You Need to Know About Natural Gas Detectors*. http://www.nidcd.nih.gov/health/smelltaste/pages/gasdtctr.aspx

While most of the Earth's surface is covered by water (70%), a mere 3% of that water is freshwater. More than 68% of this freshwater is found in glaciers and ice caps, while only 1.2% is surface water. Fresh, potable water is in even more limited supply.[39] In the case of a water shortage, rationing or elimination of nonessential activities or events could become viable options to limit unnecessary consumption of water during times of concern.

Fuel, or petroleum, is also a limited resource that is used globally for many different purposes. Petroleum alone makes up about 40% of the total energy consumption in the United States.[40] When there are shortages of this valuable commodity, the activities and commerce of impacted areas could be significantly slowed. Decisions must be made to sustain critical operations, such as first response capabilities. Rationing or the elimination of nonessential activities or events could become viable options to limit unnecessary consumption of fuel during times of concern.

5.23.2 Location and Spatial Extent

Since a water or fuel shortage would impact the entire county when it occurs, the location of this hazard is considered to be countywide.

5.23.3 Historical Occurrences

In July of 2002, there was a major water shortage throughout North Carolina. This shortage was exacerbated by exceptional drought conditions over an extended period of time. The majority of the years between 1998 and 2002 were marked as under some level of drought. The shortage led to a significant water emergency for Guilford County, in particular in the City of Greensboro. At its worst point, the city had only a 67 day water supply and emergency conservation measures were put in place.

In September of 2008, the impacts of Hurricanes Gustav and Ike caused shortages of fuel in Guilford County and many other parts of the Southeast. Oil refineries in the Gulf of Mexico and the pipelines that deliver the product to various distribution points experienced significant disruptions or damages. Three years prior in August of 2005, Hurricane Katrina caused major shortages of fuel after it damaged or shut down many of the refineries and pipelines in the same region. In both shortages, there were long lines of vehicles at gas stations as the public attempted to fill up gas tanks before the supply ran out. Some stations were completely out of diesel and regular unleaded gasoline.

The fuel situation in the area was also critical during the OPEC fuel crisis in 1973 and 1974. Some gas stations in Greensboro implemented limits on refueling, including one station recorded as asking customers to purchase a maximum of 10 gallons. This illustrates how the geopolitical climate with respect to oil in the Middle East and other major oil reserves can have a significant impact on the price and supply of fuel.

[39] United States Geological Survey, *Where Is Earth's Water,* https://www.usgs.gov/special-topic/water-science-school/science/where-earths-water?qt-science_center_objects=0#qt-science_center_objects

[40] The National Academy of Sciences, *What You Need to Know About Energy – Supply and Demand,* http://www.nap.edu/reports/energy/supply.html

5.23.4 Probability of Future Occurrence

Fuel and water shortages have occurred a number of times in Guilford County over the past several decades. Water shortages were more common in recent years, but fuel shortages have certainly impacted the county as well. As a result, the probability of future occurrences is likely.

5.23.5 Consequence Analysis

People (The Public and Public Confidence)

During events such as drought that cause water shortages or emergencies, the public is given limitations on using water for non-essential purposes such as watering lawns or washing vehicles. Water shortages beyond this are possible but less likely. Greater restrictions could be implemented and enforced in extreme water emergencies. Due to these impacts to the public, first response agencies may require additional resources to deal with heightened public safety or medical emergency concerns.

Fuel shortages are not as critical to life safety but could impact decisions made about travel and other life activities. When fuel supply issues become apparent, the public often resorts to panic buying, and lines become long at gas stations. Before the shortage even takes place, gas stations may be overtaxed, as fuel is dispensed faster than it can be replenished. In extreme shortages, limitations could be placed on consumers and in some cases businesses, governments, and other groups. Rationing at gas stations may be implemented and non-essential business or governmental activities may be put on hold or eliminated completely.

Water and other resource shortages can have an influence on the public and its outlook on how the government and any related nongovernmental organizations respond to the shortage. If rationing and restrictions are put in place, it will impact the public and its confidence in the entities responsible for dealing with these limitations. Collaboration with the media could have some influence on what is reported and could reduce negative perception.

Responders

Water shortages are more likely to present life safety issues than fuel shortages. In the event of a water shortage, more health-related emergencies such as dehydration can be expected, particularly if mechanisms are not in place to effectively obtain water from other areas. The concern is heightened during warm weather conditions, especially with extreme temperatures. Water shortages may also hamper firefighting.

Continuity of Operations

The nature of a resource shortage generally means that there is some recognition that the shortage may be forthcoming in advance of major issues. The county generally has plans in place to ensure that continuity of operations can be maintained during a resource shortage. Still, a long-term resource shortage could have an impact on operations as it begins to affect staff in the same ways as the general public is affected.

Built Environment (Property, Facilities, and Infrastructure)

Building Stock

In the midst of a water shortage, the prime concerns for residential areas would deal with hydration, preparation of food, and personal hygiene. In a fuel shortage, generators that run on fuel may not be

operational. In both water and fuel shortage scenarios, there may be limitations put on property maintenance. Water intensive processes may be disrupted during water shortages for commercial and industrial operations. Accommodations such as restrooms for employees may not be operational. During fuel supply shortages, generators may not be able to be used, and property maintenance may be limited. Also, business operations that require transportation could be impacted significantly.

Critical Facilities and Personnel
During water or fuel shortages, there could be significant impacts on medical facilities and operations. Water intensive processes within the facility may be disrupted. Some medical procedures may need to be postponed or altered. In the event of a fuel shortage, interfacility transportation of patients may be impacted and backup generators may not be operational if needed. The major concern for emergency services during water shortages deals with firefighting. At the emergency services facilities, accommodations such as restrooms or showers and gear washing machines may not have the water needed for use. Fuel shortage events would spur concerns about emergency vehicles' consumption of fuel, as well as equipment and generators that run off of fuel.

The primary concern at the I-40 Fuel Farm during water supply emergencies is fire protection on site. Some water-intensive processes or basic accommodations for employees may be affected as well. The Fuel Farm's operations could be significantly impacted by the shortage of fuel. Productivity and profit would be of concern, but security issues may be an additional concern. There may be attempts of theft at the site when the fuel supply becomes critically low.

Transportation Systems
There would be few expected impacts on the transportation system during a water shortage. However, these systems could see significant impacts during a fuel shortage. Many travelers' vehicles may breakdown due to running out of fuel, which could block roadways for others. Maintenance and response mechanisms could be limited or unavailable depending on whether fuel is available as well. There could also be significant impacts on airport operations. Maintenance measures or accommodations on the airplanes that require water may not be able to be carried out. Accommodations such as restrooms for patrons and employees at the airport may not be operational, which could force the facility to shut down operations until the crisis is resolved. A fuel crisis can be equally as problematic as, without fuel, the airplanes cannot fly and again operations could be shut down.

Economy

Shortages dealing with critical resources such as water and fuel can have detrimental impacts on the economy. Governmental entities, businesses and the public may be forced to make significant and drastic decisions in order to deal with the complexities of shortages. Water supply disruptions could impact tourism and commerce if water is needed in key processes. Businesses such as hotels and restaurants may have to consider having water brought in or closing. The transport and delivery of goods and supplies can be severely impacted by fuel shortages, causing significant disruptions in economic activity. The overall impact is dependent on the severity and the duration of the shortage. It is also dependent on the availability of the resource from other sources and the ability to effectively get these resources to the intended end user. Workers may not be able to commute to work, bringing about productivity concerns and significant costs.

Environment

In the case of a severe water shortage, vegetation and crops, livestock, and aquatic wildlife may experience some impact. Livestock may not be provided adequate water and could experience illness or death. Typical or alternative sources of water may be tapped for more water, affecting ecosystems as water levels drop. There would be little expected impact to the environment during a fuel shortage.

5.24 TRANSPORTATION INCIDENT

5.24.1 Background

While transportation accidents occur on a daily basis, large-scale incidents that have major impacts on commerce or mass transit are uncommon. This section will focus on large-scale incidents, which will include incidents involving airplanes on and off airport properties in Guilford County and incidents involving trains or major highway as when these do occur, they can have significant impacts on the community. The area has experienced several incidents in the past, but occurrence is relatively infrequent and significant impacts are rare. The most common impacts involve how the incident will impact daily life, such as travel and commerce.

In Guilford County, the most prominent site for air travel is Piedmont Triad International Airport (PTIA) located in Greensboro. There are smaller airports within the county such as Southeast Greensboro Airport which have much smaller operations that are of very low significance to national air travel. Incidents have and will occur both on and off of airport properties as will be discussed in the "Historical Data" section.

Guilford County is also a major thoroughfare for rail commerce and travel. A major rail line passes through the downtown areas of both Greensboro and High Point. Norfolk Southern and Amtrak are the two major carriers of cargo and passengers.

There are also several major highways and interstate highways that run through Guilford County including Interstate-40, Interstate-73, Interstate-74, Interstate-85, and Interstate-840.

5.24.2 Location and Spatial Extent

Transportation incidents are most likely to occur along major transportation corridors such as highways, interstates, or railways. However, transportation incidents can occur throughout the county, especially given the number of planes that take flight in and out of regional and local airports and the many roads that are found throughout the county.

5.24.3 Historical Occurrences

There have been numerous incidents in Guilford County involving airplanes. Some of these incidents have occurred at PTIA while others were outside of any airport's boundaries. The following incidents are just a sample of some of the incidents that have occurred within the county. Much of this information is from response records in the Guilford Metro 9-1-1 system archive.

- In 1989, the left main gear in the landing gear system of a 737 airplane was not functioning correctly. The plane made an emergency landing at PTIA with 107 occupants. There were no injuries or deaths.
- In August of 2000, a DC-9 airplane made an emergency landing at PTIA due to smoke in the cockpit. Of the 63 crew and passengers, no one was injured during the landing or the fire that resulted, which damaged the plane substantially.[41]
- In November of 2002, a small plane struck trees while in flight and crashed near Route 421 near Southeast Greensboro Airport. The pilot was the only occupant and the only injury/fatality in the incident.
- In January of 2004, a plane went off of the runway during its takeoff attempt. There were no significant injuries or deaths.
- In October of 2011, a small private plane crashed into a home in a subdivision in Colfax. There was no one inside the home at the time, but the occupants of the airplane did not survive.
- On February 11, 2015, there was a plane crash at 150 Air Harbor Road. This was a single engine aircraft and there was one fatality.
- In December 2018, a fuel tanker crashed resulting in a fire that damaged the Interstate 73 Overpass and requiring the highway to be closed for repairs.

There have also been several incidents within Guilford County that involved trains.

- In December of 2005, 11 cars derailed in Greensboro. No one was injured.[42]
- In May of 2010, a derailment occurred in downtown Greensboro. No one was injured in the incident, where six of the train's cars derailed.[43]

Trains also have collided with other travelers.

- In 1979, another train struck a gasoline tanker in Greensboro.
- In October of 1987, a 57-car train struck a gasoline tanker in Greensboro.

Both of these incidents occurred near the Interstate 40 Fuel Farm, where fuel is continuously being distributed to and from the facility.

5.24.4 Probability of Future Occurrence

Transportation incidents are a highly likely event given that automobile accidents occur nearly every single day to some degree. However, these smaller-scale transportation incidents would have a relatively low impact overall on the community. Transportation incidents are fairly common, and the probability of a major future occurrence is likely.

5.24.5 Consequence Analysis

People (The Public and Public Confidence)

In the event of a transportation incident such a car accident, plane crash, or train derailment, there is a strong possibility of injury or death. The first concern in any incident is toward life safety, and

[41] Aviation Safety Network, 2000, ASN Aircraft accident McDonnell Douglas DC-9-32 N838AT Greensboro, NC. http://aviation-safety.net/database/record.php?id=20000808-0
[42] WXII 12 News, 2005, *Officials Investigate Train Derailment*.
[43] News and Record, May 25, 2010. *Roads Reopen in Greensboro Following Train Derailment.*

emergency services will respond to not only assist those directly involved, but to monitor for fire or hazardous materials that could impact others. A car accident or train derailment could impact the normal operations of the transportation system, as other cars or trains attempting to pass through the area of the incident may be stopped or redirected. A plane crash on the site of an airport could drastically alter operations, also causing stoppages or redirection. An offsite plane crash may not impact other flights, but could impact businesses, homes, and other parts of everyday life depending on where the incident takes place.

Public confidence in the response to a transportation incident is dependent on the expectations of the public and past experience with such incidents. If the incident is major and there are many casualties, public confidence could be reduced, but in most smaller scale cases, there will be little impact to public confidence.

Responders

During any transportation-related incident, first responders will be responsible for public safety and returning the area of the scene back to normal as best as possible. Some of the concerns that may be present during and after an incident include the injured, fatalities, and the protection of others from hazards that result from the incident. Hazardous materials (fuel or cargo), entrapped passengers, fires, and explosions are some examples of these hazards, and are possible in any type of transportation incident. Response agencies are trained to identify, monitor, and react to any of these possibilities to provide an effective public safety response.

Continuity of Operations

Since these types of events occur on a relatively regular basis and their impact is generally fairly localized, there would probably be little disruption to continuity of operations from a transportation incident. However, if it is a major incident, staff resources may be strained and there could be some effect on continuing normal operations.

Built Environment (Property, Facilities, and Infrastructure)

Building Stock

A transportation incident having an impact on any given residence is highly unlikely. If it were to occur, there could be structural damage to the residence and the potential for fire and severe localized damage to the particular structure impacted. If the incident involves hazardous materials release the impact on homes could be more widespread.

Critical Facilities and Personnel

Similarly, impacts to any given critical facility are unlikely. However, a transportation incident could increase the volume of patients at a hospital and strain the ability of responders. Facilities may be located in close proximity to rail lines or roadways, and a major incident near one of those facilities could have an impact on the community overall.

Transportation Systems

Transportation infrastructure will be directly affected by incidents. Short term or potentially long-term closures are possible depending on the magnitude of the incident. For example, while Piedmont Triad International Airport is not one of the major national travel hubs, any disruptions to its operations will have some impact on air travel and commerce.

Economy

The economic impact of a transportation incident would be relatively minor. Plane crashes may discourage some from traveling while a train derailment may have a temporary impact on commerce. However, operations are expected to return to normal in a short period of time following the incident.

There are some rail lines that pass through the downtown Greensboro area, which makes it possible for impacts from a derailment incident to a more widespread economy, but these would likely remain fairly localized. For example, a rail line runs very close by the Greensboro Coliseum and impacts are possible. These impacts could vary from access issues to the arena to a complete closure due to hazardous materials or other significant safety concerns.

Environment

The impacts of a transportation incident vary on the types of materials contained. Most transportation vehicles use some type of fuel that may be spilled during an incident and these fuels are hazardous to plant and wildlife populations and may also be harmful if spilled into a water source. Other contained chemicals and materials that are being transported by freight vehicles can be hazardous to these populations as well, depending on the characteristics of the substance(s). These are described above in the Hazardous Materials Incident section.

Man-Made / Intentional Hazards

5.25 CIVIL DISTURBANCE

5.25.1 Background

Public unrest has been evident in society from the earliest recordings of civilization. Most of these disturbances have been related to political or social issues. Insurrection has framed much of history, dictating the governance and progression of society. In recent years, most of the publicized disturbances have been protests and riots. Rioting does not occur very often in the United States; however, marches and protests are common and could subsequently lead to riots.

5.25.2 Location and Spatial Extent

Civil disturbance or unrest can occur in any location in the county but is more likely to take place in or near prominent locations such as government buildings or significant landmarks.

5.25.3 Historical Occurrences

In Guilford County, there have not been any major civil disturbances in recent years. While there are occasional marches and protests that take place in its bounds, they have not had significant threat of violence associated with them.

On November 3, 1979, an event since named the Greensboro Massacre saw members of the Ku Klux Klan and American Nazis clash with members of the Communist Party marching for African-American

industrial workers. The event climaxed with Klansmen opening gunfire on marchers, five of whom died.[44]

A disturbance near North Carolina Agricultural and Technical State University in Greensboro led to the shooting death of a college student on May 22, 1969. African American student protestors clashed with city police and members of the National Guard for three days (May 21-23), leading to several civilian and nine officer injuries in addition to the fatality. Dozens of students were arrested for disturbing the peace on public school property.[45]

Downtown Greensboro is well-publicized for its part in the non-violent, sit-in protests during the civil rights movement. In 1960, a group of four freshmen from North Carolina Agricultural and Technical College were denied service for being African Americans at a lunch counter in the business F.W. Woolworth. In response, they sat at the counter for several days, with others later joining in on the protest. A large boycott of the business followed, resulting in substantial losses for the company before it relented and enacted changes in policy chain-wide.[46]

Although some of the events described above are not considered hazards to the community per se, they are noted as they serve as examples of past points of conflicting ideology among citizens which can sometimes lead to interactions between groups that cause harm or hurt to those involved.

5.25.4 Probability of Future Occurrence

Despite some history of civil disturbance in Guilford County, there have been few recent events that caused major violence, injury, or fatalities, so the probability of future occurrences is possible.

5.25.5 Consequence Analysis

People (The Public and Public Confidence)

The United States and Guilford County are relatively stable politically and socially. However, there are United States citizens who hold extremist opinions and ideals. There is always the likelihood of some incident sparking some form of violence or disobedience. Most incidences of civil disturbance or insurrection have specific targets, unlike terrorism where maximum effect (including casualties) is desired. Therefore, collateral damage is not as likely but still possible.

The public confidence in government and nongovernmental organizations response is paramount during these incidents. There will be high emotions already present within the community, so an effective, organized, and professional response is crucial to instill confidence in community members. Working with the media is also an important component, as the messages disseminated can influence public perception. The incident response, the media, and also societal expectations will all factor into the positive or negative outcome in the minds of the public.

[44] University of North Carolina at Greensboro Libraries: Civil Rights Greensboro, *The Greensboro Massacre,* http://library.uncg.edu/dp/crg/topicalessays/greensmassacre.aspx
[45] University of North Carolina at Greensboro Libraries: Civil Rights Greensboro, *Dudley High School/NC A&T University Disturbances, May 1969,* http://library.uncg.edu/dp/crg/topicalessays/dudleyatprotest.aspx
[46] Library of Congress, *Greensboro Lunch Counter Sit-In,* http://www.loc.gov/exhibits/odyssey/educate/lunch.html

Responders

During riots and events that become violent, first responders are put into a situation of extreme danger. This is especially true of those employed by local, state, or federal governments as they may actually be targeted in such events. Law enforcement personnel are trained and equipped to deal with such situations and would be utilized to provide for public safety during these events. Other operations may be put on hold in areas of unrest until the situation improves.

Continuity of Operations

Continuity of operations could be disrupted by a civil disturbance, especially if the aim of the unrest is aimed at government buildings or officials. Plans to maintain continuity of operations are in place, but operations would likely be disrupted to some degree by a civil disturbance.

Built Environment (Property, Facilities, and Infrastructure)

Building Stock

If disturbances occur in residential areas, residents may be unable to access their homes and neighborhoods without putting their safety in jeopardy. Destruction of property is also possible in such a scenario. In commercial areas, civil unrest can lead to the destruction of property or theft of goods and equipment. Workers may not be able to access their workplaces or may not be able to work at all if the business is shut down during the disturbance. Industrial facilities are similarly vulnerable to the destruction of property, theft of goods or equipment, or sabotage of the equipment and systems housed in the facility(ies).

Critical Facilities and Personnel

During incidences of civil disturbance, hospitals may expect higher volume of patients. While hospitals are unlikely to be targeted during civil unrest, there could be some impacts if the violence is nearby. These impacts include the possibility of limited access to the hospital for workers, patients, and emergency/patient transportation crews. Incidents of violence in emergency departments and other sections of hospital are also more likely to occur. A civil disturbance event will likely increase call volume for emergency services, and increase the potential for the targeting of responders, or cause access issues relating to emergency scenes and the transportation of patients to hospitals.

Transportation Systems

Transportation systems may be blocked or otherwise damaged during a civil disturbance event, including damage to traffic lights, signs, etc. However, generally there would not be major impacts to the infrastructure itself.

Economy

The economic impact of civil disturbances is dependent on the extent of media coverage of the event and people's feelings of safety in the area(s) affected. Tourism can be negatively affected, causing potential visitors to go somewhere else or not travel at all. Businesses or homeowners may choose to shut down and real estate values could potentially fall as well if there are frequent incidents. These effects are dependent on the severity, the scope, and the nature of the disturbance(s). Civil disturbances can lead to work stoppages, which results in loss of productivity. Targeting of financial institutions could lead to significant economic hardship through the impairment of financial transactions. City centers could be the nexus of civil disturbance activity. This activity could limit access to businesses or services in the area, impairing commerce.

Environment

Impacts are unlikely as natural resources and the environment are not generally targeted and collateral impacts are not typical, unless other hazards are caused by violent acts.

5.26 CYBER-SECURITY THREAT

5.26.1 Background

Cyber-security threats are deliberate attacks on an individual or group using the internet. In the past few decades, society has become dependent on computers and internet connections for much of daily life. This dependence has opened up the avenue for crime to be committed from afar, often from a different country or outside group. Some common examples of cyber threats include a hacker accessing bank accounts by hacking into a bank's website, infecting a computer system with a virus, Trojan horse, or worm to inflict damage to the information in the system, or disseminating incorrect or otherwise flawed information, also called "misinformation." Also, denial-of-service attacks could occur against prominent websites, which prevent legitimate users from accessing information or services.

5.26.2 Location and Spatial Extent

Cyber-security threats could occur anywhere within the county and because of the pervasiveness of information technology systems, the impacts could be widespread throughout the community and difficult to predict.

5.26.3 Historical Occurrences

In Guilford County, large-scale cyber threats or attacks have not been reported, though there have been several breaches of other nearby, similar communities in North Carolina in recent years. These ransomware attacks impacted Charlotte-Mecklenburg County in 2017 and Davidson County in 2018.

In addition, the recently published 2016 Data Breach Investigation Report[47] shows that most of the major breaches that take place across the country are in the Finance sector and the Accommodation sector. A full breakdown of the number of breach incidents by industry sector can be found in **Figure 5.51.**

[47] Data Breach Investigations Report. Verizon. 2016. Retrieved on January 3, 2017 from http://www.verizonenterprise.com/verizon-insights-lab/dbir/2016/

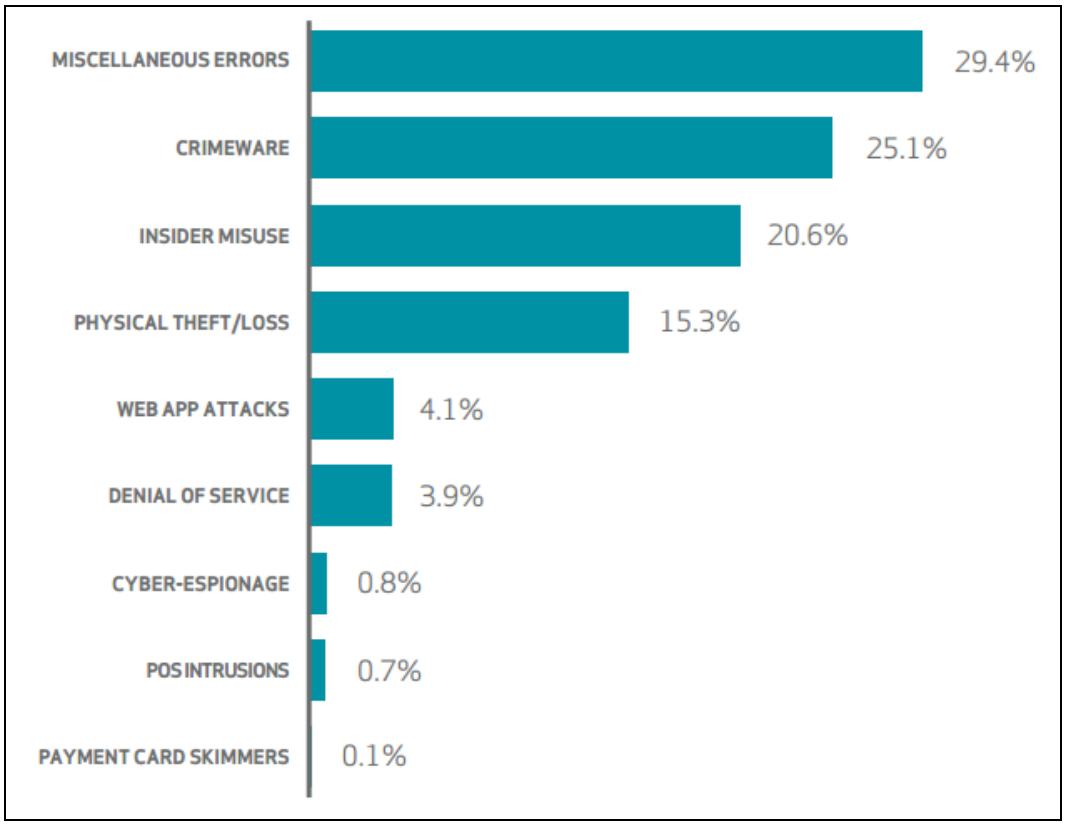
FIGURE 5.51: NATIONWIDE CYBER-BREACHES BY INDUSTRY SECTOR

Industry	Total	Small	Large	Unknown
Accommodation (72)	282	136	10	136
Administrative (56)	18	6	2	10
Agriculture (11)	1	0	0	1
Construction (23)	4	0	1	3
Educational (61)	29	3	8	18
Entertainment (71)	38	18	1	19
Finance (52)	795	14	94	687
Healthcare (62)	115	18	20	77
Information (51)	194	12	12	170
Management (55)	0	0	0	0
Manufacturing (31-33)	37	5	11	21
Mining (21)	7	0	6	1
Other Services (81)	11	5	2	4
Professional (54)	53	10	4	39
Public (92)	193	4	122	67
Real Estate (53)	5	3	0	2
Retail (44-45)	182	101	14	67
Trade (42)	4	2	2	0
Transportation (48-49)	15	1	3	11
Utilities (22)	7	0	0	7
Unknown	270	109	0	161
Total	2,260	447	312	1501

Source: Data Breach Investigations Report, 2016

As can be seen in **Figure 5.52**, Crimeware and Miscellaneous Errors together account for more than 50 percent of the data breaches. According to the Verizon report, crimeware represents malware infections that defy exact classification and are less likely to receive an intense investigation or involve law enforcement. These attacks tend to be motivated by financial gain and are opportunistic in nature. Miscellaneous Errors are basically an error on the part of a user that results in a breach of data. Examples of this include sensitive information reaching the wrong recipient, publishing nonpublic data to public servers, and insecure disposal of personal data (such as medical records).

FIGURE 5.52: BREAKDOWN OF BREACHES BY TYPE



Source: Data Breach Investigations Report, 2016

5.26.4 Probability of Future Occurrence

Although there have been no previous cyber threats in the county of significant impact, it is possible that the county could be impacted in the future.

5.26.5 Consequence Analysis

People (The Public and Public Confidence)

The aim of a cyber-security threat is typically to corrupt or exploit protected information. Depending on the target of the ploy, a significant number of people can be victims of identity theft, fraud, or other forms of technology-based crime. Anyone with an account, membership, or other relationship with an entity that requires the storage of information is vulnerable. An individual/user must rely on the entity of affiliation to create and maintain safeguards against the intrusion of computerized systems. However, even the strongest of safeguards can be corrupted or evaded. Continual monitoring of attempted or successful attempts at cyber-breaches is warranted to lessen the potential impacts.

Public confidence in government and nongovernmental organizations may be impacted by an event based upon societal expectations and media influence with respect to cyber threats. There may be an expectation that government entities should do a better job of patrolling cyber crime and hold those responsible accountable. Public confidence may be impacted by media interpretation and reporting of the event, positive or negative.

Responders

Cyber threats may be used to try to intrude into electronic safety equipment or systems. This may increase call volume, block systems, or otherwise hinder emergency operations. Although responders are not likely to be at risk to a cyber attack in a physical sense, they may be impacted financially or through identity theft, much like members of the public.

Continuity of Operations

In the event of a cyber threat, continuity of operations could be impacted if many of the services (such as internet or other IT programs) that are required to maintain daily operations are shut down by the attack. This could cause considerable disruption to normal operations in the state and could make the state potentially vulnerable to other events that may be occurring simultaneously. In some past cases, entire IT operating systems have been held for ransom and carrying out normal operations is not possible. In these cases, continuity planning is critical to ensure basic functions can still be carried out.

Built Environment (Property, Facilities, and Infrastructure)

Cyber threats may have the effect of disrupting life sustaining equipment or systems in hospitals or medical facilities by causing technological disruptions. These attacks may also sabotage information networks and communications equipment that could disrupt services within medical facilities. Normal operations in communications equipment such as telephones, cell phones, and internet could all be severely impacted by a cyber threat which would impact large numbers of people including critical facilities operators.

Economy

Freezing, redirecting, or stealing financial assets can have drastic impacts on a business. Banking and credit institutions are commonly affected or targeted by fraudulent activities and often store a great deal of information on businesses, so large-scale intrusions can have significant impacts on the local economy. Large employers are more likely to be targeted by cyber attacks than individuals or small businesses. Larger businesses generally have greater assets to exploit and store more personal information on private individuals or employees.

Environment

Because cyber attacks occur in cyberspace and would not truly have any impacts outside of the physical sphere, there are no expected environmental impacts from this type of event.

5.27 TERRORISM

5.27.1 Background

Terrorism is defined in the United States by the Code of Federal Regulations as: “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.”[48] Academic literature identifies some overarching political goals that terrorism seeks to achieve, including spreading anxiety and alarm among immediate victims, families, and the general public; eliminating opponents and destroying symbolic targets; and generating direct damage on society, such as affecting business

[48] U.S. Code of Federal Regulations. 23 C.F.R. Section 0.85

confidence. In the following sections, some general background information about terrorism is presented prior to the county's hazard identification and risk assessment findings.

There are two general types of terrorist groups: network and hierarchical. The type of organization a group adopts largely depends on how long the group has existed. More recently developed groups tend to organize or adapt to the possibilities of the network model. Older, more established groups lean toward the hierarchical structure and are often more associated with violence of a political nature.[49] Terrorist acts can be committed by large, formally organized groups with terrorist cells in different parts of the world, or they can originate from smaller groups or individuals from a small city or domestic "homegrown" location. In the United States, terrorists that are "homegrown" do not belong to a defined group, may operate very effectively "under the radar," and may pose the biggest threat initially at the local level.[50]

5.27.2 Location and Spatial Extent

A terror threat could potentially occur at any location in the county. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location/event. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table 5.46** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

TABLE 5.46: U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Although all critical facilities (see Section 6: *Vulnerability Assessment*) are at a heightened level of risk in Guilford County, there are several facilities and events in the county that have been identified as the likely primary targets. Guilford County Emergency Management maintains a list of facilities and events at elevated risk of terror threat.

[49] Terrorism Research. *Terrorist groups*. Retrieved December 27, 2011, from http://www.terrorism-research.com/groups/
[50] *Ibid*.

5.27.3 Historical Occurrences

Although there have been no major terror events in Guilford County, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities/events that could be potential targets.

5.27.4 Probability of Future Occurrences

Guilford County has had no major recorded terrorist events. Due to no recorded incidents against the county, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

5.27.5 Consequence Analysis

People (The Public and Public Confidence)

In addition to the clear impacts that terrorism can have on human life and safety, there are a number impacts on the public that will be more widespread if major events take place. As seen after the attacks on September 11, 2001 in New York City and Washington, D.C., there can be significant impacts far away from the site of the incident. Fear and worry about additional attacks or for loved ones in areas affected are just a couple examples of impacts that could occur. Other impacts include discrimination or changed interactions between people of differing nationalities depending on the nature and intent of the attack(s) and who perpetrated the attack(s).

During and after a terrorism event, the public will be expecting services to be provided despite the uncertainty of any existing hazards or further impacts. The partnership and involvement of the media is crucial not just for public guidance information, but also for keeping the public informed of the efforts underway or of any obstacles or concerns hindering response efforts. Effective planning and partnerships developed prior to the incident will provide for smoother operations, even during times of chaos like a major terrorism incident. Agencies and organizations working together in an efficient and effective way will provide for the best chance of positive public perception in these government and nongovernmental organizations. Although public confidence will almost certainly be shaken, agencies and organizations in the government working together in an efficient and effective way will provide for the best chance of positive public perception of the government.

Responders

The danger to human life in a terrorist event is dependent on the form of attack utilized, as well as its location, severity, and scope. In any terror incident, responders must conduct a scene size up to determine hazards to themselves and then others. Decisions must be made about how to handle victims and those in close proximity that may have been victimized or exposed. If hazardous materials are present, it could change the strategy completely. Fear and panic will be significant in the case of a terrorist act, whether it occurs in Guilford County or elsewhere in the state or nation. As front-line government officials, responders will be at a significant risk during an attack and may even be the object of the attack in some cases.

Depending on the location, the scope, and the nature of the event(s), response efforts could last hours, days, or potentially longer. Collaboration at all levels can provide for the most stable, effective, and

efficient effort in returning to normal activities and operations. Identification of further threats and open communication lines can prevent further harm or detriment to response and recovery operations.

Continuity of Operations

A terrorist event would likely have a high impact on continuity of operations, especially due to the disorder that would result and the unpredictability of this kind of event. Emergency personnel may be directly affected or targeted, which would cause definitive harm to maintaining continuity of operations.

Built Environment (Property, Facilities, and Infrastructure)

Major Events/Centers

Often terrorist events are targeted at major events or at large event centers in an attempt to create widespread loss on a large number of people. Therefore, large arenas, convention centers, and event spaces may be at higher risk of a terrorist attack than most other buildings. Similarly, prominent or symbolic structures may also be at an elevated risk for targeting.

Critical Facilities

At hospitals, the primary concern with a terrorism event is the influx of patients requiring care. Terrorism may pose a specific hazard to a hospital structure itself, but it is more likely to be impacted when in close proximity to a target. Many patients could be injured or their medical condition worsened by the impacts of a terrorism event. In general, emergency services buildings are not considered high probability targets for terrorists to strike. In other countries, ambulance services and 9-1-1 centers have been targets; however, that pattern has not been seen here in the United States. Alternate locations should be set up so that emergency operations can continue if an emergency services facility was affected or targeted by a terrorism event. Shelters may need to be activated in a terrorism event to house and care for displaced individuals.

Transportation Systems

Bridges found throughout the interstate system may be targeted by terrorism. Not only would the actual structural failure affect those on, under, or near the bridge, but the loss of its functionality would also significantly hinder travel and commerce. Past experiences with using airplanes for terrorist activity suggest a need for planning and collaboration with all parties of interest at airports including local, state, and federal agencies. In terms of railway transportation, the most likely means of disrupting these lines would be the derailing of a train, primarily by sabotage of the rail or the switching control system. Using explosives would be more likely because hacking into systems to cause collisions and other undesired actions to moving rail cars would be more complex operations. In addition to disrupting rail traffic, a derailing can impact other means of travel such as a nearby road or airport. The rail cars involved in an incident could contain hazardous materials, which would add an element of complexity to the situation.

Utilities

Damage to high voltage lines or power plant structures could disrupt power distribution for a large area, affecting emergency response and other facets of government and business. The economic impacts may also be significant as extended outages can be costly. Natural gas lines are also a concern as a target for terrorists. Major pipelines run through the county, but natural gas itself must be exposed to oxygen before it could cause an explosion. Most natural gas explosions are small and rarely deadly. The real concern is in shutting off natural gas to end consumers. Sabotage of a pipeline could disconnect a significant number of homes and businesses for considerable periods of time.

Other Structures

Single-family dwellings and small businesses or industries are not likely to be targets for terrorism. However, areas that have high concentrations of certain targeted populations could be vulnerable to an attack. These populations may relate to a person or group's ethnicity, religion, and socioeconomic status. Dwellings in close proximity to a targeted event center may also be more likely to experience indirect impacts. Depending on the method of attack, impacts could include stray bullets or debris from explosions. These could affect people, electrical systems, water systems, cause structural collapse, or fires. Also, the presence of chemical agents can create health hazards through dangerous reactions with water sources or building materials.

Economy

The economic impact of a terrorist attack can vary from minimal to severe. If the incident occurs in Guilford County, it could hinder the county's economy, but may not have an impact at the national level. Tourism and some commerce could decline significantly if people, events, or businesses are hesitant to come to the area following an incident. An incident in a major city or a financial hub could affect the entire country. For example, the events of September 11, 2001 had an immediate impact on local, state, and national economies. This event and other large-scale attacks like it can drastically alter the economy in both the short- and long-term.

Major Events/Centers

Terrorism would mostly likely occur in city centers during large public gatherings or during business hours to cause the most harm and promote the most fear. Political gatherings would be high priority targets as well. Arenas can be targeted by terrorism, particularly during events that may have some form of political, cultural, or historical value, or simply any event with a large number of people in attendance. These could all have a negative impact economically on the county.

Environment

Impacts on the environment depend on the type of attack utilized by terrorists. A biological, chemical, or other hazardous material can have impacts on human, animal, and plant populations alike. The impacts can vary depending on the particular hazard(s) at play, but there will certainly be at least some negative impacts from a terrorist attack including potentially the release of smoke, chemicals, or debris into the environment.

Conclusions

5.28 CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also considers the findings in other relevant plans, studies, and technical reports.

5.28.1 Hazard Extent

Table 5.47 describes the extent of each natural hazard identified for Guilford County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.47:EXTENT OF GUILFORD COUNTY HAZARDS

Natural Hazards	
Drought	Drought extent is defined by US Drought Monitor classifications which include None, Abnormal, Moderate, Severe, Extreme, Exceptional classifications. According to these classifications, the most severe drought condition is Exceptional. Guilford County has experienced at least Severe ranking 8 times over the 20-year reporting period.
Earthquake	Earthquake extent can be measured by the Richter Scale and the Modified Mercalli Intensity (MMI) scale and the distance of the epicenter from Guilford County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was IV (moderate) with a correlating Richter Scale measurement of approximately 4.3 (last reported on November 20, 1969). The epicenter of this earthquake was located 183.0 km away.
Extreme Cold	The extent of extreme cold can be defined by the minimum temperature reached. The lowest temperature recorded in Guilford County is -8 degrees Fahrenheit (reported on January 21, 1985).
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Guilford County is 106 degrees Fahrenheit (reported most recently on July 29, 1952).
Fire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2010-2019. Analyzing the data indicates the following wildfire hazard extent for the county. • The greatest number of fires to occur in any year was 139 in 2014. • The greatest number of acres to burn in a single year occurred in 2015 when 58.4 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.

Flooding

Flood extent can be measured by flood height and velocity. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the county. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was reported on September 25, 1947. Water reached a discharge of 11,600 cubic feet per second. The greatest gage height in the county was recorded on October 15, 1954 at 24.20 feet. Additional peak discharge readings and gage heights are in the table below.

Location	Date	Peak Discharge (cfs)	Gage Height (ft)
Guilford County			
Reedy Fork near Gibsonville	9/25/1947	11,600	20.77
South Buffalo Creek near Pomona	9/23/2003	3,350	15.45
South Buffalo Creek at US 220 near Greensboro	9/17/2018	3,340	16.77
South Buffalo Creek near Greensboro*	7/15/1949, 3/20/2003	10,000	14.37
West Fork Deep River near High Point	9/24/1947	8,450	19.92
East Fork Deep River near High Point*	9/24/1947, 9/23/2003	6,300	13.46
Reedy Fork near Oak Ridge*	10/10/1959, 9/22/1979	3,950	12.41
Haw River near Summerfield	10/15/1954	1,310	24.20
Rock Creek near Whitsett	10/15/1954	5,860	24.02
Candy Creek near Monticello	4/16/1987	356	6.77
Brush Creek at Muirfield Rd at Greensboro	9/17/2018	902	11.08
Brush Creek at Fleming Rd at Greensboro*	3/29/2001, 9/15/2000	221	8.96
Horsepen Creek at US 220 near Greensboro*	9/23/2003, 9/17/2018	2,800	11.99
Horsepen Creek at Battle Ground	9/24/1947	6,400	10.36
Ryan Creek below US 220 at Greensboro	7/13/2003	1,060	12.53
N Buffalo Creek at Westover Terrace at Greensboro	9/23/2003	2,520	14.07
N Buffalo Creek at Church St at Greensboro	9/23/2003	3,520	17.81
N Buffalo Creek near Greensboro	9/22/1979	9,140	20.12
Buffalo Creek at SR 2819 near Mcleansville	3/20/2003	6,720	19.35

*Peak discharge and peak gage height occurred on different dates.

Hail

Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Guilford County was 2.75 inches (reported on April 2, 1983). It should be noted that future events may exceed this.

Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane/tropical storm within 75 miles of Guilford County was an unnamed storm in October 1893 which reached a maximum wind speed of 80 knots as a Category 1 hurricane. Although the county is much more likely to be impacted by the remnants of a hurricane or tropical storm, it is possible that a storm with hurricane-force winds can impact the county directly.
Thunderstorm – Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. The strongest recorded wind event in Guilford County was reported on July 15, 1976 at 84 knots (approximately 97 mph). It should be noted that future events may exceed these historical occurrences.
Thunderstorm – Lightning	According to the Vaisala flash density map, Guilford County is located in an area that experiences 6 to 12 lightning flashes per square mile per year.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA as well as the Fujita/Enhanced Fujita Scale. The greatest magnitude reported in Guilford County was an EF3 (reported on March 28, 2010). It should be noted that in 2018, an EF2 tornado caused extensive damage in the county.
Winter Storm	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the county was 20.0 inches on March 2, 1927. Due to unpredictable variations in snowfall throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not abundantly available.
Biological Hazards	
Bioterrorism	A bioterrorism event would have significant consequences on the general public and could potentially cause major strain to hospitals and medical care providers. In some more severe scenarios, quarantines may be required as public health officials attempt to restrict the spread of infectious disease. The extent for this could be severe/widespread, impacting thousands of people.
Public Health / Emerging Disease Threat	A public health/emerging disease threat could have a large-scale effect throughout the county and may cause illness in many people. Possible impacts from a disease threat depend largely on the impacted population but might include anything from absenteeism and loss of productivity in the workplace to death or serious illness to humans or livestock. A serious disease threat could affect many thousands of people.
Technological Hazards	
Building / Structure Collapse	A building or structure collapse would most likely occur to a building that is under construction. The impacts would be relatively localized, but could be very serious, causing death or injury to anyone in or around the structure. Depending on the size of the structure, possibly hundreds of people could be affected even though in this type of event, generally only a single structure would collapse and the area of impact would be relatively small.
Communications Systems Disruption / Failure	For a communications systems disruption or failure, the greatest extent that is possible is a complete shutdown of all communications equipment. However, this is unlikely to occur as it is more likely that a loss of one form of communication (radio, cell phone) will be shut down, causing emergency personnel to seek out other forms of communication and delaying/disrupting response time.

Energy / Power/ Utility Failure	There are many impacts that would occur as a result of an energy/power/utility failure. Among other impacts, traffic lights could be down, residents might lose heat or air conditioning, medical equipment may be non-operational, and well pumps could be shut down limiting access to clean water. These failures could potentially be widespread, leaving tens of thousands of homes and businesses without power or utilities.
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 9,000 LGA released on the highway on September 30, 1999 and 13,000 SLB released on the highway on September 22, 1982. It should be noted that larger events are possible.
Nuclear Power Plant Emergency	Although there is no history of a nuclear accident at the Shearon Harris Power Plant, other events across the globe and in the United States indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Pipeline Failure	A pipeline failure could be caused in several different ways. If an explosion or fire were the cause of the incident, the impacts might include fatalities or injuries as well as loss of a fuel source and damage to personal property. However, the impacts could also be less fatal in which case the more immediate effects might be down time for services and significant price hikes for consumers.
Resource Shortage (Water / Fuel)	A resource failure would likely have widespread impacts that cause a strain on the local economy and on everyone in the county. In the past, the county has experienced events wherein there was less than 70 days of water supply available which is very low. Similarly, the county has experienced rationing of fuel supplies. Both of these types of events could occur again and the extent could be similar or somewhat worse.
Transportation Incident	A transportation incident might cause death or injury to those involved in the accident as well as to bystanders near the site of the incident. The main effects of a transportation incident might be fire or explosions and a shutdown of transportation corridors. Although these events are relatively common and emergency officials deal with them fairly often, the impacts to individuals might be severe with disruption to daily life at a minimum.
Man-Made / Intentional Hazards	
Civil Disturbance	Often one of the greatest impacts from civil disturbances is collateral damage to people and property. During civil disturbances, property can be destroyed or stolen and citizens can be injured due to violence that erupts. First responders may also be targeted and many times are more likely to be injured as a result of civil unrest that the typical citizen.
Cyber-Security Threat	While there is seldom physical damage inflicted from a cyber-security event, the effects of such an event are often damaging in other ways. For example, theft, denial of service attacks, and dissemination of misinformation can all result from a cyber-security event. Moreover, these events are often aimed at shutting down IT systems which can result in loss of productivity and damage to IT infrastructure.
Terrorism	There is no history of major terror threats in Guilford County; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could be on the scale of critical damage with many fatalities and injuries to the population.

5.28.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for Guilford County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). The purpose of the PRI is to categorize and prioritize all potential hazards for Guilford County as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allows for the prioritization of the hazard risks for mitigation planning purposes and, more specifically, the identification of hazard mitigation opportunities for the jurisdictions in Guilford County to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for Guilford County is based principally on the PRI, a tool used to measure the degree of risk for identified hazards in a particular planning area. The PRI is used to assist the Guilford County Hazard Mitigation Planning Team in gaining consensus on the determination of those hazards that pose the most significant threat to the county based on a variety of factors. The PRI is not scientifically based but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in Guilford County based on standardized criteria.

The application of the PRI results in numerical values that allow identified hazards to be ranked against one another (the higher the PRI value, the greater the relative hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk has been assigned a value (1 to 4) and an agreed upon weighting factor[51], as summarized in **Table 5.48**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

PRI VALUE = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for Guilford County, the highest PRI value is 3.1 (winter storm). Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Hazard Mitigation Planning Team.

[51] The Hazard Mitigation Planning Team, based upon any unique concerns or factors for the planning area, may adjust the PRI weighting scheme during future plan updates.

TABLE 5.48: PRIORITY RISK INDEX FOR GUILFORD COUNTY

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self explanatory	1	10%
	12 to 24 hours	Self explanatory	2	
	6 to 12 hours	Self explanatory	3	
	Less than 6 hours	Self explanatory	4	
Duration	Less than 6 hours	Self explanatory	1	10%
	Less than 24 hours	Self explanatory	2	
	Less than one week	Self explanatory	3	
	More than one week	Self explanatory	4	

5.28.3 Priority Risk Index Results

Table 5.49 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.49: SUMMARY OF PRI RESULTS FOR GUILFORD COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
Extreme Cold	Possible	Minor	Large	More than 24 hours	Less than 1 week	**2.1**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Fire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**
Flooding	Highly Likely	Limited	Small	6 to 12 hours	Less than 1 week	**2.8**
Hail	Highly Likely	Minor	Moderate	6 to 12 hours	Less than 6 hours	**2.5**
Hurricane / Other Tropical Disturbance	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Thunderstorm – Wind	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Thunderstorm – Lightning	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm	Highly Likely	Critical	Moderate	More than 24 hours	Less than 1 week	**3.1**
Biological Hazards						
Bioterrorism	Unlikely	Critical	Small	Less than 6 hours	Less than 1 week	**2.3**
Public Health / Emerging Disease Threat	Possible	Critical	Small	Less than 6 hours	More than 1 week	**2.7**
Technological Hazards						
Building / Structure Collapse	Possible	Limited	Negligible	Less than 6 hours	Less than 6 hours	**1.9**
Communications Systems Disruptions / Failures	Possible	Limited	Large	Less than 6 hours	Less than 1 week	**2.7**
Energy / Power / Utility Failure	Likely	Limited	Small	Less than 6 hours	Less than 1 week	**2.6**
Hazardous Materials Incident	Likely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.8**
Nuclear Power Plant Emergency	Unlikely	Limited	Moderate	6 to 12 hours	Less than 1 week	**2.1**
Pipeline Failure	Possible	Limited	Moderate	Less than 6 hours	Less than 1 week	**2.5**
Resource Shortage (Water / Fuel)	Possible	Limited	Large	More than 24 hours	More than 1 week	**2.5**
Transportation Incident	Likely	Critical	Negligible	Less than 6 hours	Less than 24 hours	**2.6**

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Man-Made / Intentional Hazards						
Civil Disturbance	Possible	Limited	Small	12 to 24 hours	More than 1 week	**2.2**
Cyber-Security Threat	Possible	Critical	Small	Less than 6 hours	Less than 24 hours	**2.5**
Terrorism	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

5.29 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for Guilford County, including the PRI results and input from the Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table 5.50**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Guilford County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately and is described in Section 6: *Vulnerability Assessment*. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE 5.50: CONCLUSIONS ON HAZARD RISK FOR GUILFORD COUNTY

HIGH RISK	Winter Storm Hurricane / Other Tropical Disturbance Thunderstorm (Wind/Lightning) Flooding Hazardous Materials Incident Tornado Public Health / Emerging Disease Threat Communications Systems Disruption / Failure
MODERATE RISK	Energy / Power / Utility Failure Transportation Incident Drought Resource Shortage (Water / Fuel) Pipeline Failure Cyber-Security Threat Hail Extreme Heat
LOW RISK	Fire Bioterrorism Civil Disturbance Terrorism Extreme Cold Nuclear Power Plant Emergency Earthquake Building / Structure Collapse

SECTION 6
VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the jurisdictions within Guilford County to the significant hazards identified in the previous sections (*Hazard Identification and Profiles*). It consists of the following subsections:

- 6.1 Overview
- 6.2 Methodology
- 6.3 Explanation of Data Sources
- 6.4 Asset Inventory
- 6.5 Vulnerability Assessment Results
- 6.6 Conclusions on Hazard Vulnerability

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44 CFR Requirement
44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

6.1 OVERVIEW

This section builds upon the information provided in *Section 4: Hazard Identification* and *Section 5: Hazard Profiles* by identifying and characterizing an inventory of assets in Guilford County. In addition, the potential impact and expected amount of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, Guilford County and the participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory as compiled for jurisdictions in Guilford County. The remainder of this section focuses on the results of the assessment conducted.

6.2 METHODOLOGY

This vulnerability assessment was conducted using three distinct methodologies: (1) A stochastic risk assessment; (2) a geographic information system (GIS)-based analysis; and (3) a risk modeling software analysis. Each approach provides estimates for the potential impact of hazards by using a common,

systematic framework for evaluation, including historical occurrence information provided in the *Hazard Identification* and *Hazard Profiles* sections. A brief description of the three different approaches is provided on the following pages.

6.2.1 Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to analyze hazards of concern that were outside the scope of hazard risk models and the GIS-based risk assessment. This involves the consideration of annualized loss estimates and impacts of current and future buildings and populations. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). This methodology is applied primarily to hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

- Bioterrorism
- Building/Structure Collapse
- Civil Disturbance
- Cyber-Security Threat
- Drought
- Energy/Power/Utility Failure
- Extreme Cold
- Extreme Heat
- Hail
- Public Health/Emerging Disease Threat
- Pipeline Failure
- Resource Shortage (Water/Fuel)
- Terrorism
- Thunderstorm- Lightning
- Thunderstorm- Wind
- Tornado
- Winter Storm

All of the natural hazards listed above are considered atmospheric and have the potential to affect all current and future buildings and all populations. Likewise, because man-made and technological hazards are often unpredictable and do not have a defined area in which they are more likely to occur, all current and future buildings and populations are considered at risk. **Table 6.1** provides information about all improved property in Guilford County that is vulnerable to these hazards. For all hazards, annualized loss estimates were determined using the best available data on historical losses from sources including NOAA's National Climatic Data Center records, existing plans, and local knowledge. Annualized loss estimates were generated by totaling the amount of property damage over the period of time for which records were available and calculating the average annual loss. Given the standard weighting analysis, losses can be readily compared across hazards providing an objective approach for evaluating mitigation alternatives.

For a number of the biological, technological and man-made hazards, no historical property damage data was available. Therefore, a detailed vulnerability assessment could not be completed for these hazards at this time.

The results for these hazards are found at the end of this section in **Table 6.16**.

6.2.2 GIS-Based Analysis

Other hazards have specified geographic boundaries that permit additional analysis using Geographic Information Systems (GIS). These hazards include:

- Fire/Wildfire
- Flood
- Hazardous Material Incident
- Nuclear Power Plant Emergency
- Transportation Incident

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in Guilford County using best available geospatial data. Digital data was collected from local, regional, state, and national sources for hazards and buildings. This included local tax assessor records for individual parcels and buildings and geo-referenced point locations for identified assets (e.g. critical facilities) when available.

ESRI® ArcGIS™ 10.5.1 was used to assess hazard vulnerability utilizing digital hazard data, as well as local building data. Using these data layers, hazard vulnerability can be quantified by estimating the value for parcels and/or buildings determined to be located in identified hazard areas. The results of the analysis provided an estimate of the number of parcels, buildings, and critical facilities, as well as the estimated value of those buildings determined to be potentially at risk to the hazards with delineable geographic hazard boundaries.

6.2.3 Risk Modeling Software Analysis



A risk modeling software was used for the following hazards:

- Earthquake
- Hurricane/Other Tropical Disturbance

There are several models that exist to model hazards. Hazus-MH was used in this vulnerability assessment to address the aforementioned hazards.

Hazus-MH

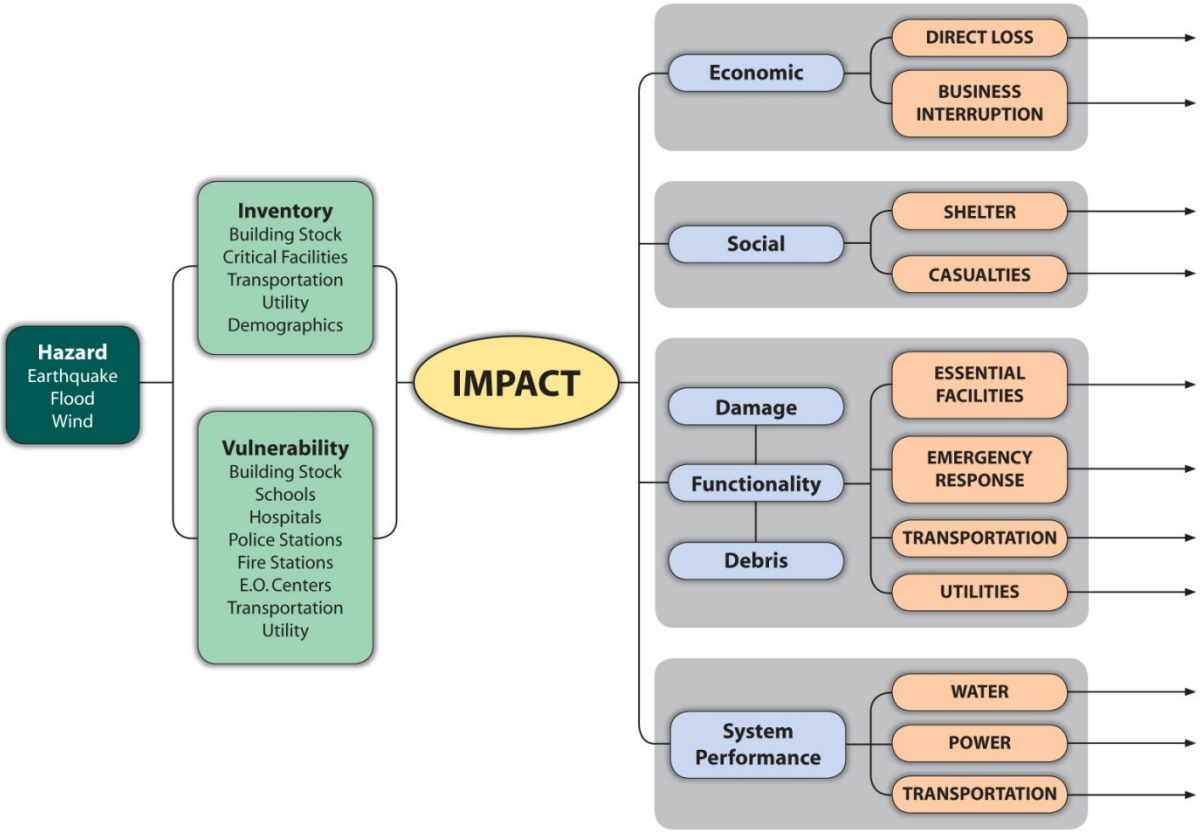
Hazus-MH ("Hazus") is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-

structure basis). The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment.

The Guilford County Risk Assessment utilized Hazus-MH to produce hazard damage loss estimations for hazards for the planning area. At the time this analysis was completed, Hazus-MH 4.2 SP2 was used to estimate potential damages from hurricane winds earthquake hazards using Hazus-MH methodology. Although the program can also model losses for flood and storm surge, it was not used in this Risk Assessment.

Figure 6.1 illustrates the conceptual model of the Hazus-MH methodology.

FIGURE 6.1: CONCEPTUAL MODEL OF HAZUS-MH METHODOLOGY



Hazus-MH is capable of providing a variety of loss estimation results. In order to be consistent with other hazard assessments, annualized losses are presented when possible. Some additional results based on location-specific scenarios may also be presented to provide a complete picture of hazard vulnerability.

Loss estimates provided in this vulnerability assessment are based on best available data and methodologies. The results are an approximation of risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their

effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, non-specific locations, demographics, or economic parameters).

All conclusions are presented in "Conclusions on Hazard Vulnerability" at the end of this section.

6.3 EXPLANATION OF DATA SOURCES

Earthquake

Hazus-MH 4.2 SP2 (as described above) was used to assess earthquake vulnerability. A level 1, probabilistic scenario to estimate annualized loss was utilized. In this scenario, several return periods (events of varying intensities) are run to determine annualized loss. Default Hazus earthquake damage functions and methodology were used to determine the probability of damage. Results are calculated at the 2010 U.S. Census tract level in Hazus and presented at the county level.

Flood

FEMA Digital Flood Insurance Rate Maps (DFIRMs) were used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes and they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of Flood Insurance Rate Maps including the 100-year flood areas (1.0-percent annual chance flood), and the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local parcel/building data and critical facilities were overlaid on the 100-year floodplain areas and 500-year floodplain areas. It should be noted that such an analysis does not account for building elevation.

Hurricane and Tropical Storm Wind

Hazus-MH 4.2 SP2 (as described above) was used to assess wind vulnerability. For the hurricane wind analysis, a probabilistic scenario was created to estimate the annualized loss damage and probable peak wind speeds in Guilford County. Default Hazus wind speed data, damage functions, and methodology were used in to determine the probability of damage for 50-, 100-, 500-, and 1,000-year frequency events (also known as return periods) in the scenario. Results are calculated in Hazus at the 2010 U.S. Census tract level and presented at the county and municipal level.

Hazardous Materials Incident

For the fixed hazardous materials incident analysis, Facility Registry Service data was used. According to the Environmental Protection Agency (EPA), the Facility Registry Services (FRS) is a centrally managed database that identifies facilities, sites or places subject to environmental regulations or of environmental interest. The FRS provides Internet access to a single integrated source of comprehensive (air, water, and waste) environmental information about those facilities, sites, or places.

The FRS is a publicly available database from the federal EPA that contains information on facilities that store potentially hazardous materials as reported by certain covered industry groups as well as federal facilities. This inventory was established under several environmental laws including the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and Resource Conservation and Recovery Act (1976), among others. Each year, facilities that meet certain activity thresholds must report their activities for listed toxic chemicals to EPA and to their state or tribal entity.

For the mobile hazardous materials incident analysis, transportation data including major highways and railroads were obtained from the North Carolina Department of Transportation. This data is ArcGIS compatible, lending itself to buffer analysis to determine risk.

Nuclear Accident

The data used to determine vulnerability to a nuclear accident in Guilford County is based on the location of the Shearon Harris and McGuire Nuclear Power Stations and buffer radii required by the Nuclear Regulatory Commission for emergency management planning in the event of a nuclear accident.

Wildfire

The data used to determine vulnerability to wildfire in Guilford County is based on GIS data called the Southern Wildfire Risk Assessment (SWRA). This data is available on the Southern Wildfire Risk Assessment website and can be downloaded and imported into ArcGIS. The Wildland Urban Interface Risk Index (WUIRI) layer was used to determine vulnerability of people and property. The WUIRI is presented on a scale of 0 to -9. It combines data on housing density with the data on the impact and likelihood of a wildfire occurring in a specific area. The primary purpose of the data is to highlight areas of concern that may be conducive to mitigation actions. Due to the assumptions made, it is not a true probability. However, it does provide a comparison of risk throughout the region.

6.4 ASSET INVENTORY

An inventory of geo-referenced assets within Guilford County and its jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards[1]. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of physical assets were created and then further assessed through GIS analysis. These are presented below in Section 6.4.1.

6.4.1 Physical and Improved Assets

The two categories of physical assets consist of:

1. Improved Property: Includes all improved properties in Guilford County according to local building and parcel data provided by the county. It was supplemented by data from surrounding counties to account for the small areas of communities whose jurisdictional boundaries cross into these surrounding counties. The information has been expressed in terms of the number of parcels and total value of improvements (buildings) that may be exposed to the identified hazards. In addition, building footprint data was available for all jurisdictions and it was used to improve the overall assessment by providing a more accurate assessment of how many buildings are located in hazard areas.

2. Critical Facilities: Critical facilities vary by jurisdiction and the critical facilities provided by each jurisdiction are used in this section. It should be noted that this listing is not all-inclusive for

[1] While potentially not all-inclusive for the jurisdictions in Guilford County, "georeferenced" assets include those assets for which specific location data is readily available for connecting the asset to a specific geographic location for purposes of GIS analysis.

assets located in the county, and it is anticipated that it may be expanded or adjusted during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

The following tables provide a detailed listing of the geo-referenced assets that have been identified for inclusion in the vulnerability assessment Guilford County.

Table 6.1 lists the number of parcels, total value of parcels, total number of buildings, and the total value of improvements for participating areas of Guilford County (study area of vulnerability assessment).[2]

TABLE 6.1: IMPROVED PROPERTY IN GUILFORD COUNTY

Location	Number of Parcels	Total Value of Parcels	Number of Buildings	Total Improved Value of Buildings
Gibsonville	3,734	$8,482,488,110	2,091	$5,676,245,169
Greensboro	95,060	$540,392,697	109,882	$424,452,737
High Point	43,595	$23,287,964,120	41,906	$16,283,343,262
Jamestown	1,674	$8,373,635,345	1,627	$6,180,323,663
Oak Ridge	3,390	$424,827,000	4,055	$303,192,200
Pleasant Garden	2,325	$957,777,350	3,989	$695,968,600
Sedalia	575	$345,545,200	547	$244,763,200
Stokesdale	2,937	$50,376,800	4,023	$33,291,000
Summerfield	4,802	$607,368,020	6,603	$408,210,700
Whitsett	439	$1,426,424,100	815	$1,037,015,300
Unincorporated Area	50,310	$53,945,900	79,088	$34,084,300
GUILFORD COUNTY TOTAL	**208,841**	**$44,550,744,642**	**254,626**	**$31,320,890,131**

Source: Guilford County GIS Department, NC OneMap

Table 6.2 summarizes the primary critical facilities located in Guilford County by type. These facilities were identified as primary critical facilities in that they are necessary to maintain government functions and protect the life, health, safety, and welfare of citizens. These facilities were geospatially mapped and used as the basis for further geographic analysis of the hazards that could potentially affect critical facilities. All critical facility information was provided by local governments and the Guilford County GIS department.

In addition, **Figure 6.2** shows the locations of the primary critical facilities in Guilford County. **Table 6.17**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. Specific information concerning shelter locations has been removed from the plan as this information is considered protected by local governments and will be published on an as-needed basis. As noted previously, this list is not all-inclusive and only includes information provided by local governments.

[2] Total values for improvements is based on tax assessor records as joined to digital parcel data. It should be noted that this represents best available data and may not reflect actual on-the-ground conditions. For example, in some cases, parcels that contain structures do not have an associated building value. Therefore, this information should be used to provide a general understanding of potential exposure.

TABLE 6.2: CRITICAL FACILITY INVENTORY IN GUILFORD COUNTY

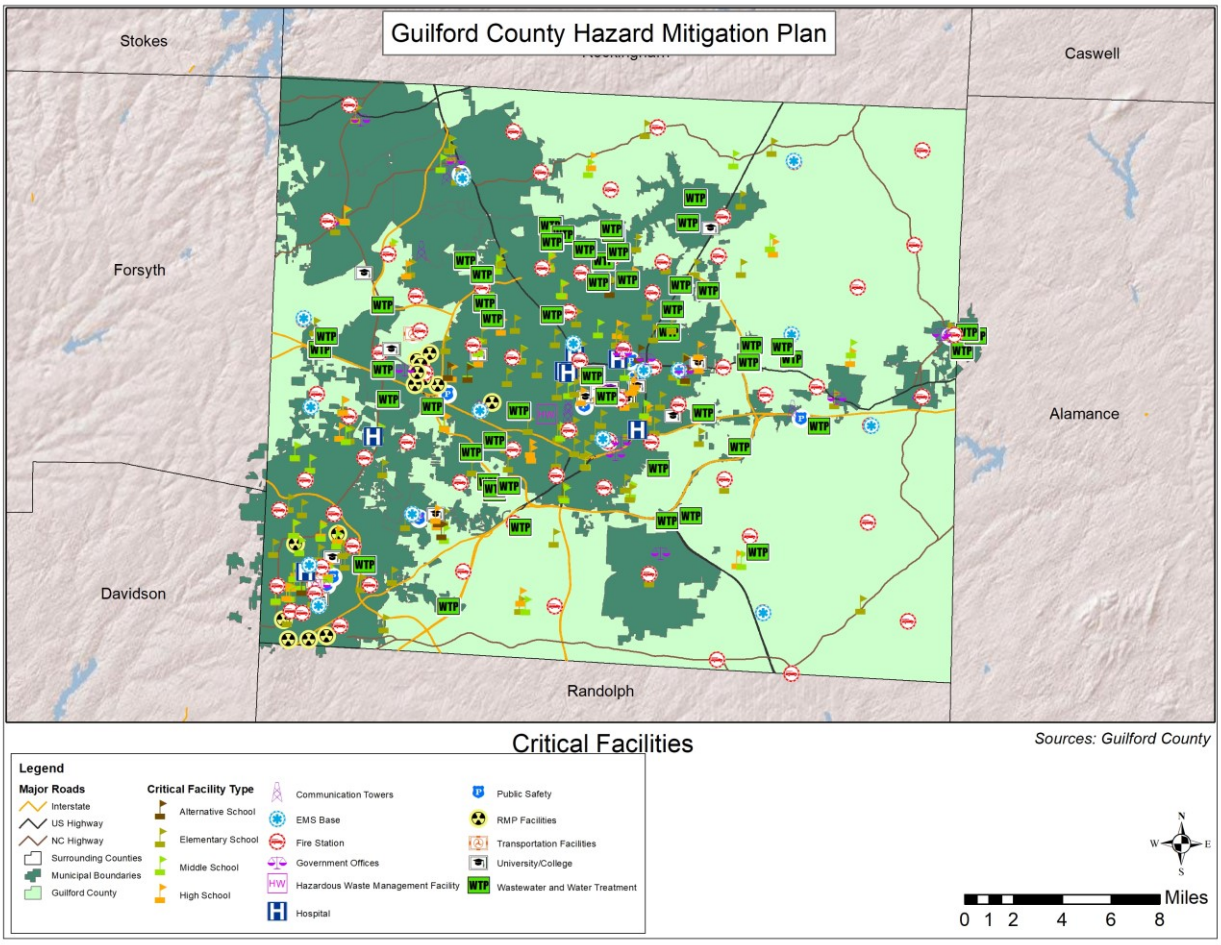
Location	Fire Stations	Public Safety	EMS Bases	Hospitals	Shelters	RMP Facilities/ Hazardous Waste
Gibsonville	1	1	0	0	n/a	0
Greensboro	27	11	5	5	n/a	9
High Point	15	2	3	2	n/a	6
Jamestown	1	1	1	0	n/a	0
Oak Ridge	1	0	0	0	n/a	0
Pleasant Garden	1	0	0	0	n/a	0
Sedalia	0	0	0	0	n/a	0
Stokesdale	1	0	0	0	n/a	0
Summerfield	3	1	1	0	n/a	0
Whitsett	1	0	0	0	n/a	0
Unincorporated Area	24	1	5	0	n/a	0
GUILFORD COUNTY TOTAL	**75**	**17**	**15**	**7**	**34**	**15**

Source: Local Governments

Location	Schools	Comm Towers	Government Offices	Trans. Facilities	University/ College	Water/ Wastewater Treatment
Gibsonville	1	0	2	0	0	3
Greensboro	109	5	11	1	9	68
High Point	48	0	1	1	2	2
Jamestown	4	0	1	0	0	0
Oak Ridge	3	0	1	0	0	0
Pleasant Garden	1	0	1	0	0	0
Sedalia	1	0	1	0	0	0
Stokesdale	1	0	1	0	0	0
Summerfield	6	2	1	0	0	0
Whitsett	0	0	1	0	0	0
Unincorporated Area	34	2	0	1	3	2
GUILFORD COUNTY TOTAL	**208**	**9**	**21**	**3**	**14**	**75**

Source: Local Governments

FIGURE 6.2: CRITICAL FACILITY LOCATIONS IN GUILFORD COUNTY



Source: Guilford County GIS Department, Municipal Officials

6.4.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Guilford County that are potentially at risk to these hazards.

Table 6.3 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Guilford County according to Census data is 488,406 persons. The annual American Community Survey (ACS) gives a more up to date estimate of the population counts for each community, but because data at the block level is not available through the ACS estimates, spatial analysis is not possible on ACS data (which are only available at the larger tract level). ACS population estimates are presented in Section 3: *Community Profile.*

TABLE 6.3: TOTAL POPULATION IN GUILFORD COUNTY

Location	Total 2010 Population
Gibsonville*	6,410
Greensboro	269,666

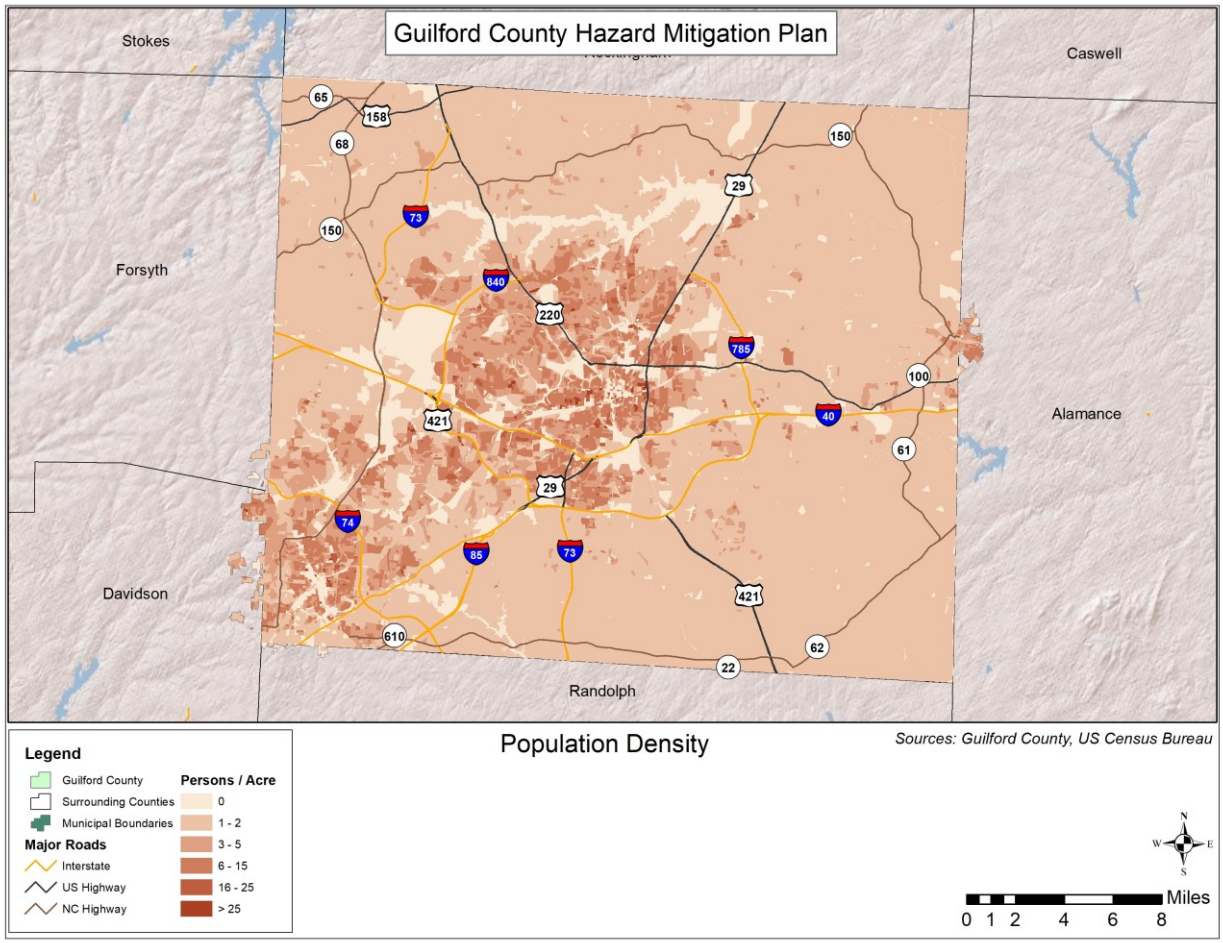
Location	Total 2010 Population
High Point*	104,371
Jamestown	3,382
Oak Ridge	6,185
Pleasant Garden	4,489
Sedalia	623
Stokesdale	5,047
Summerfield	10,232
Whitsett	590
Unincorporated Area	85,888
GUILFORD COUNTY TOTAL	**488,406**

*The population counts of Gibsonville and High Point include population residing in neighboring counties. Note: these populations are not included in the Guilford County total.

Source: United States Census 2010

In addition, **Figure 6.3** illustrates the population density by census block as it was reported by the U.S. Census Bureau in 2010.

FIGURE 6.3: POPULATION DENSITY IN GUILFORD COUNTY



Source: U.S. Census Bureau, 2010

6.4.3 Development Trends and Changes in Vulnerability

Since the previous hazard mitigation plan was approved in 2015, Guilford County has experienced moderate growth and development. **Table 6.4** shows the number of building units estimated in 2017 according to the American Community Survey (2017 was the latest year available from the ACS at the time of this planning process) and those constructed in 2014 or later.

TABLE 6.4: BUILDING COUNTS FOR GUILFORD COUNTY

Jurisdiction	Total Housing Units (2017)	Units Built 2014 or later	% Building Stock Built 2014 or later
Gibsonville*	2,684	91	3.4%
Greensboro	129,162	772	0.6%
High Point*	46,550	329	0.7%
Jamestown	1,609	6	0.4%
Oak Ridge	2,378	70	2.9%
Pleasant Garden	1,830	9	0.5%

Jurisdiction	Total Housing Units (2017)	Units Built 2014 or later	% Building Stock Built 2014 or later
Sedalia	276	0	0.0%
Stokesdale	1,952	77	3.9%
Summerfield	3,904	76	1.9%
Whitsett	421	15	3.6%
GUILFORD COUNTY TOTAL	**225,009**	**1,818**	**0.8%**

*The housing unit counts for Gibsonville and High Point include units located in neighboring counties. Note: These housing units are not included in the Guilford County total.
Source: United States Census Bureau

Table 6.5 shows population growth estimates for the county and municipalities from 2014 to 2017 based on the ACS 5-year estimates.

TABLE 6.5: POPULATION GROWTH FOR GUILFORD COUNTY

Jurisdiction	Population Estimates (as of July 1)				% Change 2014-2017
	2014	2015	2016	2017	
Gibsonville*	6,565	6,634	6,759	6,845	4.3%
Greensboro	276,225	279,427	282,177	284,816	3.1%
High Point*	106,797	108,031	108,982	109,849	2.9%
Jamestown	3,549	3,638	3,718	3,836	8.1%
Oak Ridge	6,435	6,513	6,617	6,728	4.6%
Pleasant Garden	4,585	4,632	4,684	4,762	3.9%
Sedalia	610	563	574	548	-10.2%
Stokesdale	5,177	5,221	5,278	5,331	3.0%
Summerfield	10,477	10,622	10,758	10,957	4.6%
Whitsett	770	756	809	973	26.4%
GUILFORD COUNTY TOTAL	**500,899**	**506,763**	**511,815**	**517,197**	**3.3%**

*The population counts for Gibsonville and High Point include populations residing in neighboring counties. Note: these populations are not included in the Guilford County total.
Note: ACS 5-year population estimates were used in this table to allow comparison of annual population counts (April 1 Census estimates were used for some other population counts throughout the plan which is why the counts may differ).
Source: United States Census Bureau, American Community Survey

Based on the data above, there has been a low to moderate rate of development in the county since 2013. In general, most communities experienced at least some growth, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards.

Additionally, since the population has increased across the county, there is now a greater number of people exposed to the identified hazards. Therefore, population growth has impacted the county's vulnerability since the previous local hazard mitigation plan was approved and there has been a slight increase in the overall vulnerability. Sedalia and Whitsett experienced the lowest and highest rates of growth, respectively, compared to the rest of the county. However, the small size of both of these communities makes population estimates difficult, so these estimates should be taken with some caution.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in identified high hazard areas.

6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme cold, extreme heat, hail, thunderstorm (lightning and high wind), tornado, winter storm, bioterrorism, public health/emerging disease, communications systems disruption/failure, and resource shortage,) or, due to lack of data, analysis would not lead to credible results (building/structure collapse, energy/power/utility failure, pipeline failure, transportation incident, civil disturbance, cyber-security threat and terrorism). The total county exposure, and thus risk, was presented in **Table 6.1**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table 6.15.**

The hazards presented in this subsection include: hurricane and tropical storm winds, earthquake, flood, hazardous materials incident, nuclear accident, transportation incident, and wildfire.

6.5.1 Hurricane and Tropical Storm

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, high winds, and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and storm surge and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes. Since Guilford County is not susceptible to storm surge, only hurricane winds are analyzed in this section.

It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 4.2 SP2 was used to determine annualized losses for the county as shown below in **Table 6.6.** In the comparative annualized loss analysis at the end of this section, only losses to buildings are reported in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE 6.6: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Building Loss	Contents Loss	Inventory Loss	Total Annualized Loss
Guilford County	$3,174,000	$650,000	$12,000	$3,836,000

Source: Hazus-MH 4.2 SP2

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table 6.7.**

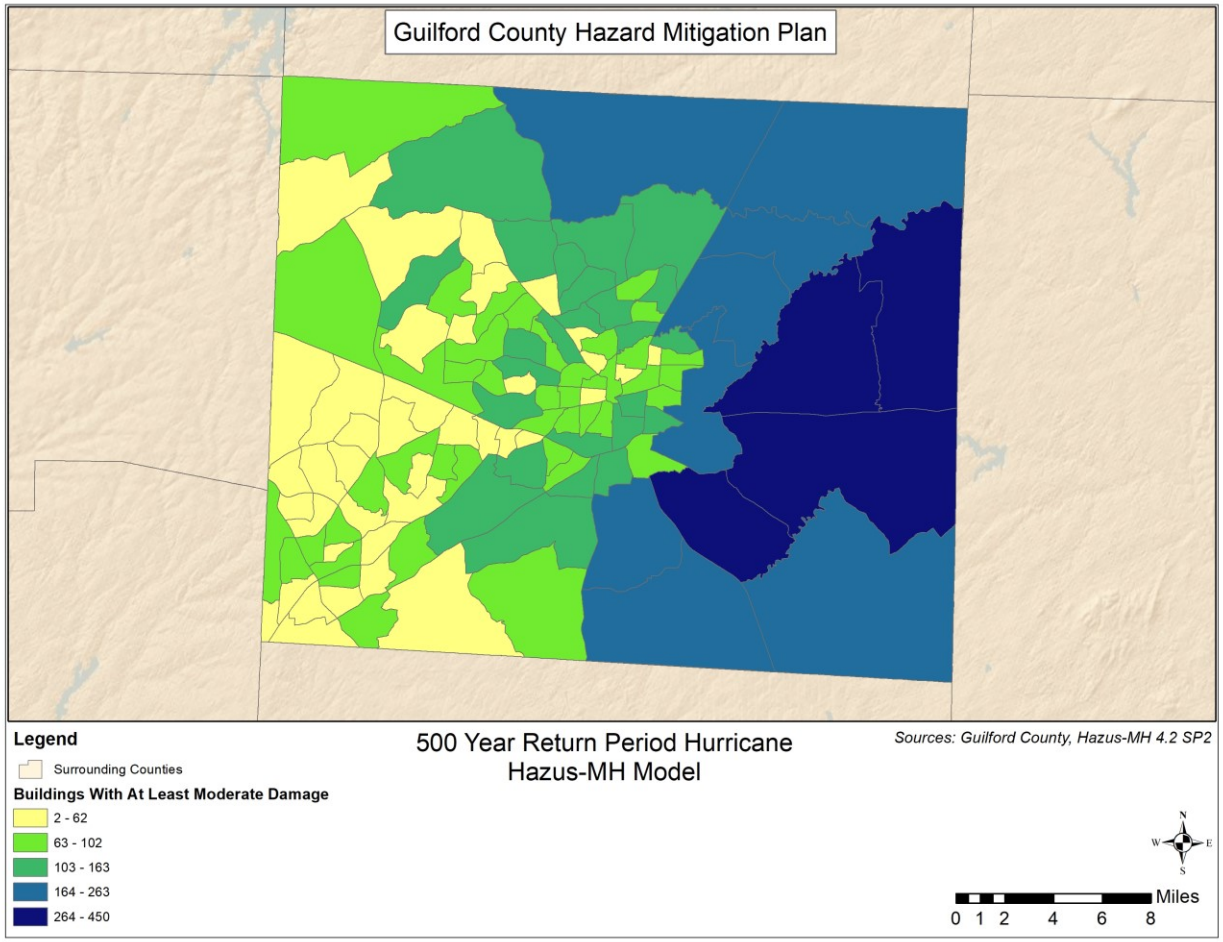
TABLE 6.7: PROBABLE PEAK HURRICANE/TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Gibsonville	63.1	71.4	88.7	96.7
Greensboro	64.0	72.3	90.0	98.5
High Point	63.2	71.7	88.6	96.4
Jamestown	61.2	69.2	86.9	95.8
Oak Ridge	62.8	71.0	89.1	97.5
Pleasant Garden	61.4	69.3	87.7	96.3
Sedalia	61.7	69.7	87.3	96.7
Stokesdale	63.2	71.7	88.6	96.4
Summerfield	63.7	72.3	89.6	98.5
Whitsett	63.1	71.2	89.4	97.9
Unincorporated Area	64.5	73.0	89.5	98.1
MAXIMUM WIND SPEED REPORTED	**64.5**	**73.0**	**89.5**	**98.1**

Source: Hazus-MH 4.2 SP2

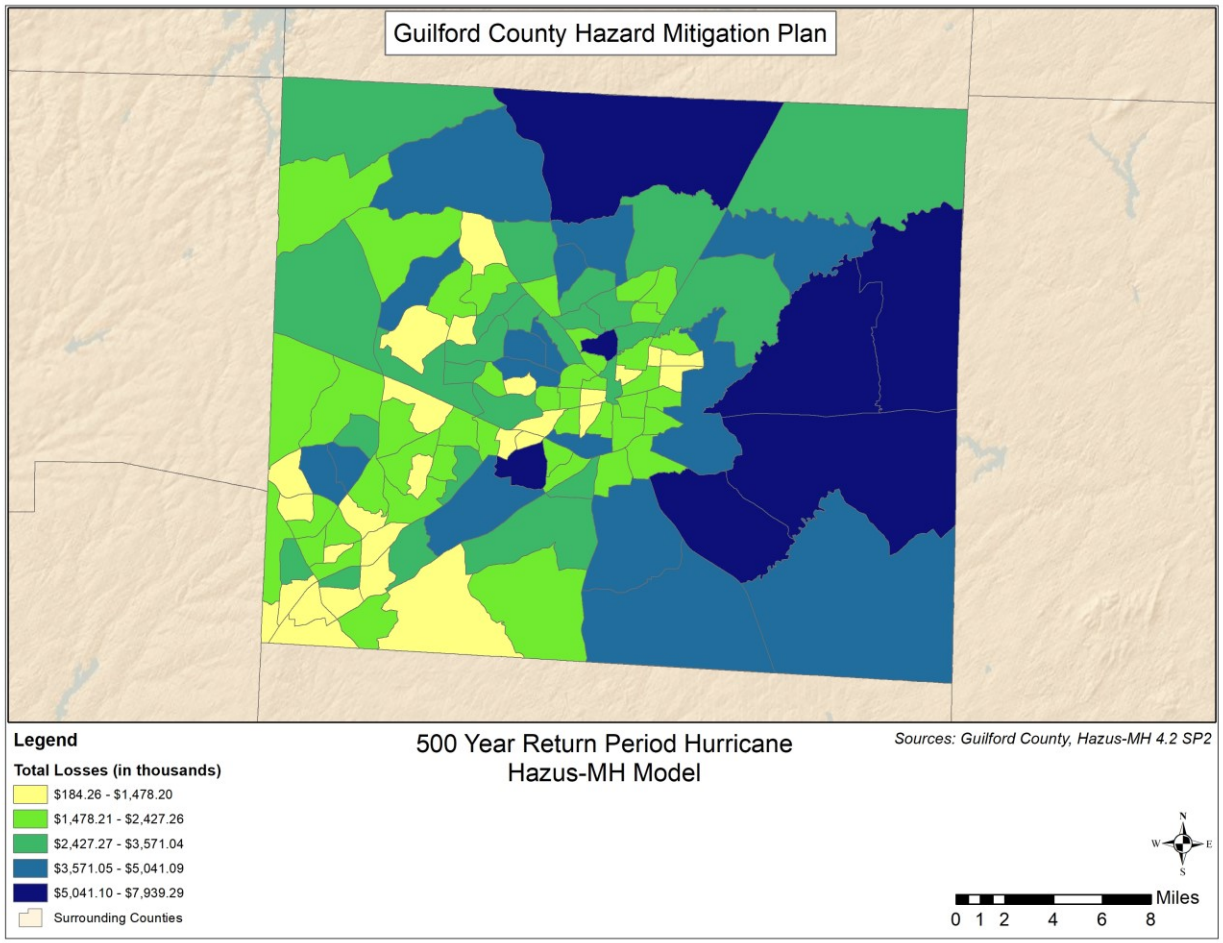
In addition, **Figure 6.4** and **Figure 6.5** show potential damage from a 500-year return period hurricane by census tract as estimated by a Hazus-MH model run.

FIGURE 6.4: ESTIMATED COUNT OF STRUCTURES SUSTAINING AT LEAST MODERATE DAMAGE IN A 500-YEAR RETURN PERIOD EVENT



Source: Hazus-MH 4.2 SP2

FIGURE 6.5: ESTIMATED TOTAL DOLLAR LOSSES IN A 500-YEAR RETURN PERIOD EVENT



Source: Hazus-MH 4.2 SP2

Social Vulnerability

Given equal susceptibility across Guilford County, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Guilford County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Guilford County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

6.5.2 Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for the county. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage (structural and non-structural), contents, and inventory. However, like the analysis for hurricanes, the comparative annualized loss figures at the end of this section only utilize building losses in order to provide consistency with other hazards. **Table 6.8** summarizes the findings.

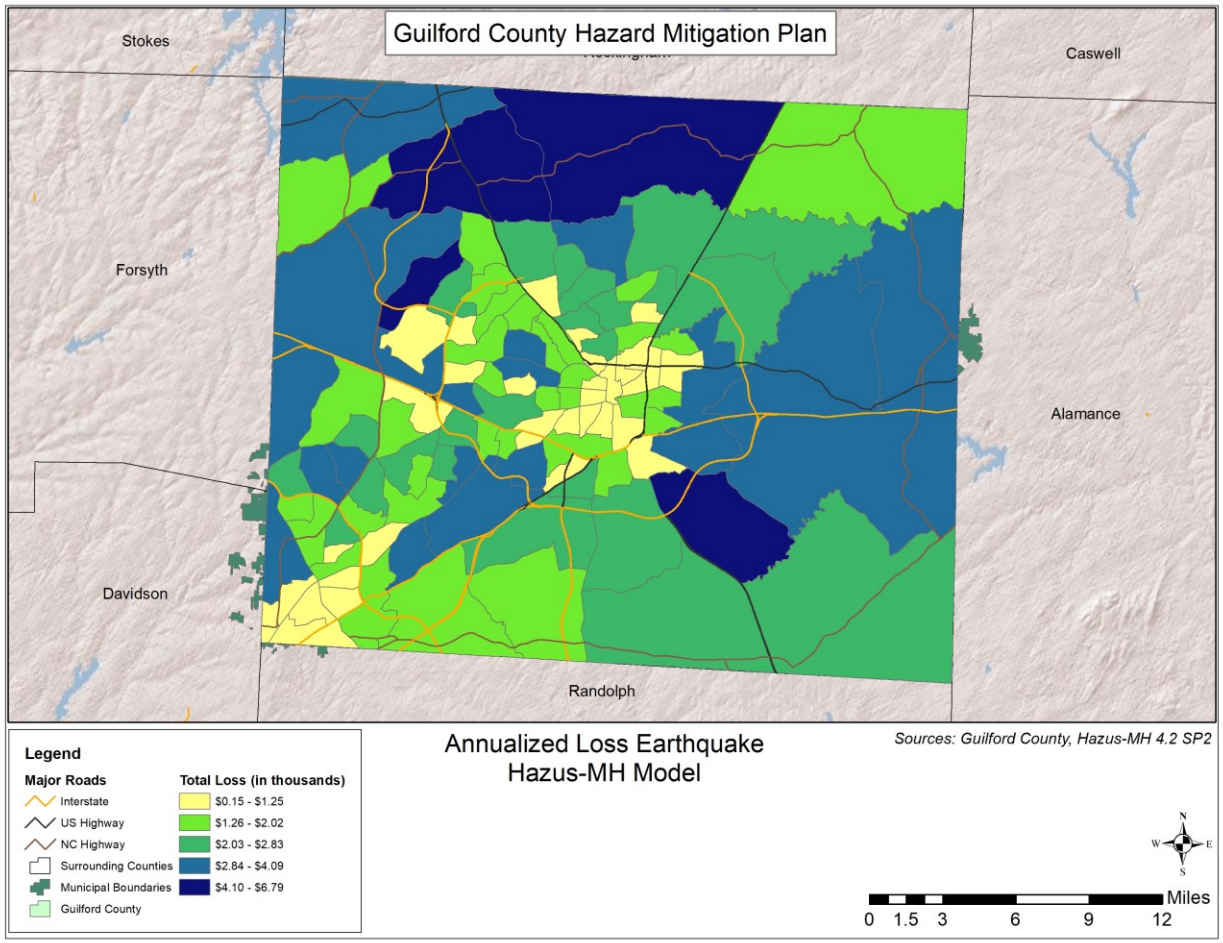
TABLE 6.8: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Structural Building Loss	Non-Structural Building Loss	Contents Loss	Inventory Loss	Total Annualized Loss
Guilford County	$83,000	$335,000	$118,000	$5,000	$541,000

Source: Hazus-MH 4.2 SP2

In addition, **Figure 6.6** shows annualized loss estimates by census tract as calculated by a Hazus-MH model run.

FIGURE 6.6: ESTIMATED TOTAL ANNUALIZED DOLLAR LOSSES FROM EARTHQUAKES



Source: Hazus-MH 4.2 SP2

Social Vulnerability

It can be assumed that all existing and future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Guilford County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse.

Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place. Such site-specific vulnerability determinations are outside the scope of this

assessment but will be considered during future plan updates if data/funding becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

6.5.3 Flood

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for each of the Guilford County municipalities. The determination of value at-risk (exposure) was calculated using GIS analysis by summing the building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table 6.9** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE 6.9: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings[3]	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings[4]
Gibsonville	2	3	$0	22	46	$1,987,500
Greensboro	960	1,261	$428,355,200	11	11	$3,599,300
High Point	621	659	$148,629,900	94	101	$12,749,000
Jamestown	22	17	$5,519,900	35	18	$10,512,000
Oak Ridge	9	14	$1,774,900	14	18	$3,581,500
Pleasant Garden	6	7	$444,500	4	6	$493,400
Sedalia	4	4	$320,400	0	0	$0
Stokesdale	3	6	$252,800	5	6	$639,800
Summerfield	1	2	$353,700	3	3	$499,400
Whitsett	0	0	$0	0	0	$0
Unincorporated Area	256	364	$26,526,300	209	248	$38,474,700
GUILFORD COUNTY TOTAL	**1,884**	**2,337**	**$612,177,600**	**397**	**457**	**$72,536,600**

Source: Federal Emergency Management Agency DFIRM

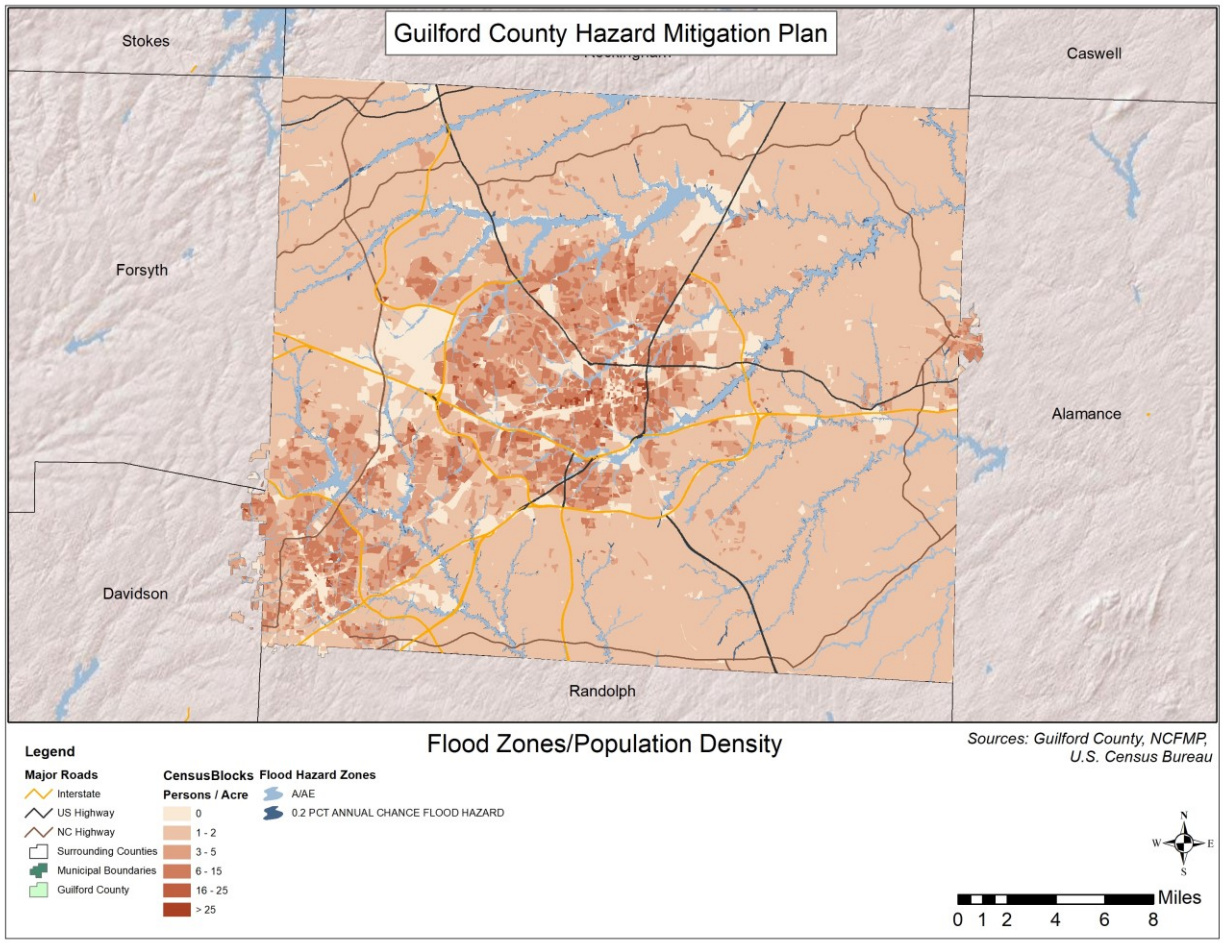
Social Vulnerability

U.S. Census 2010 population at the block level was used for analysis to determine where areas of high population concentration intersect with flood prone areas in the county. **Figure 6.7** is presented to gain a better understanding of the at-risk population.

[3] Improved value of buildings is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in the 1.0-percent annual chance floodplain, since building footprints were not associated with dollar value data.

[4] Improved value of buildings is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in the 0.2-percent annual chance floodplain, since building footprints were not associated with dollar value data. Buildings that were also counted as being located in the 1.0-percent annual chance floodplain were not counted as being in the 0.2-percent annual chance floodplain.

FIGURE 6.7 : POPULATION DENSITY NEAR FLOODPLAINS



Source: NCFMP, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 7 critical facilities located in the either the 1.0-percent annual chance or 0.2 percent annual chance floodplain. Four of these facilities are water intake facilities, one is a fire station, one is a hospital, and one is a government office (as previously noted, this analysis does not consider building elevation, which may negate risk.) A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Guilford County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 1.0 percent and 0.2 percent annual chance FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries and urban flooding and stormwater issues can often impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but may be considered during future plan updates.

6.5.4 Hazardous Materials Incident

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Such events can cause multiple deaths, completely shut down facilities and cause affected properties to be destroyed or suffer major damage.

Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is generally minimal to none.

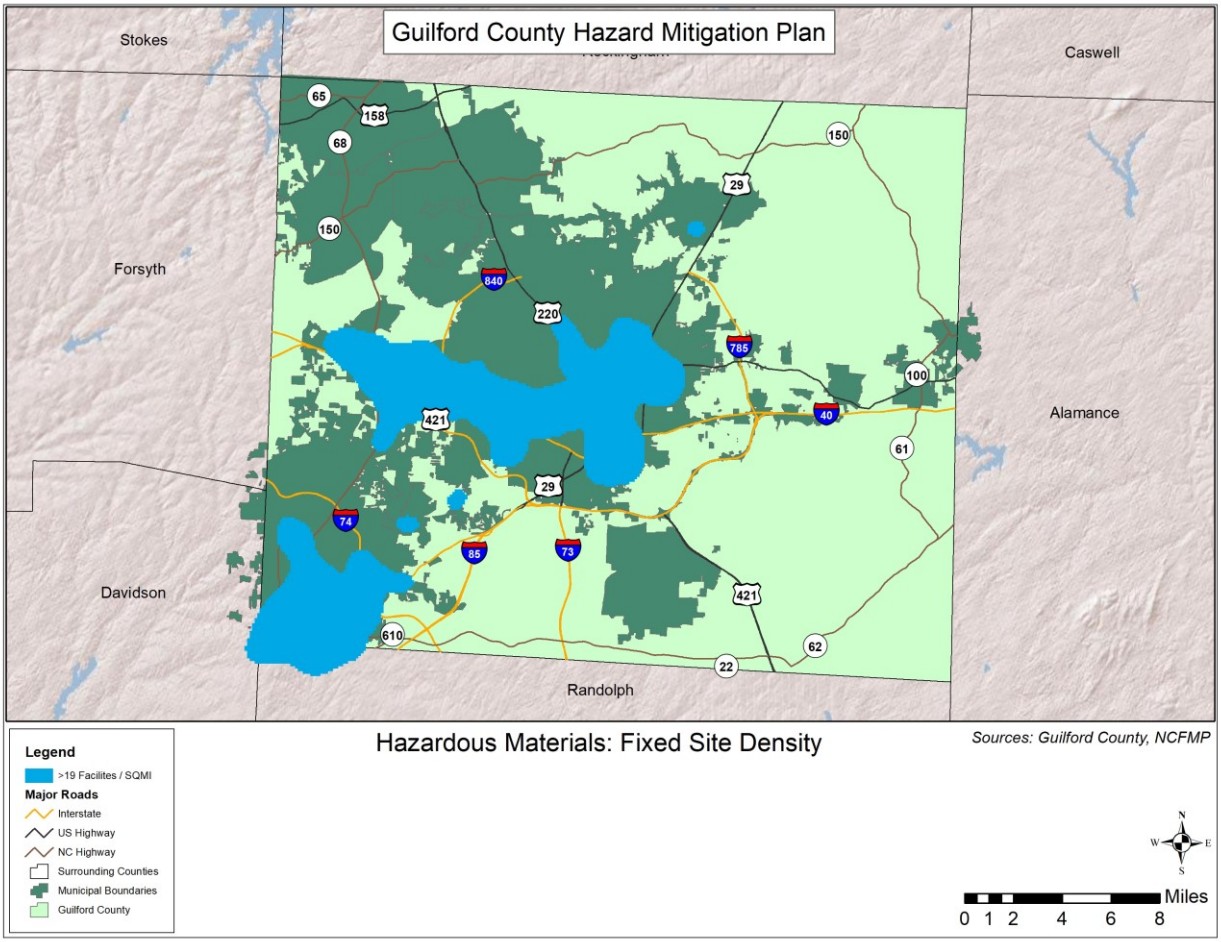
In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels.[5]

For the fixed analysis, a heat map showing the concentration of facilities per square mile was created to identify areas where the density of Facility Registry Service facilities was highest. The heat map was originally created as a raster and was converted to polygon to allow for overlay analysis with buildings and parcels. Areas where the density of facilities was higher than 19 facilities per square mile were used for analysis as shown in **Figure 6.8.** It should be noted that nearly all buildings are potentially at risk to a fixed site incident due to the prevalence of FRS facilities across the county.

For the mobile analysis, two sizes of buffers—0.5-mile and 1.0-mile—were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected using the PHMSA Emergency Response Guidebook to determine typical areas of risk for hazardous materials releases, but it should be noted that these areas may not be applicable for all hazardous materials incidents. Hazardous material-specific area analysis was not within the scope of this plan. Buffers of the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS analysis. **Figure 6.9** and **Figure 6.10** show the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels/buildings and improved value, as shown in **Table 6.10** (fixed sites), **Table 6.11** (mobile road sites) and **Table 6.12** (mobile railroad sites).

[5] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an actual event).

FIGURE 6.8: AREAS WHERE DENSITY OF FIXED FACILITY HAZARDOUS MATERIALS SITES IS GREATER THAN 19 FACILITIES/SQUARE MILE



Source: Environmental Protection Agency

TABLE 6.10: EXPOSURE OF IMPROVED PROPERTY TO FIXED SITES BASED ON DENSITY OF FRS FACILITIES (GREATER THAN 19 PER SQUARE MILE)

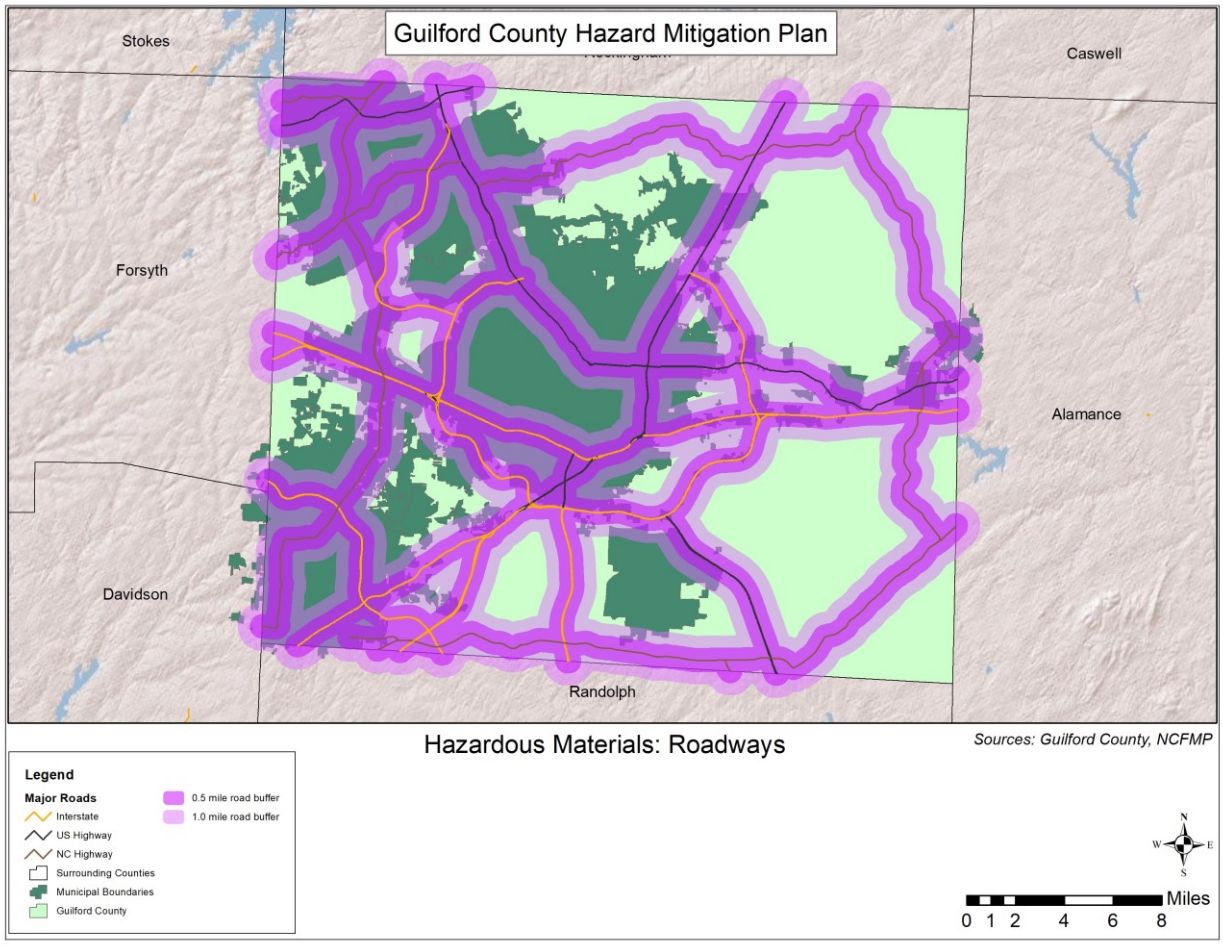
Location	Greater than 19 Facilities/SQMI		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings[6]
Gibsonville	0	0	$0
Greensboro	31,685	44,583	$6,422,004,174
High Point	14,217	18,769	$2,362,202,705
Jamestown	241	219	$50,017,000
Oak Ridge	0	0	$0
Pleasant Garden	0	0	$0
Sedalia	0	0	$0

[6] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

Location	Greater than 19 Facilities/SQMI		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings[6]
Stokesdale	0	0	$0
Summerfield	0	0	$0
Whitsett	0	0	$0
Unincorporated Area	627	1,146	$77,551,200
GUILFORD COUNTY TOTAL	**46,770**	**64,717**	**$8,911,775,079**

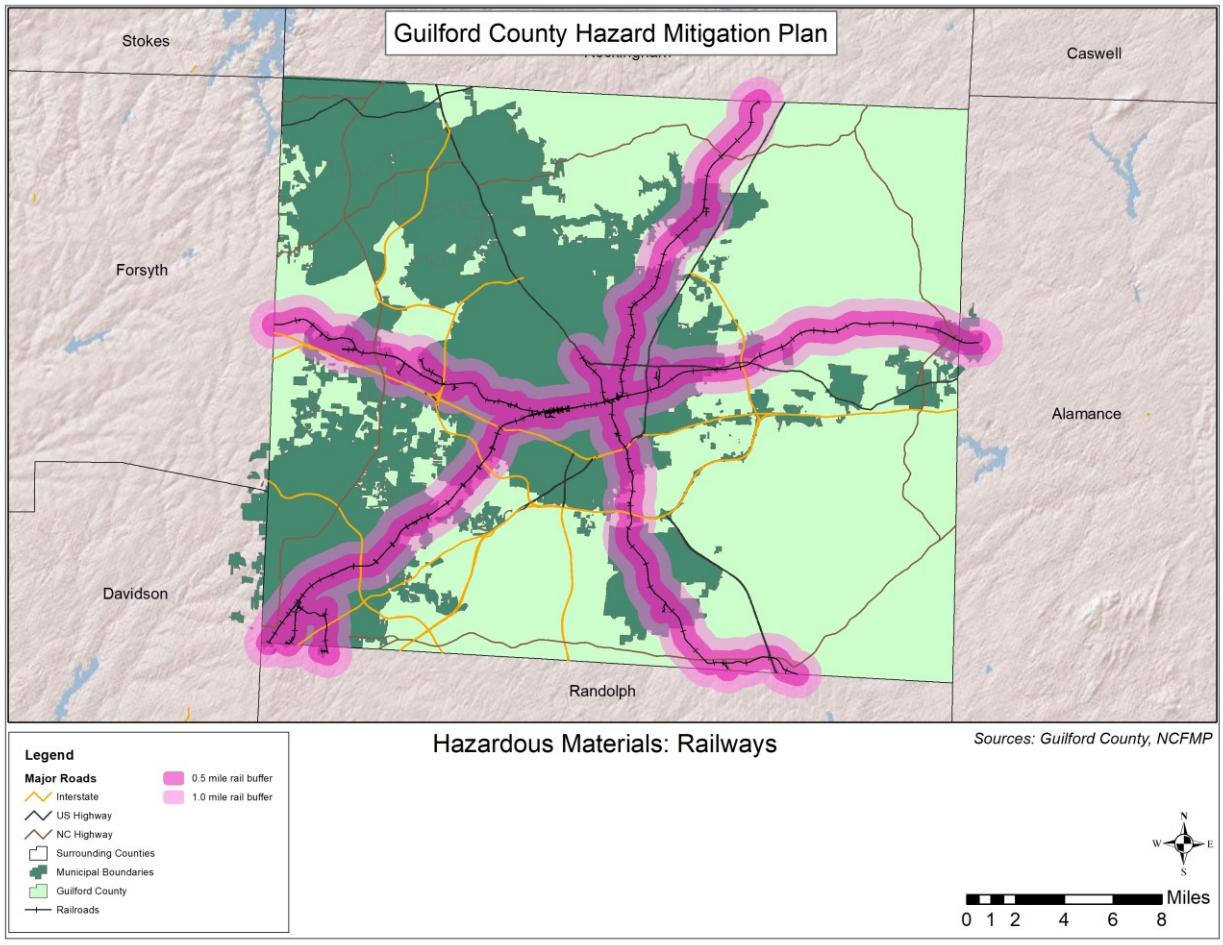
Source: Environmental Protection Agency

FIGURE 6.9: ROAD HAZMAT BUFFERS IN GUILFORD COUNTY



Source: NCDOT

FIGURE 6.10: RAIL HAZMAT BUFFERS IN GUILFORD COUNTY



Source: NCDOT, FRA

TABLE 6.11: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value[7]	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value[8]
Gibsonville	1,317	1,819	$145,218,211	208	272	$20,375,439
Greensboro	29,506	39,914	$5,404,317,074	25,970	33,612	$4,299,925,700
High Point	14,644	18,170	$2,325,038,500	13,284	15,441	$1,638,092,340
Jamestown	0	0	$0	70	117	$29,022,600
Oak Ridge	1,534	2,462	$359,648,900	517	866	$120,292,600
Pleasant Garden	201	420	$24,153,800	346	620	$57,123,000

[7] Improved value is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in the 0.5-mile buffer, since building footprints were not associated with dollar value data.
[8] Improved value is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in the 1.0-mile buffer, since building footprints were not associated with dollar value data. Buildings that were also counted as being located in the 0.5-mile buffer were not counted as being in the 1.0-mile buffer.

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value[7]	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value[8]
Sedalia	137	244	$15,155,000	159	252	$13,849,500
Stokesdale	1,673	3,094	$251,149,700	449	809	$85,284,500
Summerfield	1,853	3,286	$448,105,000	1,143	1,743	$290,770,200
Whitsett	248	634	$25,533,000	60	139	$5,409,500
Unincorporated Area	14,468	29,408	$1,776,107,220	9,712	18,552	$1,353,485,734
GUILFORD COUNTY TOTAL	**65,581**	**99,451**	**$10,774,426,405**	**51,918**	**72,423**	**$7,913,631,113**

TABLE 6.12: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value[9]	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value[10]
Gibsonville	948	1,355	$89,410,103	236	347	$23,674,147
Greensboro	22,181	31,928	$4,677,007,362	20,305	26,573	$3,526,300,188
High Point	7,544	9,612	$1,268,061,475	6,203	8,056	$748,648,910
Jamestown	752	864	$158,289,600	584	681	$135,376,100
Oak Ridge	0	0	$0	0	0	$0
Pleasant Garden	632	1,416	$84,906,900	517	1,167	$55,303,700
Sedalia	0	0	$0	0	0	$0
Stokesdale	0	0	$0	0	0	$0
Summerfield	0	0	$0	0	0	$0
Whitsett	0	0	$0	16	20	$3,124,900
Unincorporated Area	2,763	6,126	$334,090,380	3,092	6,887	$496,163,980
GUILFORD COUNTY TOTAL	**34,820**	**51,301**	**$6,611,765,820**	**30,953**	**43,731**	**$4,988,591,925**

Social Vulnerability

Given high susceptibility across Guilford County, it is assumed that the total population is at risk to hazardous materials incidents. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed FRS sites revealed that there are 180 facilities located in a HAZMAT risk zone. This includes nearly every type of facility analyzed in this assessment. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

[9] Improved value is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in the 0.5-mile buffer, since building footprints were not associated with dollar value data.

[10] Improved value is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in the 1.0-mile buffer, since building footprints were not associated with dollar value data. Buildings that were also counted as being located in the 0.5-mile buffer were not counted as being in the 1.0-mile buffer.

Mobile Analysis:
The critical facility analysis for road and railroad transportation corridors revealed that there are 290 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 237 critical facilities located in the railroad HAZMAT buffer areas.

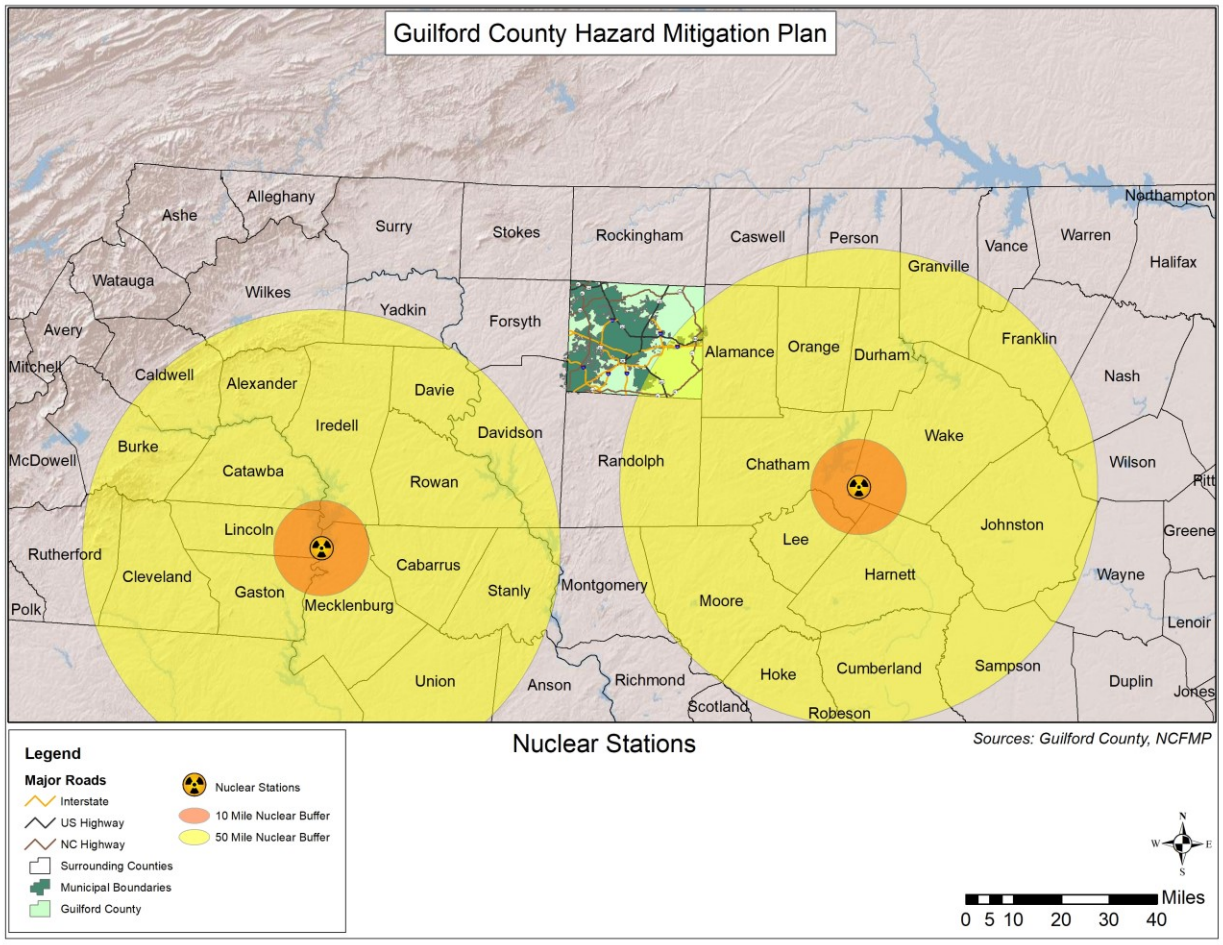
It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road and/or the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Guilford County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc.

6.5.5 Nuclear Accident

In order to assess fixed nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in *Section 5: Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total building values for only those improved properties that were confirmed to be located within one of the risk zones. There are no properties in Guilford County located within the 10-mile risk zone, so **Table 6.13** only presents potential at-risk properties in the 50-mile zone. Both the number of parcels/buildings and the approximate value are presented. **Figure 6.11** shows the 10-mile and 50-mile zones for Shearon-Harris and McGuire.

FIGURE 6.11: NUCLEAR STATIONS WITH RISK ZONES



Source: International Atomic Energy Agency

TABLE 6.13: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	50-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings[11]
Gibsonville	1,520	2,091	$165,094,850
Greensboro	120	157	$43,531,900
High Point	0	0	$0
Jamestown	0	0	$0
Oak Ridge	0	0	$0
Pleasant Garden	485	1,032	$54,680,600
Sedalia	329	547	$32,512,000
Stokesdale	0	0	$0
Summerfield	0	0	$0
Whitsett	329	815	$33,287,900

[11] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

Location	50-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings[11]
Unincorporated Area	11,173	23,445	$1,386,410,376
GUILFORD COUNTY TOTAL	**13,956**	**28,087**	**$1,715,517,626**

Source: International Atomic Energy Agency

Social Vulnerability

Since areas in the southeast part of the county are within the 50-mile buffer area, this segment of the population is considered to be at highest risk to a nuclear accident. However, other populations in the county may also be at some risk.

Critical Facilities

The critical facility analysis revealed that there are a total of 33 critical facilities located in the 50-mile nuclear buffer area. There were no facilities identified within the 10-mile area. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a nuclear accident has the potential to impact some existing and future buildings, facilities, and populations in the Guilford County, and areas in the southeast of the county are at a higher risk than others.

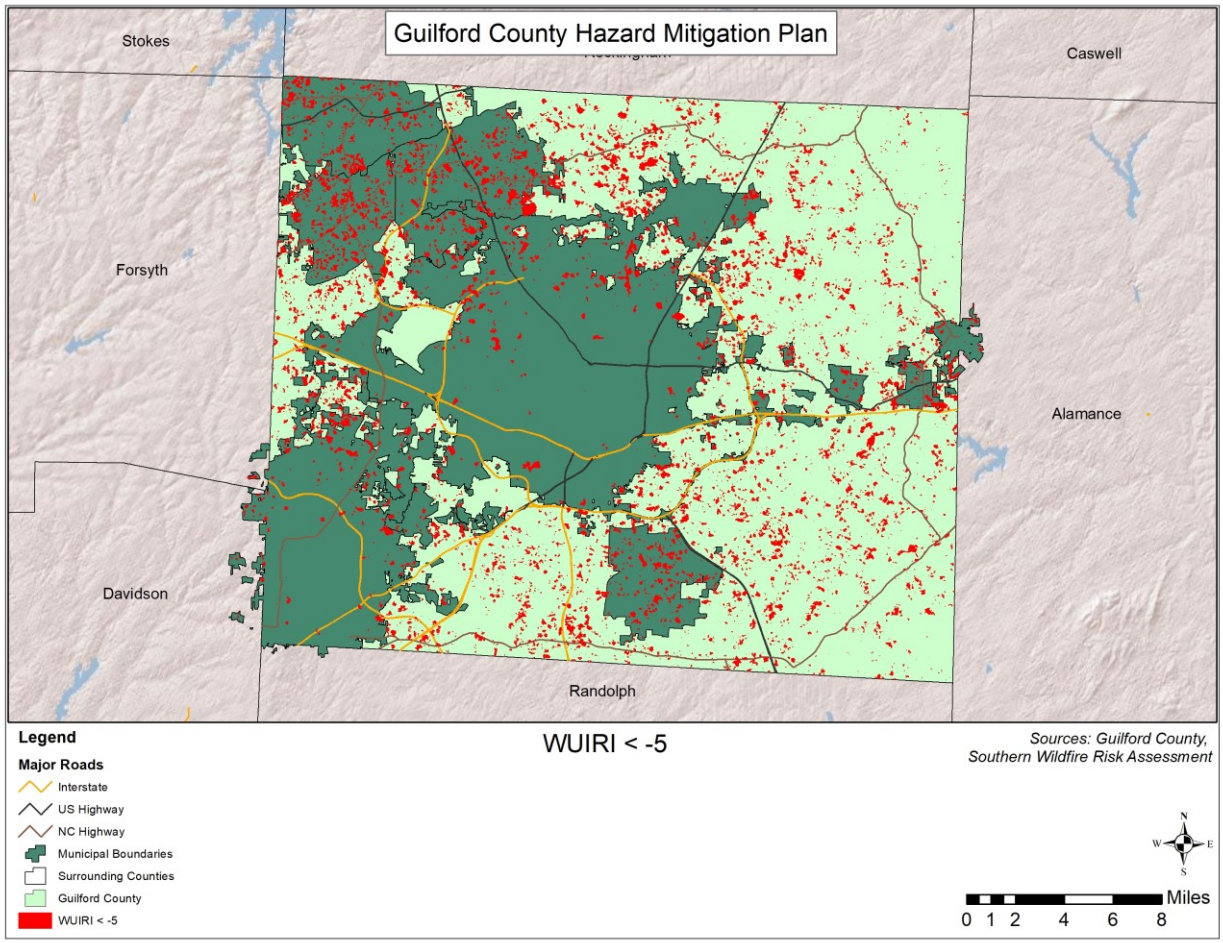
6.5.6 Fire/Wildfire

To estimate exposure to wildfire, the approximate number of buildings/parcels and their associated improved value was determined using GIS analysis. The Wildland Urban Interface Risk Index (WUIRI) data shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards.

The location of people living in the WUI is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, the WUIRI was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to -9 with lower values being most severe (as noted previously, this is only a measure of relative risk). **Figure 6.12** shows the areas of analysis where any grid cell is less than -5. Areas with a value below -5 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

Table 6.14 shows the results of the analysis.

FIGURE 6.12: WUI RISK INDEX AREAS LESS THAN -5 IN GUILFORD COUNTY



Source: Southern Wildfire Risk Assessment

TABLE 6.14: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE RISK AREAS

	HIGH WILDFIRE RISK AREA		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value[12]**
Gibsonville	105	153	$12,146,400
Greensboro	3,764	3,425	$845,151,300
High Point	1,358	1,273	$340,054,450
Jamestown	63	37	$22,416,500
Oak Ridge	835	1,168	$196,996,800
Pleasant Garden	379	659	$57,813,300
Sedalia	47	67	$4,902,700
Stokesdale	674	989	$118,653,100
Summerfield	1,152	1,588	$265,452,300
Whitsett	85	157	$9,299,800

[12] Improved value of buildings is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in wildfire risk zone, since building footprints were not associated with dollar value data.

	HIGH WILDFIRE RISK AREA		
Location	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value[12]
Unincorporated Area	7,524	12,173	$1,105,449,530
GUILFORD COUNTY TOTAL	**15,986**	**21,689**	**$2,978,336,180**

Source: Southern Wildfire Risk Assessment

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire county. It is assumed that the total population is at low to moderate risk to the wildfire hazard. Populations residing along the wildland urban interface are likely at highest risk. Determining the exact number of people in wildfire risk areas is difficult with existing data and could be misleading.

Critical Facilities

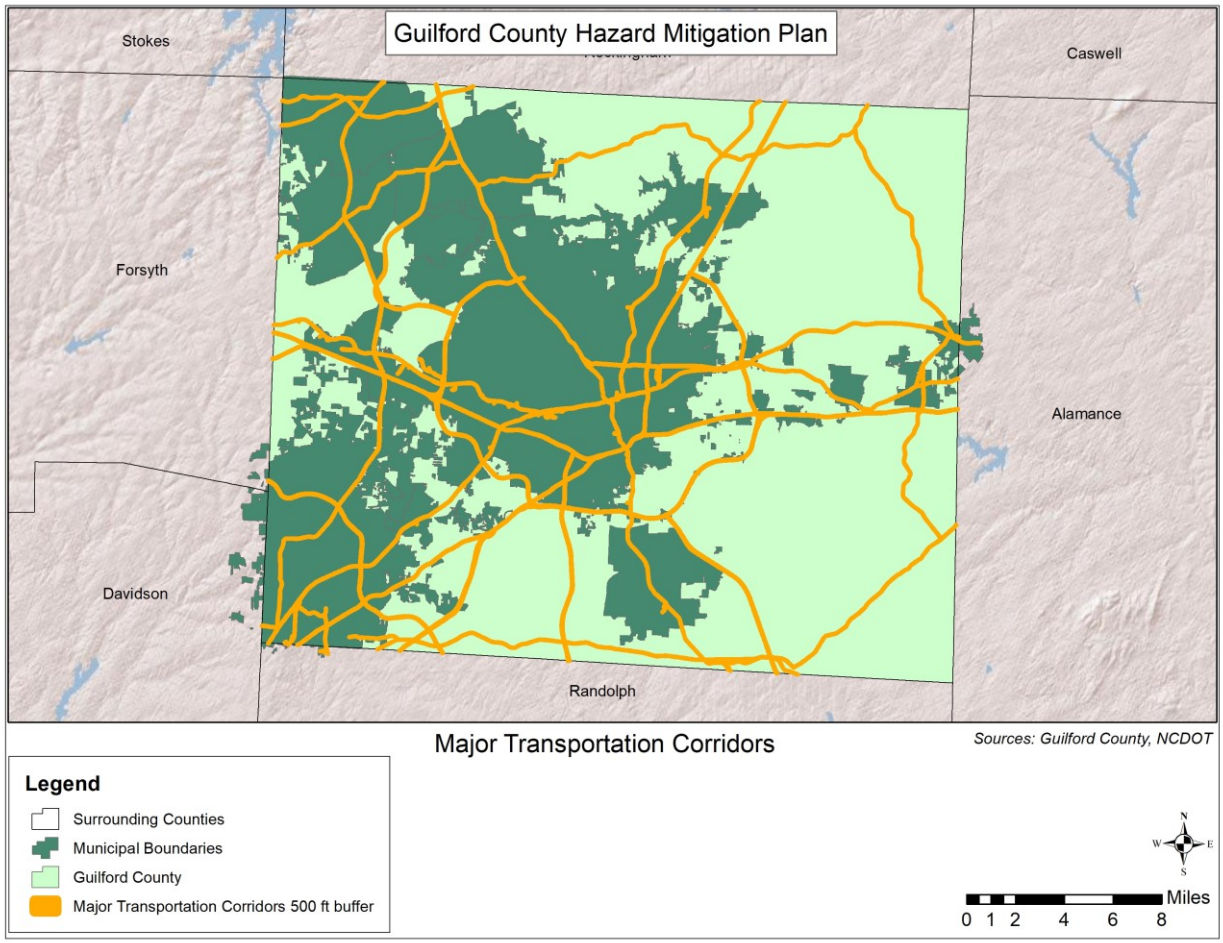
The critical facility analysis revealed that there are 21 critical facilities located in the wildfire risk area (areas where the WUIRI is less than -5). However, it should also be noted that several factors could impact the spread of a wildfire putting all facilities at some risk. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a wildfire event has the potential to impact some existing and future buildings, critical facilities, and populations in Guilford County, especially those located in non-urbanized areas of the county and in the wildland urban interface.

6.5.7 Transportation Incident

To estimate exposure to transportation incidents, major roadways and railways were identified and it was assumed that these incidents would impact a relatively narrow area along these corridors. A buffer of 500 feet was used to determine which buildings and parcels may be impacted along these corridors in the event of a major transportation incident. **Figure 6.13** shows the areas of analysis within 500 feet of a major roadway or railway in the county. **Table 6.15** shows the results of the analysis.

FIGURE 6.13: TRANSPORTATION INCIDENT 500 FEET BUFFER IN GUILFORD COUNTY



Source: NCDOT

TABLE 6.15: EXPOSURE OF IMPROVED PROPERTY TO TRANSPORTATION INCIDENT AREAS

	TRANSPORTATION INCIDENT AREAS		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value[13]**
Gibsonville	499	728	$60,000,415
Greensboro	7,469	10,264	$2,630,732,674
High Point	3,024	3,656	$804,923,510
Jamestown	85	110	$22,415,400
Oak Ridge	404	733	$90,643,500
Pleasant Garden	159	336	$23,916,700
Sedalia	69	123	$9,190,000
Stokesdale	631	1,219	$81,836,100
Summerfield	497	1,044	$78,548,800
Whitsett	142	376	$14,893,300

[13] Improved value of buildings is estimated based on the building value associated with parcels that contain buildings that have been identified as being located in wildfire risk zone, since building footprints were not associated with dollar value data.

	TRANSPORTATION INCIDENT AREAS		
Location	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value[13]
Unincorporated Area	3,759	8,005	$521,347,290
GUILFORD COUNTY TOTAL	**16,738**	**26,594**	**$4,338,447,689**

Source: NCDOT

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire county. It is assumed that while the short term impacts of a transportation incident may be severe on those involved, the long term impacts to the population at-large would be relatively small and normal conditions would be returned quickly.

Critical Facilities

The critical facility analysis revealed that there are 98 critical facilities located in the transportation incident risk area. Any facility located near a transportation corridor is at some risk to impacts from a transportation incident. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a transportation incident has the potential to impact some existing and future buildings, critical facilities, and populations in Guilford County.

6.6 CONCLUSIONS ON HAZARD VULNERABILITY

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the hazards in Guilford County through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk.
- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current picture of risk in Guilford County. Updating this risk "snapshot" with future data will enable comparison of the changes in risk with time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.
- Comparing the risk among the hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate hazards that are present in Guilford County. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to Guilford County and its municipalities.

Exposure to hazards can be an indicator of vulnerability. Economic exposure can be identified through building values and social exposure can be identified by estimating the population exposed to each

hazard. This information is especially important for decision-makers to use in planning for evacuation or other public safety related needs.

The types of assets included in these analyses include all building types in the participating jurisdictions. Specific information about the types of assets that are vulnerable to the identified hazards is included in each hazard subsection (for example all building types are considered at risk to the winter storm hazard and some commercial and residential owned structures are at risk to repetitive flooding, etc).

Table 6.16 presents a summary of annualized loss for each hazard in Guilford County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined using the damage reported from historical occurrences at the county level to the built environment. It does not take into consideration other types of damages, such as those to crops or vehicles. It should also be noted that many of these values have been collected from sources that may not account for all damages caused by a particular hazard and therefore, these values often underestimate loss. However, the annualized loss values are included as they may be used as an additional planning tool to evaluate risk and understand a baseline of expected losses.

TABLE 6.16: ANNUALIZED LOSS TO THE BUILT ENVIRONMENT FOR GUILFORD COUNTY*

Event	Guilford County
Natural Hazards	
Drought	$0
Earthquake	$83,000
Extreme Cold	$0
Extreme Heat	$0
Fire/Wildfire	*No Data*
Flooding	$847,555
Hail	$39
Hurricane/Tropical Disturbance	$3,174,000
Thunderstorm (Wind/Lightning)	$221,259
Tornado	$67,895,161
Winter Storm	$409,030
Biological Hazards	
Bioterrorism	*No Data*
Public Health/Emerging Disease	*No Data*
Technological Hazards	
Building/Structure Collapse	*No Data*
Communications Systems Failure	*No Data*
Energy/Power/Utility Failure	*No Data*
HAZMAT Incident	$15,360
Nuclear Power Plant Emergency	*No Data*
Pipeline Failure	*No Data*

Event	Guilford County
Resource Shortage (Fuel/Water)	*No Data*
Transportation Incident	*No Data*
Man-Made/Intentional Hazards	
Civil Disturbance	*No Data*
Cyber-Security Threat	*No Data*
Terrorism	*No Data*

*In this table, the term "No Data" is used to indicate that no historic property damage or other mechanism for estimating annualized risk to the built environment was available for the particular hazard. This is generally because documentation of that particular type of event is not well kept or readily available.

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme cold, extreme heat, hail, hurricane and tropical disturbance, lightning, thunderstorm wind, tornado, and winter storm. All existing and future buildings are also vulnerable to many of the biological, technological, and man-made hazards including bioterrorism, public health/emerging disease, building/structure collapse, communications systems disruption/failure, energy/power/utility failure, pipeline failure, resource shortage, civil disturbance, cyber-security threat, and terrorism. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type, but that level of analysis was outside the scope of this plan. **Table 6.17** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE 6.17: AT-RISK CRITICAL FACILITIES IN GUILFORD COUNTY

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
GIBSONVILLE																																
Gibsonville Elementary School / 401 E JOYNER ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
STA #6 / 218 Piedmont Ave	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Gibsonville Community Center/Rec Dept / 314 Tenth St	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
GIBSONVILLE TOWN HALL / 129 WEST MAIN ST	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Gibsonville Police HQ / 129 W Main St	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Broad Street Sewage Pump Station / 708 Broad St.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
Scott Drive Sewage Pump Station / 616 SCOTT DR	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X			X	X	X		X	X	X
Sullivan Court Sewage Pump Station / 213 SULLIVAN CT	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X			X	X	X		X	X	X
GREENSBORO																																
Doris Henderson Newcomers School Alternative School / 411 FRIENDWAY RD	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Gateway Education Center Alternative School / 3205 E WENDOVER AV	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Herbin-Metz Ed Center Alternative School / 400 O'FERRELL ST	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
High School Ahead Academy Alternative School / 329 COLLEGE RD	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
McIver Education Center Alternative School / 1401 SUMMIT AV	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
SCALE - Greensboro Alternative School / 116 PISGAH CHURCH RD	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X					X		X	X	X		X	X	X
Twilight School Alternative School / 116 PISGAH CHURCH RD	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X					X		X	X	X		X	X	X
Justice Tower / 1201 Coliseum Blvd.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
McLeansville Tower / 900 Knox Rd.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X				X	X	X	X		X	X	X
Meadowood Tower / 1002 Meadowood St.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
NC A&T University VIPER Tower / 1201 Sullivan St.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Time Warner Tower / 1813 Spring Garden St.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Alderman Elementary School / 4211 CHATEAU DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
Archer Elementary School / 2610 FOUR SEASON BLVD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Bessemer Elementary School / 918 HUFFINE MILL RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
Bluford Elementary School / 1901 TUSCALOOSA ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
B'nai Shalom Day School Elementary School / 804-A WINVIEW DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Brightwood Elementary School / 2001 BRIGHTWOOD SCHOOL RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X			X	X	X		X	X	X
Brooks Global Studies Elementary School / 1215 WESTOVER TR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Caldwell Academy Elementary School / 2900 HORSE PEN CREEK RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
Canterbury School Elementary School / 5400 OLD LAKE JEANETTE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Claxton Elementary School / 3720 PINETOP RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Colfax Elementary School / 9112 W MARKET ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X			X	X	X	X	X	X	X
Cone Elementary School / 2501 N CHURCH ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Cornerstone Charter Academy Elementary School / 2535 NEW GARDEN EAST RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Erwin Montessori Elementary School / 3012 E BESSEMER AV	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Falkener Elementary School / 3931 NACO RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
Foust Elementary School / 2610 FLOYD ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X					X	X	X		X	X	X
Frazier Elementary School / 4215 GATWAY DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
General Greene Elementary School / 1501 BENJAMIN PKW	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X					X	X	X		X	X	X
Gillespie Park Elementary School / 1900 MARTIN LUTHER KING BLVD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
Greensboro Academy Elementary School / 4049 BATTLEGROUND AVE	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Greensboro Day School Elementary School / 5401 LAWNDALE DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Greensboro Islamic Academy Elementary School / 2023 16TH ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X		X	X	X	X	X	X	X
Greensboro Montessori School Elementary School / 2856 HORSE PEN CREEK RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Guilford Elementary School / 920 STAGE COACH TL	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Guilford Preparatory Academy Elementary School / 2210 E CONE BLVD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Hampton Academy Elementary School / 2301 TRADE ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
Hunter Elementary School / 1305 MERRITT DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Irving Park Elementary School / 1310 SUNSET DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Jefferson Elementary School / 1400 NEW GARDEN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Jesse Wharton Elementary School / 5813 LAKE BRANDT RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Jones Elementary School / 502 SOUTH ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

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Joyner Elementary School / 3300 NORMANDY RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Lindley Elementary School / 2700 CAMDEN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X		X	X	X		X	X	X
Morehead Elementary School / 4630 TOWER RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Murphey Traditional Academy Elementary School / 2306 ONTARIO ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
Napoleon B. Smith School / 1802 E Market St	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X		X	X	X		X	X	X
New Garden Friends School Elementary School / 1128 NEW GARDEN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Next Generation Academy / 1414 Cliffwood Rd.	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Noble Academy Elementary School / 3310 HORSE PEN CREEK RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Our Lady of Grace Catholic Sch Elementary School / 201 S CHAPMAN ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X		X	X	X		X	X	X
Pearce Elementary School / 2006 PLEASANT RIDGE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Peck Elementary School / 1601 W FLORIDA ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Peeler Open Elementary School / 2200 RANDALL ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Pilot Elementary School / 4701 CHIMNEY SPRING DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
Rankin Elementary School / 3301 SUMMIT AV	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X		X		X	X	X		X	X	X
Reedy Fork Elementary School / 4571 REEDY FORK PKY	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Ronald McNair Elementary School / 4603 YANCEYVILLE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Sedgefield Elementary School / 2905 GROOMETOWN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
Simkins Elementary School / 3511 E LEE ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
St Pius X Catholic School Elementary School / 2200 N ELM ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Sternberger Elementary School / 518 N HOLDEN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Triad Math & Science Academy Elementary School / 700 CREEK RIDGE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X
Vandalia Elementary School / 407 E VANDALIA RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Washington Montessori Elementary School / 1110 E WASHINGTON ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Wiley Elementary School / 600 W TERRELL ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
EMS Base 1 / 1339 Headquarters Dr	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
EMS Base 3 / 1002 Meadowood St	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
EMS Base 4 / 2206 Fernwood Dr	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X
EMS Base 6 / 300 Concord┬á St	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X		X	X	X
PTAR 10 / 600 Huffine Mill Rd	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
STA #1 / 5107 N Church St	Fire Station	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
STA #10 / 4208 High Point Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
STA #11 / 2602 S Elm-Eugene St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
STA #14 / 3633 Summit Ave	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X			X	X	X		X	X	X
STA #17 / 6405 Old Oak Ridge Rd	Fire Station	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
STA #18 / 5903 Ballinger Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #19 / 6900 Downwind Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
STA #2 / 5107 N Church St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #20 / 8404 W Market St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
STA #21 / 2870 Horse Pen Creek Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
STA #23 / 5107 Mackay Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X			X	X	X	X	X	X	X
STA #4 / 401 Gorrell St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
STA #40 / 1805 Pisgah Church Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STA #41 / 4212 Lake Brandt Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STA #43 / 4854 Lake Jeanette Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #48 / 1400 W Vandalia Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
STA #49 / 4302 W Friendly Ave	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #5 / 1401 Westover Ter	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
STA #52 / 1000 Meadowood Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
STA #53 / 2013 Willow Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
STA #56 / 820 Franklin Blvd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STA #57 / 1539 Mt Hope Curch Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STA #59 / 3803 Reedy Fork PW	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X		X	X	X	X	X	X	X
STA #61 / 105 W Vandalia Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
STA #63 (Under Construction) / 4302 Burlington Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
STA #7 / 1064 Gatewood Ave	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
STA #8 / 2201 Coliseum Blvd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
BB&T Building (Guilford County Information Services) / 201 W. Market St.	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
City Of Greensboro City Coordination Center(Public Safety Training Facility) / 1510 N. Church St.	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X		X	X	X
County Courts Building - Greensboro / 201 S. Eugene St.	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
GREENSBORO CITY HALL / 300 WEST WASHINGTON ST	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Greensboro City Services Center (Greensborto City Field Operations) / 401 Patton Ave.	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
Guilford County Agricultural Center (Guilford Co. Cooperative Extension) / 3309 Burlington Rd.	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
Guilford County EMS Maintenance Shop / 1321 N O'Henry Blvd	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Guilford County Juvenile Detention Center / 15 Lockheed Court	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X				X	X	X		X	X	X
GUILFORD COUNTY OLD COURT HOUSE / 221 W MARKET ST	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Guilford County Sheriff'S Office - Special Operations Office / 2814 Firestone Dr.	Government Offices	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		X				X	X	X		X	X	X
INDEPENDENCE CENTER / 400 W MARKET ST	Government Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Ecoflo / 2750 Patterson St.	Hazardous Waste Management Facility	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X				X	X	X	X	X	X	X
Academy at Smith High School / 2225 S HOLDEN RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X	X		X	X	X
American Hebrew Academy High School / 4334 HOBBS RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X	X		X	X	X
Caldwell Academy High School / 2900 HORSE PEN CREEK RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X		X	X	X
Cornerstone Charter Academy High School / 2535 NEW GARDEN EAST RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X	X		X	X	X
Dudley High School / 1200 LINCOLN ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X			X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Early College at Guilford High School / 5608 W FRIENDLY AV	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Greensboro Day School High School / 5401 LAWNDALE DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Greensboro Middle College High School / 815 W MARKET ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X
Grimsley High School / 801 WESTOVER TR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
GTCC Middle College-Greensboro High School / 3505 E WENDOVER AV	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Mell Burton School / 1601 Huffine Mill Rd.	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X		X		X	X	X		X	X	X
Middle College at Bennett High School / 722 GORRELL ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X		X	X	X
Middle College at NC A&T High School / 1601 E MARKET ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Middle College at UNCG High School / 1408 WALKER AV	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
New Garden Frieds School Upper School-Page-Frederiksen Campus / 2015 Pleasant Ridge Rd.	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
New Garden Friends School High School / 1128 NEW GARDEN RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Noble Academy High School / 3310 HORSE PEN CREEK RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Page High School / 201 ALMA PINNIX DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X		X	X	X		X	X	X
Piedmont Classical High School High School / 1401 LEES CHAPEL RD	High School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X					X		X	X	X		X	X	X
Smith High School / 2407 S HOLDEN RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STEM Early College at NC A&T High School / 402 LAUREL ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
Triad Math & Science Academy High School / 700 CREEK RIDGE RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X
Weaver Academy High School / 300 S SPRING ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X
Western High School / 409 FRIENDWAY RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Kindred Hospital / 2401 S. Side Blvd.	Hospital	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
MOSES CONE BEHAVIORAL HEALTH SYSTEM / 700 WALTER REED DR	Hospital	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
MOSES H CONE MEMORIAL HOSPITAL / 1200 N ELM ST	Hospital	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
WESLEY LONG COMMUNITY HOSPITAL / 501 N ELAM AV	Hospital	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
WOMEN'S HOSPITAL OF GREENSBORO / 801 GREEN VALLEY RD	Hospital	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Academy at Lincoln Middle School / 1016 LINCOLN ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X		X	X	X	X	X	X	X
Allen Middle School / 1108 GLENDALE DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
B'nai Shalom Day School Middle School / 804-A WINVIEW DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Caldwell Academy Middle School / 2900 HORSE PEN CREEK RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Canterbury School Middle School / 5400 OLD LAKE JEANETTE RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Cornerstone Charter Academy Middle School / 2535 NEW GARDEN EAST RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Greensboro Academy Middle School / 4049 BATTLEGROUND AVE	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Greensboro Day School Middle School / 5401 LAWNDALE DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Greensboro Montessori School Middle School / 2856 HORSE PEN CREEK RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Guilford Preparatory Academy Middle School / 2210 E CONE BLVD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Hairston Middle School / 3911 NACO RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Jackson Middle School / 2200 ONTARIO ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
Kernodle Middle School / 3600 DRAWBRIDGE PKY	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Kiser Middle School / 716 BENJAMIN PKY	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X		X	X	X
Mendenhall Middle School / 205 WILLOUGHBY BLVD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
New Garden Frieds School Upper School-Page-Frederiksen Campus / 2015 Pleasant Ridge Rd.	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
New Garden Friends School Middle School / 1128 NEW GARDEN RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Noble Academy Middle School / 3310 HORSE PEN CREEK RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Our Lady of Grace Catholic Sch Middle School / 201 S CHAPMAN ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X		X	X	X		X	X	X
St Pius X Catholic School Middle School / 2200 N ELM ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Swann Middle School / 811 CYPRESS ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Triad Math & Science Academy Middle School / 700 CREEK RIDGE RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X
Western Guilford Middle School / 401 COLLEGE RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Central Operations Center / 100 Police Pl	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Eastern Operations Center / 1106 Maple St	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Greensboro Police HQ / 300 W Washington St	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Guilford County Sheriff's Office - Law Enforcement Center / 401 W. Sycamore St.	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Guilford County Sheriff's Office - Main Office / 400 W. Washington St.	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
N.C. Agricultural & Technical State Univ. Police Dept. / 406 Laurel St.	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
Sheriff Office District 2 / 5440 Millstream Rd	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X				X	X	X	X		X	X	X
Sheriff/Detention Center / 201 S Edgeworth St	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Southern Operation Center / 2602 S Elm-Eugene ST	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
University of North Carolina - Greensboro Police Dept. / 1200 W. Lee St.	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X
Western Operations Center / 300 S Swing Rd	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
BRENNTAG MID-SOUTH - 49 - BMS GREENSBORO (S) /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
Greensboro II Terminal (Magellan Terminals) / 7101 W Market St.	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
Guilford County Terminal /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X
Harris Teeter Frozen Foods Distribution Center /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
Harris Teeter Perishables Distribution Center /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X		X	X	X
KMST Greensboro 1 /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
MOTIVA ENTERPRISES LLC - GREENSBORO /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
Pactiv LLC - Greensboro Plant /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X
Galyon Transportation Center / 236 E. Washington St.	Transportation Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X
BENNETT COLLEGE / 900 E WASHINGTON ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X		X	X	X
ELON UNIVERSITY - SCHOOL OF LAW / 201 N GREENE ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X		X	X	X
GATEWAY UNIVERSITY RESEARCH PARK-NORTH / 5900 SUMMIT AV	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X		X	X	X		X	X	X
GATEWAY UNIVERSITY RESEARCH PARK-SOUTH / 2901 E LEE ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
GREENSBORO COLLEGE / 815 W MARKET ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X
GUILFORD COLLEGE / 5800 W FRIENDLY AV	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
GUILFORD TECHNICAL COMMUNITY COLLEGE / 3505 E MARKET ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
NORTH CAROLINA AGRICULTURAL & TECHNICAL STATE UNIVERSITY / 1601 E MARKET ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL													MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
THE UNIVERSITY of NORTH CAROLINA at GREENSBORO / 1400 SPRING GARDEN ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Abner Lift Station / 2000 Kaufelt St.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
Airpark Ct Booster Station / 5 Sharp's Airpark Ct.	Wastewater and Water Treatment	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X		X	X	X
Airport Lift Station / 6307 Airport Pkwy.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Alamance Lift Station / 1035 Neese Rd.	Wastewater and Water Treatment	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
American Express Lift Station / 7501-LS Business Park Dr	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Battleground Booster Station / 3110 Forest Lawn Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Beaver Creek / 3652-LS Southeast School Rd	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Big Alamance Lift Station / 3038-X Alamance Church Rd	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X		X	X	X		X	X	X
Birch Creek Lift Station / 210 Birch Creek Rd	Wastewater and Water Treatment	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X			X		X	X	X		X	X	X
Bishop Road / 4715-X Evans Town Rd	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Bledsoe Drive Lift Station / 2783 Horsepen Creek Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Brandon Station Lift Station / 2104 - X Brandon Station Ct.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Brightwood Lift Station / 3240 Gatesville Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Bryan Park Lift Station / 6105 Townsend Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X			X	X	X	X	X	X	X
Burnt Poplar Road Lift Station / 6350 - LS Burnt Poplar Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Cardella Lift Station / 612 - LS Cardella Drive	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Cardinal Lift Station / 3861 Lewiston Rd	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Clifton Rd. 1 Booster Station / 3912 Clifton Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
Corbin Road Lift Station / 4111-X Corbin Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
Eastern Shores Lift Station / 5002 Eastern Shores Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Foxburrow Lift Station / 5070 Foxburrow Rd.	Wastewater and Water Treatment	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X						X	X	X	X		X	X	X
Foxcroft Lift Station / 4908-LS Peppercorn Ln	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Gallimore Dairy Lift Station / 502-X Gallimore Dairy Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X					X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Greensboro Wastewater Treatment Plant- N. Buffalo Plant / 2199 White St.	Wastewater and Water Treatment	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Greensboro Wastewater Treatment Plant- TZ Osborne / 2350 Huffine Mill Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X
Greensboro Water Treatment Plant - Lake Townsend / 6268 Bryan Park Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X			X	X	X		X	X	X
Greensboro Water Treatment Plant - NL Mitchell / 1041 Battleground Ave.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X
Greensboro Water Treatment Plant - Reedy Fork / 5966 Lake Brant Rd.	Wastewater and Water Treatment	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Griffin Mill Lift Station / 6104 Bedstone Ln.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Groometown Rd Booster Station / 3700 Groometown Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Guilford Lift Station / 7998 Leabourne Rd	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Highway 70 Booster Station / 4501-A Burlington Rd.	Wastewater and Water Treatment	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Hilltop Road Lift Station / 5230 - X Hilltop Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Horsepen Creek Lift Station / 3846-LS Battleground Av.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Hunters Ridge Lift Station / 4601-X Alliance Church Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
Jessup Grove Rd. 1 Booster Station / 4501 Jessup Grove Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Kenneth Road Lift Station / 700 Kenneth Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Lake Brandt Lift Station / 2535 North Beech Ln	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Lake Daniel 1 Booster Station / 502 Benjamin Parkway	Wastewater and Water Treatment	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL													MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Lawndale Lift Station / 5004-LS Bluff Run Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Lee's Chapel Rd. Tank 1 Booster Station / 1364-W Lee'S Chapel Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X					X		X	X	X		X	X	X
Long Branch Lift Station / 6199 Chimney Center Blvd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X
Lynwood Lakes Lift Station / 2018 Lynwood Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
McConnell Rd. Booster Station / 3409-A Mcconnell Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Mcknight Mill Road Lift Station / 3600-X Peterford Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Mcnairy Point Lift Station / 5221 N. Church St.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Nealtown Road Lift Station / 2003-LS White St.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Neelley Road Lift Station / 2022-X Neelley Way	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
New Garden Rd. 1 Booster Station / 1601 New Garden Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Northern Shores Lift Station / 802-LS Northern Shores Pt	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Peach Orchard Lift Station / 5702-X River Glen Dr	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Reedy Fork Lift Station / 6951 McLeansville Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X			X	X	X	X	X	X	X
Regional Rd. 1 Booster Station / 801 N. Regional Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
Reserve Lift Station / 1943-LS Pavillion Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Rock Creek Lift Station / 6595 Judge Adams Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Sedgefield Lakes Lift Station / 5004 Ellery Ct.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X		X	X	X		X	X	X
Sedgefield Lift Station / 3413-X Old Onslow Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Shirley Lane Lift Station / 4109-LS Rev Williams Dr	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Stewart Mill Lift Station / 1500-X Stewart Mill Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X				X	X	X	X		X	X	X
Stoney Creek 1 Booster Station / 6430-A Burlington Rd.	Wastewater and Water Treatment	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
Summerhill Lift Station / 5243 N Church St.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Sunfish Point Lift Station / 2 Sunfish Pt.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
Triad Drive Lift Station / 8700 Triad Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Twilla Acres Lift Station / 1315 Ranhurst Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Waterbury Lift Station / 6737 Barton Creek Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X			X	X	X		X	X	X
Wayne Road Lift Station / 4306 Wayne Rd.	Wastewater and Water Treatment	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Winston Booster 1 Booster Station / 9652 West Market	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X
Young's Mill Road Lift Station / 1723 Young's Mill Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
HIGH POINT																																
Pruette SCALE Academy Alternative School / 900 ENGLISH RD	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X				X	X		X	X	X
Allen Jay Elementary School / 1311 E SPRINGFIELD RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Brittain Academy Elementary School / 155 NORTHPOINT AV	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X
Fairview Elementary School / 608 FAIRVIEW ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X

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		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Florence Elementary School / 7605 FLORENCE SCHOOL RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X						X	X		X	X	X
Hayworth Christian School Elementary School / 1696 WESTCHESTER DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X				X	X	X	X	X	X
High Point Christian Academy Elementary School / 307 N ROTARY DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X					X	X		X	X	X
High Point Friends School Elementary School / 800 QUAKER LN	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X				X	X		X	X	X
Immaculate Heart of Mary Catholi Elementary School / 4145 JOHNSON ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X									X	X		X	X	X
Johnson Global Studies Elementary School / 1601 JOHNSON ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X							X	X		X	X	X
Kirkman Park Elementary School / 1101 N CENTENNIAL ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X		X				X	X		X	X	X
Montlieu Academy of Technology Elementary School / 1105 MONTLIEU AV	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X		X				X	X		X	X	X
Northwood Elementary School / 818 W LEXINGTON AV	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X							X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Oak Hill Elementary School / 320 WRIGHTENBERRY ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X				X	X		X	X	X
Oak View Elementary School / 614 OAKVIEW RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Parkview Elementary School / 325 GORDON ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X				X	X		X	X	X
Phoenix Academy Elementary School / 4191 MENDENHALL OAKS PKWY	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X
Shadybrook Elementary School / 503 SHADYBROOK RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Southwest Elementary School / 4372 SOUTHWEST SCHOOL RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
The Piedmont School Elementary School / 815 OLD MILL RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Triangle Lake Montessori Elementary School / 2401 TRIANGLE LAKE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X		X	X	X
Union Hill Elementary School / 3523 TRIANGLE LAKE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X		X	X	X
Wesleyan Christian Academy Elementary School / 1917 N CENTENNIAL ST	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
EMS Base 2 / 201 Montlieu Av	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X			X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
EMS Base 9 / 2011 Sandy Ridge Rd	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X									X	X		X	X	X
PTAR 7 / 901 S Elm St	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X					X	X		X	X	X
HP #1 / 508 N Centennial St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
HP #10 / 2419 Whites Mill Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X							X	X		X	X	X
HP #11 / 2604 Morris Farm Dr	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X									X	X		X	X	X
HP #12 / 4538 Barrow Rd	Fire Station	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X									X	X		X	X	X
HP #13 / 2414 Ambassador Ct	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X							X	X	X	X	X	X
HP #2 - Headquarters / 434 South Elm St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
HP #26 / 2127 Sandy Ridge Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X									X	X		X	X	X
HP #3 / 1309 Chestnut Dr	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X				X	X	X	X	X	X
HP #4 / 930 Old Winston Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X						X	X		X	X	X
HP #5 / 3828 Johnson St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X						X	X		X	X	X
HP #6 / 110 East Springfield Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
HP #7 / 1116 Gordon St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X				X	X		X	X	X
HP #8 / 208 Prospect St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X					X	X	X	X	X	X
HP #9 / 2707 Triangle Lake Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
HP Fire Training / 1035 W Ward Av	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X					X	X	X	X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Academy at Central High School / 700 CHESTNUT DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X		X	X	X
Andrews High School / 1920 MCGUINN DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Brittain Academy High School / 155 NORTHPOINT AV	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X
GTCC Middle College-High Point High School / 901 S MAIN ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
Hayworth Christian School High School / 1696 WESTCHESTER DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X
High Point Central High School / 801 FERNDALE BLVD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X			X	X		X	X	X
High Point Christian Academy High School / 307 N ROTARY DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X		X	X	X
Penn-Griffin High School / 825 E WASHINGTON DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
Phoenix Academy High School / 4191 MENDENHALL OAKS PKWY	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X
Southwest High School / 4364 BARROW RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
The Piedmont School High School / 815 OLD MILL RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Wesleyan Christian Academy High School / 1917 N CENTENNIAL ST	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
HIGH POINT REGIONAL HOSPITAL / 601 N ELM ST	Hospital	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X				X			X	X		X	X	X
MOSES CONE MEDCENTER / 2630 WILLARD DAIRY RD	Hospital	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Brittain Academy Middle School / 155 NORTHPOINT AV	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X
Ferndale Middle School / 701 FERNDALE BLVD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X				X	X		X	X	X
Hayworth Christian School Middle School / 1696 WESTCHESTER DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X
High Point Christian Academy Middle School / 307 N ROTARY DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X				X	X		X	X	X
High Point Friends School Middle School / 800 QUAKER LN	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X			X	X		X	X	X
Immaculate Heart of Mary Catholi Middle School / 4145 JOHNSON ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Johnson Street Global Middle School / 1601 JOHNSON ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Penn-Griffin Middle School / 825 E WASHINGTON DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X	X	X	X	X
Phoenix Academy Middle School / 4191 MENDENHALL OAKS PKWY	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X
Southwest Middle School / 4368 BARROW RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
The Piedmont School Middle School / 815 OLD MILL RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Welborn Academy Middle School / 1710 MCGUINN DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Wesleyan Christian Academy Middle School / 1917 N CENTENNIAL ST	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
HIGH POINT CITY HALL / 211 S HAMILTON ST	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
High Point Detention Cent / 507 East Green Drive	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
High Point Police HQ / 1009 Leonard Av	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
Future Foam, Inc /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X				X	X	X	X	X	X
Glass Unlimited of High Point /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X				X	X		X	X	X
High Point Facility /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X				X	X	X	X	X	X
Hunter Farms /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Kao Specialties Americas LLC /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Suiza Dairy Group LLC dba Land of Sun Dairies LLC (High Point) /	RMP Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X			X			X	X		X	X	X
AmTrak Train Station / 100 W. High Ave.	Transportation Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X	X	X	X	X
GUILFORD TECHNICAL COMMUNITY COLLEGE / 901 S MAIN ST	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
HIGH POINT UNIVERSITY / 833 MONTLIEU AV	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X					X			X	X		X	X	X
Eastside Wastewater Treatment Plant / 5898 Riverdale Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Frank L. Ward Water Treatment Plant / 2011 E. Kivett Dr.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X		X				X	X	X	X	X	X
JAMESTOWN																																
Christine Joyner Ed Center Alternative School / 604 HIGH POINT RD	Alternative School	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
Jamestown Elementary School / 108 POTTER DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			X				X	X		X	X	X
Millis Road Elementary School / 4310 MILLIS RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
Medic 3/35 / 301 E Main St	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
STA #46 / 301-B East Main St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
Ragsdale High School / 1000 LUCY RAGSDALE DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
JAMESTOWN TOWN HALL / 301 E MAIN ST	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
Sheriff Office District 3 / 211 Hillstone Dr	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X	X	X	X	X
OAK RIDGE																																	
Oak Ridge Elementary School / 2050 OAK RIDGE RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
STA #15 / 8325 Linville Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Oak Ridge Military Academy High School / 2317 OAK RIDGE RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
Oak Ridge Military Academy Middle School / 2317 OAK RIDGE RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
OAK RIDGE TOWN HALL / 8315 LINVILLE RD	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
PLEASANT GARDEN																																	
Pleasant Garden Elementary School / 4833 PLEASANT GARDEN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
STA #3 / 4814 Pleasant Garden Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
PLEASANT GARDEN TOWN HALL / 4920 ALLIANCE CHURCH RD	Municipal Offices	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X					X			X	X		X	X	X
SEDALIA																																
Sedalia Elementary School / 6120 BURLINGTON RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
SEDALIA TOWN HALL / 6121 BURLINGTON RD	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
STOKESDALE																																
Stokesdale Elementary School / 8025 US HIGHWAY 158	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
STA #12 / 8401 US Hwy 158	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
STOKESDALE TOWN HALL / 8325 ANGEL-PARDUE	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
SUMMERFIELD																																
Clarkland Tower / 5449 5459 Clarkland Rd	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Summerfield Tower / 5501 Centerfield Rd.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Revolution Academy Charter School / 3800 Oak Ridge Rd	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Laughlin Primary (CLOSED) Elementary School / 7911 SUMMERFIELD RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Summerfield Charter Academy Elementary School / 5303 US 220 N	Elementary School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
Summerfield Elementary School / 7501 SUMMERFIELD RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Medic 1 / 7400 Summerfield Rd	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
STA #29 / 1800 Scalesville Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
STA #39 / 6214 Lake Brandt Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
STA #9 / 7400 Summerfield Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Revolution Academy Charter School / 3800 Oak Ridge Rd	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
Summerfield Charter Academy Middle School / 5303 US 220 N	Middle School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
SUMMERFIELD TOWN HALL / 4117 OAK RIDGE RD	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
Sheriff Office District 1 / 7504 Summerfield Rd	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
WHITSETT																																	
STA #31 / 809 NC Hwy 61 S	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
WHISETT TOWN HALL / 809 NC HWY 61 S	Municipal Offices	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
UNINCORPORATED AREA																																
Meredith Leigh Inman ED Center Alternative School / 200 HAYNES RD	Alternative School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X			X		X			X	X		X	X	X
High Point Jail Tower / 507 E. Greene St.	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
North Tower / 3301 Forest Lawn Drive	Communication Towers	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Alamance Elementary School / 3600 WILLIAMS DAIRY RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Madison Elementary School / 3600 HINES CHAPEL RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
McLeansville Elementary School / 5315 FRIEDEN CHURCH RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
Monticello-Brown Summit Elementary School / 5006 NC HIGHWAY 150 E	Elementary School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Nathanael Greene Elementary School / 2717 NC HIGHWAY 62 E	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X
Northern Elementary School / 3801 NC HIGHWAY 150	Elementary School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Shining Light Academy Elementary School / 4530 W WENDOVER AV	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X						X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Southern Elementary School / 5720 DRAKE RD	Elementary School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Sumner Elementary School / 1915 HARRIS DR	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Triad Christian Academy Elementary School / 5104 DUNSTAN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Tri-City Christian Academy Elementary School / 8000 CLINARD FARMS RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Vandalia Christian School Elementary School / 3919 PLEASANT GARDEN RD	Elementary School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X	X
EMS Base 5 / 6498 Franz Warner PW	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
Medic 2 / 6012 Liberty Rd	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
Medic 4 / 5326 Frieden Church Rd	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X	X	X	X	X
Medic 5 / 7806 Jackson School Rd	EMS Base	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Medic 6 / 9414 W Market St	EMS Base	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X	X
PTIA STA #100 / 803 N Terminal Service Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
STA #13 / 2505 Lee's Chapel Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
STA #16 / 9414 W Market St	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
STA #22 / 5342 Vickrey Chapel Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
STA #24 / 2239 Bishop Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
STA #25 / 6519 Coltrane Mill Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
STA #27 / 3719 High Rock Rd	Fire Station	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
STA #28 / 6619 NC Hwy 61 North	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
STA #30 / 6012 Liberty Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
STA #32 / 7806 Jackson School Rd	Fire Station	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
STA #33 / 3937 NC Hwy 150 E	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X	X	X	X	X
STA #34 / 6200 Osceola-Ossippee Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
STA #35 / 1210 NC Hwy 62 E	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
STA #36 / 4317 Folger Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X
STA #37 / 625 Knox Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X					X	X	X		X	X	X
STA #38 / 6651 Holts Store Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #44 / 4831 Blakeshire Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #45 / 6610 Humble Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
STA #47 / 5326 Frieden Church Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X	X	X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
STA #50 / 6498 Franz Warner PW	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STA #51 / 5219 Northwest School Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
STA #54 / 4107 Presbyterian Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X
STA #55 / 4629 Hicone Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
STA #58 / 6912 Spencer-Dixon Rd	Fire Station	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Eastern High School / 415 PEEDEN DR	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X							X	X	X		X	X	X
GTCC Middle College-Jamestown High School / 601 HIGH POINT RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
Northeast High School / 6700 MCLEANSVILLE RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Northern High School / 7101 SPENCER DIXON RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Northwest High School / 5240 NORTHWEST SCHOOL RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Shining Light Academy High School / 4530 W WENDOVER AV	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Southeast High School / 4530 SOUTHEAST SCHOOL RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Southern High School / 5700 DRAKE RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Tri-City Christian Academy High School / 8000 CLINARD FARMS RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Vandalia Christian School High School / 3919 PLEASANT GARDEN RD	High School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X	X
Brown Summit Middle School / 4720 NC HIGHWAY 150 E	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X			X			X	X	X	X	X	X
Eastern Middle School / 435 PEEDEN DR	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X					X		X	X	X		X	X	X
Jamestown Middle School / 301 HAYNES RD	Middle School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X			X					X	X		X	X	X
Northeast Middle School / 6720 MCLEANSVILLE RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Northern Middle School / 616 SIMSON-CALHOUN RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Northwest Middle School / 5300 NORTHWEST SCHOOL RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Shining Light Academy Middle School / 4530 W WENDOVER AV	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Southeast Middle School / 4825 WOODY MILL RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X				X	X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL															MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Southern Middle School / 5747 DRAKE RD	Middle School	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Tri-City Christian Academy Middle School / 8000 CLINARD FARMS RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Vandalia Christian School Middle School / 3919 PLEASANT GARDEN RD	Middle School	X	X	X	X				X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X	X
PTIA Police / 1000 A Ted Johnson Pkwy	Public Safety	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
Piedmont Triad International Airport (PTIA) / 1000 A Ted Johnson Pkwy.	Transportation Facilities	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X
GUILFORD TECHNICAL COMMUNITY COLLEGE / 601 HIGH POINT RD	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X				X				X	X		X	X	X
GUILFORD TECHNICAL COMMUNITY COLLEGE / 260 REGIONAL RD	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X				X	X		X	X	X
GUILFORD TECHNICAL COMMUNITY COLLEGE /	University/College	X	X	X	X				X	X	X	X	X	X	X	X	X	X		X						X	X		X	X	X
Travis Creek Sewage Pump Station / 2712 Amick Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X

FACILITY NAME / ADDRESS	FACILITY TYPE	NATURAL												BIO		TECHNOLOGICAL														MAN MADE		
		Drought	Earthquake	Extreme Cold	Extreme Heat	Fire/Wildfire	Flooding- 100 year	Flooding- 500 year	Hail	Hurricane	Thunderstorm	Tornado	Winter Storm	Bioterrorism	Public Health Threat	Building Collapse	Communications Failure	Energy/Utility Failure	Fixed HAZMAT	Mobile HAZMT0.5-mile (road)	Mobile HAZMT1.0-mile (road)	Mobile HAZMT0.5-mile (rail)	Mobile HAZMT1.0-mile (rail)	Nuclear Accident 10-mile	Nuclear Accident 50-mile	Pipeline Failure	Resource Shortage	Transportation Incident	Civil Disturbance	Cyber-Security Threat	Terrorism
Westside Wastewater Treatment Plant / 1044 W. Burton Rd.	Wastewater and Water Treatment	X	X	X	X				X	X	X	X	X	X	X	X	X	X								X	X		X	X	X

SECTION 7
CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the jurisdictions in Guilford County to implement hazard mitigation activities. It consists of the following four subsections:

- 7.1 What is a Capability Assessment?
- 7.2 Conducting the Capability Assessment
- 7.3 Capability Assessment Findings
- 7.4 Conclusions on Local Capability

7.1 WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects[1]. As in any planning process, it is important to try to establish which goals, objectives, and/or actions are feasible based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical, and likely to be implemented over time, given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for Guilford County and its municipalities serves as a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals and objectives for the county to pursue under this Plan, but it also ensures that those goals and objectives are realistically achievable under given local conditions.

[1] While the Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step in developing a mitigation strategy that meets the needs of the region while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities for Guilford County and its municipalities, a detailed Capability Assessment Survey was completed for each of the participating jurisdictions based on the information found in the existing hazard mitigation plan and local government websites, and then distributed to the participating jurisdictions for review and update. The survey questionnaire compiled information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the jurisdictions' ability to implement hazard mitigation actions. Other indicators included information related to the communities' fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. The current political climate, an important consideration for any local planning or decision-making process, was also evaluated with respect to hazard mitigation.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs, and resources that are in place or under development in addition to their overall effect on hazard loss reduction. However, the survey instrument can also serve to identify gaps, weaknesses, or conflicts that the county and local jurisdictions can recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information collected in the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology[2] was then applied to quantify each jurisdiction's overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation

Using this scoring methodology, a total score and an overall capability rating of "high," "moderate," or "limited" was determined according to the total number of points received. These classifications are designed to provide a basic, general assessment of local government capability and are used to inform an effective and meaningful mitigation strategy.

7.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of the jurisdictions in Guilford County to implement hazard mitigation activities. All information is based upon the review of the existing hazard mitigation plan and local government websites through the Capability Assessment Survey and input provided by local government officials during meetings of the Guilford County Hazard Mitigation Planning Team.

7.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning; the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built; as well as protecting environmental, historic,

[2] The scoring methodology used to quantify and rank the jurisdictions' capability can be found in Appendix B.

and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools and programs that are in place or under development for the jurisdictions in Guilford County along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the jurisdictions in Guilford County. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A dagger (†) indicates that the given item is administered for that municipality by the county. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Guilford County Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	GUILFORD COUNTY	Gibsonville	Greensboro	High Point	Jamestown	Oak Ridge	Pleasant Garden	Sedalia	Stokesdale	Summerfield	Whitsett
Hazard Mitigation Plan	✓	†	†	†	†	†	†	†	†	†	†
Comprehensive Land Use Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floodplain Management Plan											
Open Space Management Plan (Parks & Rec/Greenway Plan)	✓		✓	✓	✓	✓	✓		✓	*	
Stormwater Management Plan/Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Natural Resource Protection Plan	✓			✓						✓	
Flood Response Plan											
Emergency Operations Plan	✓	†	†	✓	†	†	†	†	†	†	†
Continuity of Operations Plan	✓	*	✓	✓		*	✓	✓		✓	✓
Evacuation Plan											
Disaster Recovery Plan	✓	†	†	†	†	†	†	†	†	†	†
Capital Improvements Plan	✓	✓	✓	✓	✓	✓	✓			*	

Planning / Regulatory Tool	GUILFORD COUNTY	Gibsonville	Greensboro	High Point	Jamestown	Oak Ridge	Pleasant Garden	Sedalia	Stokesdale	Summerfield	Whitsett
Economic Development Plan	✓		✓	✓							
Historic Preservation Plan			✓								
Flood Damage Prevention Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Subdivision Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unified Development Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Post-Disaster Redevelopment Ordinance											
Building Code	✓	✓	✓	✓	†	†	†	†	†	†	†
Fire Code	✓	†	✓	✓	†	†	†	†	†	†	†
National Flood Insurance Program (NFIP)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NFIP Community Rating System	✓		✓								

A more detailed discussion on the county's planning and regulatory capability follows.

7.3.2 Emergency Management

Hazard mitigation is widely recognized as one of the five mission areas of emergency management. The other four phases include prevention, protection, response, and recovery. In reality, each phase is interconnected with hazard mitigation as **Figure 7.1** suggests. Opportunities to reduce potential losses through mitigation practices are most often implemented before disaster strikes, such as the elevation of flood prone structures or the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards due to its location, design, or other characteristics. Mitigation opportunities will also be presented during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane, and certainly during the long-term recovery and redevelopment process following a hazard event.

FIGURE 7.1: THE FIVE MISSION AREAS OF EMERGENCY MANAGEMENT



Source: FEMA

Planning for each mission area is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess the participating jurisdictions' willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- Guilford County has previously adopted a hazard mitigation plan. Each participating municipality was included in the county's plan.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

- Guilford County has developed a recovery framework plan that serves as the county's disaster recovery plan. This recovery framework pertains to all participating municipalities and each community acts as an integral part of the framework.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.

- Guilford County maintains an emergency operations plan through the County Emergency Management Department. All 10 participating municipalities have adopted the county plan.
- The City of High Point has also adopted a municipal-level emergency operations plan.

Continuity of Operations Plan: A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- Guilford County has adopted a continuity of operations planning program that allows all county departments to develop a department specific continuity of operations plan. As part of this program, Guilford County has also developed and adopted a continuity of government plan.
- Various departments within the Cities of Greensboro and High Point have developed department specific continuity of operations plans.
- Several of the municipalities within Guilford County have developed or are in the process of developing a continuity of government and/or continuity of operations plan for their jurisdiction.

Flood Response Plan: A flood response plan establishes procedures for responding to a flood emergency including coordinating and facilitating resources to minimize the impacts of flood.

- The county does not currently have a flood response plan in place.

7.3.3 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they are not designed as such. Therefore, the Capability Assessment Survey also asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in Guilford County.

Comprehensive Land Use Plan: A comprehensive land use plan establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- Guilford County has adopted a county comprehensive plan.
- Each of the 10 participating municipalities has adopted a municipal land use plan.

Capital Improvements Plan: A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- Guilford County, Gibsonville, Greensboro, High Point, Jamestown, Oak Ridge, and Pleasant Garden have capital improvement plans in place.

- The Town of Summerfield is currently in the process and developing a capital improvements plan.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often-overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

- The City of Greensboro has a Preservation Plan that is a sub-section of the city's Comprehensive Plan.
- None of the remaining participating municipalities have adopted a historic preservation plan.

Zoning Ordinance: Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety, and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- Guilford County and all 10 participating municipalities have adopted zoning ordinances.
- The county and all of the participating municipalities, except the Town of Whitsett, include zoning regulations as part of their local unified development ordinances. Whitsett has adopted a standalone zoning ordinance.

Subdivision Ordinance: A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- Guilford County and all 10 participating municipalities have adopted subdivision ordinances.
- The county and all of the participating municipalities, except the Town of Whitsett, include subdivision regulations as part of their local unified development ordinances. Whitsett has adopted a standalone subdivision ordinance.

Building Codes, Permitting, and Inspections: Building codes regulate construction standards. In many communities, permits and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- North Carolina has a state compulsory building code, which applies throughout the state; however, jurisdictions may adopt codes if approved as providing adequate minimum standards. The county and all 10 participating municipalities have adopted a building code.

- Guilford County provides building inspection services for all unincorporated areas of the county and through contractual agreements for the Towns of Jamestown, Oak Ridge, Pleasant Garden, Sedalia, Stokesdale, Summerfield, and Whitsett.
- Gibsonville, Greensboro, and High Point are responsible for enforcement of the building codes within their planning jurisdictions.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO).[3] In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes *with special emphasis on mitigation of losses from natural hazards*. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The concept is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses and, as a result, should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education as well as the number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10 with a BCEGS grade of 1 representing exemplary commitment to building code enforcement and a grade of 10 indicating less than minimum recognized protection.

Specific BCEGS rating for the participating jurisdictions can be obtained by contacting the department for building inspections within that jurisdiction.

7.3.4 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the *National Flood Insurance Program* (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by a 100-year flood event and that new development in the floodplain will not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices,

[3] Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated.

and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Table 7.2 provides NFIP policy and claim information for each participating jurisdiction in Guilford County.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Map Panel Effective Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Guilford County†	06/04/80	11/17/17	119	$32,483,100	38	$317,993
Gibsonville	05/15/80	11/17/17	25	$6,015,600	5	$73,676
Greensboro	04/16/71	07/03/07	685	$172,509,800	439	$5,789,820
High Point	11/01/79	03/16/09	274	$64,886,200	86	$287,251
Jamestown	03/04/80	06/18/07	9	$3,179,800	3	$51,619
Oak Ridge	08/13/02	01/02/09	5	$1,686,500	1	$17,950
Pleasant Garden	03/17/09	06/18/07	4	$1,330,000	2	$0
Sedalia	10/09/08	06/18/07	1	$280,000	0	$0
Stokesdale	05/05/97	01/02/09	1	$350,000	0	$0
Summerfield	08/12/02	07/03/07	19	$5,782,000	0	$0
Whitsett	11/07/08	06/20/18	0	$0	2	$25,576

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 7/31/2019; NFIP claims and policy information as of 7/31/2019

Community Rating System: An additional indicator of floodplain management capability is the active participation of local jurisdictions in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP by adding extra local measures to provide protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class rating. Class ratings, which range from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 7.3**. As class rating improves (the lower the number the better), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

TABLE 7.3: CRS PREMIUM DISCOUNTS, BY CLASS

CRS Class	Premium Reduction
1	45%
2	40%

CRS Class	Premium Reduction
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%
10	0

Source: *FEMA*

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years based on community comments. Changes were made with the intent to make the CRS more user-friendly and make extensive technical assistance available for communities who request it.

- Guilford County (Class 7) and the City of Greensboro (Class 8) are the only two jurisdictions that currently participate in the CRS. Participation in the CRS program should be considered as a mitigation action by the other participating municipalities. The program would be most beneficial to the City of High Point, which has 274 NFIP policies.

Flood Damage Prevention Ordinance: A flood damage prevention ordinance establishes minimum building standards in the floodplain with the intent to minimize public and private losses due to flood conditions.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. The county and all 10 participating municipalities participate in the NFIP and they all have adopted flood damage prevention regulations.

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- Neither the county nor any of the participating municipalities have adopted floodplain management plans.

Open Space Management Plan*:* An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances, open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- Guilford County participated in the development of the Piedmont Triad Regional Open Space Strategy which identifies a wide variety of key conservation opportunities across the region as

well as a strategy meant to serve as the foundation for future conservation planning efforts within the county.

- Greensboro, High Point, Jamestown, Oak Ridge, Pleasant Garden, and Stokesdale have adopted parks, recreation, greenways, and/or open space plans.
- The Town of Summerfield is currently in the process and developing an open space management plan.

Stormwater Management Plan: A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- Guilford County, the City of Greensboro, and the City of High Point are the only jurisdictions that have adopted a stormwater management plan.
- Guilford County and all 10 of the participating municipalities have adopted a stormwater management ordinance.

7.3.5 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 7.4 provides a summary of the capability assessment results for Guilford County with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill. A dagger (†) indicates a county-level staff member(s) provides the specified knowledge or skill to that municipality.

TABLE 7.4: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	GUILFORD COUNTY	Gibsonville	Greensboro	High Point	Jamestown	Oak Ridge	Pleasant Garden	Sedalia	Stokesdale	Summerfield	Whitsett
Planners with knowledge of land development / land management practices	✓	✓	✓	✓	✓	✓	†	†	†	✓	†
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	✓	✓	✓	✓	†	†	†	†	†	†	†
Planners or engineers with an understanding of natural and/or human-caused hazards	✓	✓	✓							✓	
Emergency Manager	✓	†	†	✓	†	†	†	†	†	†	†
Floodplain Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Land Surveyors	✓		✓	✓							
Scientists familiar with the hazards of the community	✓	†	†	†	†	†	†	†	†	†	†
Staff with education or expertise to assess the community's vulnerability to hazards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Personnel skilled in GIS and/or Hazus	✓		✓	✓	✓	✓				✓	
Resource development staff or grant writers	✓		✓			✓				✓	

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

7.3.6 Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. This may take the form of outside grant funding awards or locally-based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative

costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project, such as the acquisition of flood-prone homes, which can require a substantial commitment from local, state, and federal funding sources.

The Capability Assessment Survey was used to capture information on the county's fiscal capability through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for Guilford County with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

TABLE 7.5: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	GUILFORD COUNTY	Gibsonville	Greensboro	High Point	Jamestown	Oak Ridge	Pleasant Garden	Sedalia	Stokesdale	Summerfield	Whitsett
Capital Improvement Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Development Block Grants (CDBG)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Special Purpose Taxes (or taxing districts)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gas / Electric Utility Fees											
Water / Sewer Fees			✓								
Stormwater Utility Fees			✓	✓							
Development Impact Fees			✓								
General Obligation, Revenue, and/or Special Tax Bonds											
Partnering Arrangements or Intergovernmental Agreements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other: PDM, FMA, HMGP, PA, SBA, other Federal, state, and non-governmental funding sources, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.3.7 Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority or may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Capability Assessment Survey was used to capture information on political capability of Guilford County. The previous hazard mitigation plan was reviewed for general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e., building codes, floodplain management, etc.).

- The previous local hazard mitigation plan identified existing ordinances that address natural hazards or are related to hazard mitigation such as flood damage prevention, watershed protection, soil erosion and sediment control, stormwater management, zoning, and subdivision.
- Most Guilford County residents are quite knowledgeable about the potential hazards that their community faces, and in recent years, they have become more familiar with the practices and principles of mitigation. A number flood prone structures have been acquired and demolished or elevated out of harm's way. It is strongly believed that such tangible and visual changes within the community have created a greater sense of awareness among local residents and that hazard mitigation is a concept that citizens are beginning to readily accept and support. Because of this fact, coupled with Guilford County's history with natural disasters, it is expected that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies.

7.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Capability Assessment Survey. This methodology, further described in Appendix B, attempts to assess the overall level of capability of Guilford County to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varies among the participating jurisdictions. For planning and regulatory capability, the majority of the jurisdictions are in the moderate range. There is also some variation in the administrative and technical capability among the jurisdictions with larger jurisdictions generally having greater staff and technical resources. All of jurisdictions are in the limited range for fiscal capability.

Table 7.6 shows the results of the capability assessment using the designed scoring methodology. The capability score is based on the information found in the existing hazard mitigation plan and readily available on the jurisdictions' government websites. This information was reviewed by all jurisdictions and each jurisdiction provided feedback on the information included in the capability assessment. Local government input was vital to identifying capabilities. According to the assessment, the average local capability score for all jurisdictions is 38.8, which falls into the moderate capability ranking and nearly reaches the 40-point threshold for high capability.

TABLE 7.6: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
GUILFORD COUNTY	53	High
Gibsonville	36	Moderate
Greensboro	50	High
High Point	45	High
Jamestown	35	Moderate
Oak Ridge	37	Moderate
Pleasant Garden	35	Moderate
Sedalia	32	Moderate
Stokesdale	32	Moderate
Summerfield	41	High
Whitsett	31	Moderate

As previously discussed, one of the reasons for conducting a Capability Assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified for each jurisdiction in the tables found throughout this section. The participating jurisdictions used the Capability Assessment as part of the basis for the Mitigation Actions that are identified in Section 9; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their Mitigation Actions.

7.4.1 Linking the Capability Assessment with the Risk Assessment and the Mitigation Strategy

The conclusions of the Risk Assessment and Capability Assessment serve as the foundation for the development of a meaningful hazard mitigation strategy. During the process of identifying specific mitigation actions to pursue, the Hazard Mitigation Planning Team considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

SECTION 8
MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in Guilford County to follow in order to become less vulnerable to the identified hazards. It is based on the general consensus of the Guilford County Hazard Mitigation Planning Team and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

- 8.1 Introduction
- 8.2 Mitigation Goals
- 8.3 Identification and Analysis of Mitigation Techniques
- 8.4 Selection of Mitigation Techniques for Guilford County
- 8.5 Plan Update Requirement

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide Guilford County with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic, and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high-risk hazards, but also to help the region achieve compatible economic, environmental, and social goals.
- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.
- In being *functional,* each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance) and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration, and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue to be

considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for Guilford County and its municipalities (provided separately in Section 9: *Mitigation Action Plan*). The county and each participating jurisdiction has its own Mitigation Action Plan (MAP) that reflects the needs and concerns of that jurisdiction. The MAP represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for Guilford County and its municipalities to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources, and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for Guilford County, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted mitigation goals and unique needs of the community.

8.1.1 Mitigation Action Prioritization

Prioritization of the proposed mitigation actions was based on the following six factors:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review[1]
- Funding availability
- Continued compliance with the NFIP

The point of contact for each jurisdiction helped coordinate the prioritization process by reviewing each action and working with the lead agency/department responsible to determine a priority for each action using the six factors listed above.

[1] A general economic cost/benefit review was considered by the Hazard Mitigation Planning Team through the process of selecting and prioritizing mitigation actions as recommended by FEMA guidance. Mitigation actions with "high" priority were determined to be the most cost effective and most compatible with the participating jurisdictions' unique needs. Actions with a "moderate" priority were determined to be cost-effective and compatible with jurisdictional needs, but may be more challenging to complete administratively or fiscally than "high" priority actions. Actions with a "low" priority were determined to be important community needs, but the community likely identified several potential challenges in terms of implementation (e.g. lack of funding, technical obstacles). A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

Using these criteria, actions were classified as high, moderate, or low priority by the participating jurisdiction officials.

8.2 MITIGATION GOALS

44 CFR Requirement
44 CFR Part 201.6(c)(3)(i): The mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

One of the primary goals of all local governments is generally to promote the public health, safety, and welfare of its citizens. In keeping with this standard, Guilford County and the participating municipalities have developed four goal statements for local hazard mitigation planning in the county. In developing these goals, the previous hazard mitigation plan was reviewed to determine if the goals remained applicable. The existing goals were presented, reviewed, voted on, and accepted by the Hazard Mitigation Planning Team (all of the goals remain unchanged). Each goal, purposefully broad in nature, serves to establish parameters that were used in developing mitigation actions. The Guilford County Mitigation Goals are presented in **Table 8.1**. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.1: GUILFORD COUNTY MITIGATION GOALS

	Goal
Goal #1	Increase the internal capabilities of Guilford County and its municipalities to mitigate the effects of natural, biological, technical, and man-made hazards
Goal #2	Enhance existing or implement new County, City, and Town policies that will reduce the potential damaging effects of hazards without hindering other community goals.
Goal #3	Protect the most vulnerable populations, public buildings, and critical facilities in Guilford County, and its municipalities, through the implementation of cost-effective and technically-feasible mitigation projects.
Goal #4	Protect public health, safety, and welfare by increasing the public awareness of existing hazards and by enhancing both individual and public responsibility in mitigating risks due to those hazards throughout Guilford County and its municipalities.

8.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement
44 CFR Part 201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the Mitigation Strategy for Guilford County, a wide range of activities were considered in order to help achieve the established mitigation goals, in addition to addressing any specific hazard concerns. These activities were discussed during the Guilford County Hazard Mitigation Planning Team meetings. In general, all activities considered by the Hazard Mitigation Planning Team can be classified under one of the following six broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

8.3.1 Prevention

Preventive activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventive activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Riverine / fault zone setbacks

8.3.2 Property Protection

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

8.3.3 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Riparian buffers
- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)

- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

8.3.4 Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams / levees / dikes / floodwalls
- Diversions / detention / retention
- Channel modification
- Storm sewers

8.3.5 Emergency Services

Although not typically considered a "mitigation" technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

8.3.6 Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs

- Hazard expositions

8.4 PIEDMONT TOGETHER CLIMATE ADAPTATION STRATEGIES

The *Piedmont Together Climate Adaptation Report* identifies strategies that will be necessary to ensure the health of the Piedmont Triad's people, economy, and ecosystems as the region grows to 2 million people and North Carolina ascends to a greater role nationally with its greater constituency. Although the strategies listed below in **Table 8.2** are not official actions included in the Hazard Mitigation Plan (Section 9: *Mitigation Action Plan*), they are potential strategies that can be considered by Guilford County and its municipalities to help to reduce the impacts and risks of climate change.

TABLE 8.2: RESILIENCE STRATEGIES FROM PIEDMONT TOGETHER CLIMATE ADAPTATION REPORT

Piedmont Together Resilient Climate Adaptation Strategy		
Goal	**Objective**	**Example Strategy**
Decrease the Piedmont Triad's Vulnerability to Climate Change	Decrease the Piedmont Triad's Vulnerability to Extreme Heat	Update county hazard mitigation plans to include extreme heat response strategies
	Decrease the Piedmont Triad's Vulnerability to Frozen Precipitation and Extreme Low Temperatures	Focus household weatherization programs on vulnerable populations
	Protect the Piedmont Triad's Water Supply and Quality	Develop source water protection plans for all drinking water sources
	Protect the Piedmont Triad's Air Quality	Promote and support the enhancement of the available alternative transportation infrastructure to reduce vehicle miles traveled
	Preserve Piedmont Triad Plants, Trees and Natural Landscapes	Enhance urban forest canopies so that all Triad municipalities have a 40% canopy cover
	Decrease the Piedmont Triad's Vulnerability to Wildfires	Partner with the county EMS and the NC Division of Parks and Recreation staffs to improve public awareness of wildfire risks
	Reduce the Vulnerability of Piedmont Triad Residents to Health Risks	Work with hospitals to monitor and respond to extreme heat conditions
	A Climate-Educated Piedmont Triad Public	Share Piedmont Together work with vested parties and develop a public engagement campaign
	Plan for Future Challenges	Adopt a regional green infrastructure plan to anticipate needs an mitigate their impacts to the public and ecology

Reduce Energy Consumption	Retrofit Commercial and Industrial Buildings	Develop weatherization program that targets those most vulnerable to extreme weather events
	Increase the Use of Energy-Efficient Appliances	Collaborate with retail partners to build upon existing appliance buy-back programs
	Promote Energy Reduction Through Water Conservation	Develop leak detection programs for water utility in the region
	Streamline Resources	Work with public and private sector partners to make structural and programmatic retrofits simpler and easier to implement
	Promote Clean and Renewable Energy Sources	Diversify the sources of energy generation used by power plants
	Improve Transportation Options	Promote transit-oriented development patterns
	Reduce Waste and Industrial Pollution	Switch to newer, less-toxic refrigerants

Additionally, many organizations in the Piedmont Triad, such as the Dan River Basin Association (DRBA), North Carolina Interagency Leadership Team, US Centers for Disease Control (CDC), and the National Oceanic and Atmospheric Administration (NOAA), have begun implementing climate adaptation strategies. Additional details on these strategies can be found in the *Piedmont Together Climate Adaptation Report*.

8.5 SELECTION OF MITIGATION TECHNIQUES FOR GUILFORD COUNTY

In order to determine the most appropriate mitigation techniques for the communities in Guilford County, the Hazard Mitigation Planning Team thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment* to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

8.6 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous plans were evaluated to determine their 2020 implementation status. Updates on the implementation status of each action are provided. The mitigation actions provided in Section 9: *Mitigation Action Plan* include the mitigation actions from the previous plans as well as any new mitigation actions proposed through the 2020 planning process.

SECTION 9
MITIGATION ACTION PLAN

This section includes the listing of the mitigation actions proposed by the participating jurisdictions in Guilford County. It consists of the following two subsections:

- 9.1 Overview
- 9.2 Mitigation Action Plans

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44 CFR Requirement
44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

9.1 OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: *Mitigation Strategy* and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: *Plan Maintenance*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for Guilford County. Each action is listed in the MAP in conjunction with background information such as hazard(s) addressed and relative priority. Other information provided in the MAP includes potential funding sources to implement the action, should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out as well as a timeframe for its completion. These implementation mechanisms ensure that the Guilford County Multi-Jurisdictional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of “high,” “moderate,” or “low” as described in Section 8.

The Mitigation Action Plan is organized by mitigation strategy category (Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, or Public Education and Awareness). The following are the key elements described in the Mitigation Action Plan:

- Hazard(s) Addressed—Hazard which the action addresses.
- Relative Priority—High, moderate, or low priority as assigned by the jurisdiction.
- Lead Agency/Department—Department responsible for undertaking the action.
- Potential Funding Sources—Local, State, or Federal sources of funds are noted here, where applicable.
- Implementation Schedule—Date by which the action should be completed. More information is provided when possible.

- Implementation Status (2020)—Indication of completion, progress, deferment, or no change since the previous plan. If the action is new, that will be noted here.

9.2 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in 11 individual MAPs on the following pages. **Table 9.1** shows the location of each jurisdiction's MAP within this section as well as the number of mitigation actions proposed by each jurisdiction.

TABLE 9.1: INDIVIDUAL MAP LOCATIONS

Location	Page	Number of Mitigation Actions
Guilford County	**9:3**	**23**
Gibsonville	9:9	16
Greensboro	9:14	16
High Point	9:22	16
Jamestown	9:28	14
Oak Ridge	9:32	14
Pleasant Garden	9:36	14
Sedalia	9:40	14
Stokesdale	9:44	14
Summerfield	9:48	19
Whitsett	9:53	14

Guilford County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS	NC DEM	2025	The county continues to maintain appropriate layers and has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.
P-2	Regularly calculate and document the amount of flood prone property that is preserved as open space for additional credit points under the Community Rating System (CRS).	Flood	High	Guilford County NFIP/CRS	N/A	2025	The Guilford County Planning Department has continued to calculate and document the amount of flood prone property that is preserved as open space for additional CRS points. Guilford County would like to continue this effort on an annual basis to maximize CRS points.
P-3	Identify the county's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator	NC DEM; others as available	2025	The county frequently attempts to update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county attempts to identify potential mitigation actions to reduce risk to these facilities. The county will continue to carry out the update process going forward.
P-4	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services	Local	2025	The county works across departments to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Augment enforcement of the State Building Code and related County ordinances by encouraging wind-resistant design techniques for new residential construction during the county's permit process.	Hurricanes and Tropical Storms, Tornadoes	High	County and municipal code enforcement officials	None identified at this time	Completed	The 2018 NC Building Codes became mandatory on January 1, 2019. The wind speed design criteria increased from 90 mph to 115 mph for Guilford County. This action is considered complete.
P-6	Invest in cyber security equipment and training to mitigate future cyber incidents.	Cyber-security threat	High	Guilford County Information Services	Local	2025	The county has carried out a number of tasks related to this action including upgrading Firewall to Sonic Wall's latest appliance, adding other layers in email security such as Advanced Threat protection from Barracuda with their Essentials product line, and adding Cyber security topic and security best practices to the initial HR orientation for all new Employees. The county will continue to evolve Cyber Security strategies as threat landscape changes.
Property Protection							
PP-1	Continue to acquire and preserve parcel land subject to repetitive flooding from willing and voluntary property owners. The county will also consider other residential mitigation projects such as elevation and mitigation reconstruction	Flood	High	Guilford County Planning and Development Department	FEMA; NC DEM	2025	The county continues to update the Repetitive Loss Properties and include them on the mailings regarding federal flood assistance and flood protection measures. The county has also applied for HMGP grants to acquire parcels and is looking forward to implementing those projects in the future. Guilford County applied for two property acquisition projects under Hurricane Florence HMGP.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PP-2	Research and implement, if feasible, zoning regulations for critical facilities (schools and/or other vulnerable population facilities) located near hazardous materials and pipeline locations.	Hazardous Materials and Pipeline Failure	High	Guilford County Planning and Development, Information Services, and Emergency Management	Local	2025	There were some updates to the Unified Development Ordinance in 2018, but this action has not been fully completed so it will remain in the plan.
PP-3	Research and implement, if feasible, residential sprinkler code in Guilford County	Fire/Wildfire	Moderate	Guilford County Fire Marshal's Office	Local	2025	The latest building code for residential sprinkler systems in the county has not been updated. Research and implementation still need to take place, so this action will remain in the plan.
PP-4	Research and create a Historic Preservation Plan.	All	Moderate	Guilford County Planning and Development	Local	2025	There were some updates to the Unified Development Ordinance in 2018, but this action has not been fully completed so it will remain in the plan.
PP-5	Based on the March 6, 2014 Ice Storm Disaster Declaration, Guilford County applied under the Post Disaster Mitigation Grant program to relocate EMS Base 1.	Flooding	Moderate	Guilford County Emergency Services	Mitigation Grants, Local Capital Funding	2025	Applied for PDM funding in 2016 and determined that the Cost/Benefit to the Guilford County was not favorable at the time. The grant was declined. The county will continue to explore opportunities to complete this project in the future.
PP-6	Research grant funding opportunities for alternate power sources for critical facilities.	All Hazards	Moderate	Guilford County Emergency Management	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The county will continue to research opportunities to implement this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Research safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Guilford County Emergency Management	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The county will continue to research opportunities to implement this action.
SP-2	Research and implement, if feasible, a local building code that requires new and modified commercial buildings to install communication repeaters/amplifiers within the structure to augment public safety radio systems.	Communicatio ns Disruption	Moderate	Guilford County Emergency Management	Local	2025	The latest building code for did not include a requirement for repeaters/amplifiers within structures to augment public safety radio systems. Research and implementation still need to take place, so this action will remain in the plan.
SP-3	Research and implement, if feasible, a building code modification to require that all vulnerable population facilities (assisted care facilities, group homes, etc.) have an alternate power source to sustain operations during power outages.	Power Outages	High	Guilford County Emergency Management	Local	Completed	This is now required as per the section 2702.1.7 of new 2018 NC State Building Codes which became effective as of 1/21/2019. This action is considered complete.
Emergency Services							
ES-1	Develop a Flood Response Plan to address the specific response to flooding events within the county.	Flood	High	Guilford County Emergency Management	Local	2025	Little action has been made on this action since the previous update. The county will continue to research opportunities to implement this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
ES-2	Offer additional training to law enforcement officers regarding civil disturbances and provide necessary equipment to officers.	Civil Disturbance	High	Guilford County Sheriff's Office	Local	2025	The Sheriff's Office Civil Disorder Unit is in operational status. All members have been nationally certified in Field Force Operations in Anniston, AL by FEMA. The CDU trains monthly for 8 hours. We currently have 22 members on the team, with a few vacancies. We are working on filling the open spots at this time. Once the members are selected we will send them for the FEMA training.
Public Education and Awareness							
PEA-1	Promote the availability of flood insurance to County and City property owners.	Flood	High	Guilford County NFIP/CRS	Local	2025	The county makes efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county will continue these efforts going forward.
PEA-2	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to carry out this action going forward for repetitive loss properties.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. This action is still relevant and will remain in place.
PEA-4	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management	Local	2025	Guilford County works with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.
PEA-5	Explore Firewise program implementation in Guilford County.	Fire	Moderate	Guilford County Fire Marshal's Office	Various	Deleted	The Firewise Program has been identified as not being applicable to the wildfire risk in Guilford County. This project is being deleted.
PEA-6	Re-Certify as a StormReady Community through the National Weather Service	Thunderstorms and Tornadoes	Moderate	Guilford County Emergency Management	Local	2023	Guilford County was re-certified as a Storm Ready Community effective February 28th, 2020. This will expire February 28th, 2023. At this time, the county will again aim to re-certify, so this action will remain in the plan.

Town of Gibsonville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Gibsonville Town Planner	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Gibsonville Town Planner	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Gibsonville Town Planner	Town planning expertise	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Promote the availability of flood insurance to City property owners.	Flood	Moderate	Gibsonville Town Planner	Local When Available	2025	The town has made efforts through regular contact with homeowners to encourage the purchase flood insurance and will continue to promote flood insurance for properties in floodplain.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Prevent encroachments, including fill, new construction, substantial improvements, and other developments within areas designated as floodways or non-encroachment areas	Flood	Low	Gibsonville Town Planner	Local	2025	The town implements Jordan Lake Buffer Rules and Stormwater Phase II ordinances, both of which are rules systems to address encroachments and development. Going forward, the town will continue to identify and implement rules to guide appropriate development as it pertains to flood prone areas.
P-6	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Gibsonville Town Planner	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.
P-7	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Gibsonville Town Planner	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-8	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Gibsonville Town Planner	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Property Protection							
PP-1	Continue to evaluate and update facilities and infrastructure that may be deemed "High Risk" facilities for various threats.	All	Moderate	Town of Gibsonville All Departments	Local	2025	The town has worked to identify facilities that may be at high risk to various threats and will continue to evaluate and mitigate, where possible, facilities and infrastructure that are in high risk areas.
PP-2	Continue to acquire and preserve parcel land subject to repetitive flooding from willing and voluntary property owners. The county will also consider other residential mitigation projects such as elevation and mitigation reconstruction	Flood	High	Guilford County Planning and Development Department; Gibsonville Town Planner	FEMA; NC DEM	2025	The county will continue to work with the town to update the Repetitive Loss Properties and include them on the mailings regarding federal flood assistance and flood protection measures. The county has also applied for HMGP grants to acquire parcels and is looking forward to implementing those projects in the future. The county will work with the town to coordinate on potential future projects.
PP-3	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Gibsonville Town Planner	State and Federal funding as available; HMGP	2025	New Action
Public Education and Awareness							
PEA-1	Stormwater Smart Information	Flood-Stormwater Runoff / illicit discharges	Moderate	Gibsonville Town Planner	PTRCOG	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Gibsonville Town Planner	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Gibsonville Town Planner	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Gibsonville Town Planner	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Gibsonville Town Planner	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

City of Greensboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	City of Greensboro Planning Department, Information Technology Department, GIS Department	NC DEM	2025	The City continues to maintain up to date mapping layer data in GIS for the use of many departments in conducting development review and permit issuance in an effort to mitigate known risks, including a recent effort by the fire department which implemented a new software system called "GOVAP" which captures hazards and assists with risk assessments and is based on fire, collapse, utility, and hazardous materials. The city will continue to evaluate its GIS and improve as needed.
P-2	Regularly calculate and document the amount of flood prone property that is preserved as open space for additional credit points under the Community Rating System (CRS).	Flood	High	City of Greensboro Water Resources Department	N/A	2025	Task has been carried out annually. The City of Greensboro Parks and Recreation Department enforces the drainage way and does open space calculations. The Water Resources Department works with the ISO representative to determine the amount of open space for CRS Credit. The open space for CRS Credit gets calculated and updated as property becomes available. This action will continue to be carried out going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-3	Identify the city's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	City of Greensboro Emergency Management Coordinator	NC DEM; others as available	2025	The city has applied for a number of grants through different programs of FEMA and Homeland Security to strengthen and mitigate its critical facilities, though it has not always been successful in gaining the funding. As such, there are a number of facilities that could benefit from additional retrofits and the city will continue to pursue efforts to carry out those projects. The city has undertaken a Flood Resiliency Project to identify each critical structure and the impacts associated with flooding events. Critical information is being gathered for each facility and individual improvements will be evaluated to mitigate future flooding impacts
P-4	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services	Local	2025	The Greensboro Emergency Management office works with other city departments to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
P-5	Revise the Flood Damage Prevention Ordinance on as needed basis	Flood	High	City of Greensboro	Local	2025	As of the 2020 update of this plan, the ordinance has been updated concerning substantial damage, but it will need to be updated again in the future so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-6	Invest in cyber security equipment and training to mitigate future cyber incidents. This includes deploying Malware prevention technology to detect zero-day and advanced persistent threats and gain visibility into advanced threat activity. Additionally, IT Security offers and conducts security awareness and training to all of the departments (onsite and online), sends monthly security bulletins (advisories) and sometimes alerts via email as needed, as well as a quarterly Cyber Security newsletter to the organization. The City now has Cyber Liability Insurance for the organization in the case of a breach that provides an end-to-end risk management solution to stay ahead of the curve of cyber risk and offers additional services that provide loss prevention tools to educate (training portal IT Security can use) and potentially prevent a breach.	Cyber-security threat	High	Guilford County Information Services	Local	2025	The City of Greensboro has developed and implemented a risk based cyber security program based on ISO/IEC 27001 standards. The goal of the cyber security program is to ensure compliance to laws and regulations and protect the City of Greensboro from advanced threats and cyber-attacks that aim at compromising systems and confidential information. The Cyber Security Team is continually looking for risks and threats in our environment to ensure compliance to laws and regulations; monitoring, evaluating and measuring processes and putting controls into place to ensure that these risks and threats do not compromise systems and confidential information. The Cyber Security Team will continue to make improvements to the cyber security program based on changes to business requirements, compliance requirements and industry threats. In May of 2018, IT underwent a table top exercise to go through a scenario of the City being attacked with Ransomware.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Property Protection							
PP-1	Continue to acquire and preserve parcels of land subject to repetitive flooding from willing and voluntary property owners. The city will also consider other residential mitigation projects such as elevation and mitigation reconstruction.	Flood	High	City of Greensboro Water Resources	FEMA; NC DEM	2025	The City of Greensboro Water Resources Department continues to update the Repetitive Loss Properties and include them on the mailings regarding federal flood assistance and flood protection measures. The city has also applied for HMGP grants to acquire parcels and is looking forward to implementing those projects in the future. The City has developed a strategy to prioritize flood prone properties for potential mitigation of these properties. This process involves potentially utilizing Hazard Mitigation Grant Program funding along with matching City funds to mitigate flood prone properties through either elevation of the property or acquisition and demolition. In 2019, the City of Greensboro acquired two flood prone parcels in the Mount Latham neighborhood using local funding.
PP-2	Augment enforcement of the State Building Code and related City of Greensboro ordinances by encouraging wind-resistant design techniques for new residential construction during the city's permit process.	Hurricanes and Tropical Storms, Tornadoes	High	City of Greensboro code enforcement officials	None identified at this time	Completed	The 2018 NC Building Codes became mandatory on January 1, 2019. The wind speed design criteria increased from 90 mph to 115 mph for Guilford County. This action is considered complete.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PP-3	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	City of Greensboro Emergency Management Coordinator	State and Federal funding as available; HMGP	2025	New Action
Emergency Services							
ES-1	Inventory and evaluate the City's emergency response activities. Identify the resources needed to accomplish specific response activities. Reviews shall include the needs of personnel, equipment, and required resources for emergency deployment.	All	Moderate	City of Greensboro Fire, GDOT and Police Departments	Local	2025	During the past year, the City experienced several natural weather-related events. These occurrences provided opportunities for both multi-agency responses and for post-event evaluations. Specifically, these events identified the need to continue to explore options for the combined City-County EOC with numerous agencies' involvement.
ES-2	Offer additional training to law enforcement officers regarding civil disturbances and provide necessary equipment to officers.	Civil Disturbance	High	Greensboro Police Department	Local	2025	The CEU team has continued to function as a special team within the Greensboro Police Department. For example, throughout 2018, they were activated for several planned protests within the city along with deployments outside the municipality at the request of other law enforcement agencies. The training program will be reviewed annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Public Education and Awareness							
PEA-1	Advertise and promote the availability of flood insurance to property owners that are located in flood hazard areas. Continue to review FEMA-identified repetitive loss properties for potential mitigation through the federal Flood Mitigation Assistance (FMA) program or other flood protection measures.	Flood	High	City of Greensboro	Local when available	2025	The Annual Public Education campaign for Flood Damage Prevention advertises and promotes the availability of flood insurance to property owners. Owners of properties in the floodplain receive a brochure yearly that provides information on different topics related to Flood Damage Prevention which includes flood insurance. In addition, the public information campaign includes mailing a letter to all repetitive loss structures and surrounding high risk structures that includes information regarding FEMA and flood protection measures. Article submissions are routinely published in the monthly At Your Service customer newsletter. The city plans to continue this campaign going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-2	As new Repetitive Loss Properties are identified within the City of Greensboro, contact all owners and inform them of the assistance available through the federal flood assistance programs, in addition to other flood protection measures.	Flood	High	City of Greensboro Water Resources Department	Local	2025	The City's public outreach project consists of flood informational inserts with water bills. Topics covered include a Flood Risk Map, Flood Safety, Property Protection Measures. We also run three educational programs on our local television channel. City staff advises citizens looking to purchase flood prone properties through our credited hazard disclosure measures. The City sends out annual letters to repetitive loss areas explaining property protection, financial assistance, and flood insurance. This program will continue in the future.
PEA-3	Continue to collect education materials as budgeting will allow for pamphlets to educate the public on family preparedness as well as mitigation measures that are available to property owners. These pamphlets shall remain on display for the public at the following locations: the City Library and designated City Facilities.	Flood	High	City of Greensboro	Local	2025	During FY18-19, GFD Fire Prevention and Life Safety have hired two additional personnel. They are currently exploring options to implement the best build-out the program. This is in addition to previous and continuing ongoing efforts and programs from past years and will continue going forward.
PEA-4	Continue to provide technical assistance for property owners located in flood hazard areas.	Flood	High	City of Greensboro Water Resources Department	Local	2025	The City of Greensboro Water Resources Department has provided technical assistance for property owners located in flood hazard areas and will continue to do so going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; City of Greensboro Emergency Management Coordinator	Local	2025	Guilford County and the city will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

City of High Point Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to identify areas in the city subject to repetitive flooding and institute mitigation measures as funds allow.	Flood	High	City of High Point Public Services Department	Local	2025	Seven priority areas have been identified within the city as those that have a greater potential loss of life and property damage and which are of greatest concern to citizens. A new Emergency Manager was hired in 2019 and the implementation of capital improvement projects will be a priority in the seven identified areas.
P-2	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; City of High Point Public Services	NC DEM	2025	The city continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.
P-3	Identify the city's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; City of High Point Public Services	NC DEM; others as available	2025	The county works with the city to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and city attempt to identify potential mitigation actions to reduce risk to these facilities. The county and city will continue to carry out the update process going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-4	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; City of High Point Public Services	Local	2025	The county works across departments and with the city to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to update City of High Point facilities and infrastructure to identify "High Risk" facilities for various threats. As budgetary resources allow, redefine the criteria and evaluate the aid of establishment of protective measures that may be required to mitigate and respond to incidents within the high risk facilities.	All	Moderate	All City of High Point Departments	Local	2025	The city has worked to identify facilities that may be at high risk to various threats and will continue to evaluate and mitigate, where possible, facilities and infrastructure that are in high risk areas.
PP-2	Each city department should have an established system to identify potential hazards within their supervised departments. This system should provide for mitigation strategies of known hazards in the department's planning and budget processes as needed. The list of hazard mitigation needs should be periodically revised and updated.	All	Moderate	All City of High Point Departments	Local	2025	The city has taken action at the departmental level to identify potential hazards, but this action will require consistent supervision. The city has a new EM and responsibility for managing this across departments will be carried out by the EM.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PP-3	Continue to acquire and preserve parcel land subject to repetitive flooding from willing and voluntary property owners. The county will also consider other residential mitigation projects such as elevation and mitigation reconstruction	Flood	High	Guilford County Planning and Development Department; City of High Point Public Services	FEMA; NC DEM	2025	The county will continue to work with the city to update the Repetitive Loss Properties and include them on the mailings regarding federal flood assistance and flood protection measures. The county has also applied for HMGP grants to acquire parcels and is looking forward to implementing those projects in the future. The county will work with the city to coordinate on potential future projects.
PP-4	Pursue grant funding as possible to allow for the purchase and installation of generators at critical facilities lacking same	All	High	Federal, State	Led by OEM, departments with such facilities assisting	2025	Since the last plan update, generators have been purchased for all fire stations in the city. There are still a number of facilities that do not have a generator, so this action will remain in place, but the progress to date has been noteworthy.
Structural Projects							
SP-1	Continue utility pole inspection program	Energy/Power/ Utility Failure	Medium	Local	Electric Utilities	2025	The utility pole inspection program is in place and has resulted in the replacement of numerous poles that were found to be deficient, which has had positive, mitigative impacts in avoiding potential losses and downtime during storms. The city will continue to implement this program and identify areas for improvement in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Emergency Services							
ES-1	Inventory and evaluate the City's emergency response activities. Identify the resources needed to accomplish specific response activities. Reviews shall include the needs of personnel, equipment, and required resources for emergency deployment.	All	Moderate	City of High Point Fire and Police Departments	Local	2025	During the past few years, the city experienced several natural, weather-related events. These occurrences provided opportunities for both multi-agency responses and for poste-event evaluations. Specifically, these events identified the need to continue to explore options for the combined city-county EOC with numerous agencies involved. These activities will need to be reviewed annually.
ES-2	Continue to receive intelligence on law enforcement/security matters and monitor developments/best practices for management of same	All	High	Local	Police Department	2025	The city has been communicating with numerous agencies at all levels of government on intelligence matters to ensure staff are up to date on best practices. The city will continue to maintain these lines of coordination and ensure it is up to date on best practices.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Public Education and Awareness							
PEA-1	Advertise and promote the availability of flood insurance to property owners that are located in flood hazard areas. Continue to review FEMA-identified repetitive loss properties for potential mitigation through the federal Flood Mitigation Assistance (FMA) program or other flood protection measures.	Flood	High	City of High Point Public Services Department	FEMA	2025	The city has made efforts through regular contact with homeowners to encourage the purchase flood insurance and will continue to promote flood insurance for properties in floodplain. Additionally, the City's public outreach project consists of flood informational inserts with water bills. Topics covered include a Flood Risk Map, Flood Safety, Property Protection Measures. We also run three educational programs on our local television channel. The City's public library maintains flood protection materials provided by FEMA
PEA-2	Continue to collect education materials as budgeting will allow for pamphlets to educate the public on family preparedness as well as mitigation measures that are available to property owners. These pamphlets shall be posted on the High Point Emergency Management Website and will remain on display for the public at the following locations: the City Library, Public Services, and the Fire Department/City's Office of Emergency Management as budget and conditions allow.	All	High	City of High Point Fire Department/ Emergency Management	Local	2025	During FY18-19, GFD Fire Prevention and Life Safety have hired two additional personnel. They are currently exploring options to best build-out this program. This is in addition to previous and continuing ongoing efforts and programs from past years, many of which will be continued going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Update the educational pamphlet on the ICC (Increased Cost of Compliance) and how it associates with the policy holders within the City of High Point. This informational pamphlet should be distributed to the city property owners that receive substantial damage during a flood type event.	Flood	High	City of High Point Fire Department and Public Services	Local	2025	As described above, the city has made great efforts to educate the public on flood-related issues through various pamphlets and documents, including the ICC pamphlet. Most of these educational documents will need to be updated regularly, so this action will remain in the plan.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; City of High Point Emergency Management and Public Services	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the city to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; City of High Point Emergency Management and Public Services	Local	2025	Guilford County and the city will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Jamestown Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Town of Jamestown Town Clerk	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Town of Jamestown Town Clerk	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Jamestown Town Clerk	Town planning expertise	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Town of Jamestown Town Clerk	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Town of Jamestown Town Clerk	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-6	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Town of Jamestown Town Clerk	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Town of Jamestown Town Clerk	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Town of Jamestown Town Clerk	State and Federal funding as available; HMGP	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Support county as it researches safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Town of Jamestown Town Clerk	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The town will continue to work with the county to research opportunities to implement this action.
Public Education and Awareness							
PEA-1	Work with Guilford County to promote education and awareness through Town website and Facebook	All	High	Town of Jamestown Town Clerk	Local	2025	The town has worked to increase public awareness of hazards and potential mitigation measures. The town will continue to promote public education efforts in the future using multiple methods such as posting weather updates, emergency declarations, etc. on website and Facebook.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Town of Jamestown Town Clerk	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Town of Jamestown Town Clerk	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Town of Jamestown Town Clerk	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Town of Jamestown Town Clerk	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Oak Ridge Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Town of Oak Ridge Town Clerk	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Town of Oak Ridge Town Clerk	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Oak Ridge Town Clerk	Local	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Town of Oak Ridge Town Clerk	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Town of Oak Ridge Town Clerk	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-6	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Town of Oak Ridge Town Clerk	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Town of Oak Ridge Town Clerk	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Town of Oak Ridge Town Clerk	State and Federal funding as available; HMGP	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Support county as it researches safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Town of Oak Ridge Town Clerk	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The town will continue to work with the county to research opportunities to implement this action.
Public Education and Awareness							
PEA-1	Work with Guilford County to promote education and awareness through Town website and Facebook	All	High	Town of Oak Ridge Town Clerk	Local	2025	The town has worked to increase public awareness of hazards and potential mitigation measures. The town will continue to promote public education efforts in the future using multiple methods such as posting weather updates, emergency declarations, etc. on website and Facebook.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Town of Oak Ridge Town Clerk	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Town of Oak Ridge Town Clerk	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Town of Oak Ridge Town Clerk	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Town of Oak Ridge Town Clerk	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Pleasant Garden Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Town of Pleasant Garden Town Clerk	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Town of Pleasant Garden Town Clerk	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Pleasant Garden Town Clerk	Town planning expertise	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Town of Pleasant Garden Town Clerk	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Town of Pleasant Garden Town Clerk	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-6	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Town of Pleasant Garden Town Clerk	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Town of Pleasant Garden Town Clerk	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Town of Pleasant Garden Town Clerk	State and Federal funding as available; HMGP	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Install a back-up generator in Town Hall so the site can function as a staging or communications site during incidents	All	High	Town of Pleasant Garden Town Clerk	Town/grants	Deleted	This project was dropped by Town Council as it was decided to be too costly to implement locally. This action will be deleted and re-framed into action ES-1.
Public Education and Awareness							
PEA-1	Provide information, prevention tips, safety ideas, etc. in the town newsletter and on the town website for hazards pertinent to town residents	All	Moderate	Town of Pleasant Garden Town Clerk	Town	2025	Throughout the last several years, the town continued to share pertinent information within the town newsletter and website. This is a critical part of outreach, so this action will remain in place.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Town of Pleasant Garden Town Clerk	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Town of Pleasant Garden Town Clerk	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Town of Pleasant Garden Town Clerk	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Town of Pleasant Garden Town Clerk	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Sedalia Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Town of Sedalia Town Clerk	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Town of Sedalia Town Clerk	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Sedalia Town Clerk	Local	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Town of Sedalia Town Clerk	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Town of Sedalia Town Clerk	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-6	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Town of Sedalia Town Clerk	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Town of Pleasant Garden Town Clerk	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Town of Sedalia Town Clerk	State and Federal funding as available; HMGP	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Support county as it researches safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Town of Sedalia Town Clerk	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The town will continue to work with the county to research opportunities to implement this action.
Public Education and Awareness							
PEA-1	Provide information, prevention tips, safety ideas, etc. in the town newsletter and on the town website for hazards pertinent to town residents	All	Moderate	Town of Sedalia Town Clerk	Town	2025	Throughout the last several years, the town continued to share pertinent information within the town newsletter and website. This is a critical part of outreach, so this action will remain in place.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Town of Sedalia Town Clerk	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Town of Sedalia Town Clerk	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Town of Sedalia Town Clerk	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Town of Sedalia Town Clerk	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Stokesdale Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Town of Stokesdale Town Clerk	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Town of Stokesdale Town Clerk	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Stokesdale Town Clerk	Town planning expertise	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Town of Stokesdale Town Clerk	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Town of Stokesdale Town Clerk	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-6	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Town of Stokesdale Town Clerk	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Town of Stokesdale Town Clerk	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Town of Stokesdale Town Clerk	State and Federal funding as available; HMGP	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Support county as it researches safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Town of Stokesdale Town Clerk	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The town will continue to work with the county to research opportunities to implement this action.
Public Education and Awareness							
PEA-1	Provide information, prevention tips, safety ideas, etc. in the town newsletter and on the town website for hazards pertinent to town residents	All	Moderate	Town of Stokesdale Town Clerk	Town	2025	Throughout the last several years, the town continued to share pertinent information within the town newsletter and website. This is a critical part of outreach, so this action will remain in place.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Town of Stokesdale Town Clerk	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Town of Stokesdale Town Clerk	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Town of Stokesdale Town Clerk	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Town of Stokesdale Town Clerk	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Summerfield Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Summerfield Planning Department	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Summerfield Planning Department	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Summerfield Town Planner	Town planning expertise	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Require the installation of underground utilities to minimize outages during winter storms, tornadoes, hurricanes and other wind related storms - residential	Winter Storms Tornadoes/ Winds Hurricanes	Moderate	Summerfield Planning Department	Developer installed	2020	A Unified Development Ordinance (UDO) is under development and the Zoning Board will present the UDO to the Governing Body in 2020 for adoption. This UDO includes the mandatory underground installation of utility infrastructure.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Explore the installation of underground utilities to minimize outages during winter storms, tornadoes, hurricanes and other wind related storms – all other uses	Winter Storms Tornadoes/ Winds Hurricanes	Moderate	Summerfield Planning Department	Joint Town/Developer/ Utility Effort	2020	A Unified Development Ordinance (UDO) is under development and the Zoning Board will present the UDO to the Governing Body in 2020 for adoption. This UDO includes the mandatory underground installation of utility infrastructure.
P-6	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Summerfield Planning Department	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.
P-7	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Summerfield Planning Department	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-8	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Summerfield Planning Department	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Summerfield Planning Department	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Summerfield Planning Department	State and Federal funding as available; HMGP	2025	New Action
Natural Resource Protection							
NRP-1	Modify land regulation to reduce the amount of impervious surfaces and limit uses which may impact surface and groundwater quality	Resources – water/Public Health	High	Summerfield Planning Department	Watershed programs and State Water quality	2020	A Unified Development Ordinance (UDO) is under development and the Zoning Board will present the UDO to the Governing Body in 2020 for adoption.
Structural Projects							
SP-1	Support county as it researches safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Guilford County Emergency Management	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The town will continue to work with the county to research opportunities to implement this action.
Emergency Services							
ES-1	Explore joint ventures with commercial development to acquire water storage capacity for emergency services	Resource shortage water	Moderate	Summerfield Planning Department/ consulting engineers	Private/public	2025	The town has begun looking into increasing its water capacity to ensure sufficient supply during water shortages, but this is an ongoing process that will need to be revisited, so this action will remain in the plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
ES-2	Identify opportunities to develop new water supply and storage resources used in fire suppression by emergency services.	Resources - water	Moderate	Summerfield Planning Department/ consulting engineers	Balance from recent regional water study	2022	New Action
Public Education and Awareness							
PEA-1	Develop web pages to add to Community Website for information distribution regarding hazard education, risk awareness, and mitigation techniques.	All	High	Summerfield Planning Department	Local	2021	The town has leveraged its website as a platform to distribute information about hazards and risk and will continue to do so going forward.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Summerfield Planning Department	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Summerfield Planning Department	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Summerfield Planning Department	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Summerfield Planning Department	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

Town of Whitsett Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	Continue to participate in the NFIP and improve floodplain management within the community. As part of this action the community will evaluate implementing: • Requirements to reduce new construction in SFHAs • Programs to improve information provided to citizens whose homes are located in the floodplain	Flood	High	Town of Whitsett Town Clerk	State and Federal funding as available	2025	As of 2020, the town is a participant in the NFIP and will continue to work towards meeting all requirements of the NFIP going forward and will work to make improvements to its participation as described.
P-2	Work with the County and State to complete hazard mitigation plan updates. As part of this action, the community will: • Annually evaluate its list of critical facilities for additions or changes • Identify new opportunities for actions that may be included in future plan updates	All	High	Town of Whitsett Town Clerk	State and Federal funding as available; Town planning expertise	2025	The town has been an active participant in the 2020 update of the hazard mitigation plan and will take an active role in future updates. The town will also work to implement the identified improvements to the plan in the interim between update cycles.
P-3	Continue to identify and document hazard occurrences and potential mitigation projects.	All	High	Town of Whitsett Town Clerk	Town planning expertise	2025	As of 2020, the town has worked with the county on a system to identify and document hazards that occur. The town will aim to improve its identification of mitigation projects in the future.
P-4	Maintain Geographic Information System (GIS) to maintain current cadastral (building/parcel) data for purposes of conducting more detailed hazard risk assessments and for tracking permitting and land use patterns.	All	High	Guilford County IS; Town of Whitsett Town Clerk	NC DEM	2025	The town continues to work with the county to maintain appropriate layers and has assisted as the county has installed cloud-based, data access paths. These pathways are currently being expanded, so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Identify the town's most at-risk vital/critical facilities, and evaluate the potential mitigation techniques for protecting each facility to the maximum extent possible.	All	Moderate	Guilford County Emergency Management Coordinator; Town of Whitsett Town Clerk	NC DEM; others as available	2025	The county works with the town to frequently update its list of vital/critical facilities, including through the update of this plan. Through these processes, the county and town attempt to identify potential mitigation actions to reduce risk to these facilities. The county and town will continue to carry out the update process going forward.
P-6	Monitor grant opportunities for funding to establish a local reserve fund for repairing and/or incorporating hazard mitigation measures for public facilities and infrastructure damaged by natural hazards.	All	Moderate	Guilford County Emergency Services; Town of Whitsett Town Clerk	Local	2025	The county works across departments and with the town to evaluate funding streams for various projects and will continue to work on establishing mechanisms to carry out this action.
Property Protection							
PP-1	Continue to identify potential mitigation projects (e.g. acquisition, elevation, reconstruction, etc) and continue to require floodplain dedication.	Flood	Moderate	Town of Whitsett Town Clerk	Local	2025	The town has not implemented any major mitigation projects in recent years, but will continue to work with the county to identify potential mitigation projects that may help reduce flood risk.
PP-2	When available, work with the county and state to invest in generator projects and power redundancy to ensure power availability during hazard events, particularly for critical facilities.	All	Moderate	Town of Whitsett Town Clerk	State and Federal funding as available; HMGP	2025	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
SP-1	Support county as it researches safe room grant opportunities to construct safe rooms in schools and vulnerable population locations.	Tornado	Moderate	Town of Whitsett Town Clerk	Various	2025	Little progress has been made on this action since the last plan update as grant opportunities have not been available. The town will continue to work with the county to research opportunities to implement this action.
Public Education and Awareness							
PEA-1	Provide information, prevention tips, safety ideas, etc. in the town newsletter and on the town website for hazards pertinent to town residents	All	Moderate	Town of Whitsett Town Clerk	Town	2025	Throughout the last several years, the town continued to share pertinent information within the town newsletter and website. This is a critical part of outreach, so this action will remain in place.
PEA-2	Maintain an all-hazards public education program to educate and prepare residents for all hazards identified in Guilford County.	All	High	Guilford County Emergency Management, Town of Whitsett Town Clerk	Local	2025	The county has developed a program aimed at all hazards education and Guilford County Emergency Management has performed presentations multiple times for various community groups. The town will work with the county to disseminate this information and encourage public attendance at these presentations. This action is still relevant and will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-3	Promote the availability of flood insurance to County and Town property owners.	Flood	High	Guilford County NFIP/CRS; Town of Whitsett Town Clerk	Local	2025	The county and town coordinate to make efforts to promote the availability of flood insurance to property owners, especially those located in the floodplain or other flood prone areas. The county and town will continue these efforts going forward.
PEA-4	As new Repetitive Loss Properties are identified within the County and municipalities, contact all owners and inform them of the assistance available through the federal flood assistance programs, in additional to other flood protection measures.	Flood	High	Guilford County NFIP/CRS; Town of Whitsett Town Clerk	Local	2025	Guilford County has relatively few repetitive loss properties and has carried this out for all of these properties where required. The county will continue to work with the town to carry out this action going forward for repetitive loss properties.
PEA-5	Develop outreach program to local school administrators to help them identify sheltering areas for all schools	Tornadoes	Moderate	Guilford County Emergency Management; Town of Whitsett Town Clerk	Local	2025	Guilford County and the town will work with stakeholders in the school system to keep them informed of best practices in the industry and to coordinate and educate on critical matters related to disaster preparedness. Further coordination will take place going forward.

SECTION 10
PLAN MAINTENANCE

This section discusses how the Guilford County Mitigation Strategy and Mitigation Action Plan will be implemented and how the Multi-jurisdictional Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following three subsections:

- 10.1 Monitoring and Evaluating the Previous Plan
- 10.1 Implementation and Integration
- 10.2 Monitoring, Evaluation, and Enhancement
- 10.3 Continued Public Involvement

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44 CFR Requirement
44 CFR Part201.6(c)(4)(i): The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle. ***44 CFR Part 201.6(c)(4)(ii):*** The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

10.1 MONITORING AND EVALUATING THE PREVIOUS PLAN

Since the previous plan was adopted, each jurisdiction has worked to ensure that mitigation was integrated into local activities and that the mitigation plan was appropriately implemented. The participants jointly outlined a process in the previous mitigation plan for monitoring and evaluating the plan throughout the interim period between plan updates.

All participants were ultimately successful in implementing the monitoring and evaluation processes that were outlined in the previous plan as all eleven jurisdictions participated in annual meetings to discuss the mitigation plan and the priorities that were outlined in it. The specific process is outlined below with an explanation of how the monitoring and evaluating process was carried out, as well as any changes that were identified that would be useful to implement during the next update.

Guilford County
During the 2016-2020 timeframe, the Guilford County Hazard Mitigation Plan included an annual review process and progress report on the plan. This review process was carried out by the Emergency Management Director at the request of the County Manager and Board of County Commissioners. During this review process, the Emergency Management Director solicited comments from all affected county departments and local governments via the hazard mitigation planning team.

During this review, the County Board of Commissioners received a report on the implementation status of the plan which included a review of mitigation actions in the plan and progress that had been made towards completing those actions.

Although there were some minor revisions made to the plan during the interim update period, there were few major revisions identified during this time and the HMP planning team generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

The planning team noted that reporting was done on the progress of the plan through the interim review period via annual meetings to discuss these progress reports. Going forward, the planning team will continue to conduct an annual Hazard Mitigation Planning Team meeting every year. This meeting will include monitoring, evaluating, and updating the plan, with particular emphasis on the mitigation actions and progress towards completing those.

10.2 IMPLEMENTATION AND INTEGRATION

Each agency, department, or other partner participating under the Guilford County Multi-Jurisdictional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific "lead" agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

The participating jurisdictions will integrate this Hazard Mitigation Plan into relevant city and county government decision-making processes or mechanisms, where feasible. This includes integrating the requirements of the Hazard Mitigation Plan into other local planning documents, processes, or mechanisms, such as comprehensive or capital improvement plans, when appropriate. The members of the Guilford County Hazard Mitigation Planning Team will remain charged with ensuring that the goals and mitigation actions of new and updated local planning documents for their agencies or departments are consistent, or do not conflict with, the goals and actions of the Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability in Guilford County.

Since the previous plan was adopted, each jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances;
- Integrating the mitigation plan into reviews and updates of emergency operations plans;
- Integrating information in the mitigation plan into county Geographic Information Systems; and

- Integrating the mitigation plan into the local reserve fund through identification of mitigation actions that require local funding

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Hazard Mitigation Planning Team and the review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Multi-jurisdictional Hazard Mitigation Plan is deemed by the Hazard Mitigation Planning Team to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.3 MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

The Hazard Mitigation Planning Team shall meet once every year to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. This meeting shall be held in the month upon which final plan approval is attained, however, it may be necessary to schedule in the month prior or after in any given year, depending on the schedules of local officials. The findings and recommendations of the Planning Team will be documented in the form of a report that can be shared with interested municipalities, the county, and other stakeholders. The Hazard Mitigation Planning Team will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within Guilford County. The Guilford County Emergency Management Director will be responsible for reconvening the Hazard Mitigation Planning Team for these reviews.

Five Year Plan Review

The Plan will be thoroughly reviewed by the Hazard Mitigation Planning Team every five years to determine whether there have been any significant changes in Guilford County that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The plan review provides Guilford County/municipal officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. The Guilford County Emergency Management Director will be responsible for reconvening the Hazard Mitigation Planning Team and conducting the five-year review.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Guilford County Multi-jurisdictional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

Because the plan update process can take several months to complete, and because Federal funding may be needed to update the plan, it is recommended that the five-year review process begin at the beginning of the third year after the plan was last approved. This will allow the participants in the Guilford County Multi-Jurisdictional Hazard Mitigation Plan to organize in order to seek Federal funding if necessary and complete required plan update documentation before the plan expires at the end of the fifth year.

Disaster Declaration

Following a disaster declaration, the Guilford County Multi-jurisdictional Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the Guilford County Emergency Management Director to reconvene the Hazard Mitigation Planning Team and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Reporting Procedures

The results of the five-year review will be summarized by the Hazard Mitigation Planning Team in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

Plan Amendment Process

Upon the initiation of the amendment process, representatives from Guilford County and the participating municipalities will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County/municipal departments, residents, and businesses. Information will also be forwarded to the North Carolina Division of Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the Hazard Mitigation Planning Team for final consideration. The Hazard Mitigation Planning Team will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the Hazard Mitigation Planning Team:

- There are errors, inaccuracies, or omissions made in the identification of issues or needs in the Plan.
- New issues or needs have been identified which are not adequately addressed in the Plan.
- There has been a change in information, data, or assumptions from those on which the Plan is based.

Upon receiving the recommendation from the Hazard Mitigation Planning Team, and prior to adoption of the Plan, the participating jurisdictions will hold a public hearing. The governing bodies of each participating jurisdiction will review the recommendation from the Hazard Mitigation Planning Team (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

- Adopt the proposed amendments as presented;
- Adopt the proposed amendments with modifications;
- Refer the amendments request back to the Hazard Mitigation Planning Team for further revision; or
- Defer the amendment request back to the Hazard Mitigation Planning Team for further consideration and/or additional hearings.

Incorporation Into Existing Planning Documents

The Guilford County Hazard Mitigation Planning Team intends to make available to all of Guilford County and its municipalities a process by which the requirements of this hazard mitigation plan will be incorporated into other plans. During the planning process for new and updated local planning documents, such as a comprehensive plan, capital improvements plan, or emergency operations plan to name a few examples, Guilford County Emergency Management will provide a copy of the hazard mitigation plan to the advisory committee of each relevant planning document. Guilford County Emergency Management will advise the advisory committee members to ensure that all goals and strategies of new and updated local planning documents are consistent with the hazard mitigation plan and will not increase the risk of hazards or vulnerability of the jurisdictions.

This process will be carried out for each of the planning documents described in *Section 7: Capability Assessment* of this document. It should also be noted that most jurisdictions within the county are participants in the county-level version of each type of plan and do not have stand-alone jurisdictional plans of their own. Therefore, when Emergency Management shares and advises on the hazard mitigation plan, they are acting on behalf of the municipalities. It should be further noted that due to the smaller size of many municipalities, municipal representatives of the Hazard Mitigation Planning

Team are often the same person who participates in the update of comprehensive plans, zoning ordinances, and other planning documents. As such, much of the engrained knowledge these officials have gained from participating in the hazard mitigation planning process is transferred to these processes.

Therefore, each municipality's process for integrating the hazard mitigation plan into other planning mechanisms is the same as the county level process because these planning mechanisms are carried out as countywide plans or ordinances and each community's stake in each process is intricately linked.

10.4 CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement
44 CFR Part 201.6(c)(4)(iii): The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation, and revision process will also be made. These efforts may include, among others:

- Advertising meetings of the Hazard Mitigation Planning Team in local newspapers, public bulletin boards and/or County and municipal office buildings;
- Designating willing and voluntary citizens and private sector representatives as official members of the Hazard Mitigation Planning Team;
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place;
- Utilizing the websites of participating jurisdictions to advertise any maintenance and/or periodic review activities taking place; and
- Keeping copies of the Plan in public libraries.

Appendix A
Plan Adoption

This appendix will include the final approval letter and local adoption resolutions for each of the participating jurisdictions.

Appendix B
Planning Tools

This appendix includes the following:

1. List of Recommended Stakeholders
2. Blank Public Survey
3. GIS Data Inventory Sheet
4. Scoring Criteria for Capability Assessment
5. Blank Mitigation Action Worksheet

In establishing a planning team, you want to ensure that you have a broad range of backgrounds and experiences represented. Below are some suggestions for agencies to include in a planning team. There are many organizations, both governmental and community-based, that should be included when creating a local team. In addition, state organizations can be included on local teams, when appropriate, to serve as a source of information and to provide guidance and coordination.

Use the checklist as a starting point for forming your team. Check the boxes beside any individuals or organizations that you have in your community/state that you believe should be included on your planning team so you can follow up with them.

Task A. Create the planning team – *Suggestions for team members.* Date:_____

Local/Tribal

- ☐ Administrator/Manager's Office
- ☐ Budget/Finance Office
- ☐ Building Code Enforcement Office
- ☐ City/County Attorney's Office
- ☐ Economic Development Office
- ☐ Emergency Preparedness Office
- ☐ Fire and Rescue Department
- ☐ Hospital Management
- ☐ Local Emergency Planning Committee
- ☐ Planning and Zoning Office
- ☐ Police/Sheriff's Department
- ☐ Public Works Department
- ☐ Sanitation Department
- ☐ School Board
- ☐ Transportation Department
- ☐ Tribal Leaders

Special Districts and Authorities

- ☐ Airport and Seaport Authorities
- ☐ Business Improvement District(s)
- ☐ Fire Control District
- ☐ Flood Control District
- ☐ Redevelopment Agencies
- ☐ Regional/Metropolitan Planning Organization(s)
- ☐ School District(s)
- ☐ Transit/Transportation Agencies

Others

- ☐ Architectural/Engineering/Planning Firms
- ☐ Citizen Corps
- ☐ Colleges/Universities
- ☐ Land Developers
- ☐ Major Employers/Businesses
- ☐ Professional Associations
- ☐ Retired Professionals

State

- ☐ Adjutant General's Office (National Guard)
- ☐ Board of Education
- ☐ Building Code Office
- ☐ Climatologist
- ☐ Earthquake Program Manager
- ☐ Economic Development Office
- ☐ Emergency Management Office/State Hazard Mitigation Officer
- ☐ Environmental Protection Office
- ☐ Fire Marshal's Office
- ☐ Geologist
- ☐ Homeland Security Coordinator's Office
- ☐ Housing Office
- ☐ Hurricane Program Manager
- ☐ Insurance Commissioner's Office
- ☐ National Flood Insurance Program Coordinator
- ☐ Natural Resources Office
- ☐ Planning Agencies
- ☐ Police
- ☐ Public Health Office
- ☐ Public Information Office
- ☐ Tourism Department

Non-Governmental Organizations (NGOs)

- ☐ American Red Cross
- ☐ Chamber of Commerce
- ☐ Community/Faith-Based Organizations
- ☐ Environmental Organizations
- ☐ Homeowners Associations
- ☐ Neighborhood Organizations
- ☐ Private Development Agencies
- ☐ Utility Companies
- ☐ Other Appropriate NGOs

PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING

We need your help! Please take a few minutes to complete this survey.

Guilford County is currently engaged in a planning process to become less vulnerable to disasters caused by natural, technological, biological, and man-made/intentional hazards, and your participation is important to us!

The county, along with local jurisdictions and other partners, is working to update its multi-jurisdictional *Hazard Mitigation Plan*. This Plan will identify and assess our community's natural and man-made hazard risks and determine how to best mitigate, or minimize and manage, those risks.

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impacts of future hazard events.

Please help us by completing this survey by August 31, 2019 and returning it to:

Ryan Wiedenman, Atkins
1616 E Millbrook Road, Suite 160
Raleigh, NC 27609

Surveys can also be faxed to: (919) 876-6848 c/o Ryan Wiedenman or scanned and emailed to: Ryan Wiedenman at ryan.wiedenman@atkinsglobal.com.

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the *Guilford County Hazard Mitigation Plan*, please contact Atkins, planning consultant for the project. You may reach Ryan Wiedenman (Atkins) at 919-431-5295 or by email at ryan.wiedenman@atkinsglobal.com.

1. Where do you live?

- ❑ Unincorporated Guilford County
- ❑ Gibsonville
- ❑ Greensboro
- ❑ High Point
- ❑ Jamestown
- ❑ Oak Ridge
- ❑ Pleasant Garden
- ❑ Sedalia
- ❑ Stokesdale
- ❑ Summerfield
- ❑ Whitsett
- ❑ Other: _____

2. Is your home located in a floodplain?

- ❑ Yes
- ❑ No
- ❑ I don't know

3. **Do you have flood insurance for your home/personal property?**

   - ❑ Yes
   - ❑ No
   - ❑ I don't know

   a. **If "No," why not?**

      - ❑ Not located in floodplain
      - ❑ Too expensive
      - ❑ Not necessary because it never floods
      - ❑ Not necessary because my property is elevated or otherwise protected
      - ❑ Never really considered it
      - ❑ Other (please explain): _____

4. **Have you ever experienced or been impacted by a natural disaster or man-made incident?**

   - ❑ Yes
   - ❑ No

   a. **If "Yes," please explain:**

5. **On a scale of 1 to 5, how concerned are you about the possibility of your community being impacted by a natural disaster or man-made incident?**

   - ❑ 1 – Not at all
   - ❑ 2 – Slightly
   - ❑ 3 – Moderately
   - ❑ 4 – Very
   - ❑ 5 – Extremely

6. **Please select the <u>three</u> hazards you think pose the *greatest concern* to your community:**

<u>Natural Hazards</u>
- ❑ Drought
- ❑ Earthquake
- ❑ Extreme Cold
- ❑ Extreme Heat
- ❑ Fire
- ❑ Flooding
- ❑ Hail
- ❑ Hurricane/Other Tropical Disturbance
- ❑ Thunderstorm (Wind and Lightning)
- ❑ Tornado
- ❑ Winter Storm

<u>Biological Hazards</u>
- ❑ Bioterrorism
- ❑ Public Health/Emerging Disease Threat

<u>Technological Hazards</u>
- ❑ Building/Structure Collapse
- ❑ Communications Systems Disruption/Failure
- ❑ Energy/Power/Utility Failure
- ❑ Hazardous Materials Incident
- ❑ Nuclear Power Plant Emergency
- ❑ Pipeline Failure
- ❑ Resource Shortage (Water/Fuel)
- ❑ Transportation Incident

<u>Man-made/Intentional Hazards</u>
- ❑ Civil Disturbance
- ❑ Cyberterrorism
- ❑ Terrorism

7. **Is there another hazard not listed above that you think is a wide-scale threat to your community?**
   - ❑ Yes (please explain): _____
   - ❑ No

8. **On a scale of 1 to 5, how prepared do you feel if a natural disaster or man-made incident were to occur?**
   - ❑ 1 – Not at all
   - ❑ 2 – Slightly
   - ❑ 3 – Moderately
   - ❑ 4 – Very
   - ❑ 5 – Extremely

9. **Have you taken any actions to make your home, neighborhood, or family safer from hazards?**
   - ❑ Yes
   - ❑ No

   a. **If "Yes," please explain:**

10. **Are you interested in making your home, neighborhood, or family safer from hazards?**
    - ❑ Yes
    - ❑ No

11. On a scale of 1 to 5, how informed do you feel about the risks and potential impacts of natural disasters and man-made incidents?

- ❑ 1 – Not at all
- ❑ 2 – Slightly
- ❑ 3 – Moderately
- ❑ 4 – Very
- ❑ 5 – Extremely

12. Do you know which government department or agency to contact regarding your risks from hazards in your area?

- ❑ Yes
- ❑ No

13. Please select the way(s) you prefer to receive information about how to make your home, neighborhood, or family safer from hazards:

- ❑ Newspaper
- ❑ Television
- ❑ Radio
- ❑ Internet
- ❑ Social media
- ❑ Email
- ❑ Mail
- ❑ Public workshops/meetings
- ❑ School meetings
- ❑ Other (please explain): _____

14. Please select the way(s) you prefer to receive alerts or warnings about impending hazard events or dangerous conditions:

- ❑ Television
- ❑ Radio
- ❑ Landline phone
- ❑ Cell phone
- ❑ Text message
- ❑ Facebook
- ❑ Twitter
- ❑ Other (please explain): _____

15. In your opinion, what are some steps your local government could take to reduce the risk of future hazard damages in your community?

16. A number of community-wide activities can reduce vulnerability to hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each category is for your community to consider.

Category	Very Important	Somewhat Important	Not Important
1. Prevention Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.	❑	❑	❑
2. Property Protection Actions that involve modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.	❑	❑	❑
3. Natural Resource Protection Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.	❑	❑	❑
4. Structural Projects Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls, and storm sewers.	❑	❑	❑
5. Emergency Services Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.	❑	❑	❑
6. Public Education and Awareness Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.	❑	❑	❑

THANK YOU FOR YOUR PARTICIPATION!

GIS Data Request Sheet
Guilford County Multi-Jurisdictional Hazard Mitigation Plan

Data requested	Available?	Received?	Potential Sources
Tax Parcel Data			Tax Assessor
including replacement value			
Building Footprints			Tax Assessor/GIS office
Critical Facilities (in GIS or list form with addresses)			Tax Assessor/GIS office
examples include:			
government buildings			
hospitals			
senior care			
police/fire/EMS/EOC			
locally significant buildings			
schools			
Local hazard studies			public works, natural resources, planning
examples include:			
Flood Studies (HEC-RAS, Risk MAP)			
Local Hazard History Articles			
Areas of Concern Studies			

If you have any questions, please contact:

Ryan Wiedenman
919-431-5295
ryan.wiedenman@atkinsglobal.com

Points System for Capability Ranking

0-19 points = Limited overall capability
20-39 points = Moderate overall capability
40-68 points = High overall capability

I. Planning and Regulatory Capability
(Up to 43 points)

Yes = 3 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- National Flood Insurance Program
- NFIP Community Rating System

Yes = 2 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Open Space Management Plan / Parks & Recreation Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-disaster Redevelopment / Reconstruction Ordinance

Yes = 1 point
No = 0 points

- Capital Improvements Plan
- Economic Development Plan
- Historic Preservation Plan
- Zoning Ordinance
- Subdivision Ordinance
- Unified Development Ordinance
- Building Code
- Fire Code

II. Administrative and Technical Capability
(Up to 15 points)

Yes = 2 points
Service provided by County = 1 point
No = 0 points

- Planners with knowledge of land development and land management practices
- Engineers or professionals trained in construction practices related to buildings and/or infrastructure
- Planners or engineers with an understanding of natural and/or human-caused hazards
- Emergency manager
- Floodplain manager

Yes = 1 point
No = 0 points

- Land surveyors
- Scientist familiar with the hazards of the community
- Staff with education or expertise to assess the community's vulnerability to hazards
- Personnel skilled in Geographical Information Systems (GIS) and/or Hazus
- Resource development staff or grant writers

III. Fiscal Capability
(Up to 10 points)

Yes = 1 point
No = 0 points

- Capital Improvement Programming
- Community Development Block Grants (CDBG)
- Special Purpose Taxes (or tax districts)
- Gas / Electric Utility Fees
- Water / Sewer Fees
- Stormwater Utility Fees
- Development Impact Fees
- General Obligation / Revenue / Special Tax Bonds
- Partnering arrangements or intergovernmental agreements
- Other

MITIGATION ACTION WORKSHEETS

Mitigation Action Worksheets are used to identify potential hazard mitigation actions that participating jurisdictions in Guilford County will consider to reduce the negative effects of identified hazards. The worksheets provide a simple yet effective method of organizing potential actions in a user-friendly manner that can easily be incorporated into the County's Hazard Mitigation Plan.

The worksheets are to be used as part of a strategic planning process and are designed to be:

a.) completed electronically (worksheets and instructions will be e-mailed to members of the Hazard Mitigation Planning Team following the Mitigation Strategy Workshop);
b.) reviewed with your department/organization for further consideration; and
c.) returned according to the contact information provided below.

Please return all completed worksheets no later than September 30, 2019 to:

Ryan Wiedenman, Project Manager Atkins
Electronic copies may be e-mailed to: ryan.wiedenman@atkinsglobal.com
Hard copies may be faxed to: 919-876-6848 (Attn: Ryan Wiedenman)

INSTRUCTIONS

Each mitigation action should be considered to be a separate local project, policy or program and each individual action should be entered into a separate worksheet. By identifying the implementation requirements for each action, the worksheets will help lay the framework for engaging in distinct actions that will help reduce the community's overall vulnerability and risk. Detailed explanations on how to complete the worksheet are provided below.

Proposed Action: Identify a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives.

Site and Location: Provide details with regard to the physical location or geographic extent of the proposed action, such as the location of a specific structure to be mitigated, whether a program will be citywide, countywide or regional, etc.

History of Damages: Provide a brief history of any known damages as it relates to the proposed action and the hazard(s) being addressed. For example, the proposed elevation of a repetitive loss property should include an overview of the number of times the structure has flooded, total dollar amount of damages if available, etc.

Hazard(s) Addressed: List the hazard(s) the proposed action is designed to mitigate against.

Category: Indicate the most appropriate category for the proposed action as discussed during the Mitigation Strategy Workshop (Prevention; Property Protection; Natural Resource Protection; Structural Projects; Emergency Services; Public Education and Awareness).

Priority: Indicate whether the action is a "high" priority, "moderate" priority or "low" priority based generally on the following criteria:

1. Effect on overall risk to life and property
2. Ease of implementation / technical feasibility
3. Project costs versus benefits
4. Political and community support
5. Funding availability

Estimated Cost: If applicable, indicate what the total cost will be to accomplish this action. This amount will be an estimate until actual final dollar amounts can be determined. Some actions (such as ordinance revisions) may only cost "local staff time" and should be noted so.

Potential Funding Sources: If applicable, indicate how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, a cost-sharing federal or state grant program, etc.

Lead Agency/Department Responsible: Identify the local agency, department or organization that is best suited to implement the proposed action.

Implementation Schedule: Indicate when the action will begin and when the action is expected to be completed. Remember that some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.

Comments: This space is provided for any additional information or details that may not be captured under the previous headings.

MITIGATION ACTION	
Proposed Action:	
BACKGROUND INFORMATION	
Site and Location:	
History of Damages:	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	
Category:	
Priority (High, Moderate, Low):	
Estimated Cost:	
Potential Funding Sources:	
Lead Agency/Department Responsible:	
Implementation Schedule:	

COMMENTS

Appendix C
Local Mitigation Plan Review Tool

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Guilford County	**Title of Plan:** Guilford County Multi-Jurisdictional Hazard Mitigation Plan	**Date of Plan:** February 2020
Local Point of Contact: **Taylor Jones**	**Address:** **Guilford County Emergency Services** **1002 Meadowood Street** **Greensboro, NC 27409**	
Title: **Emergency Management Coordinator**		
Agency: **Guilford County Emergency Management**		
Phone Number: **336-641-2278**	**E-Mail:** **Tjones3@guilford-es.com**	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region IV		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:

REGULATION CHECKLIST

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 1.3; Section 2; App. D	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2.4-2.7; App. D	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2.6; App. B; App. D; App. F	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 7.3	X	
A5. Is there discussion of how the community (ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 10.3-10.4	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 10.2-10.3	X	
ELEMENT A: REQUIRED REVISIONS			

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4; Section 5	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 4; Section 5	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 5; Section 6	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 5.9.5; Section 9	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 7	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5.9; Section 7.3.4	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 8.2	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 8.3-8.4; Section 9.2	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 8.1.1; Section 9.2	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning	Section 10.3	X	

mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))			

ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 3; Section 6.4.3; Section 6.5	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 2.8; Section 8.5; Section 9	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 5.28-5.29; Section 9.2	X	
ELEMENT D: REQUIRED REVISIONS			

ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	App. A (pending FEMA approval)		X
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	App. A (pending FEMA approval)		X
ELEMENT E: REQUIRED REVISIONS			

ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Element B: Hazard Identification and Risk Assessment

Element C: Mitigation Strategy

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

B. Resources for Implementing Your Approved Plan

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Guilford County	County	Taylor Jones									
2	Town of Gibsonville	Town	Brandon Parker									
3	City of Greensboro	Town	Jason Geary									
4	City of High Point	Town	Perry Hall									
5	Town of Jamestown	Town	Paul Blanchard									
6	Town of Oak Ridge	Town	Ashley Royal									
7	Town of Pleasant Garden	Town	Angela Deal									
8	Town of Sedalia	Town	Cam Dungee									

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
9	Town of Stokesdale	City	Thearon Hooks									
10	Town of Summerfield	Town	Chris York									
11	Town of Whitsett	Town	Ken Jacobs									
12												
13												
14												
15												
16												
17												
18												
19												
20												

Appendix D
Planning Process Documentation

This appendix includes:

1. Meeting Agendas
2. Meeting Minutes
3. Meeting Sign-In Sheets
4. Other Affected Stakeholders Opportunity to Comment on Draft

AGENDA

Guilford County Hazard Mitigation Plan Update
Hazard Mitigation Planning Team Kickoff Meeting
May 30, 2019
10:00 AM – 12:00 PM

1) **Introductions**

2) **Mitigation Overview**
   a) Icebreaker Exercise

3) **Project Overview**
   a) Planning Process
   b) Risk Assessment
   c) Capability Assessment
   d) Mitigation Strategy
   e) Data Collection
   f) Public Involvement

4) **Roles & Responsibilities**
   a) Atkins
   b) County Leads
   c) Participating Jurisdictions

5) **Next Steps**
   a) Initiate data collection efforts
   b) Begin public outreach
   c) Attend next HMPT meeting

6) **Questions/Concerns?**

ATKINS

AGENDA

Guilford County Hazard Mitigation Plan Update
Hazard Mitigation Plan Public Meeting
June 13, 2019
9:00 AM – 10:30 AM

1) **Introductions**

2) **Mitigation Overview**
   a) What is mitigation and why do we do it?

3) **Mitigation Techniques**
   a) Prevention
   b) Property Protection
   c) Natural Resource Protection
   d) Structural Projects
   e) Emergency Services
   f) Public Education and Awareness

4) **Project Overview**
   a) Who is participating?
   b) Key Objectives
   c) Planning Process
   d) Public Participation and Survey

5) **Next Steps**

6) **Questions/Concerns?**

ATKINS

AGENDA

Guilford County Hazard Mitigation Plan Update
Hazard Mitigation Planning Team Kickoff Meeting
August 28, 2019
10:00 AM – 12:00 PM

1) **Overview of the Project so Far**

2) **Risk Assessment Findings**
   a) Hazard Profiles
   b) Critical Facilities
   c) Vulnerability

3) **Capability Assessment Findings**

4) **Public Involvement**

5) **Mitigation Strategy**
   a) Goals
   b) Actions

6) **Next Steps**

7) **Questions/Concerns?**

ATKINS

AGENDA

Guilford County Hazard Mitigation Plan Update
Hazard Mitigation Planning Sedalia Meeting
November 7, 2019
10:30 AM – 12:00 PM

1) **Overview of the Project so Far**

2) **Risk Assessment Findings**
   a) Hazard Profiles
   b) Critical Facilities
   c) Vulnerability

3) **Capability Assessment Findings**

4) **Public Involvement**

5) **Mitigation Strategy**
   a) Goals
   b) Actions

6) **Next Steps**

7) **Questions/Concerns?**

ATKINS

Meeting Minutes
Guilford County Multi-Jurisdictional Hazard Mitigation Plan
Project Kickoff Meeting
May 30, 2019

The Guilford County Emergency Management Director started the meeting by welcoming the representatives from the county, participating municipal jurisdictions, and other stakeholders. He then introduced the Project Manager from the project consulting team, Atkins.

The Project Manager led the kickoff meeting and began by providing an overview of the items to be discussed at the meeting. He briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, presentation slides, and the public survey). He then provided a brief overview/reminder of mitigation and discussed the impetus for the update of the hazard mitigation plan as per the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

The Project Manager from Atkins then explained the six different categories of mitigation techniques (prevention; property protection; natural resource protection; emergency services; structural projects; public education and awareness) and gave examples of each. This explanation culminated with an Ice Breaker Exercise for the attendees. The Project Manager instructed attendees on how to complete the exercise.

Attendees were each given an equal amount of fictitious FEMA money ($20) and asked to spend it in the various mitigation categories. Participants were asked to imagine this to be grant money that their community or organization received that could be used towards mitigation projects or actions. Attendees were asked to target their money towards areas of mitigation that were of greatest concern for their community/organization. Ideally, the exercise was intended to pinpoint areas of mitigation that the community may want to focus on when developing their mitigation action plan and overall mitigation program in the community.

After completing the exercise, the Project Manager reviewed several items that were new in mitigation planning during this update cycle. He then noted that all local governments in the county are participating in the existing county-level hazard mitigation plan and that this plan expires in January of 2021, so the planning team will plan to develop a draft to submit to FEMA by February 2020.

He then discussed the key objectives and structure of the planning process, explaining the specific tasks to be accomplished for this project, including the planning process, risk and vulnerability assessment, capability assessment, mitigation strategy, plan maintenance procedures, and documentation. The project schedule was presented and the need for assistance with data collection and public outreach efforts were also discussed.

The Project Manager then reviewed the roles and responsibilities of Atkins and participating communities/stakeholders. The presentation concluded with a discussion of the next steps to be taken in the project development, which included discussing data collection efforts, continuing public outreach, and the next meeting for the HMPT.

The Project Manager then shared the results of the Icebreaker Exercise which was carried out earlier in the meeting. The results were as follows:

- Prevention $119
- Property Protection $62
- Natural Resource Protection $33
- Structural Projects $66
- Emergency Services $112
- Public Education and Awareness $69

The meeting was opened for questions and comments and, as there were none, the meeting was adjourned.

Meeting Minutes
Guilford County Multi-Jurisdictional Hazard Mitigation Plan
Public Meeting #1
June 13, 2019

The Guilford County Emergency Management Coordinator started the meeting by welcoming everyone.

He then provided a brief overview of mitigation and discussed the impetus for the update of the hazard mitigation plan as per the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

The EM Coordinator then explained the six different categories of mitigation techniques (prevention; property protection; natural resource protection; emergency services; structural projects; public education and awareness) and gave examples of each.

He then went on to explain that all incorporated communities within the county were participating in the plan update and that the current plan does not expire for more than a year, so the planning process is very much on track.

He then described the key objectives of the plan which include identifying potential mitigation projects and increasing public awareness of hazards and the risks they pose. The plan will be updated in compliance with state and federal requirements and involving the public is a key component. As such, there is a public survey that is available for completion and it is encouraged for members of the public to let others know about the survey even if they cannot attend public meetings.

The EM Coordinator then opened the floor for questions and comments and, as there were none, the meeting was adjourned.

Meeting Minutes
Guilford County Multi-Jurisdictional Hazard Mitigation Plan
Second Hazard Mitigation Planning Team Meeting
August 28, 2019

The Emergency Management Director with Guilford County Emergency Services welcomed everyone to the meeting and went over safety and administrative topics. He then passed the meeting over to the Project Manager to lead the presentation and discussion for the remainder of the meeting.

The Project Manager initiated the meeting with a review of the meeting handouts, which included an agenda, presentation slides, the current critical facility list, a capability assessment table, and the existing mitigation actions from current plan. The Project Manager reviewed the discussion from the previous meeting explained that the project was still on schedule.

He then went on to present the findings of the risk assessment, starting with a review of the hazards that had been identified to profile and assess in the plan. He then explained the process for preparing Hazard Profiles and discussed how each hazard falls into one of four categories: Natural, Biological, Technological, and Man-Made/Intentional. He indicated that each hazard must be evaluated and profiled to determine a relative risk for each hazard.

The Project Manager reviewed the information and analysis for each hazard using the Hazard Profiles as a baseline. The following bullets summarize the information presented:

<u>Natural Hazards</u>

- DROUGHT. There have been eight years between 2000 and 2019 where drought conditions have been reported as at least severe in Guilford County.

- EARTHQUAKES. There have been 5 recorded earthquake events in Guilford County since 1850. Overall earthquake risk is relatively low.

- EXTREME COLD. Cold temperatures as low as -8 degrees have occurred in the county and indicate that extreme cold events are possible.

- EXTREME HEAT. Extreme temperatures of 106 degrees have occurred in the county and indicate that extreme heat events are possible.

- FIRE/WILDFIRE. There have been an average of 33 fires per year reported in Guilford County.

- FLOOD. There have been over $18 million of recorded damages due to flood events in Guilford County since 1996 according to NCEI. There have been almost 600 flood insurance claims since 1978 and approximately $5.6 million in claims.

- HAILSTORM. These events occur frequently and hail stones as large as 2.75 inches in diameter have been recorded.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that more than 55 storm tracks have come within 75 miles of Guilford County since 1850 and 5 federal disaster declarations have been made due to hurricanes in the county.

- THUNDERSTORM WIND/LIGHTNING. There have been more than 250 severe thunderstorm events reported since 1950 and the county is in an area that experiences 6 to 12 lightning flashes per square mile per year.

- TORNADOES. There have been 2 federal disasters declared in the county and the county has experienced an EF3 level tornado.

- WINTER STORM. The greatest 24 hour snowfall in the county was 20 inches and there have been 6 federal disaster declarations related to winter weather in Guilford County.

Biological Hazards

- BIOTERRORISM. There have not been any major bioterrorism incidents in the county, but future occurrences are possible and may cause major impacts to hospitals and loss of economic productivity.

- PUBLIC HEALTH/EMERGING DISEASE. There have been several disease outbreaks in the county, notably in 1999 (SARS) and 2003 (West Nile). Impacts could be widespread, affecting thousands.

Technological Hazards

- BUILDING/STRUCTURE COLLAPSE. Few past incidents have been recorded. Future occurrences are possible, but damage would be highly localized.

- COMMUNICATIONS SYSTEMS DISRUPTION/FAILURE. At least one past event occurred in 2011 and there would potentially be delays in emergency service response time during these events as a result of diminished in-building radio coverage due to the building's construction.

- ENERGY/POWER/UTILITY FAILURE. A number of impacts could occur including traffic issues and loss of heat and air conditioning associated with a loss of power. Loss of other utilities could cause public health concerns or downtime for businesses.

- HAZARDOUS MATERIALS INCIDENTS. There have been more than 2,000 reported hazardous materials events reported in the county. Certain areas in High Point and Greensboro contain higher concentrations of hazardous materials facilities.

- NUCLEAR ACCIDENT. Some of the county falls within the 50-mile buffer of Shearon Harris Nuclear Plant, but there have been no major incidents and future occurrences are unlikely.

- PIPELINE FAILURE. Some major pipelines run through Guilford County and there is a center of breakout tanks located off I-40 that has experienced at least one major incident in the past.

- RESOURCE SHORTAGE (WATER/FUEL). Several water and fuel shortages have impacted the county in the past 20 years. Future incidents could have major impacts on businesses and consumers.

- TRANSPORTATION INCIDENT. Several plane and train incidents have occurred in the county in past years in addition to numerous vehicle incidents. Impacts are typically very localized, but can cause logistical issues.

Man-Made/Intentional Hazards

- CIVIL DISTURBANCE. Few recent events but future occurrences are most likely to occur in prominent locations causing work stoppages and loss of productivity.

- CYBER-SECURITY THREAT. No large-scale cyber-attacks have been recorded in Guilford County, but these have impacted neighboring communities and may result in theft, loss of IT functions, or dissemination of misinformation.

- TERRORISM. There have been no major historic terrorism events in the county, but several facilities were identified as potential targets and confirmed by the planning team.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Winter Storm.

In general, the planning team agreed with the overall rankings of the hazards and felt that they accurately represented the relative risk in the county. In concluding the review of Hazard Profiles, the Project Manager stated if anyone had additional information for the hazard profiles, or had concerns with any of the data presented, they could call or email him.

The Project Manager then walked the planning team through another exercise related to critical facilities. A list of all of the critical facilities that had been pre-identified was presented to each planning team member. Members were asked to review the list and ensure that the proper information (name, location, etc.) was attached to each facility. Further, the team was asked to provide suggestions on any facilities that should be removed or added to the list. After reviewing, several suggestions were made to include additional facilities to the list. The Project Manager made note of these suggestions and made updates to the list accordingly.

Next, the Project Manager reviewed the data that would be included in the hazard vulnerability assessment. Because of the detailed and granular level of the analysis, an in-depth review of this data was not presented to the planning team during this meeting. Instead, the overall process of carrying out the vulnerability assessment was described to the team.

After the conclusion of the Risk and Vulnerability findings were presented, the Project Manager presented the Capability Assessment findings. Atkins developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, and Community Rating System (CRS) participation were evaluated as part of the Local Capability Assessment Survey conducted by Atkins.

The Project Manager reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions were found to be in the moderate to high

range overall for capability based upon the scoring methodology developed by Atkins. The planning team was then asked to review the capability scoring and note any areas where Atkins' analysis had not accurately captured the actual capability of the community. A few areas were noted by the planning team and these changes were recorded by the Project Manager.

The Project Manager also discussed the results of the public participation survey that was posted on the county and municipal websites as well as made available in hard copy form at several government locations. As of the meeting date, around 50 responses had been received. The Project Manager explained that the survey would close August 31, so the HMPT could make one final push to get responses back from the public. Based on preliminary survey results, respondents felt that hurricane/tropical storm posed the greatest threat to their neighborhood. Ninety-two percent of the respondents were interested in making their homes more resistant to hazards. However, sixty-three percent do not know who to contact regarding reducing their risks to hazards.

The Project Manager then reminded team members of the results of the icebreaker exercise from the first Hazard Mitigation Team meeting, where attendees were given "money" to spend on various hazard mitigation techniques and compared them to the results of the public survey. The results of the public survey ranked the categories as follows:

- Prevention
- Emergency Services
- Public Education and Awareness
- Structural Projects
- Property Protection
- Natural Resource Protection

Finally, the Project Manager gave an overview of Mitigation Strategy Development and presented the existing goals for the plan and explained that Atkins recommended keeping the goals as they are. The Hazard Mitigation Team accepted the existing goals for the plan. The Project Manager then provided an overview and examples of suggested mitigation actions tailored for Guilford County. The Project Manager then asked each county and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by September 30, 2019. The Project Manager also asked planning team members to include any new mitigation actions by this time.

The Project Manager thanked the group for taking the time to attend and the Emergency Management Coordinator explained that if team members had any issues or questions about the planning process or their next steps, they could contact him or the Project Manager. The meeting was adjourned.

Meeting Minutes
Guilford County Multi-Jurisdictional Hazard Mitigation Plan
Project Kickoff Meeting
November 7, 2019

The Project Manager led the meeting and began by providing an overview of the items to be discussed at the meeting. He briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, mitigation actions, capability assessment). He then provided a brief overview/reminder of mitigation and discussed the impetus for the update of the hazard mitigation plan as per the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

The Project Manager then went over a number of the findings from the Risk Assessment which had been reviewed at the last meeting of the planning team. He described the hazard profiles and critical facilities that had been identified through the planning process and worked with the community to understand all aspects of the information provided. The community then provided feedback on what was presented, and the Project Manager took note of the few comments the community had.

Next, the Project Manager worked with the community to update the capability assessment worksheet that was provided and then to write status updates for each of the existing mitigation actions that the community had presented in the previous plan update. These updates were completed and the discussion moved to whether there were any new actions that the community would like to add to the plan during this update cycle. The community members present wished to further discuss with other staff and said they would provide any new actions to the Project Manager via email.

The meeting concluded with a discussion of the next steps to be taken in the project development, which getting the draft plan ready to share with the planning team. The Project Manager asked the community to review the draft and provide comments in accordance with the timeline set out in the forthcoming draft review email.

The Project Manager asked if there were any final questions or comments and, as there were none, the meeting was adjourned.

Guilford County Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

May 30, 2019

10:00AM-12:00PM

Name	Title	Organization	Phone Number	E-mail Address
Steven Grose	Emergency Management Coordinator	Guilford County	336-641-2278	sgrose@guilford-es.com
Catherine Hughes	Emergency Management Coordinator	Guilford County	336-641-2278	chughes@guilford-es.com
Taylor Jones	"	"	"	Tjones3@guilford-es.com
Ken Jacobs	Town administrator	Town of Whitsett	336-449-3580	cabmkrken@aol.com
Rachel Faucette	Guilford County Em	Guilford County	336-641-2278	rfaucet@guilford-es.com
Chris Susi	Battchief	Greensboro Fire	336 430-6011	Chris.Susi@greensboro-nc.gov
Don Campbell	EM Director	Guilford County	336-641-6567	dcampbe@guilford-es.com
Kenny Cole	Town Manager	Jamestown	333-454-1130	Kcole@jamestown-nc.gov

Name	Title	Organization	Phone Number	E-mail Address
Chris York	Town Planner	Town of Summerfield	336-643-8681	cyork@summerfieldnc.gov
Theron Hooks	MAYOR PT	Stokesdale	336-601-2383	drthooks@gmail.com
Alisa Hook	Town Clerk	Stokesdale	336-643-4011	Stokesdale@Stokesdale.org
Alfonso Chavez	Deputy Sheriff	GCSO	336-641-3938	achavez@guilfordcountync.gov
Jason Geary	Eng. Supervisor	City of Greensboro	336-373-2527	Jason.Geary@greensboro-nc.gov
Vivian Bou Gomez	Eng. Specialist	City of GSO	336-373-7748	vivian.bou-gomez@greensboro-nc.gov
Perry Hall	HighPoint EM	Fire	362-1124	perry.hall@highpointnc.gov
Brandon Parker	Town Planner	Town of Gibsonville	336-449-4144	bparker@gibsonville.net
Frank Park	~~Senior Engineer~~ Civil Plans Engineer	Guilford County	336-641-3753	Frank@GuilfordCountyNC.gov
Angela Deal	Town Clerk	Town of Pleasant Garden	336-674-3002	townclerk@pleasantgarden.net

Name	Title	Organization	Phone Number	E-mail Address
Paul Blanchard	Public Services Director	Town of Jamestown	336 454-1138	pblanchard@jamestown-nc.gov
Ashley Royal	~~Deputy~~ Clerk Deputy	Town of Oak Ridge	336-644-7009	aroyal@oakridgenc.com
Teresa Andrews	Stormwater program Admin	Guilford Co.	336-669-3923	tandrews@guilfordcountync.gov
Bobby Carmon	Deputy Fire Marshal	Guilford Co.	336-641-6563	rcarmon@Guilford-es.com
Stephen Dew	GIS Manager	" "	641-7583	sdew@guilfordcountyga gov

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
EMERGENCY MANAGEMENT DIVISION

Name	Organization / Agency	Phone	E-Mail
Kelli Swain	TE Connectivity	336-890-8585	kelli.swain@te.com
Arthur Johnson	AT&T	704-202-1352	gj0324@att.com
Walter Boone	AT&T- FirstNet	704-778-0621	~~[illegible]~~ wb6791@att.com
Debbie Shoffner	City of Greensboro		
Vicki Farmer	American RedCross	336.332.6920	vicfarmer@redcross.org
DAVID LEONARD	NCEM	336-266-2692	david.leonard@ncdps.gov
Allen Bullis	Liberty Hardware	336-771-6012	Abullis@Libertyhardware.com
Matthew Smith	Greensboro Fire	336-430-6013	Matthew.smith@greensboro-nc.gov
Chris Susi	Greensboro Fire	336 430-6011	Chris.Susi@greensboro-nc.gov
Taylor Jones	Guilford EM	336 641 2278	Tjones36@guilford-es.com
Roy Rimmer	McLeansville Fire	336-698 0244	Deputyc7@Aol.com

Meeting: Hazard Mitigation Plan 2020 Public Meeting

Date: June 13, 2019

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
EMERGENCY MANAGEMENT DIVISION

Name	Organization / Agency	Phone	E-Mail
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Jessica Roth	VERIZON	336 407 0050	Jessica.Roth@VZW.COM
Ken DeCourt	Verizon	336 708 1032	Ken.decourt@VZW.com
Jim Gwyn	City of High Point	336-442-5207	jim.gwyn@highpointnc.gov
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Kenny Stewart	UNCG EM	336-334-3339	Kenny.Stewart@uncg.edu
Kimberly Bostic	DS Smith Packaging	336-391-6365	kimberly.bostic@dssmith.com
Michael Chestnut	Piedmont Chemical	336-885-5131 mchestnut@piedmontchemical.com	
Richard "Woody" Bland	LANXESS		RICHARD.BLAND@LANXESS.COM

Meeting: Hazard Mitigation Plan 2020 Public Meeting

Date: June 13, 2019

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
EMERGENCY MANAGEMENT DIVISION

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Jackie Abou-Rizk	Thomas Built Buses	336-881-6025	jacqueline.abou-rizk@daimler.com
Dan Klyenum	KSA	336-471-7900	on file
Scott Moore	Syngenta Crop Protection	336-501-7747	scott.marc-1@syngenta.com

Meeting: Hazard Mitigation Plan 2020 Public Meeting

Date: June 13, 2019

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
EMERGENCY MANAGEMENT DIVISION

Name	Organization / Agency	Phone	E-Mail

Meeting: Hazard Mitigation Plan 2020 Public Meeting

Date: June 13, 2019

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
EMERGENCY MANAGEMENT DIVISION

Name	Organization / Agency	Phone	E-Mail
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Frank Paul	GC Planning Depart	336-641-3753	Fpark@guilfordcountync.gov
Robert Carmon	GC Fire Marshal	336-641-6563	Rcarmon@Guilford-es.com
Bobbie Hatley	Town of Pleasant Garden	336-674-3002	townclerk@pleasantgarden.net
Ken Jacobs	Town of Whitsett	336-263-4774	WhitsettNC@Embarq.com
Stephen Dew	GC	641-7583	sdew@guilfordcountync.gov
Conor Baker	GCEM	641-5517	Cbaker@guilford.es.com
Chris York	Summerfield	336-643-5051	cyork@summerfieldnc.gov

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
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JASON GEARY	City of GREENSBORO	336-373-2527	JASON.GEARY@GREENSBORO-NC.GOV
Vivian Bou Gomez	City of Greensboro	336-373-7748	vivian.bou-gomez@greensboro-nc.gov
ALISA HAWK	Town of Stokesdale	336-643-4011	Stokesdale@Stokesdale.org
Thermon Hooks	"	"	"
Pat Blanchard	Town of Jamestown	336 454 1138	pblanchard@jamestown-nc.gov

GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
EMERGENCY MANAGEMENT DIVISION

Name	Organization / Agency	Phone	E-Mail
Ben Baxley	Town of Gibsonville	(336) 449-4144 ext. 8	bbaxley@gibsonville.net

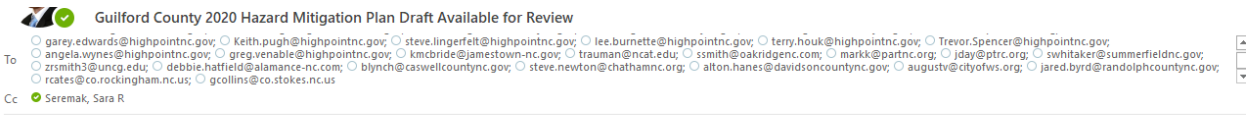
Guilford County Hazard Mitigation Plan
Sedalia Hazard Mitigation Planning Team Meeting

November 7, 2019

10:30AM-12:00PM

Name	Title	Organization	Phone Number	E-mail Address
Cam Dungee	Town Clerk	Town of Sedalia	(336) 449-1132	Sedaliatownhall@gmail.com
Taylor Jones	EM Coord.	Guilford County ES	336 641 5393	Tjones3@guilford-es.com
Ryan Wiederman	Project Manager	Atkins	919 431 5295	ryan.wiederman@atkinsglobal.com

Opportunity for Other Affected Stakeholders to Review Draft Plan



Guilford County 2020 Hazard Mitigation Plan Draft Available for Review

To: garey.edwards@highpointnc.gov; Keith.pugh@highpointnc.gov; steve.lingerfelt@highpointnc.gov; lee.burnette@highpointnc.gov; terry.houk@highpointnc.gov; Trevor.Spencer@highpointnc.gov; angela.wynes@highpointnc.gov; greg.venable@highpointnc.gov; kmcbride@jamestown-nc.gov; trauman@ncat.edu; ssmith@oakridgenc.com; markk@partnc.org; jday@ptrc.org; swhitaker@summerfieldnc.gov; zrsmith3@uncg.edu; debbie.hatfield@alamance-nc.com; blynch@caswellcountync.gov; steve.newton@chathamnc.org; alton.hanes@davidsoncountync.gov; augustv@cityofws.org; jared.byrd@randolphcountync.gov; rcates@co.rockingham.nc.us; gcollins@co.stokes.nc.us

Cc: Seremak, Sara R

Good morning everyone,

You are receiving this message because you participated in the development of the *Guilford County 2020 Hazard Mitigation Plan Update* or represent a community or organization that we would like to give an opportunity to review the draft version of this plan. This plan represents the hard work of many individuals, including Guilford County EM staff and the members of the planning team, so thanks to them for the time they devoted to the development of this plan.

The first draft is now available for review via the link below and **we strongly recommend downloading a copy of the plan rather than trying to view/review it in the online FTP site:**

https://atkins.box.com/s/m8y69x7572ireka4fdaz1r59e57l3ahb
(Download option should be in the upper right corner of the browser once you click this link. If you have trouble downloading, please let us know, we can look at some other options to get you a copy)

Please note that there are still just one or two outstanding items that you'll see highlighted in the plan. These are a couple of things we'll update once they've been completed towards the end of the process. Also, note that the Table of Contents is 'clickable' which we hope will make the plan easier to review if you are only interested in certain parts of it.

We definitely don't want anyone having this in the back of their mind when they should be enjoying time off at the very tail end of the year, so we're setting a deadline of December 20th (5 weeks) to review the plan and send us any comments/suggestions.

Please return any plan review comments by December 20th to:
Ryan Wiedenman- ryan.wiedenman@atkinsglobal.com
AND
Sara Seremak- sara.seremak@atkinsglobal.com

If anyone has any questions or issues, please don't hesitate to let us know.

Thanks in advance for taking the time to review!

Appendix E
Community Rating System

This section of the Plan provides a summary of mitigation measures that were considered by the participating jurisdictions in Guilford County to reduce their risk to the flood hazard specifically, thereby achieving the requirements set forth in Section 510 of the Community Rating System (specifically Step 7). These flood mitigation measures are based on suggested activities that have been shown to significantly reduce flood risk and have been analyzed by each of the respective communities that participate in the Guilford County Hazard Mitigation Plan. The measures are broken down into one of the following seven categories of activities that fall within the sphere of possible activities:

ACTIVITY TYPES CONSIDERED

- Preventive
- Floodplain Management
- Property Protection
- Protection of Natural and Beneficial Functions of the Floodplain
- Emergency Services
- Structural
- Public Information Activities

E.1 INTRODUCTION

This appendix to the Hazard Mitigation Plan was developed in order to enhance each jurisdiction's overall resilience to the flood hazard by documenting the steps taken, and those that need to be taken to help improve each jurisdiction's regulatory environment through a wide range of actions. In order to maximize points that can be awarded to reduce flood insurance rates through the Community Rating System, communities must thoroughly evaluate a range of mitigation measures.

Mitigation activities for consideration were evaluated by the Hazard Mitigation Planning Team. These included preventive activities, floodplain management activities, property protection activities, activities to protect the natural and beneficial functions of the floodplain, structural projects, emergency services activities, and public information activities. For each activity considered, the status (whether the action would be new or an update), pros and cons, appropriateness for the community and its flood problems, as well as an explanation of why or why not the activity is appropriate were identified by the planning team and are listed in **Table E.1** below.

TABLE E.1: MITIGATION ACTIVITIES FOR CONSIDERATION

Activity	New or Update	Pros	Cons	Appropriate for the Community and its Flood Problems (Y/N)	Explanation of why or why not appropriate

Activity	New or Update	Pros	Cons	Appropriate for the Community and its Flood Problems (Y/N)	Explanation of why or why not appropriate
Preventive Activities					
Comprehensive or Land Use Plan	Update	• Implements requirements to better designate growth	• May be detrimental to pre-existing buildings • Non-conforming uses may exist	Y	The land use informs more strategic development to make it more appropriate for that area.
Zoning Ordinance	Update	• Helps guide appropriate development	• May not be politically favorable	Y	Typically good for the safety and welfare of the public overall.
Stormwater Management Regulations	Update	• Manages runoff, storage, pervious pavement • Reduce localized flooding	• Can be expensive • Not everyone is open to it as it may commit a portion of someone's property to non-productive use	Y	To manage stormwater and reduce flooding and the demand on the drainage systems.
Building Codes	Update	• Guide structural development • Help to promote best practices	• Applicants may seek variances to code requirements	Y	Provides a safe structure for everyone.
Subdivision Ordinance	Update	• Creates safe and compliant subdivisions	• Cookie cutter • May be source of conflict for the public and developers • May increase cost of development	Y	Creates safer development.
Open Space Preservation	Update	• Creates opportunities for water to flow naturally • Protects natural floodplain functions • Increase recreational opportunities	• Removes option to use land for other commerce	Y	Water needs to flow somewhere, people want more green space, and this continues to reduce pervious areas. Increases value of surrounding areas.
Drainage system maintenance	Update	• Reduces flooding quickly • Keep everything running efficiently and where needed	• Expensive • Lose CRS points if not properly maintained • Could back up	Y	An efficient drainage system reduces flooding, protects properties, and costs less in the long run.
Capital improvements program	Update	• May be quicker than waiting for other funding sources • Keeping the plan in line with evolving needs	• Maintaining funding against other projects	Y	Investing locally can be more efficient and direct funding where needed most

Activity	New or Update	Pros	Cons	Appropriate for the Community and its Flood Problems (Y/N)	Explanation of why or why not appropriate
Floodplain Management Activities					
Floodplain mapping	Update	• Provide information to public • Identify at-risk areas	• Costly! • Slow and technical • Not always accurate	Y	It is appropriate because it impacts everyone, helps to rate insurance, and provides level of risk.
Future conditions mapping	New	• Can provide better information for future planning • Maps bring future conditions to reality	• Can help deter development • May feel overwhelming or be disputed	N	Difficult to implement at this time.
Freeboard requirements	Update	• Better protected property and people • Protects investments • Significant savings on flood insurance	• Discourages developers • May not be politically feasible	Y	It protects communities and reduces exposure.
Setbacks	Update	• Can reduce impervious surface area	• May restrict development	Y	Help drive development to the way it should be to reduce flooding.
No-rise ordinance	Update	• Not increasing runoff	• Cost to implement	Y	To reduce flooding while allowing development.
Prohibit fill in floodplain	Update	• Allows place for water to go	• Requires changing development mentality	Y	To lessen the flooding on existing homes.
Compensatory storage requirement for new construction	Update	• No net impact	• Increase cost • Finding space to do it	Y	So that new development does not impact existing development or built environment.
Regulate development in upland areas	New	• Reduce water volume coming from upland areas	• May require coordination on a regional scale	N	At this time, this may be too difficult to coordinate among many stakeholders.
Require drainage study with new development	Update	• Modeling existing risks and impacts of new development	• Money • Time • Slows development	Y	Helps model potential impacts in new development areas.
Program to incentivize rain gardens	New	• Look nice • Reduces impermeable areas	• Who is in charge of maintenance and management	N	No available funding at this time.
Permeable surface requirements for new construction	New	• Incentives • Reduces impermeable areas	• May be issues from the development community in implementing	N	May be difficult to implement.

Activity	New or Update	Pros	Cons	Appropriate for the Community and its Flood Problems (Y/N)	Explanation of why or why not appropriate
Limit/prevent construction in floodplain	Update	• Reduces impermeable areas • Reduces property/people at risk	• Difficult politically to completely prevent construction	Y	Providing limits on construction in floodplain can help reduce development at risk to flooding
Property Protection Activities					
Acquisition	Update	• Create storage capacity • Removes structure from risk	• Lose tax base	Y	May not be feasible in areas with high tax bases. Needs to be balanced and vetted between benefits and loss of revenue.
Retrofitting	Update	• Helps maintain continuity of operations	• May leave facilities in risk zones	Y	See insurance benefits and protect key facilities.
Flood Insurance	Update	• Provides fall back for owners who are flooded	• Damage still may occur, and recovery efforts take time	Y	Helps those who remain in risk zones to protect asset.
Elevation	New	• Reduces flood risk of individual structures	• Some populations may have difficulty with stairs • Leaves structures in risk zones	Y	Helps maintain tax base but protects structures.
Relocation	New	• Historic structures can be saved	• Moving structures may not be feasible or cost-effective	Y	This will likely be difficult to implement but will be considered for special cases.
Sewer backup protection	New	• Reduce damages and health risks	• Cost exceed benefits	N	May be difficult to implement programmatically and cost-effectively
Safe rooms	New	• Protect life	• Must locate in areas of high-density population to have effect	Y	These can protect life in certain areas
Activities to Protect the Natural and Beneficial Functions of the Floodplain					
Wetlands Protection	New	• First level of protection • Environmentally feasible	• Economic feasibility	Y	Would help in the protection of critical areas. Connected to erosion and sediment control.
Erosion and sediment control	Update	• Reduces risk to people and property	• Economic feasibility	Y	Connected to wetlands protection.
Natural area restoration	New	• Provide areas for filtration and retention	• Legal feasibility • Economic feasibility • Political feasibility	Y	Can help restore flood prone areas to natural state.

Activity	New or Update	Pros	Cons	Appropriate for the Community and its Flood Problems (Y/N)	Explanation of why or why not appropriate
Water quality improvement	New	• Deliver cleaner water to our lakes • Enhancing recreational activities	• Administrative feasibility	Y	Important to care for water quality as it impacts human health
Coastal barrier protection	New	• N/A	• N/A	N	Community is not located near a coastal area.
Environmental corridors	New	• Likely created as open space that will act as pervious surface	• May require large areas to be preserved and undeveloped	N	Difficult to implement given amount of existing development
Emergency Services Activities					
Hazard warning systems	Update	• Public stays informed	• Cost and implementation • Educating public	Y	Increases public safety by giving advanced warning.
Evacuation planning and management	Update	• Promotes situation awareness and helps get people out of harm's way	• Often not necessary or possible in non-coastal areas	Y	Public safety, enhance efficiency of emergency response.
Shelter operations planning	Update	• Provides safe haven for public	• Cost • Manpower • Safety • Special needs	Y	Important part of public safety in hazard events.
Emergency response training and exercises	Update	• Community officials are more prepared • Fills gaps and needs	• Cost • Time/scheduling	Y	Emergency Management responses more efficient.
Sandbagging	Update	• Protects areas at risk temporarily • Can be deployed as last-minute solution	• Not long-term solution • Cost • Manpower • Storage	Y	Should not be considered long term solution, but can be helpful.
Structural Projects					
Levees	New	• Can help keep water away from development	• Water overtopping, failure	N	Levees are typically not a viable solution in community.
Reservoirs	Update	• Water can be held and released slowly	• Reservoirs may overtop if not managed	Y	Reservoirs can be useful part of the overall solution and provide drinking water
Channel Modifications	Update	• Water flow improvement	• Extremely costly	Y	This can help with areas where water needs to be controlled and managed.
Detention/ retention basins	Update	• Water can be held and released slowly	• Extremely costly	Y	Less strain on the drainage system at one time.

Activity	New or Update	Pros	Cons	Appropriate for the Community and its Flood Problems (Y/N)	Explanation of why or why not appropriate
Stormwater diversions	New	• Water can be directed to areas where it won't cause harm	• Extremely costly	Y	These may be used as part of an overall stormwater solution.
Dams	Update	• Can help keep water away from development	• Water overtopping, failure	Y	Dams can help provide protection and be amenities to the community.
Floodwalls	New	• N/A	• N/A	N	Typically used in coastal areas and community is not located near a coastal area.
Storm drain improvements	Update	• Improve drainage and help move water away from development	• Costly	Y	These may be used as part of an overall stormwater solution
Public Information Activities					
Outreach Projects	Update	• Keep public better informed • Keep public better educated	• Tech maintenance • Tech education	Y	Safety awareness.
Environmental Education Programs	Update	• Early education = greater information retention	• Time	Y	Geared to every age group.
Map information	Update	• Help make residents aware of current flood insurance	• May not fully encapsulate all areas of risk	Y	Assist with floodplain/ insurance understanding.
Real estate disclosure	Update	• Involves development community	• Difficult to get involved	Y	Helps get all sides of the flood insurance industry involved.
Public postings/ displays (e.g. at library)	Update	• Help make residents aware of flood risk	• These may only reach certain population groups	Y	Acts as one component of the public outreach strategy.
School education program	Update	• Early education = greater information retention	• Targeted at only a small part of population	Y	Helps long-term understanding of population.
Speaker series	New	• May be more informative and engaging for public	• Only reaches audience during certain times	Y	Can help get people interested and engaged in flood risk.
Hazard expositions	New	• Provides interactive opportunity	• Doesn't have wide-ranging reach	Y	Can be part of the solution to engage public.

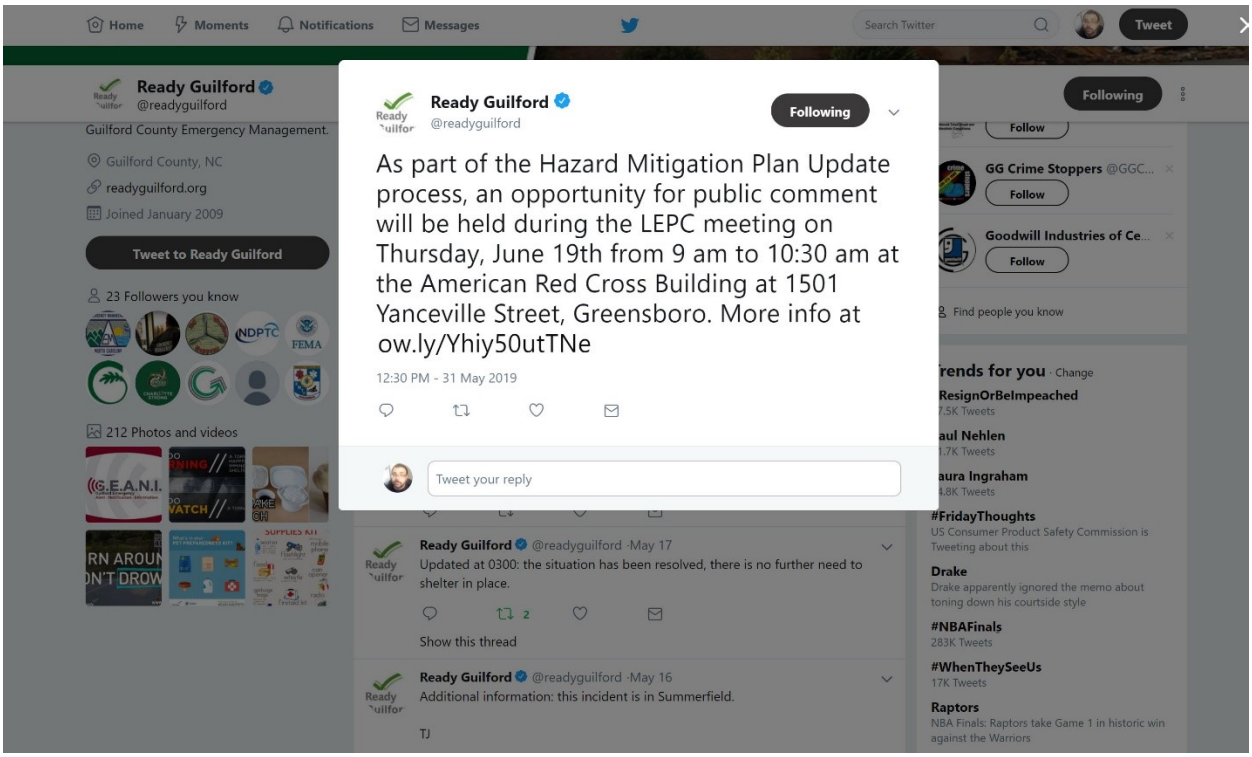
Appendix F
Public Involvement

This appendix includes:

1. Public Outreach Documentation
2. Public Survey Summary Results

Guilford County




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Ready Guilford
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Guilford County, NC
readyguilford.org
Joined January 2009
Tweet to Ready Guilford
23 Followers you know
212 Photos and videos
Following
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GG Crime Stoppers @GGC...
Goodwill Industries of Ce...
Find people you know
Trends for you · Change
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7.5K Tweets
Paul Nehlen
1.7K Tweets
Laura Ingraham
4.8K Tweets
#FridayThoughts
US Consumer Product Safety Commission is Tweeting about this
Drake
Drake apparently ignored the memo about toning down his courtside style
#NBAFinals
283K Tweets
#WhenTheySeeUs
17K Tweets
Raptors
NBA Finals: Raptors take Game 1 in historic win against the Warriors
Ready Guilford
@readyguilford
Following
As part of the Hazard Mitigation Plan Update process, an opportunity for public comment will be held during the LEPC meeting on Thursday, June 19th from 9 am to 10:30 am at the American Red Cross Building at 1501 Yanceville Street, Greensboro. More info at ow.ly/Yhiy50utTNe
12:30 PM - 31 May 2019
Tweet your reply
Ready Guilford @readyguilford ·May 17
Updated at 0300: the situation has been resolved, there is no further need to shelter in place.
Show this thread
Ready Guilford @readyguilford ·May 16
Additional information: this incident is in Summerfield.
TJ



Emergency Management Coordinator Taylor Jones, Guilford County Em...

Hazard Mitigation Plan - Public Meeting

Guilford County is updating our Hazard Mitigation Plan and looking for public input! Hazard Mitigation is how we as a community plan to reduce the impact of various hazards that can impact Guilford County. The current version of the plan can be found at https://www.guilfordcountync.gov/our-county/emergency-services/emergency-management/mitigation.

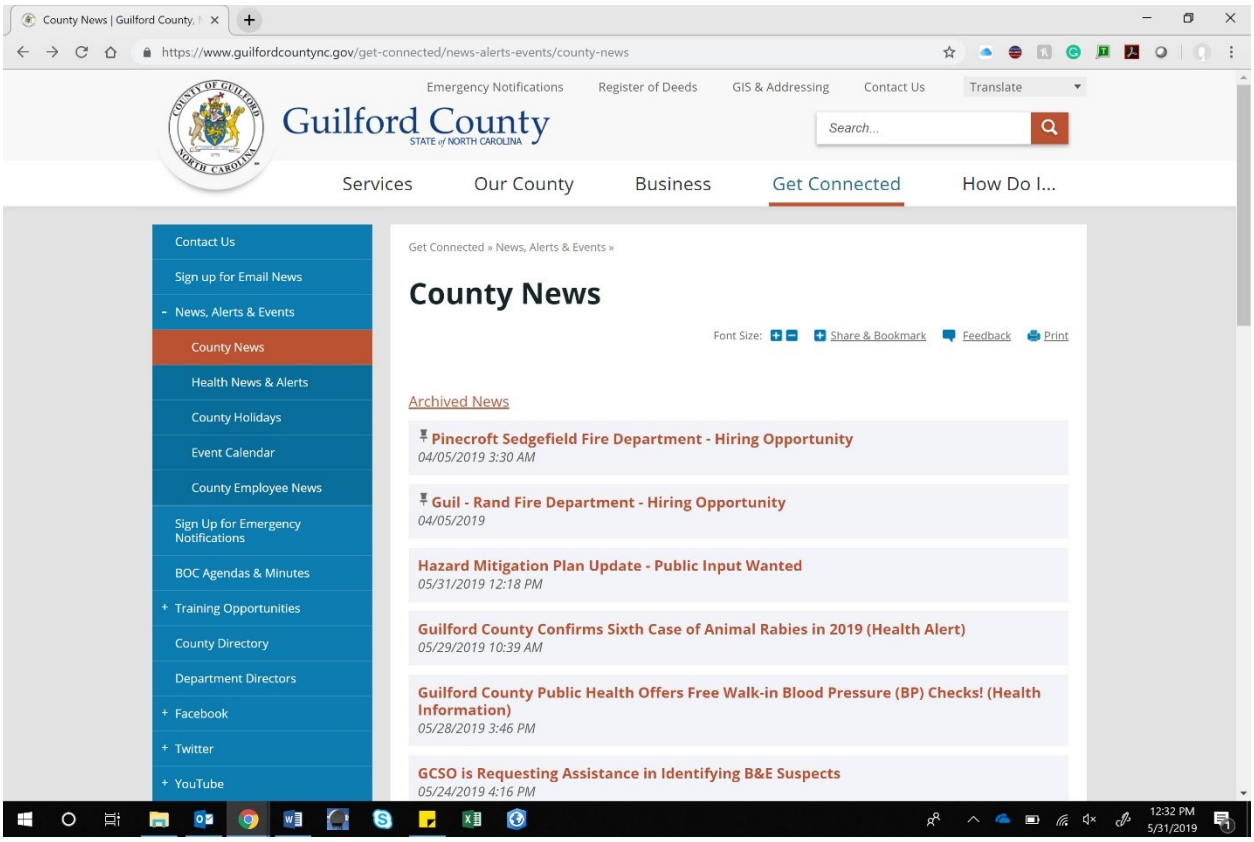
This is a required update that takes place every 5 years, with public input and meetings. A public comment period will be held during the June 13th Local Emergency Planning Committee (LEPC) meeting at the American Red Cross building, 1501 Yanceyville Street, Greensboro. The LEPC meeting will run from 09:00 to 10:30 and anyone from the public is welcome to attend.

Hazard Mitigation Program | Guilford County, NC

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County News
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Archived News
Pinecroft Sedgefield Fire Department - Hiring Opportunity
04/05/2019 3:30 AM
Guil - Rand Fire Department - Hiring Opportunity
04/05/2019
Hazard Mitigation Plan Update - Public Input Wanted
05/31/2019 12:18 PM
Guilford County Confirms Sixth Case of Animal Rabies in 2019 (Health Alert)
05/29/2019 10:39 AM
Guilford County Public Health Offers Free Walk-in Blood Pressure (BP) Checks! (Health Information)
05/28/2019 3:46 PM
GCSO is Requesting Assistance in Identifying B&E Suspects
05/24/2019 4:16 PM
12:32 PM
5/31/2019


Hazard Mitigation Plan Update
https://www.guilfordcountync.gov/Home/Components/News/News/1665/16
Emergency Notifications
Register of Deeds
GIS & Addressing
Contact Us
Translate
Guilford County
STATE of NORTH CAROLINA
Search...
Services
Our County
Business
Get Connected
How Do I...
Contact Us
Sign up for Email News
- News, Alerts & Events
County News
Health News & Alerts
County Holidays
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Hazard Mitigation Plan Update - Public Input Wanted
Post Date: 05/31/2019 12:18 PM
Guilford County is updating our Hazard Mitigation Plan and looking for public input! Hazard Mitigation is how we as a community plan to reduce the impact of various hazards that can impact Guilford County. The current version of the plan can be found at https://www.guilfordcountync.gov/our-county/emergency-services/emergency-management/mitigation. This is a required update that takes place every 5 years, with public input and meetings.
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Return to full list >>
12:30 PM
5/31/2019

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County News

Guilford County Hazard Mitigation Plan Update Survey

Post Date: 06/27/2019 11:25 AM

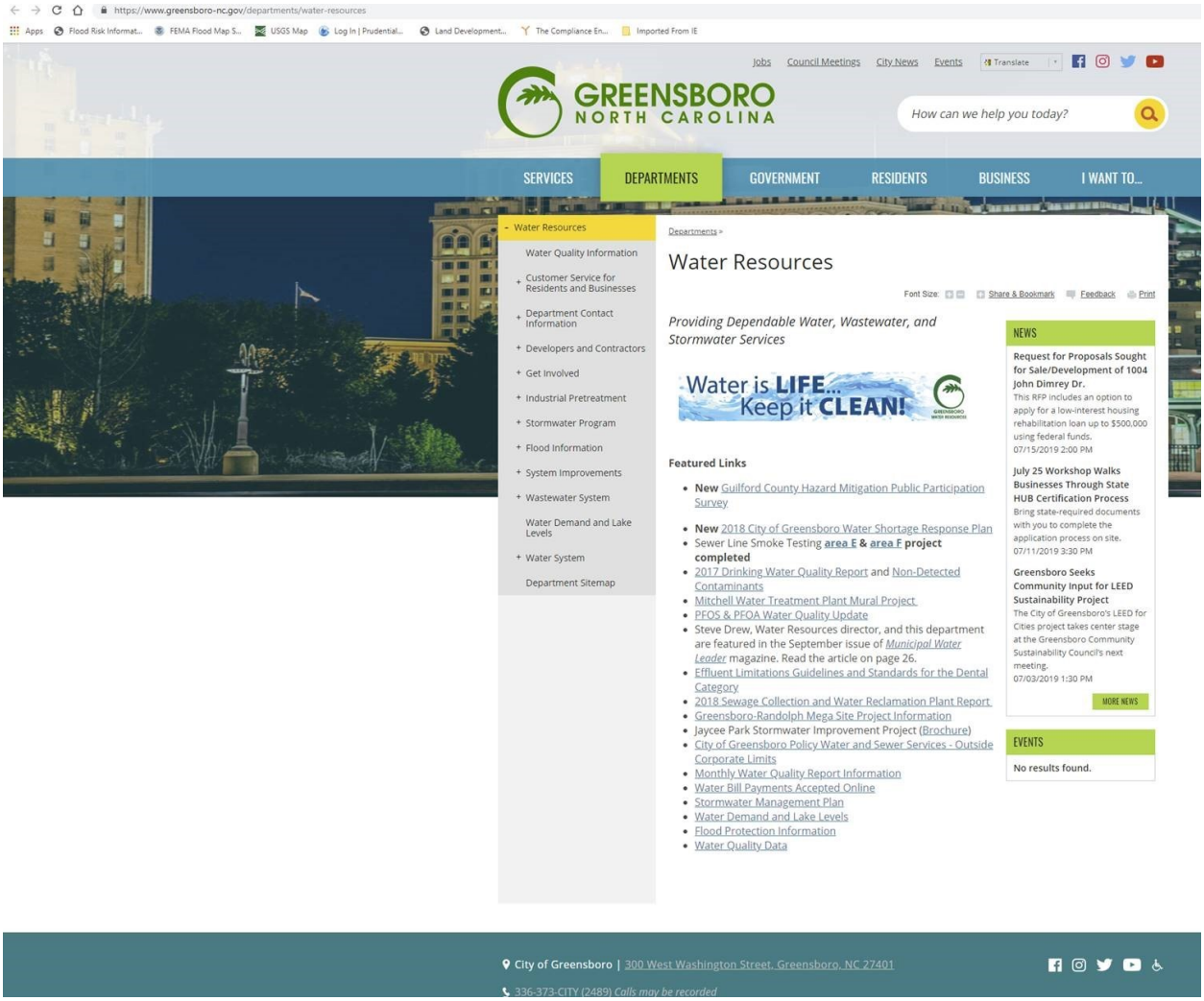
GUILFORD COUNTY
DEPARTMENT OF EMERGENCY SERVICES
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Guilford County is updating its Hazard Mitigation Plan and looking for public input! Hazard Mitigation is how we as a community plan to reduce the impact of various hazards that can impact Guilford County. The current version of the plan can be found at https://www.guilfordcountync.gov/our-county/emergency-services/emergency-management/mitigation.

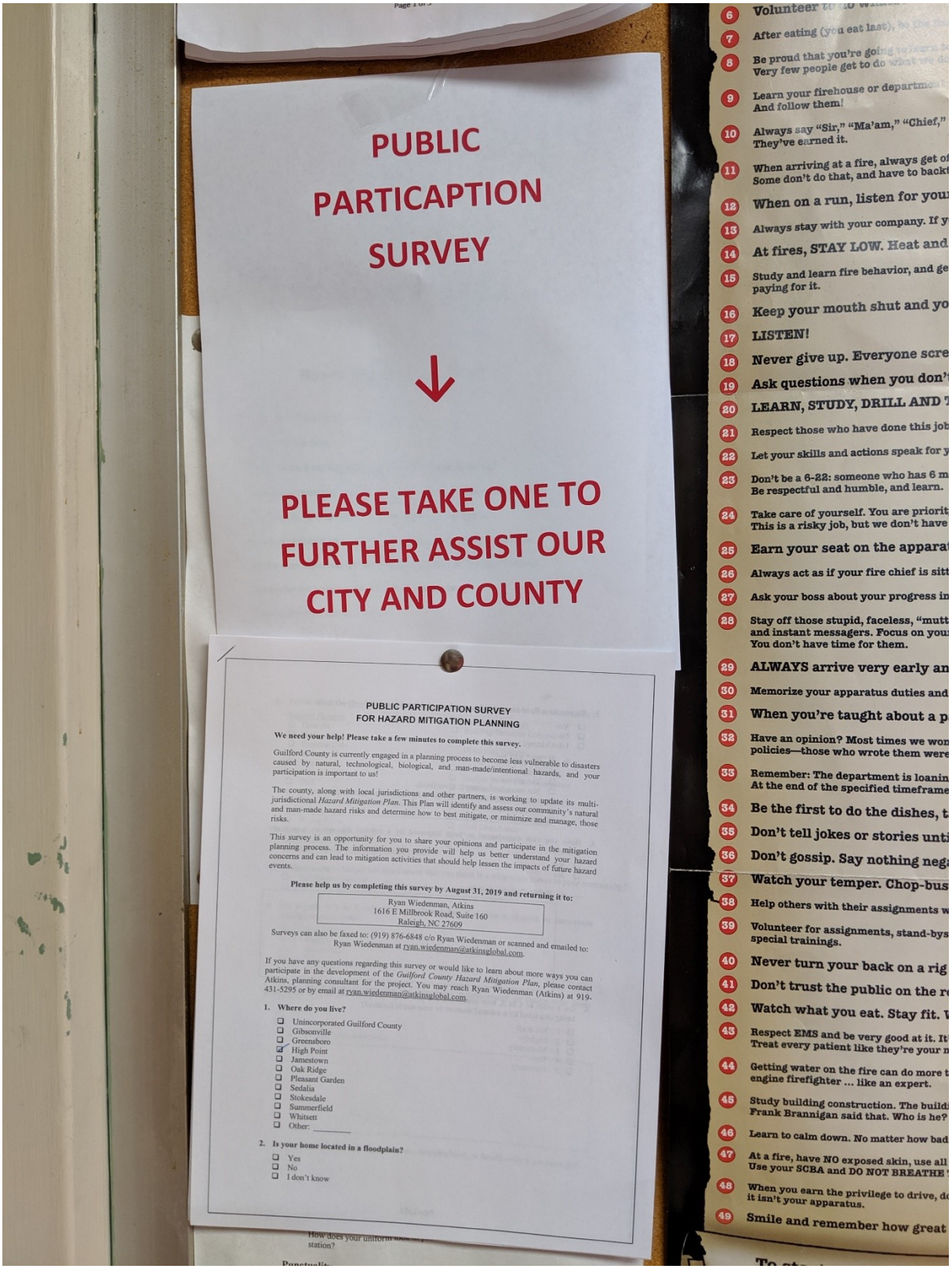
As part of this process, we are asking Guilford County residents to fill out a short Hazard Mitigation survey. The survey can be found at https://forms.gle/cRezsTQU7RnmFwve8. Any feedback is anonymous and will provide us with valuable information about how the county and its municipalities should approach mitigation in the future!

Return to full list >>

Greensboro

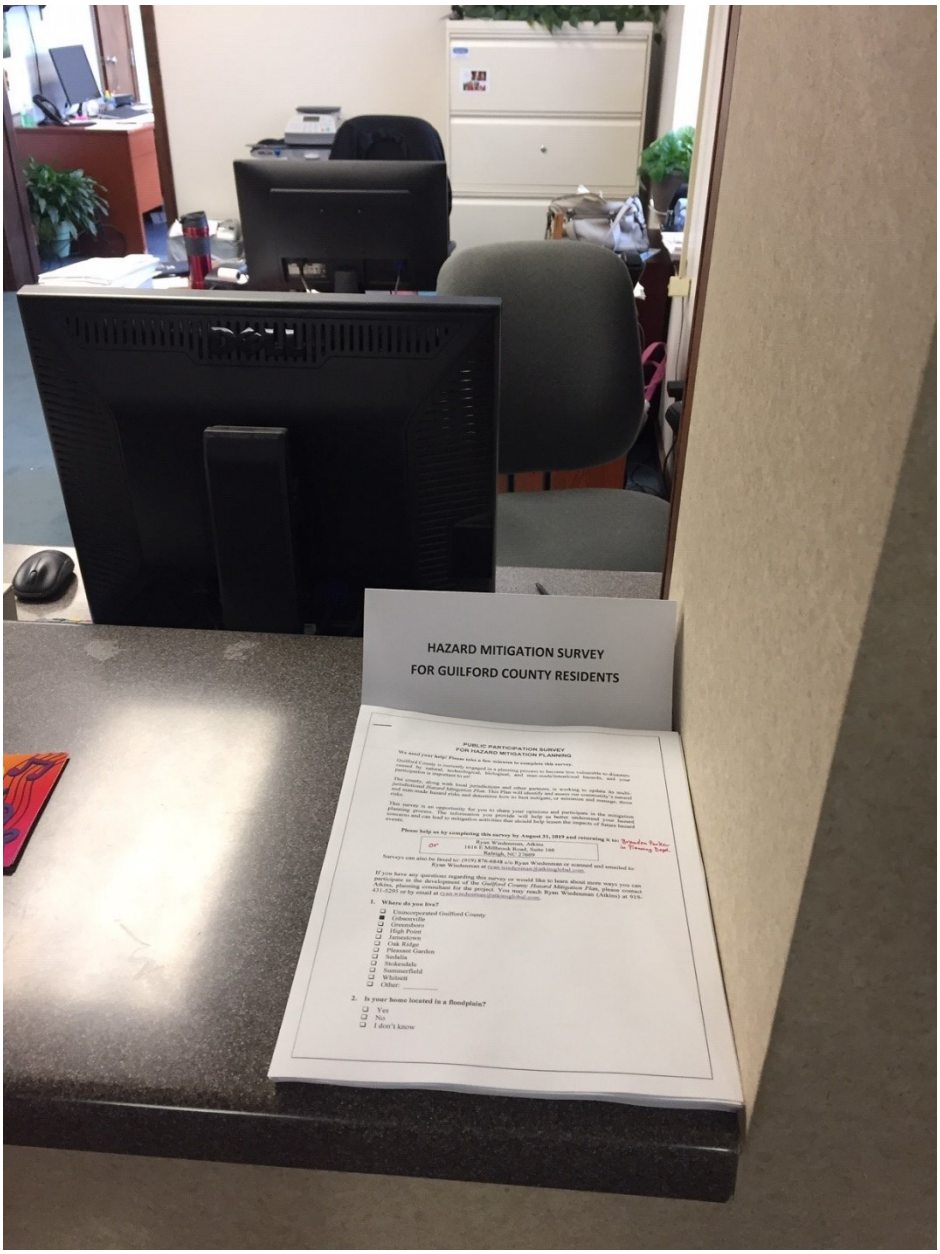

https://www.greensboro-nc.gov/departments/water-resources
Jobs
Council Meetings
City News
Events
Translate
GREENSBORO
NORTH CAROLINA
How can we help you today?
SERVICES
DEPARTMENTS
GOVERNMENT
RESIDENTS
BUSINESS
I WANT TO...
- Water Resources
Water Quality Information
+ Customer Service for Residents and Businesses
+ Department Contact Information
+ Developers and Contractors
+ Get Involved
+ Industrial Pretreatment
+ Stormwater Program
+ Flood Information
+ System Improvements
+ Wastewater System
Water Demand and Lake Levels
+ Water System
Department Sitemap
Departments »
Water Resources
Font Size:
Share & Bookmark
Feedback
Print
Providing Dependable Water, Wastewater, and Stormwater Services
Water is LIFE... Keep it CLEAN!
Featured Links
New Guilford County Hazard Mitigation Public Participation Survey
New 2018 City of Greensboro Water Shortage Response Plan
Sewer Line Smoke Testing area E & area F project completed
2017 Drinking Water Quality Report and Non-Detected Contaminants
Mitchell Water Treatment Plant Mural Project
PFOS & PFOA Water Quality Update
Steve Drew, Water Resources director, and this department are featured in the September issue of Municipal Water Leader magazine. Read the article on page 26.
Effluent Limitations Guidelines and Standards for the Dental Category
2018 Sewage Collection and Water Reclamation Plant Report
Greensboro-Randolph Mega Site Project Information
Jaycee Park Stormwater Improvement Project (Brochure)
City of Greensboro Policy Water and Sewer Services - Outside Corporate Limits
Monthly Water Quality Report Information
Water Bill Payments Accepted Online
Stormwater Management Plan
Water Demand and Lake Levels
Flood Protection Information
Water Quality Data
NEWS
Request for Proposals Sought for Sale/Development of 1004 John Dimrey Dr.
This RFP includes an option to apply for a low-interest housing rehabilitation loan up to $500,000 using federal funds.
07/15/2019 2:00 PM
July 25 Workshop Walks Businesses Through State HUB Certification Process
Bring state-required documents with you to complete the application process on site.
07/11/2019 3:30 PM
Greensboro Seeks Community Input for LEED Sustainability Project
The City of Greensboro's LEED for Cities project takes center stage at the Greensboro Community Sustainability Council's next meeting.
07/03/2019 1:30 PM
MORE NEWS
EVENTS
No results found.
City of Greensboro | 300 West Washington Street, Greensboro, NC 27401
336-373-CITY (2489) Calls may be recorded

High Point


PUBLIC
PARTICAPTION
SURVEY
PLEASE TAKE ONE TO
FURTHER ASSIST OUR
CITY AND COUNTY
PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING
We need your help! Please take a few minutes to complete this survey.
Guilford County is currently engaged in a planning process to become less vulnerable to disasters caused by natural, technological, biological, and man-made/intentional hazards, and your participation is important to us!
The county, along with local jurisdictions and other partners, is working to update its multi-jurisdictional Hazard Mitigation Plan. This Plan will identify and assess our community's natural and man-made hazard risks and determine how to best mitigate, or minimize and manage, those risks.
This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impacts of future hazard events.
Please help us by completing this survey by August 31, 2019 and returning it to:
Ryan Wiedenman, Atkins
1616 E Millbrook Road, Suite 160
Raleigh, NC 27609
Surveys can also be faxed to: (919) 876-6848 c/o Ryan Wiedenman or scanned and emailed to: Ryan Wiedenman at ryan.wiedenman@atkinsglobal.com.
If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the Guilford County Hazard Mitigation Plan, please contact Atkins, planning consultant for the project. You may reach Ryan Wiedenman (Atkins) at 919-431-5295 or by email at ryan.wiedenman@atkinsglobal.com.
1. Where do you live?
Unincorporated Guilford County
Gibsonville
Greensboro
High Point
Jamestown
Oak Ridge
Pleasant Garden
Sedalia
Stokesdale
Summerfield
Whitsett
Other: _____
2. Is your home located in a floodplain?
Yes
No
I don't know
6 Volunteer
7 After eating (you eat last),
8 Be proud that you're
Very few people get to do
9 Learn your firehouse or
And follow them!
10 Always say "Sir," "Ma'am," "Chief,"
They've earned it.
11 When arriving at a fire, always get
Some don't do that, and have to
12 When on a run, listen for
13 Always stay with your company.
14 At fires, STAY LOW. Heat and
15 Study and learn fire behavior, and
paying for it.
16 Keep your mouth shut and
17 LISTEN!
18 Never give up. Everyone
19 Ask questions when you
20 LEARN, STUDY, DRILL AND
21 Respect those who have done this
22 Let your skills and actions speak for
23 Don't be a 6-22: someone who has 6
Be respectful and humble, and learn.
24 Take care of yourself. You are
This is a risky job, but we don't have
25 Earn your seat on the
26 Always act as if your fire chief is
27 Ask your boss about your progress
28 Stay off those stupid, faceless, "
and instant messagers. Focus on
You don't have time for them.
29 ALWAYS arrive very early
30 Memorize your apparatus duties
31 When you're taught about a
32 Have an opinion? Most times we
policies—those who wrote them
33 Remember: The department is
At the end of the specified timeframe
34 Be the first to do the dishes,
35 Don't tell jokes or stories
36 Don't gossip. Say nothing
37 Watch your temper. Chop-
38 Help others with their assignments
39 Volunteer for assignments, stand-bys
special trainings.
40 Never turn your back on a
41 Don't trust the public on the
42 Watch what you eat. Stay fit.
43 Respect EMS and be very good at it.
Treat every patient like they're your
44 Getting water on the fire can do more
engine firefighter ... like an expert.
45 Study building construction. The
Frank Brannigan said that. Who is he?
46 Learn to calm down. No matter how
47 At a fire, have NO exposed skin, use
Use your SCBA and DO NOT BREATHE
48 When you earn the privilege to drive,
it isn't your apparatus.
49 Smile and remember how great

Gibsonville




HAZARD MITIGATION SURVEY
FOR GUILFORD COUNTY RESIDENTS
PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING
1. Where do you live?
Unincorporated Guilford County
Gibsonville
Greensboro
High Point
Jamestown
Oak Ridge
Pleasant Garden
Sedalia
Stokesdale
Summerfield
Whitsett
Other:
2. Is your home located in a floodplain?
Yes
No
I don't know



Guilford County Hazard Mitigation Plan Update Survey

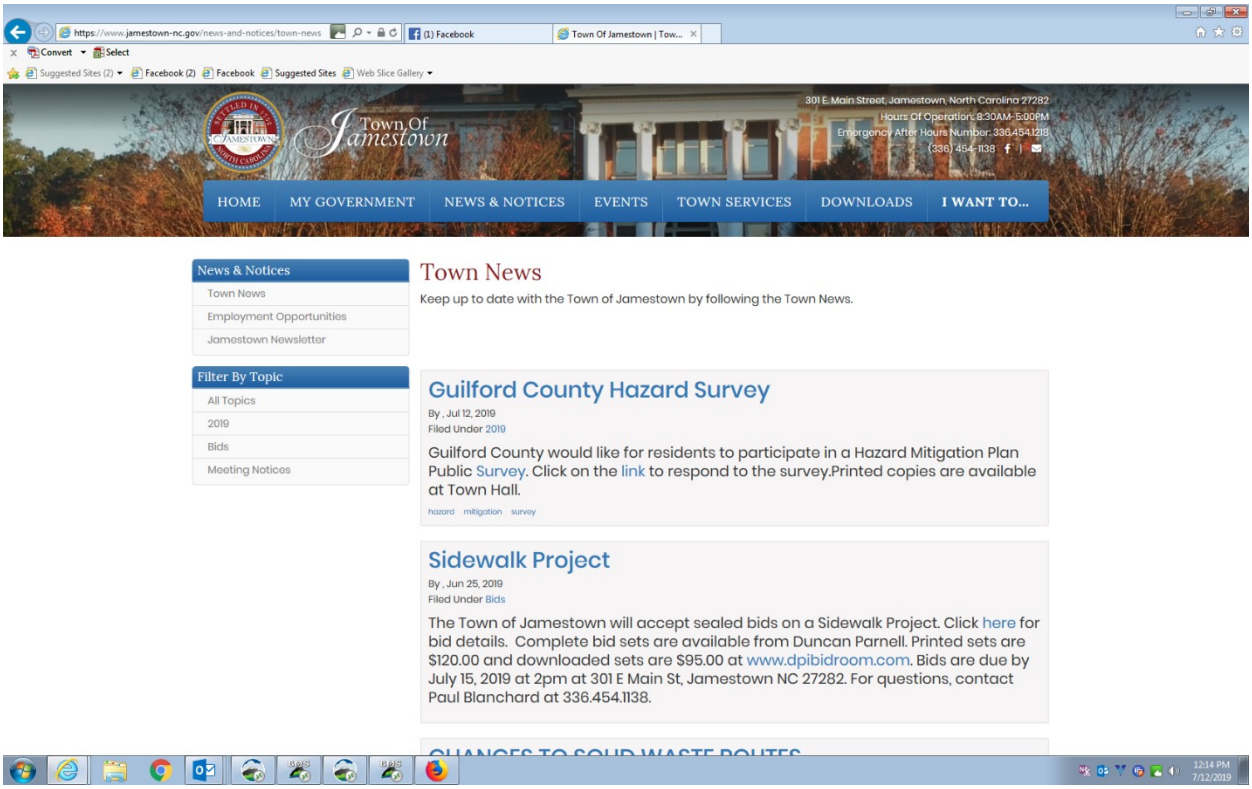
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As part of this process, we are asking Guilford County residents to fill out a short Hazard Mitigation survey. The survey can be found at https://forms.gle/cRezsTQU7RnmFwve8and will be available through August 31st. Any feedback is anonymous and will provide us with valuable information about how the county and its municipalities should approach mitigation in the future!

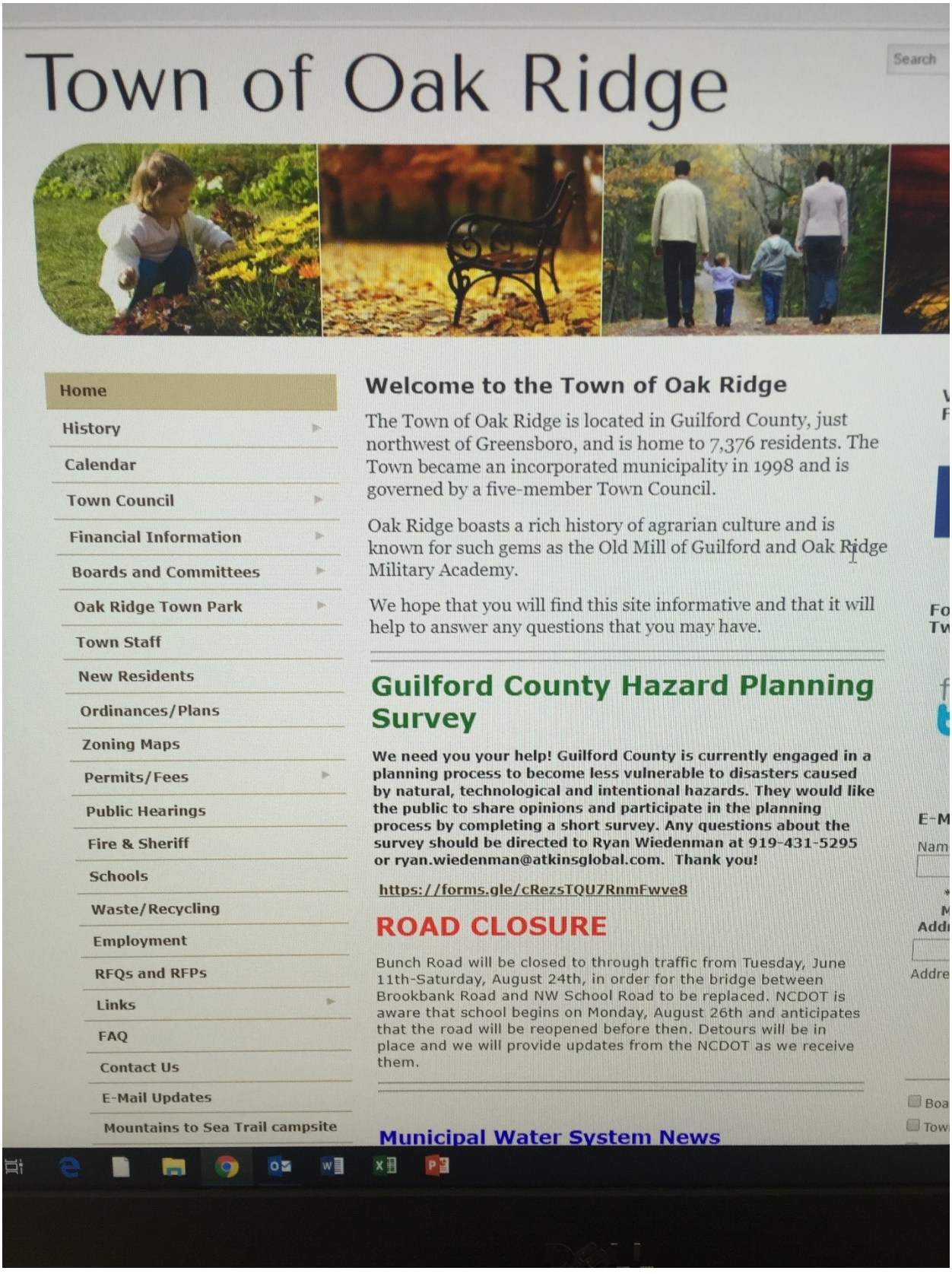
More info at https://www.guilfordcountync.gov/Home/Components/News/News/1707/16.

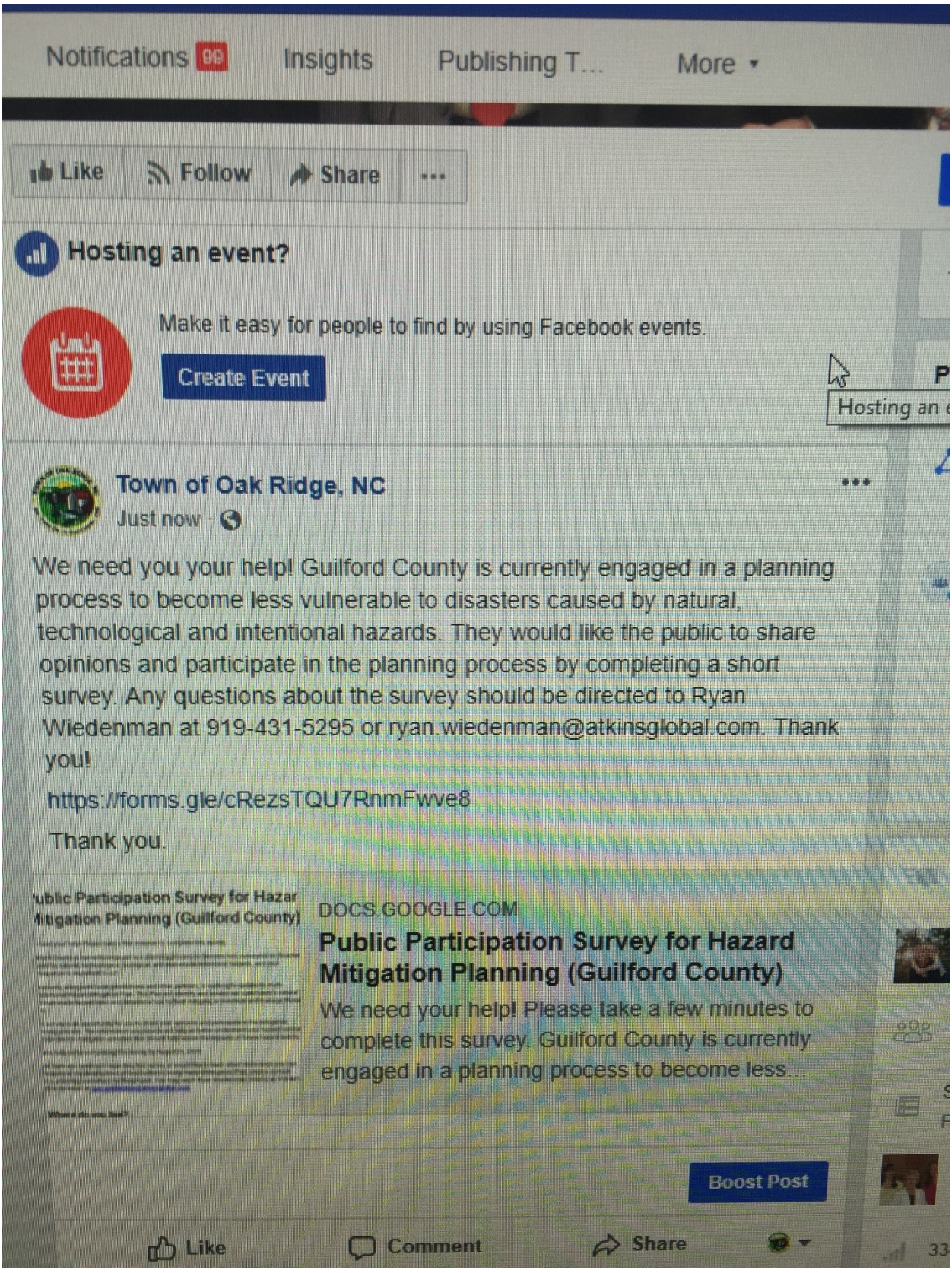
read more

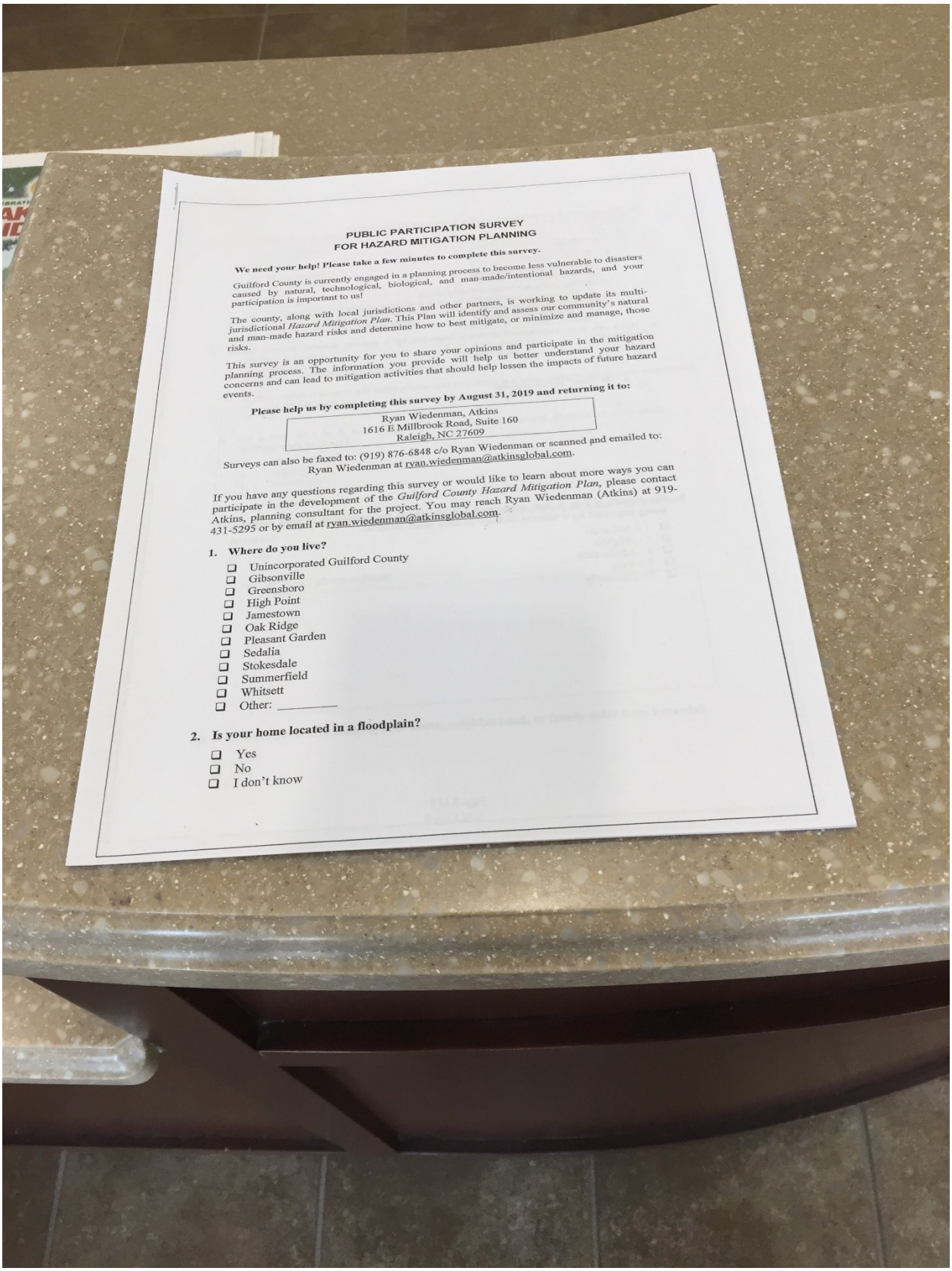
Jamestown


https://www.jamestown-nc.gov/news-and-notices/town-news
(1) Facebook
Town Of Jamestown | Tow...
Convert
Select
Suggested Sites (2)
Facebook (2)
Facebook
Suggested Sites
Web Slice Gallery
Town Of Jamestown
301 E. Main Street, Jamestown, North Carolina 27282
Hours Of Operation: 8:30AM-5:00PM
Emergency After Hours Number: 336.454.1138
(336) 454-1138
HOME
MY GOVERNMENT
NEWS & NOTICES
EVENTS
TOWN SERVICES
DOWNLOADS
I WANT TO...
News & Notices
Town News
Employment Opportunities
Jamestown Newsletter
Filter By Topic
All Topics
2019
Bids
Meeting Notices
Town News
Keep up to date with the Town of Jamestown by following the Town News.
Guilford County Hazard Survey
By , Jul 12, 2019
Filed Under 2019
Guilford County would like for residents to participate in a Hazard Mitigation Plan Public Survey. Click on the link to respond to the survey.Printed copies are available at Town Hall.
hazard mitigation survey
Sidewalk Project
By , Jun 25, 2019
Filed Under Bids
The Town of Jamestown will accept sealed bids on a Sidewalk Project. Click here for bid details. Complete bid sets are available from Duncan Parnell. Printed sets are $120.00 and downloaded sets are $95.00 at www.dpibidroom.com. Bids are due by July 15, 2019 at 2pm at 301 E Main St, Jamestown NC 27282. For questions, contact Paul Blanchard at 336.454.1138.
12:14 PM
7/12/2019

Oak Ridge


Town of Oak Ridge
Search
Home
History
Calendar
Town Council
Financial Information
Boards and Committees
Oak Ridge Town Park
Town Staff
New Residents
Ordinances/Plans
Zoning Maps
Permits/Fees
Public Hearings
Fire & Sheriff
Schools
Waste/Recycling
Employment
RFQs and RFPs
Links
FAQ
Contact Us
E-Mail Updates
Mountains to Sea Trail campsite
Welcome to the Town of Oak Ridge
The Town of Oak Ridge is located in Guilford County, just northwest of Greensboro, and is home to 7,376 residents. The Town became an incorporated municipality in 1998 and is governed by a five-member Town Council.
Oak Ridge boasts a rich history of agrarian culture and is known for such gems as the Old Mill of Guilford and Oak Ridge Military Academy.
We hope that you will find this site informative and that it will help to answer any questions that you may have.
Guilford County Hazard Planning Survey
We need you your help! Guilford County is currently engaged in a planning process to become less vulnerable to disasters caused by natural, technological and intentional hazards. They would like the public to share opinions and participate in the planning process by completing a short survey. Any questions about the survey should be directed to Ryan Wiedenman at 919-431-5295 or ryan.wiedenman@atkinsglobal.com. Thank you!
https://forms.gle/cRezsTQU7RnmFwve8
ROAD CLOSURE
Bunch Road will be closed to through traffic from Tuesday, June 11th-Saturday, August 24th, in order for the bridge between Brookbank Road and NW School Road to be replaced. NCDOT is aware that school begins on Monday, August 26th and anticipates that the road will be reopened before then. Detours will be in place and we will provide updates from the NCDOT as we receive them.
Municipal Water System News


Notifications 99
Insights
Publishing T...
More
Like
Follow
Share
Hosting an event?
Make it easy for people to find by using Facebook events.
Create Event
Town of Oak Ridge, NC
Just now
We need you your help! Guilford County is currently engaged in a planning process to become less vulnerable to disasters caused by natural, technological and intentional hazards. They would like the public to share opinions and participate in the planning process by completing a short survey. Any questions about the survey should be directed to Ryan Wiedenman at 919-431-5295 or ryan.wiedenman@atkinsglobal.com. Thank you!
https://forms.gle/cRezsTQU7RnmFwve8
Thank you.
DOCS.GOOGLE.COM
Public Participation Survey for Hazard Mitigation Planning (Guilford County)
We need your help! Please take a few minutes to complete this survey. Guilford County is currently engaged in a planning process to become less...
Boost Post
Like
Comment
Share



PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING

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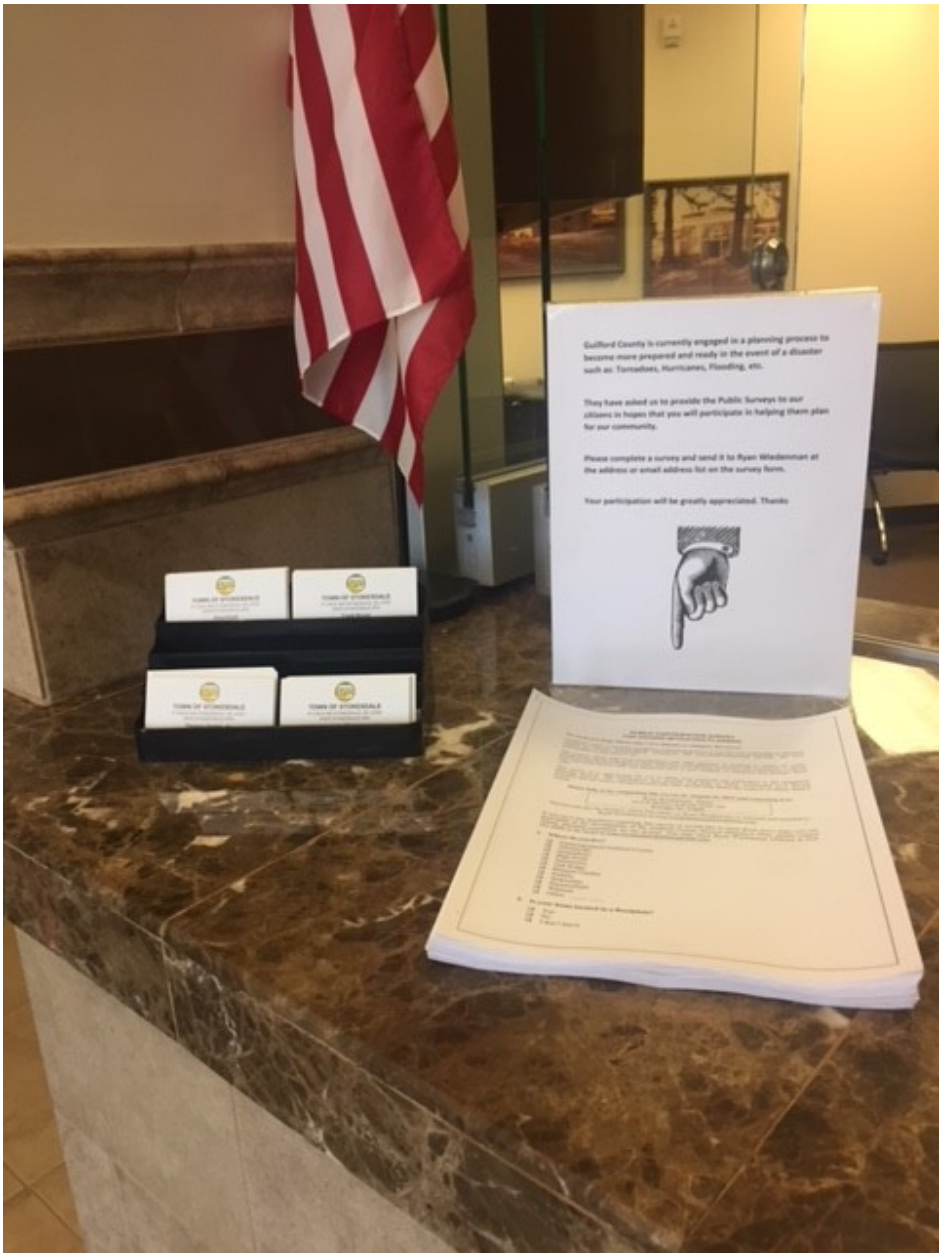
1. Where do you live?

- ☐ Unincorporated Guilford County
- ☐ Gibsonville
- ☐ Greensboro
- ☐ High Point
- ☐ Jamestown
- ☐ Oak Ridge
- ☐ Pleasant Garden
- ☐ Sedalia
- ☐ Stokesdale
- ☐ Summerfield
- ☐ Whitsett
- ☐ Other: _____

2. Is your home located in a floodplain?

- ☐ Yes
- ☐ No
- ☐ I don't know

Stokesdale


Guilford County is currently engaged in a planning process to become more prepared and ready in the event of a disaster such as: Tornadoes, Hurricanes, Flooding, etc.
They have asked us to provide the Public Surveys to our citizens in hopes that you will participate in helping them plan for our community.
Please complete a survey and send it to Ryan Wiedenman at the address or email address list on the survey form.
Your participation will be greatly appreciated. Thanks

@copyright 2018 Stokesdale, NC

Stokesdale Town Hall
P O Box 465
8325 Angel Pardue Road
Stokesdale, NC 27357
(336) 643-4011

General Information
News & Notices
Parks
Urban Archery Season
Development Ordinances

Thank you, Mayor John Flynt

JUNE 10-JUNE 12 TOWN HALL AND TOWN PARK PARKING LOTS AND ROAD TO THE PARK WILL BE CLOSED FOR RESURFACING.

PLEASE PARDON THE INCONVIENCE

THERE WILL BE A SMALL AREA TO THE LEFT OF THE TOWN HALL BUILDING OPEN FOR ANYONE NEEDING TO COME INTO TOWN HALL.

2019 ELECTION FILING SCHEDULE

Friday, July 5, 2019 at Noon – Friday, July 19, 2019 at Noon for the following Municipalities:

High Point, Jamestown, Pleasant Garden, Sedalia, Oak Ridge, Stokesdale, Summerfield, Whitsett, Gibsonville, Sedgefield Sanitary District, City of Burlington, and Town of Kernersville

2019 ELECTION SCHEDULE TUESDAY, OCTOBER 8, 2019 MUNICIPAL PRIMARIES

to be conducted only in the necessary Municipal Precincts of High Point, Jamestown, Pleasant Garden, City of Burlington TUESDAY,

NOVEMBER 5, 2019 MUNICIPAL ELECTION

To be conducted in the Municipalities of High Point, Jamestown, Pleasant Garden, Sedalia, Oak Ridge, Stokesdale, Summerfield, Whitsett, Gibsonville, Sedgefield Sanitary District, City of Burlington, Town of Kernersville. Date Issued: January 9, 2019

Guilford County is currently engaged in a planning process to become better prepared to handle emergencies whether they be weather related or other types of disasters. They would like the public to share opinions and participate in the planning process by completing a short survey. Please go to: https://forms.gle/cRezsTOU7RnmFwve8 and fill out the survey. Thank you.

We have started a new flushing program. We will be flushing weekly each Tuesday and Friday around 1pm for 30 minutes each day on Nuegent Drive once warmer spring weather is here to stay We will not be flushing during the winter months. And will notify when we change locations. Thank you.

Town of Stokesdale Water Customers Please Note: After office hours and on holidays in the event of a TRUE water emergency (water main breaks, water gushing from the ground) Please call Mayor Flynt at 336-687-6019. He will contact our water contractors. For Water Disruption, during routine business hours, please call Town Hall at 336-643-4011 and someone will assist you with your account. Thank you.

To view the Town's Development Ordinances, please see the link below
https://www.municode.com/library/nc/stokesdale/codes/development_ordinance

SHARE THIS

ATKINS

Guilford County

Multi-Jurisdictional Hazard Mitigation Plan

Public Participation Survey Results



Public Participation Survey

ATKINS

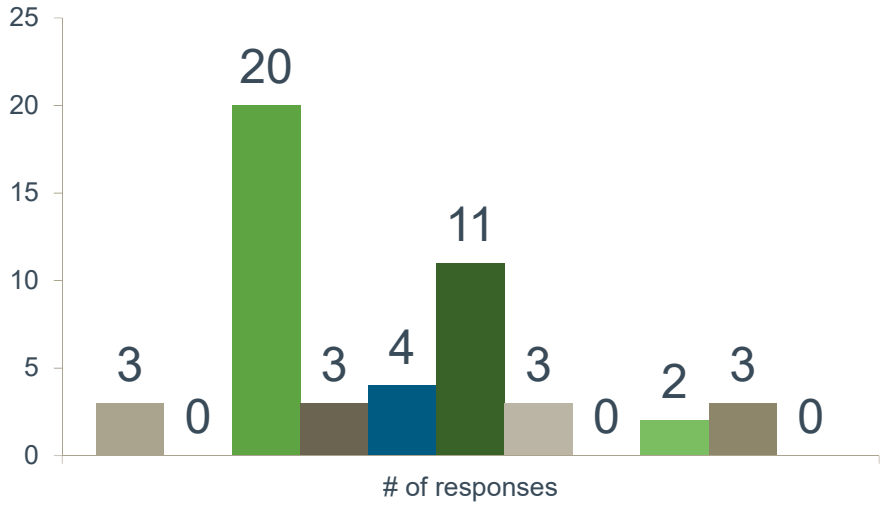
- Provides an opportunity for the public to share opinions and participate in the planning process
- Link to survey posted on county and municipal websites
- 50 completed surveys received

Public Participation Survey Highlights

ATKINS

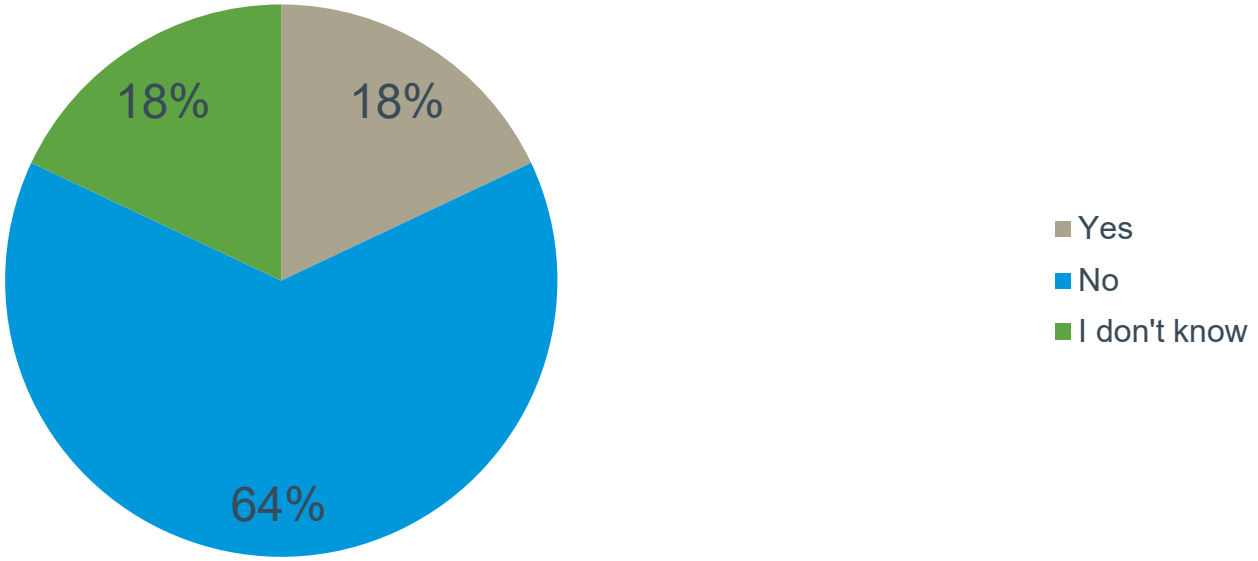
- 92% of respondents are interested in making their homes safer from hazards
- 48% have already taken action to make their homes safer from hazards
- 62% do not know who to contact regarding risks from hazards

1. Where do you live?

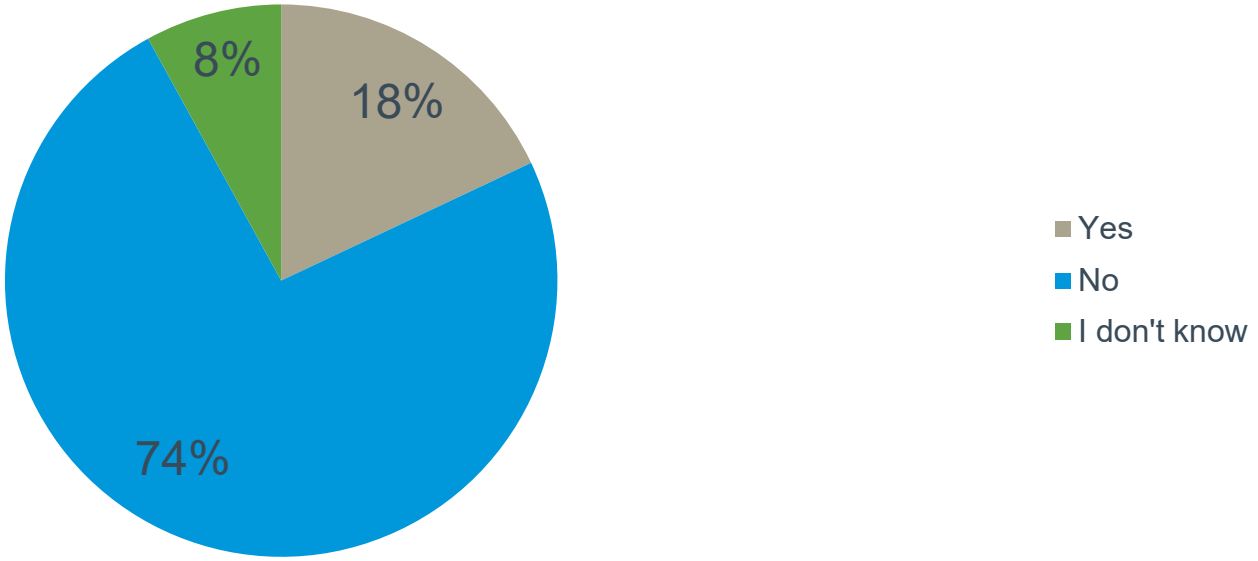


ATKINS

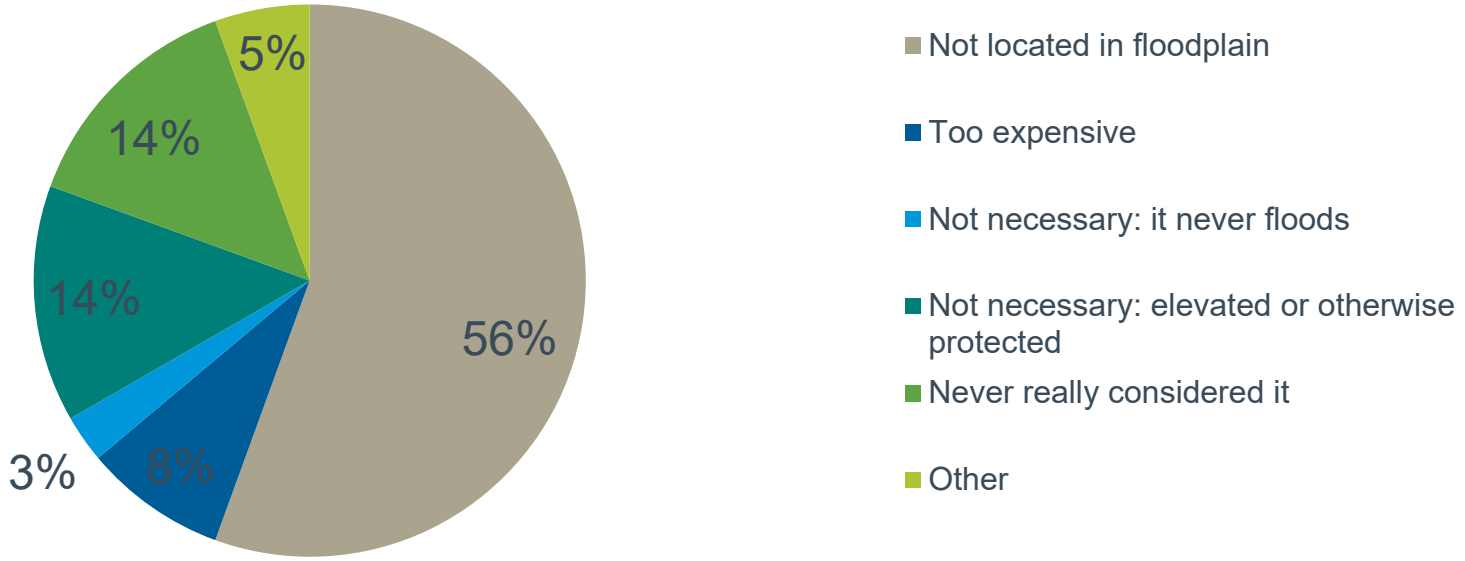
2. Is your home in a floodplain?



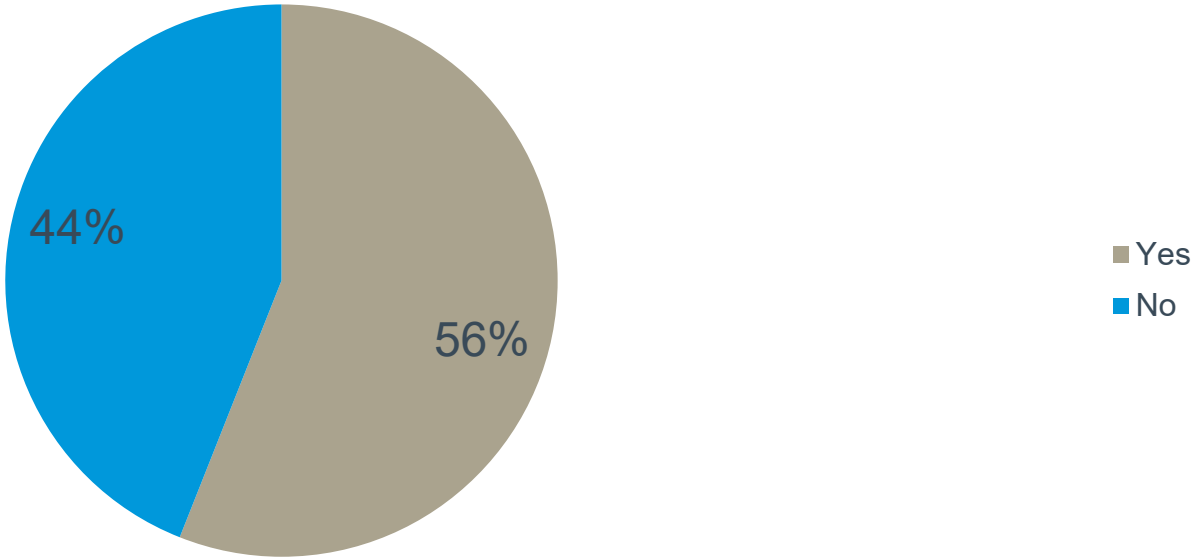
3. Do you have flood insurance?



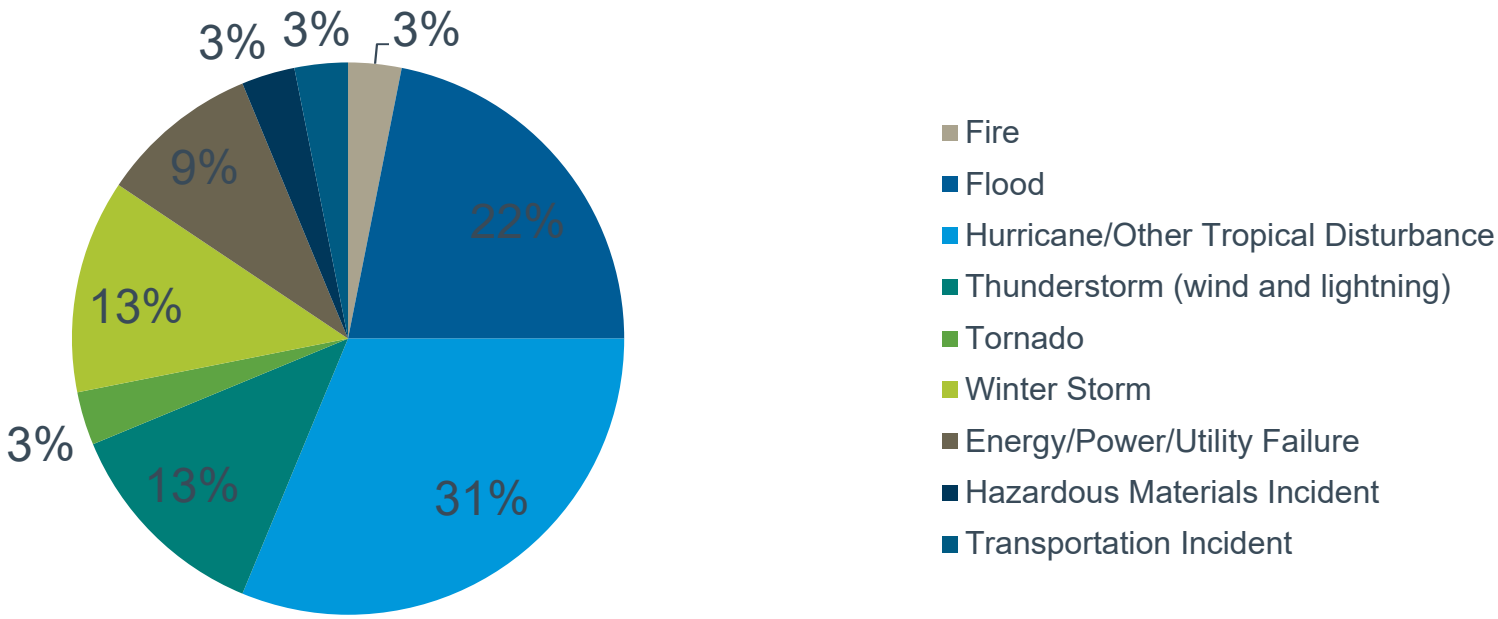
3a. Why no flood insurance?



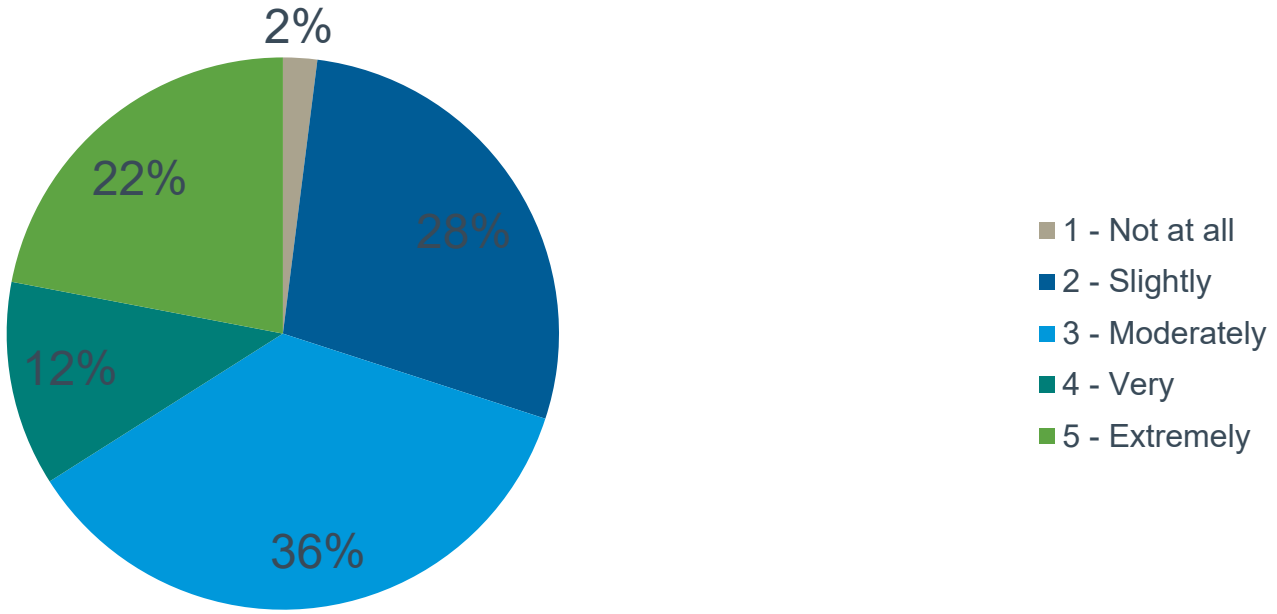
4. Have you experienced a disaster?



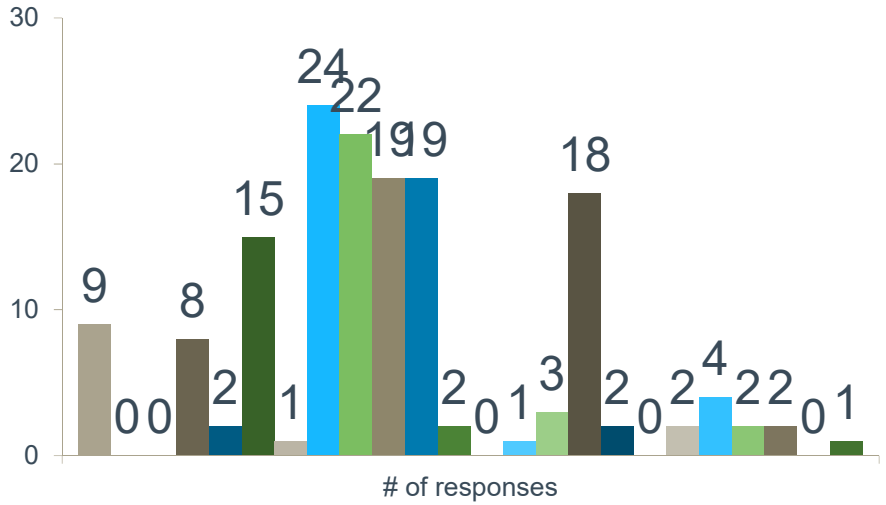
4a. Examples of disasters experienced



5. How concerned about possibility of being impacted by disaster?



6. Hazards of greatest concern?

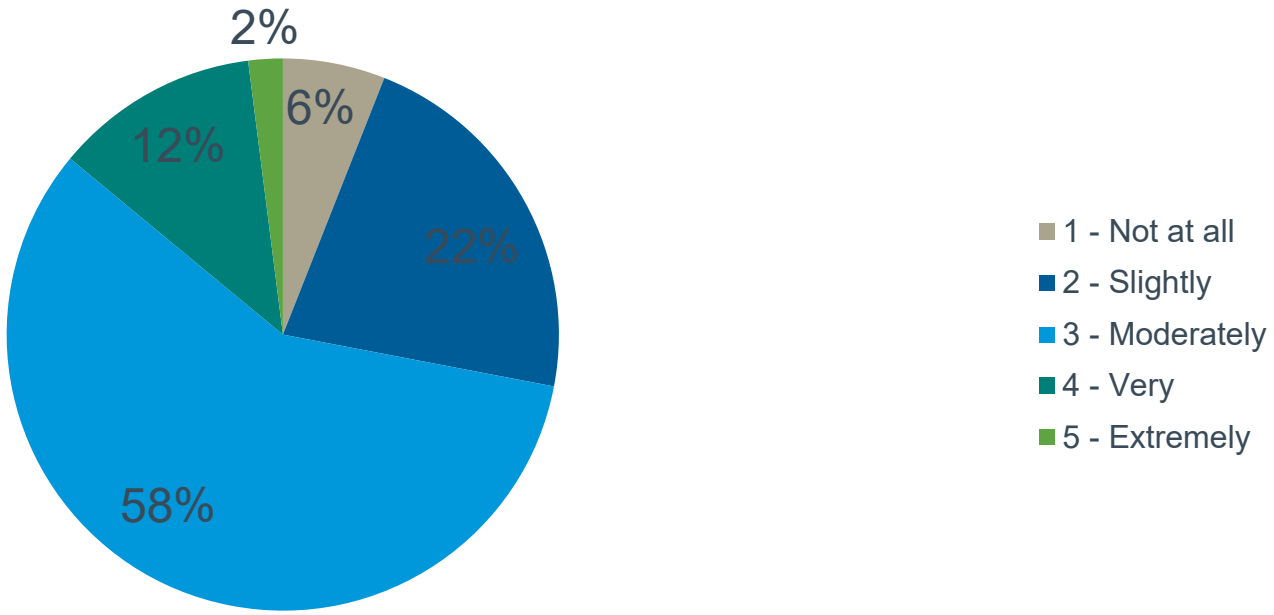


- Drought
- Earthquake
- Extreme Cold
- Extreme Heat
- Fire
- Flooding
- Hail
- Hurricane/Other Tropical Disturbance
- Thunderstorm (Wind and Lightning)
- Tornado
- Winter Storm
- Bioterrorism
- Public Health/Emerging Disease Threat
- Building/Structure Collapse
- Communications Systems Disruption/Failure
- Energy/Power/Utility Failure
- Hazardous Materials Incident
- Nuclear Power Plant Emergency
- Pipeline Failure
- Resource Shortage (Water/Fuel)
- Transportation Incident
- Civil Disturbance
- Cybersecurity
- Terrorism

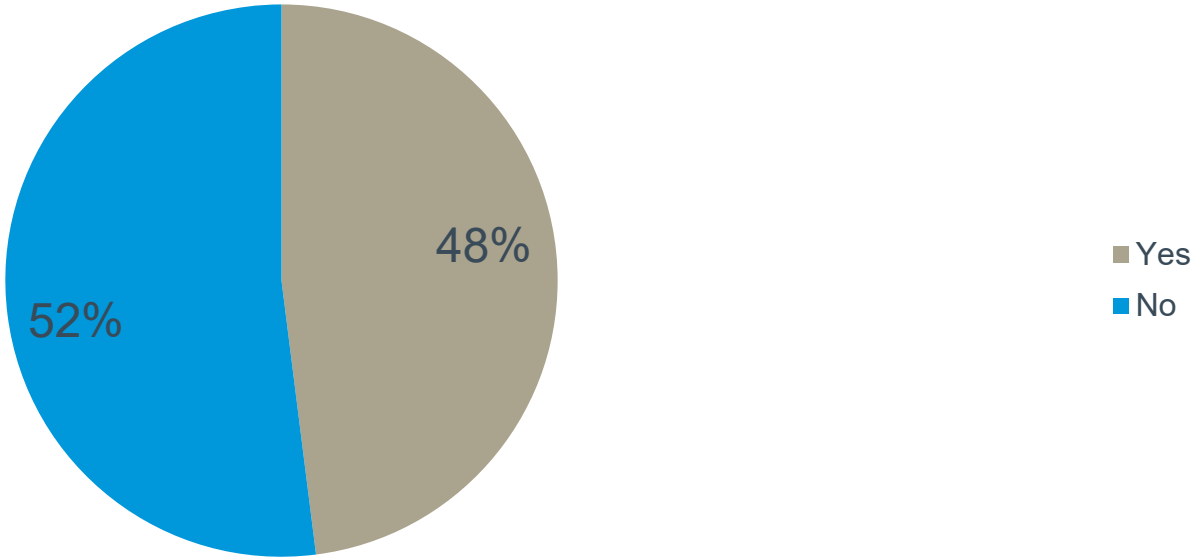
7. Other hazards not listed?

- Climate Change
- Home Invasion/Theft

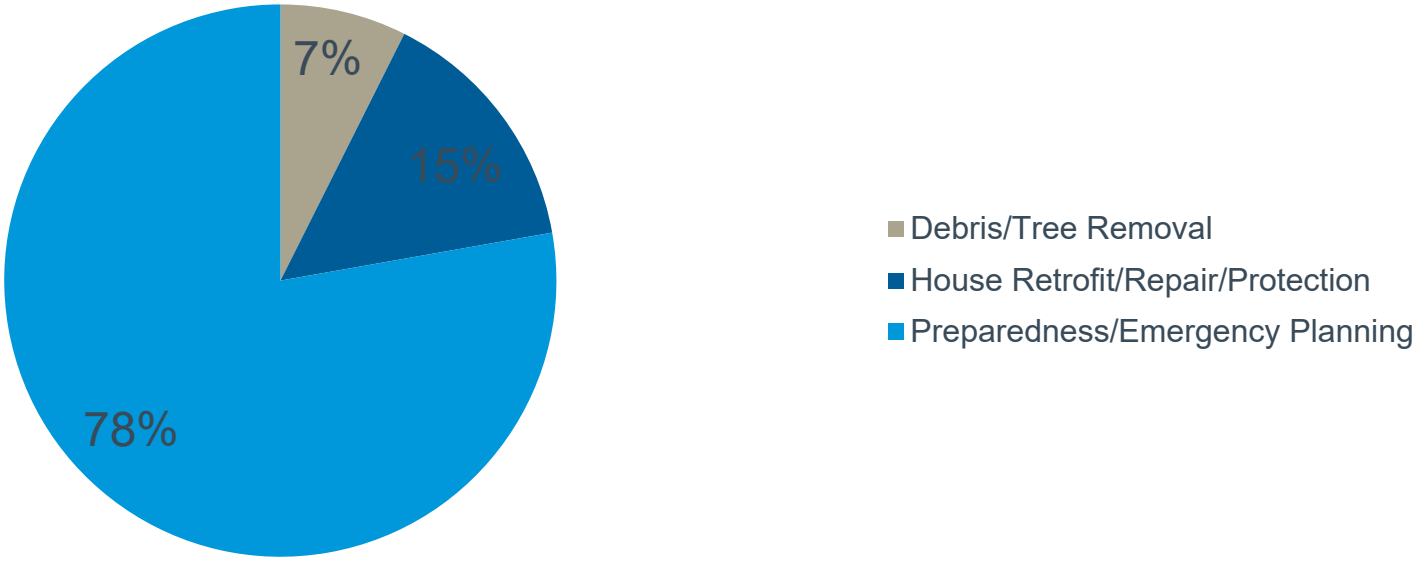
8. How prepared if disaster occurs?



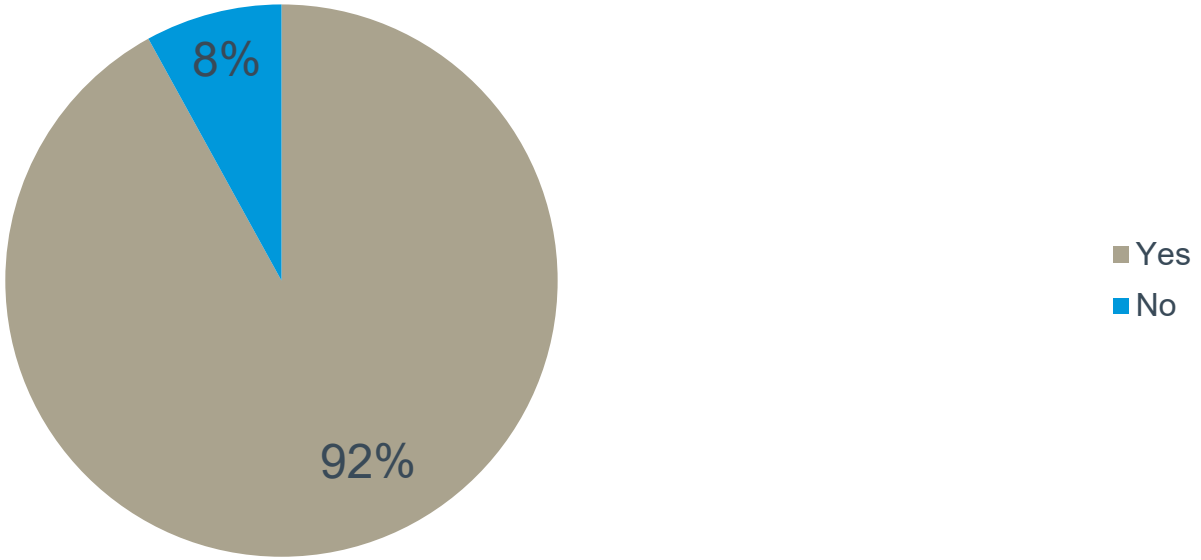
9. Taken action to be safer from hazards?



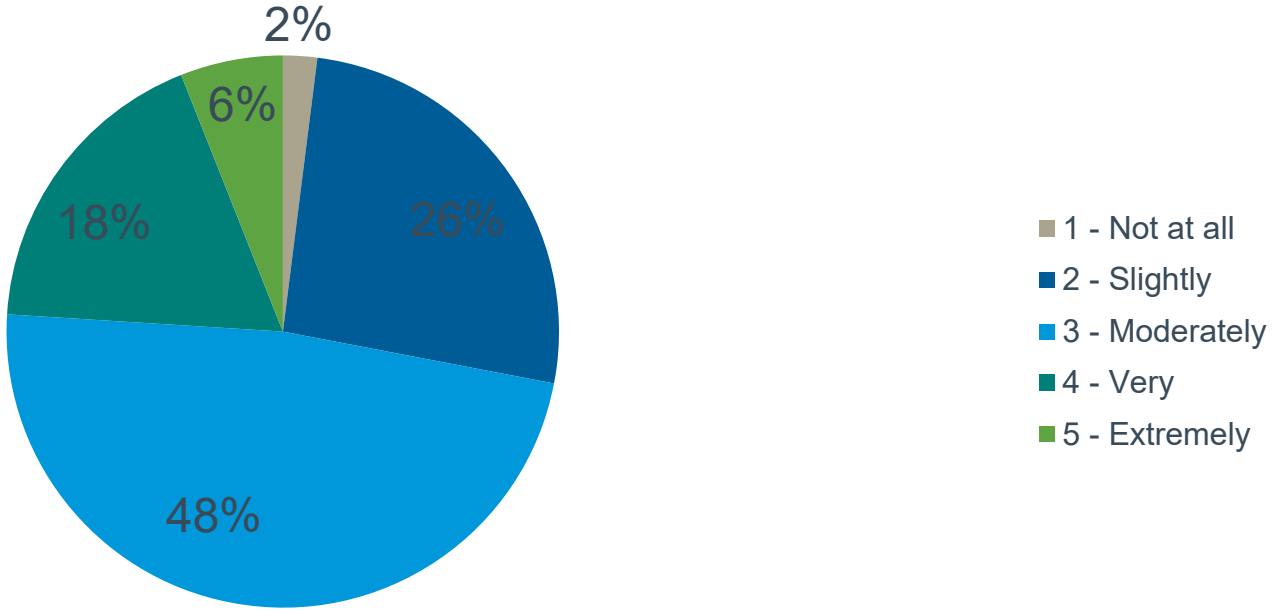
9a. Examples of actions taken



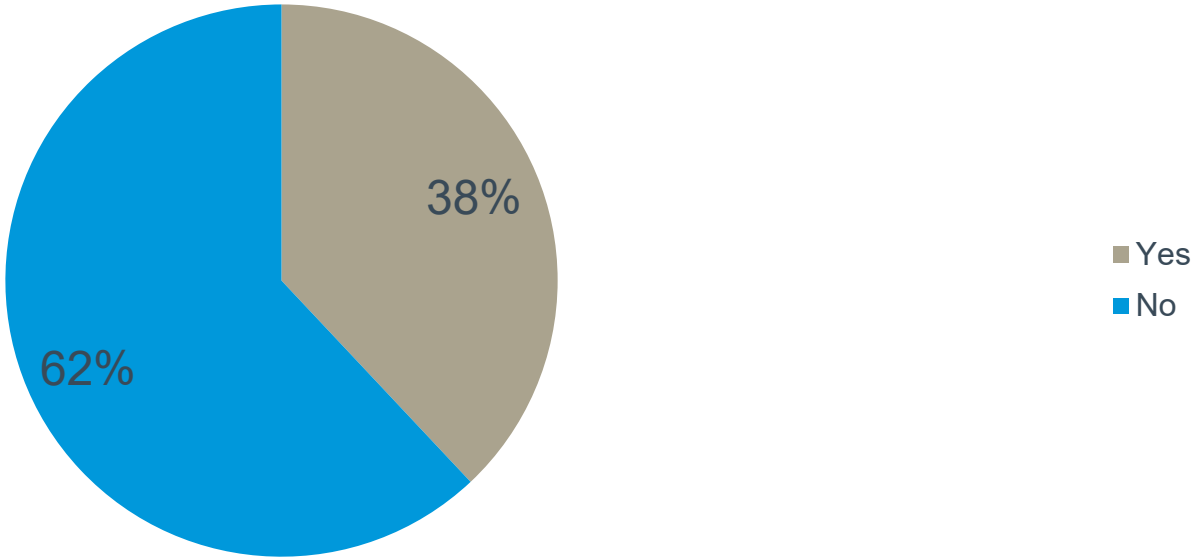
10. Interested in being safer from hazards?



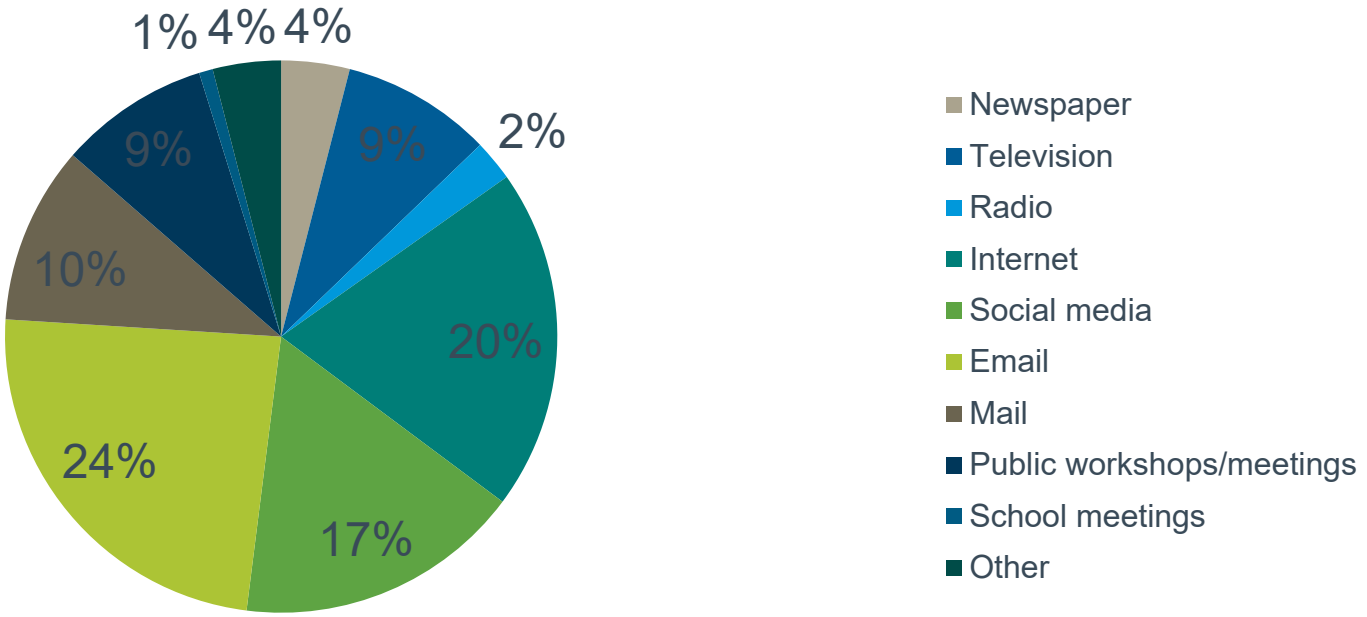
11.How informed about risks and impacts of disasters?



12. Know who to contact regarding risks from hazards?



13. Preferred way to receive info. about being safer from hazards?

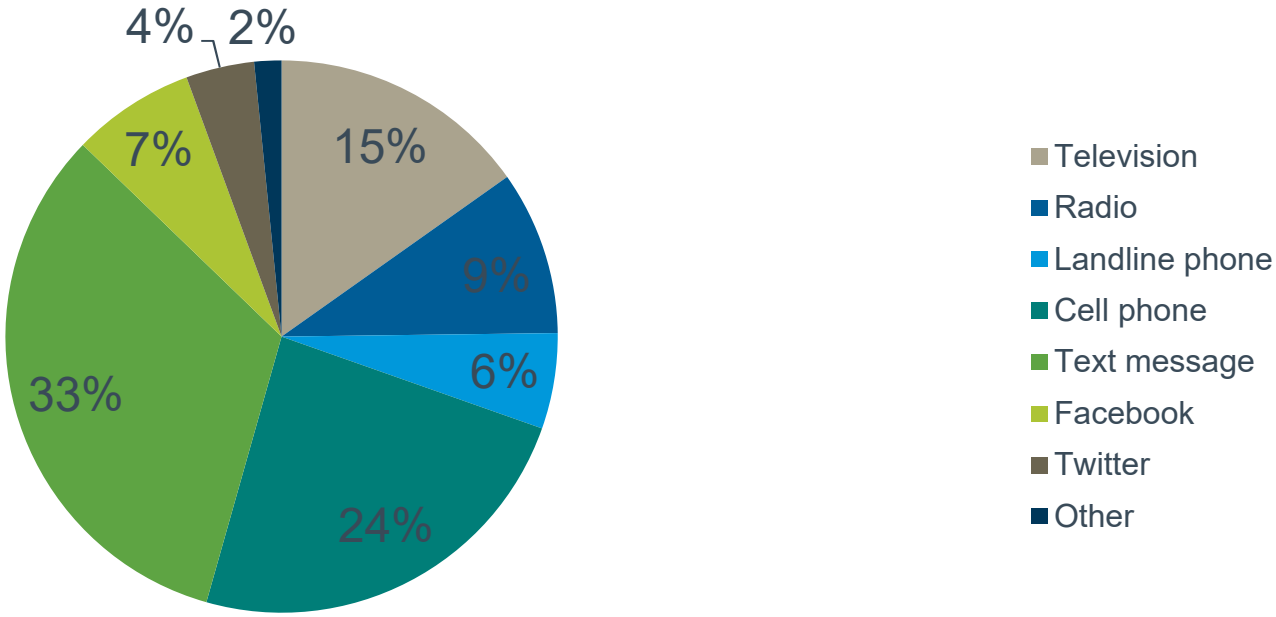


ATKINS

13. Other ways to receive information

- Text messages
- Neighborhood discussions

14. Preferred way to receive alerts/warnings about hazard events?

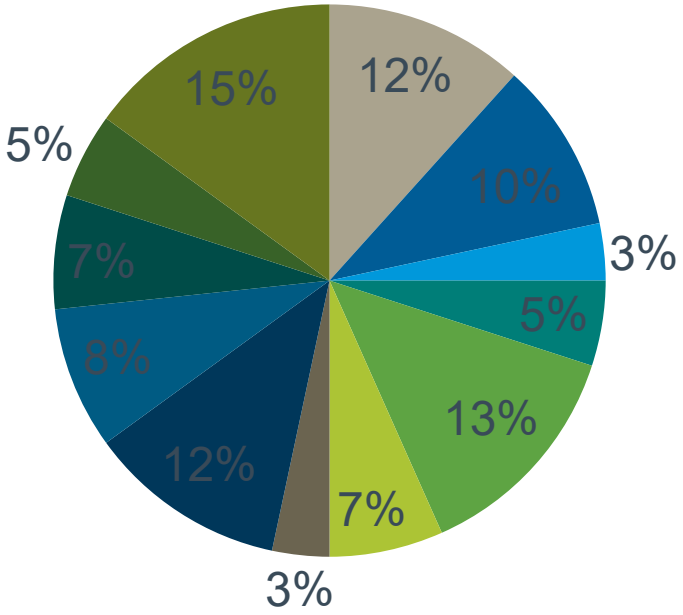


14. Other ways to receive alerts/warnings

- Siren/Warning System

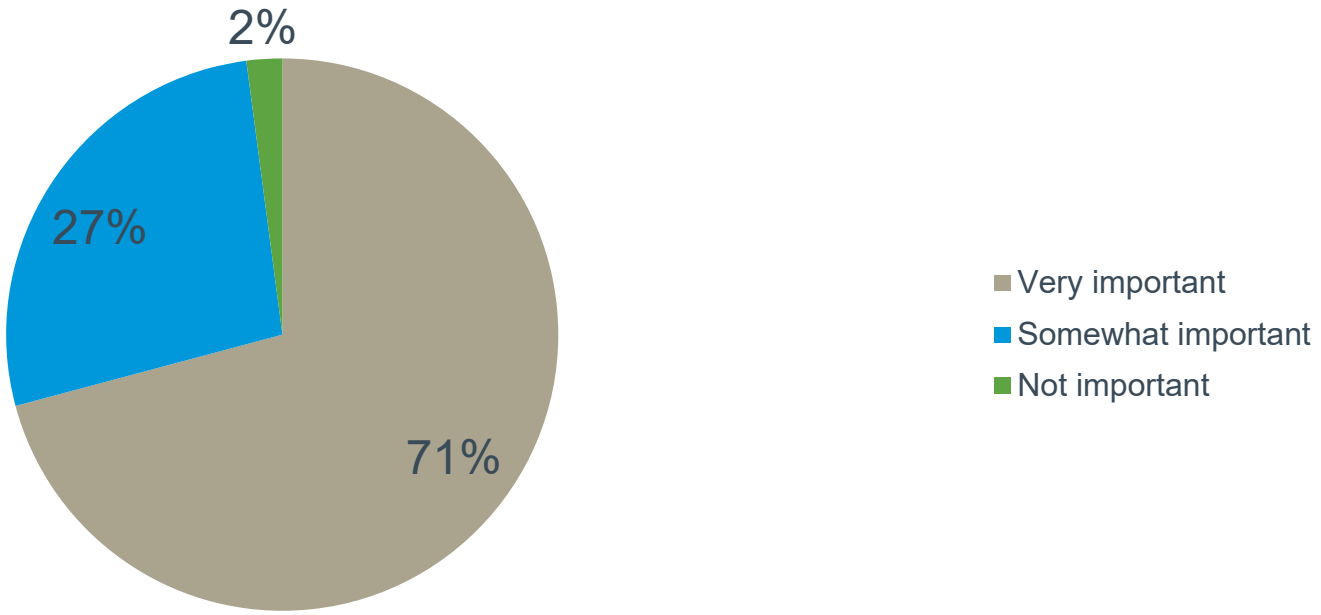
ATKINS

15. Steps local gov't could take to reduce risk

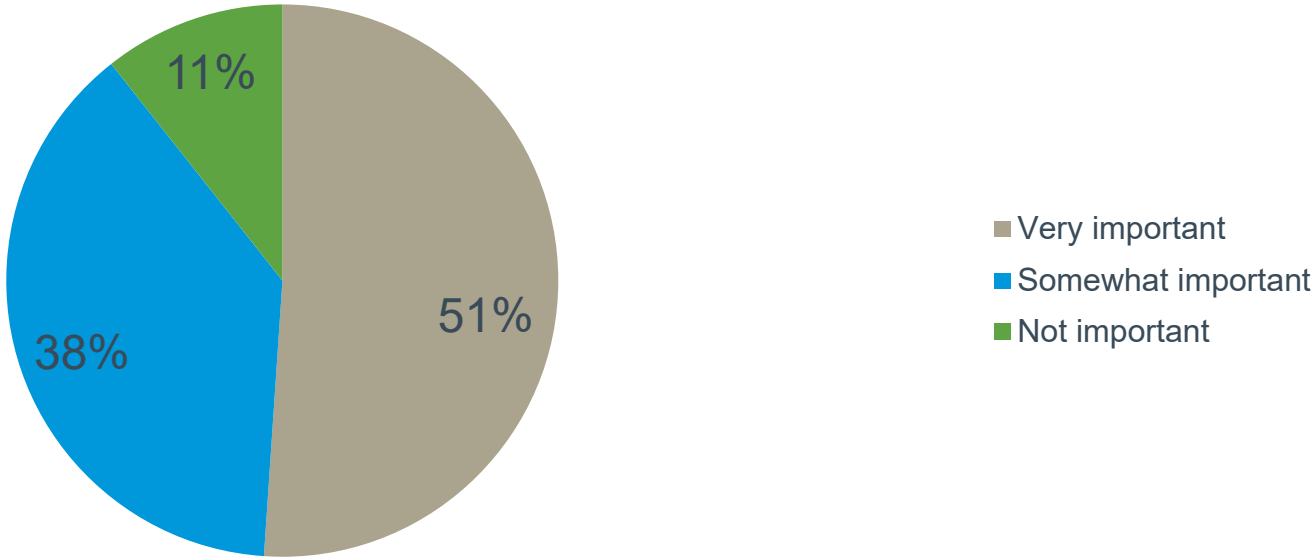


- Alert/Warning System
- Improve Communication/Coordination
- Emergency/Storm Shelters/Safe Rooms
- Debris/Tree Removal
- Improve/Maintain Drainage/Flood Protection
- Improve/Maintain/Retrofit Infrastructure
- Response/Recovery
- Preparedness/Emergency Planning
- Monitoring/Enforcement/Inspections
- Environment/Natural Resource Protection
- Grants/Budget/Funding
- Public Education/Awareness

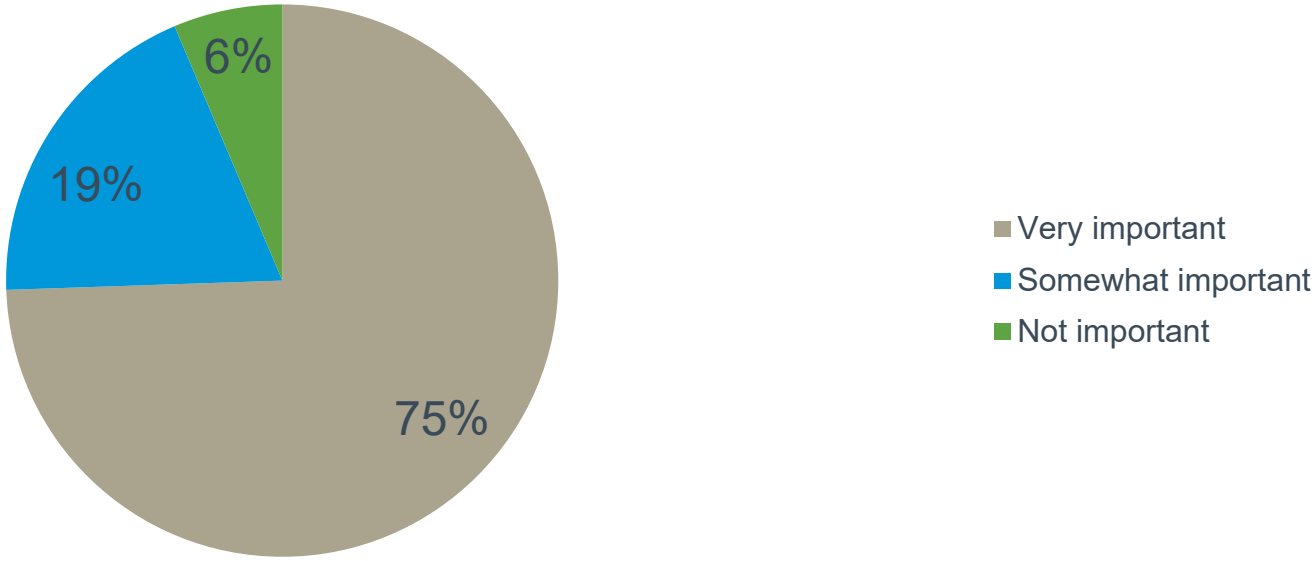
16. Mitigation Actions: Prevention



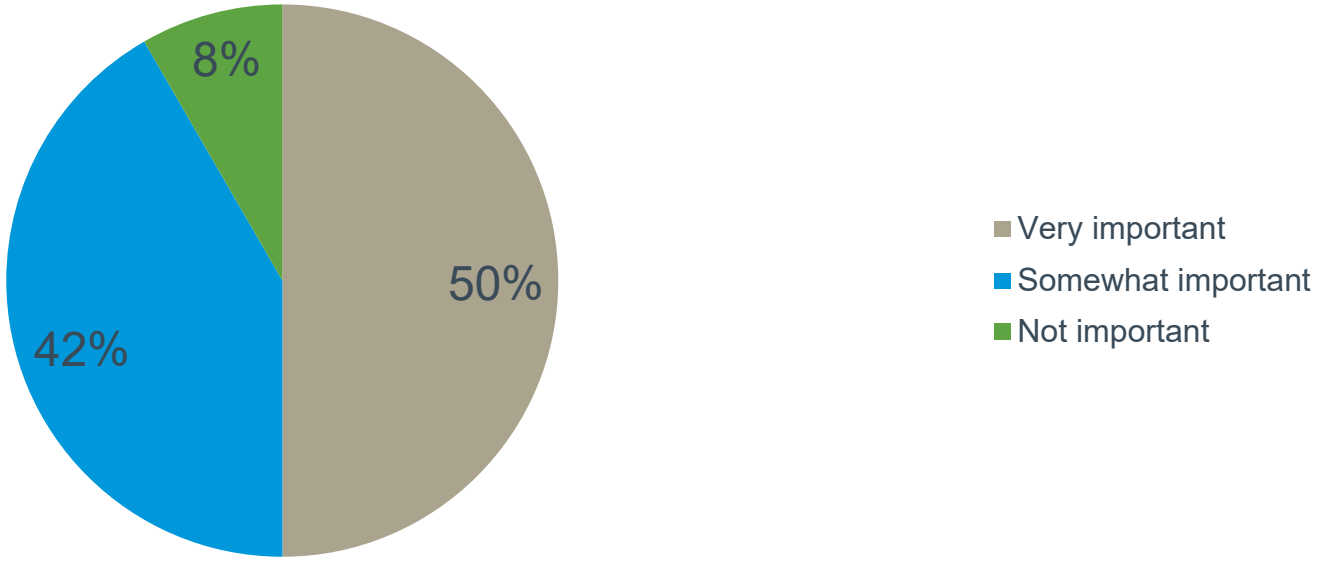
16. Mitigation Actions: Property Protection



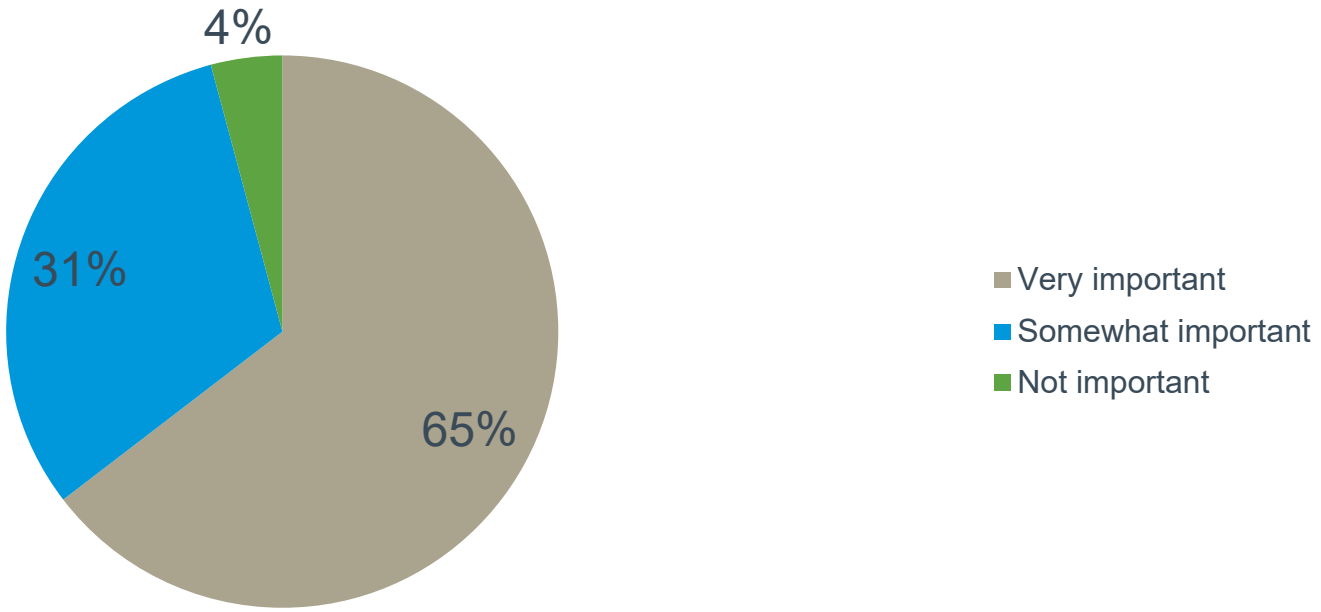
16. Mitigation Actions: Natural Resource Protection



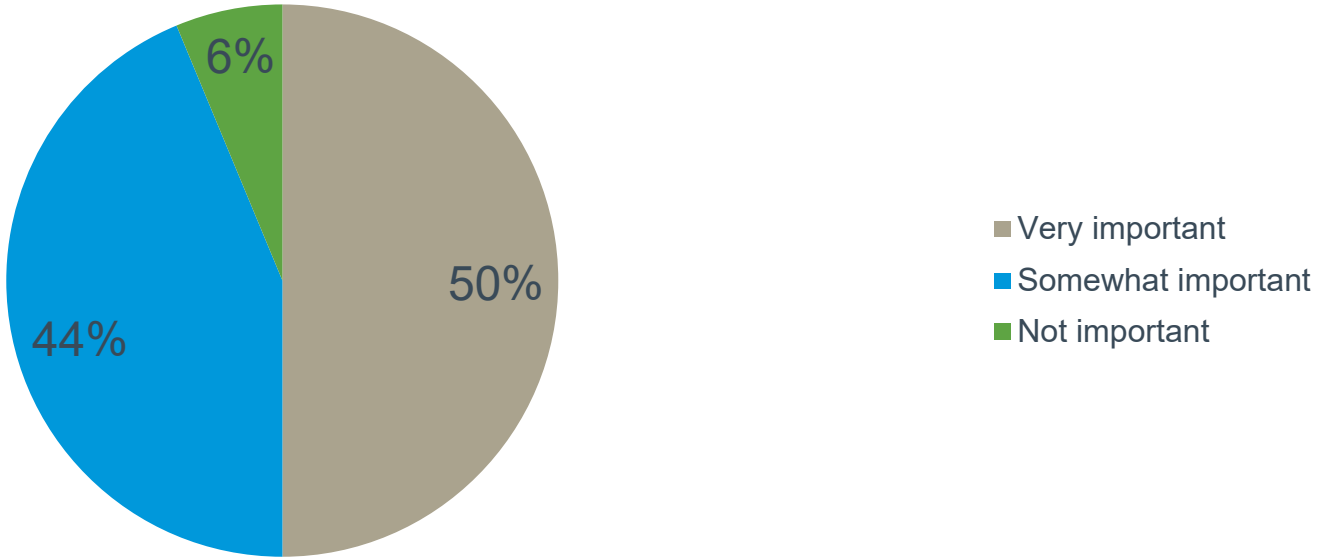
16. Mitigation Actions: Structural Projects



16. Mitigation Actions: Emergency Services



16. Mitigation Actions: Public Education and Awareness



16. Types of Mitigation Actions

ATKINS

Highest importance

- Natural Resource Protection
- Prevention

Moderate importance

- Emergency Services

Lower importance

- Public Education and Awareness
- Structural Projects
- Property Protection

Committee Results

Highest importance

- Prevention
- Emergency Services

Moderate importance

- Public Education and Awareness
- Structural
- Property Protection

Lower importance

- Natural Resource Protection

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CITY OF HIGH POINT
AGENDA ITEM

Title: Reappointment- High Point Board of Alcoholic Control (ABC)

From: City Clerk's Office

Meeting Date: January 19, 2021

Public Hearing: N/A

Advertising Date / Advertised By: N/A

Attachments:

PURPOSE:
To make the necessary reappointment to the High Point Board of Alcoholic Control (ABC) for a term that soon will be expiring.

BACKGROUND:
Ashley Tillery is currently serving on the High Point ABC Board. Her term will soon expire on 2/8/2021. Ms. Tillery is also currently representing High Point on a statewide level and serves on the N.C. Association of ABC Boards.

Mayor Wagner is recommending the reappointment of Ashley Tillery to the High Point ABC Board. Term to be effective 2/8/2021 and will expire 2/8/2024.

BUDGET IMPACT:
N/A

RECOMMENDATION / ACTION REQUESTED:
Council is requested to confirm the reappointment of Ashley Tillery to the High Point ABC Board to be effective 2/8/2021 and will expire on 2/8/2024.

Vesta Kennedy Emails #1 - #11

Email #1 with Attachment(s)

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 12:15 AM
To: Public Comment
Subject: ZA-20-20 for January 19, 2021
Attachments: WS-9337_44644_CA_CSA_20170622 (1) (1).pdf; tp72(1).pdf

https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebfa49fc383f688

January 3, 2021

Dear Jay Wagner, Randy McCaslin, and Town Council,

I am writing to you as a resident of High Point and a concerned citizen.

The possible rezoning of 1809 Eastchester Drive and adjacent lot on Hilton Court (referred to as 1801 Eastchester Dr) deeply troubles me. One of my fears is I am afraid of the negative impact this would bring to both Oak Hollow Lake and High Point City Lake in Jamestown. The lots in question sit in between a classified stream of the General Watershed West Fork of Deep River and in Critical Tiers 2 and 3 of Oak Hollow Lake Watershed. These lots are currently zoned Conditional Use Office, Institutional and Residential Single Family. Based upon the most recent Land Use Assessment of Eastchester Drive/ I-74, it is reccommended that the current zoning not change.

Developers are requesting a Conditional Use General Business zoning to allow a convenience store with gas pumps, car wash and a restaurant with a drive through window (their first choice among the many uses this rezoning would allow). My neighbors and I have been told by the developers the front part of these parcels slope towards the storm drains on Eastchester Drive, and that the back part of this land will be graded to allow all of the parking lot run off to go into Eastchester's storm drain.

The West Fork of Deep River is directly in the path of this high intensity parking lot run off, via a classified stream. This contaminated water will run unchecked straight into High Point City Lake in Jamestown. Toxic compounds from gasoline spills (Benzene, Toulene, Ethylbenzene, Xylene are a few of the 150+ complex, highly variable components that make up gasoline- see reference report from the US Department of Health and Human Services - tp.72.pdf) motor oil, detergents, etc . will also be present in this run off. The West Fork of Deep River floods our neighbors in the Foxwood Meadows community with increasing frequency and intensity. I am sending pictures of the recent October flooding event, as well as data from the US Geological Survey explaining how a 4 acre impervious surface (these parcels total 3.6 acres) with 1.5 inches of rainfall create enough run off to flood a half acre lot an entire foot. Nowhere in the developer's mitigation have I seen any mention of Development Ordinance 6.4 regarding Flood Damage Prevention. Sure, this site doesn't sit directly in the floodway itself, but by their plan, they are certainly sending run off waters straight to it. Heavily contaminated water at that.

The increased traffic in this area is also a major concern, as there were already 109 car accidents within a one mile radius of 1809 Eastchester Drive within a years (October 16, 2019 to October 15, 2020) time. (see p2c.highpointnc.gov) This is roughly one automobile accident every three days. Imagine now that we aren't living in a time of COVID-19, and High Point had been able to host robust Fabric and Furniture Markets during this time frame. A TIA conducted in 2017 states that 40,000 Average Daily Trips occur on Eastchester Drive. Davenport's summary TIA analysis available online did not include actual daily car counts. I would expect roughly 500 cars a day (on the low end) would visit these proposed high intensity businesses. Lead in our waters come from cracked batteries and asbestos in our waters trace back to damaged brake pads which occurs with automobile accidents. Can the West Fork of Deep River (which sits in a flood zone) and High Point City Lake keep their current clean water standard? Are we willing to send additional pollutants downstream to Foxwood Meadows?

Can Oak Hollow Lake and High Point City Lake sustain inevitable spills from tankers filling underground storage units and the eventual repair and replacement of damaged, rusted and corroded components of UST systems, leaks, and

leaches from multiple Underground Storage Tanks? The proposed site sits in the middle of our watersheds. USTs typically range from 8,000 gallons to 15,000 gallons in capacity and have increasingly shorter shelf lives due to ethanol increases, diversified diesel and biodiesel fuels. The West Fork of Deep River and Oak Hollow Lake are feet from these tanks. The USTs will quite possibly sit directly on top of and adjacent to veins of groundwater which flow immediately into both of these watersheds.

In the Piedmont, we have a swirled mix of red clay and silt. Different liquids travel through these mediums at varying speeds. But don't take my word for it, as I am no scientist. I implore you to go to North Carolina Department of Enviromental Quality's website. Use their tool. (link provided as attachment). See the dangerous precedents for yourself. I found Incident #44644, Sam's Mart#782 at 1401 N. Main Street to be quite informative and enlightening. The date of "last use" of these Underground Storage Tanks was September 15, 2015. On September 22, 24 and 30, 2015, three 12,000gl gasoline and one 4,000gl kerosene tanks were removed. To this day, clean up continues. Particularly revealing is a report written by civil and environmental engineer Mike Stanforth, employed by Excel Civil and Enviromental Associates in Gastonia, NC. (see attachment WS-9337_44644_CA_CSA20170622.pdf) Mr. Standforth was extremely concerned by "an unnamed tributary leading to Oak Hollow Lake" and its' possible contamination and ramifications. This site is on the corner of E. Lexington and N. Main, perhaps 2-3 miles from the shore of Oak Hollow. I will be sending additional Underground Storage Tank Incidents, along with documentation of Permanent Soil and Groundwater Contamination Notices attached to the deeds of these properties.

I learned lessons and had realizations from this first precedent I researched; a lesson teaching me how connected and fragile our waterways are, above ground and below. How fallible our best intentions and preventive science can be, how valuable the smallest bit of clean dirt is, and how all the environmental pieces work together to make a viable whole. In the coming days I will be sending all of you STIRA guidelines (guidelines for contaminate cleanup), more UST incidents with documentation attached, and a lot of what my research in this matter has led me to. PLEASE take the time to read through this and coming information. Please reach out to me if you have any questions concerning the attachments, links, and any of the facts I am presenting to you.

The proposed rezoning of this particular piece of High Point could be catastrophic to our public safety, community's health, fiscal well-being, and bright future. Thank you for your time.

Sincerely,
Vesta Kennedy, 1821 Eastchester Drive, High Point, NC 27265
(336)987-9115

Attachment to Email #1

Excel Civil & Environmental Associates, PLLC
625 Huntsman Court
Gastonia, North Carolina 28054
NC License No. P-0129
Telephone: (704) 853-0800
Facsimile: (704) 853-3949
Internet: www.excelengr.com

June 22, 2017

Mr. Gene Mao, P.G.
Guilford County Department of Public Health
Environmental Health Division
410 West Market Street, Suite 300
Greensboro, North Carolina 27401

Re: Comprehensive Site Assessment
Sam's Mart No. 782
1401 North Main Street
High Point, North Carolina 27262
Land Use: **COMMERCIAL**
EXCEL Project No. **2015059**

Dear Mr. Mao:

On behalf of Sam's Mart, Inc., Excel Civil & Environmental Associates, PLLC (Excel) respectfully submits for your review and approval this Comprehensive Site Assessment Report for the above-referenced facility.

If you have any questions, please contact the undersigned.

Sincerely yours,

EXCEL CIVIL & ENVIRONMENTAL ASSOCIATES, PLLC

M.T. Stanforth, P.E.
Principal Engineer

p.c. Mitch Rose / Sam's Mart, Inc. / Matthews, NC

COMPREHENSIVE SITE ASSESSMENT REPORT

SAM'S MART NO. 782

1401 NORTH MAIN STREET
HIGH POINT, GUILFORD COUNTY, NORTH CAROLINA

NCDEQ FACILITY ID NO. **00-0-0000013106**
EXCEL PROJECT NO. **2015059**

LATITUDE = 35.973302° / LONGITUDE = (-)80.017967°

Date submitted

June 22, 2017

Prepared for

Mr. Mitch Rose
Environmental Manager
Sam's Mart, Inc.
7935 Council Place, Suite 200
Matthews, North Carolina 28105

Prepared by

Excel Civil & Environmental Associates, PLLC
625 Huntsman Court
Gastonia, North Carolina 28054
NC License No. P-0129

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Excel Civil & Environmental Associates
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6/23/17

Aaron C. Long
Engineer In Training

Michael T. Stanforth, P.E., DEE
Principal Engineer

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APPENDIX F – PUBLIC NOTIFICATION INFORMATION

PROJECT INFORMATION SUMMARY

NCDEQ Incident Number:	44644
Facility UST ID Number:	0-013106
Regulator Incident Manger(s):	Gene Mao, Guilford County Department of Health and Human Services (336) 641-3589
Site Risk / Priority Rank:	Intermediate
Current Facility Name:	Former Sam's Mart 782
Former Facility Name:	Former Sam's Mart 782
Facility Address:	1401 North Main Street High Point, Guilford County, North Carolina

CONTACT INFORMATION

Current UST Owner/Operator:	Sam's Mart, Inc. 7935 Council Place # 200 Matthews, North Carolina 28105 Mitch Rose Phone: (704) 940-3612
Former UST Owner/Operator:	Sam's Mart, Inc. 7935 Council Place # 200 Matthews, North Carolina 28105
Current Property Owner:	Sam's Mart, Inc.
Consultant:	Excel Civil & Environmental Associates, PLLC 625 Huntsman Court Gastonia, North Carolina 28054 NC License No. P-0129
Consultant Contact:	Michael Stanforth *Principal Engineer* Phone: (704) 853-0800 Email: mstanforth@excelengr.com

RELEASE INFORMATION

Date Discovered:	September 2015
Estimated Quantity of Release:	Amount Unknown
Source of Release:	(Former) UST System
Current UST Sizes & Contents:	None Present, Removed September 2015
Former UST Sizes & Contents:	(3) 12,000-gal Gasoline, (1) 4,000-gal Kerosene

1.0 Executive Summary

Excel Civil & Environmental Associates, PLLC (Excel) was contracted by Sam's Mart, Incorporated to complete a Comprehensive Site Assessment Report for the Sam's Mart No. 782 facility located at 1401 North Main Street and within the incorporated limits of High Point, Guilford County, North Carolina (refer to **Figure 1**). This assessment was conducted in response to the UST removal performed by Excel in September of 2015, and to assess current soil and groundwater conditions at the site. The following report will discuss the Comprehensive Assessment activities conducted by Excel during November 2016 through May 2017.

The site has undergone various phases of assessment activities starting with UST closure activities conducted in September 2015 and a Phase I Limited Site Assessment (LSA) Report dated March 7, 2016, both completed by Excel. After completion of the LSA, the site was ranked as an "Intermediate" risk site due to the presence of petroleum constituents in the groundwater above Gross Contamination Levels (GCLs) as established by the North Carolina Department of Environmental Quality (NCDEQ). In regards to sensitive receptors, an unnamed tributary to Oak Hollow Reservoir is located approximately 2,200 feet northeast of the source area.

The CSA activities included the installation of five permanent monitoring wells (four Type II and one Type III), soil and groundwater sampling with associated laboratory analysis, hydraulic falling-head test, and the completion of this report.

2.0 Site History and Characterization

The subject property is located adjoining to the northwest of the intersection of West Lexington Avenue and North Main Street, inside the incorporated limits of High Point, North Carolina (refer to **Figure 1**). The subject property consists of two parcels of land with a combined area of approximately 0.73-acres and was formerly utilized as a convenience store and filling station. Following demolition and UST removal in 2015, the facility is currently inactive and undergoing redevelopment. The site will likely remain zoned for commercial use. West Lexington Avenue tracks in an approximate west-east direction along the southern perimeter of the subject property, and North Main Street, tracking in an approximate northwest-southeast direction, bounds the property to the east. Immediately to the north and west of the property is commercial development.

In response to UST closure activities, Sam's Mart contracted with Excel to complete a UST closure assessment at the subject site. In September 2015, a total of four regulated underground storage tanks (USTs) containing various grades of gasoline and kerosene fuel were removed from the site. Three 12,000-gallon USTs containing gasoline and one 4,000-gallon UST containing kerosene were used on site and the product was distributed through five dispenser islands. The USTs were last used on September 22, 2015, and were removed on September 22, 24, and 30, 2015. A total of twenty-eight soil samples were collected from beneath the USTs, product lines and dispenser islands and laboratory analyzed for Total Petroleum Hydrocarbons (TPH), Diesel Range Organics (DRO) and/or Gasoline Range

Organics (GRO) by EPA Methods 3550 and 5030, respectively. Sample analysis indicated petroleum impacted soils associated with the former UST system were present at the site.

A Phase II Limited Site Assessment, dated March 7, 2016, was conducted by Excel and included the installation of one (1) groundwater monitoring well and collection of one (1) soil sample. Select groundwater samples were collected and analyzed for volatile organic compounds (VOCs) via EPA Method 601/602 plus MTBE, IPE, and Naphthalene; semivolatile (SVOCs) organics by EPA Method 625; EDB by EPA Method 504.1, Lead by EPA Method 3030C, and MADEP for VPH and EPH. Select soil samples were analyzed for VOCs and SVOCs via EPA Methods 8260 and 8270 and MADEP EPH and VPH. Both soil and groundwater sample analysis detected petroleum constituents above applicable state guidelines.

To date, Excel has conducted one groundwater sampling event which has identified groundwater impact at the site. No additional information pertaining to previous releases at the site has been reviewed by Excel prior to the completion of this report.

3.0 Receptor Information

According to the receptor survey completed as part of LSA activities by Excel, no potable water supply wells were identified within 1,500-feet of the source area. According to the USGS Topographical Map for this area, the nearest surface water body is an unnamed tributary of Oak Hollow Reservoir, located approximately 2,200 feet northeast of the source area.

The area within 1,500-feet of the site is predominantly developed for commercial use. Surrounding the subject property to the north, east and west are commercial properties, and to the south is commercial property with residential properties beyond.

4.0 CSA Soil & Groundwater Sampling

In order to assess the horizontal and vertical extent of both soil and groundwater impact beneath the subject site, Excel contracted with Ransier Environmental Drilling, Incorporated (REDI) of Pinehurst, North Carolina in November 2016 for the installation of four monitoring wells as approved by the NCDEQ. In support of further delineation and subsurface investigation, Excel installed one additional monitoring well in May 2017.

4.1 Soil Assessment Activities

To support the delineation of impacted soils during this phase of the assessment, Excel collected soil samples during the installation of monitoring wells MW-2, MW-3 and MW-4. Descriptions regarding soil classification, color, geologic and/or sedimentary structures, and staining are detailed by the soil boring and monitoring well construction logs located in **Appendix A**.

A total of three soil samples (MW-2, MW-3 and MW-4) were collected on November 15, 2016 and were submitted to Shealy Environmental Services, Inc., of West Columbia, South Carolina. Sampling intervals are included in **Table 2**. All soil samples were laboratory analyzed by the following analytical methods:

- Volatile Organic Compounds (VOCs) by EPA Method 8260B.

Copies of the associated Chain-of-Custody (COC) forms for all soil samples collected by Excel during CSA activities, which were submitted for laboratory analysis, are provided in **Appendix B** of this report.

4.2 Groundwater Assessment Activities

In support of vertical and lateral delineation of groundwater impact at the site, five monitoring wells were installed at the site. On November 15, 2016, three Type II and one Type III permanent monitoring wells (MW-2, MW-3, MW-4, and VEW-1) were installed utilizing hollow-stem auger technology. On April 17, 2017, Excel installed one Type II permanent monitoring wells (MW-5) on a surrounding property utilizing solid-stem auger technology. All wells installed during CSA activities were constructed of two-inch diameter Schedule-40 PVC well casing with screen placed at varying depth intervals (refer to **Table 1** for monitoring well construction data).

The following provides a brief summary of monitoring wells previously installed at the site by Excel:

- MW-1 was installed by Excel on January 21, 2016.

Utilizing new or dedicated PVC bailers, six groundwater samples (MW-1, MW-2, MW-3, MW-4, MW-5 and VEW-1) were collected on January 21, 2016, November 18, 2016 and April 26, 2017. Each well was purged until dry or until three well volumes were removed, following which, grab samples were collected and placed into laboratory provided containers. Groundwater samples collected were submitted to Environmental Science Corporation of Mount Juliet, Tennessee. All groundwater samples were laboratory analyzed by the following analytical methods:

- VOCs via EPA Method 6200B – All groundwater samples
- MADEP VPH and LEAD via EPA Method 8260 and 8011 – MW-1.

Copies of the associated Chain-of-Custody (COC) forms for the groundwater samples collected by Excel during these CSA activities are provided in **Appendix B** of this report.

4.3 LNAPL Investigation & Recovery

During groundwater sampling activities conducted for this report, LNAPL was not encountered in any of the monitoring wells sampled. Monitoring well MW-1 has been observed to contain LNAPL with the thicknesses and dates included in **Table 3**. MW-1 is located directly at the source area (former gasoline UST), in which elevated levels of TPH-GRO were identified during UST closure activities.

4.4 Offsite Access Agreements

To assess the horizontal delineation of groundwater impact associated with the subject release, Excel issued two Right-of-Entry Agreements (ROEA) for the installation of one offsite wells. Access to install MW-5 was granted on March 14, 2017 by Grace 1 LLC, property owner of 1500 North Main Street (adjacent property to the east).

As required, Excel obtained monitoring well permits from the NCDEQ for wells installed as part of this assessment (refer to **Appendix D**).

5.0 CSA Soil & Groundwater Laboratory Results

Soil and groundwater samples have been collected at the site as described in **Section 4.0** of this report. Excel utilized the most recent version of the NCDEQ "Guidelines for Sampling" for methods of sample collection, sample preservation, chain-of-custody procedures, laboratory analysis, and for the completion of this phase of assessment activities. The subsequent sections of this report describe both soil and groundwater analytical results for samples collected during CSA activities.

5.1 Soil Sampling Results

To approximate the extent of soil impact at the site, four soil samples were collected (refer to **Figure 6**) and laboratory analyzed for the previously mentioned methods. All soil samples were found to below the Soil-to-Water MSCCs for all constituents with the exception of the soil sample collected from MW-1. MW-1 was found to exceed Soil-to-Water MSCCs for various constituents with benzene exceeding the Residential Soil Cleanup Level. However, no soil samples were found to contain concentrations above the applicable Industrial/Commercial MSCCs for any constituents. **Figure 6** and **Table 3** provide a summary of sampling locations and results. **Figure 7** provides a summary of all current and historical soil sampling locations at the site.

The extent of **Total C_9–C_{18} Aliphatics** in soils, which exceeds only the Soil-to-Water MSCCs at approximately 20-fbgs, is estimated to encompass an area of approximately 3,000-ft^2. (refer to **Figure 7**). Concentrations of **Total C_9–C_{18} Aliphatics** were below the Industrial/Commercial MSCCs for all soil samples. Estimated extent of impact is based on laboratory analytical data collected as part of this assessment. **Figure 7** provides a summary of the extent of aliphatics in the soil.

The extent of **Total C_9–C_{22} Aromatics** in soils, which exceeds only the Soil-to-Water MSCCs at approximately 20-fbgs, is estimated to encompass an area of 3,000-ft^2. (refer to **Figure 7**). Concentrations of **Total C_9–C_{22} Aromatics** were below the Industrial/Commercial MSCCs for all soil samples. Estimated extent of impact is based on laboratory analytical data collected as part of this assessment. **Figure 7** provides a summary of the extent of aromatics in the soil.

In conclusion, review of historical and current soil analytical data indicates that all soil samples were found to contain concentrations below the applicable Industrial/Commercial MSCCs for all constituents. Soils at the site are compliant with the NCDEQ's applicable cleanup levels and require no additional investigation at this time.

5.2 Groundwater Sampling Results

For completion of the CSA and in order to approximate the extent of groundwater impact at the site, six (6) groundwater samples were collected (refer to **Figure 8**) from both onsite and offsite wells and laboratory analyzed for the previously mentioned methods during the January 2016 through April 2017 sampling events. Groundwater samples collected from MW-1 and MW-2 were found to contain concentrations above the NCAC 2L levels for all constituents and above the GCL standards benzene. Monitoring well MW-1 also exceeded the GCLs for 1,2-dichloropropane during the January 2016 sampling event. Monitoring wells MW-3, MW-4 and VEW-1 were found to exceed NCAC 2L standards for various constituents and be below the Gross Contamination Levels (GCLs) for all constituents. Monitoring well MW-5 was found to be below the NCAC 2L and GCL standards for all constituents.

A review of dissolved phase groundwater concentrations indicates that the current extent of **benzene** in groundwater, which exceeds both the applicable NCAC 2L and GCL standards, is estimated to encompass an area of approximately 13,000-ft^2 and 3,744 -ft^2 in size, respectively (refer to **Figure 9**). Estimated extent of impact is based on laboratory analytical data collected as part of this assessment.

The current maximum extent of **MTBE** in groundwater, which exceeds the applicable NCAC 2L standards, is estimated to encompass an area of approximately 5,000-ft^2 in size (refer to **Figure 10**). Estimated extent of impact is based on laboratory analytical data collected as part of this assessment.

In conclusion, delineation of dissolved phase contaminants to GCL standards has been completed at the site (refer to **Figure 8** thru **Figure 10**). Review of available historical and current groundwater analytical data (refer to **Table 3**) suggests that the estimated extent of impacted groundwater, which exceeds the GCL standards, is located in the center of the subject property originating at the location of the former UST basin and spanning north and west in the down-gradient direction. Groundwater quality samples collected from MW-5, located up-gradient on the adjacent property to the east, has indicated no impact based on analytical results.

6.0 Geology & Hydrogeology Summary

Site geology was established by a review of the USGS geologic maps and from field records of field activities and geology encountered at drilling locations. It should be noted that field classification and the corresponding USCS classification is based on visual observations and not from laboratory testing of soils (i.e. grain-size analysis, liquid and plastic limits test, etc.).

6.1 Regional Geology & Hydrogeology

The subject site is located in the Central Piedmont Physiographic Province, specifically the Carolina Slate Belt, at an elevation of approximately 920-feet above mean sea level. The majority of the site is covered by fill material and rubble, and the general topography of the site is developed to slope to the north-northwest with site-specific surface drainage expected to flow towards the adjoining property to the north.

Review of groundwater hydrology data from the "Ground Water Atlas of the United States, Volume 11" indicates the major aquifer beneath the subject site is part of the Piedmont Crystalline-rock Aquifer system. The aquifer system is composed predominately of clastic rocks ranging in age from late Precambrian to early Paleozoic and underlies an area of approximately 49,000-square miles.

6.2 Site Geology & Hydrogeology

During the completion of soil borings and monitoring wells, a reddish orange to brown, silt-clay mixture was observed from grade to an average depth of approximately 55-fbgl. The type of soils observed at the drilling locations appears consistent with the surficial sediments common for this area (refer to **Figure 4** and **Figure 5** for geologic cross-sections). Soil boring and monitoring well construction logs from recent drilling activities completed by Excel are provided in **Appendix A**.

Groundwater onsite was encountered at a depth of approximately 22.4-fbgl during sampling activities conducted in January 2016 through April of 2017. The well elevation survey was reportedly initiated by Excel as part of previous assessments utilizing a relative datum of 100.00-feet. Static water levels were recorded during sampling events using an electronic water-level indicator or an oil-to-water interface probe.

Water table elevations range from a high of 78.94 at MW-5 to a low of 77.28 at MW-4 (refer to **Table 1** for current liquid level data). Based on the measured groundwater elevations, the predominant groundwater flow direction across the subject site is in a westerly direction towards monitoring well MW-4 (refer to **Figure 3** for a water table contour map).

7.0 Hydrogeologic Investigation

Two rising-head slug tests were performed for the site at monitoring wells MW-2 and MW-3 to estimate the hydrogeologic properties at the site. The tests were conducted by submersing a

PVC bailer into the water column, bailing the well dry, and measuring the water level as it returns to the equilibrium point at specific time intervals. The water level changes were measured as a function of time using an electronic water-level meter.

Subsequently, the data from the tests was analyzed using AQTESOLV® (Hydrosolve, 1998) by the Theis Method (1976) for unconfined aquifers. The average value of hydraulic conductivity (K) estimated by this program was 1.39×10^{-4} ft/min or 0.201-ft/day (average of MW-2 and MW-3). The final reports which display the response curves are included in the **Appendix E**.

Assuming an effective porosity (n) of 0.25 (for silty clays), the rate of ground water movement was computed using the following equation:

$$V = \left(\frac{K}{n}\right)\left(\frac{dh}{dl}\right)$$

Where; V = velocity (ft/day)
K = hydraulic conductivity (0.201-ft/day)
n = effective porosity [assumed to be 0.25, (25%)]
dh/dl = hydraulic gradient (average 0.0064-ft/ft)

Using the referenced equation, the groundwater flow across the impacted area is estimated to be approximately 0.0051-ft/day or 1.86-ft/year. Based on this data, the lateral migration of dissolved petroleum constituents appears to be limited by the local geological/hydrogeological conditions. This is consistent with the apparent extent of soil and groundwater impact being contained on site and primarily within the source area, as defined in previous sections of this report.

8.0 Conclusions

Based on the results of current and past assessments performed at the site, various soil samples collected by Excel reveal constituents above the applicable Soil-to-Water MSCCs for select constituents. However, no soil samples were found to contain concentrations above the applicable Industrial/Commercial MSCCs for any constituents (refer to **Table 2**).

Review of current and historical soil analytical data (refer to **Table 2**) indicates that soil samples were found to contain concentrations below the applicable Industrial/Commercial MSCCs for all constituents. Soils at the site are compliant with the NCDEQ's applicable cleanup levels and require no additional investigation at this time.

Review of groundwater analytical data indicates that samples collected from monitoring wells MW-1 and MW-2 were found to exceed NCAC 2L standards for all constituents and the GCLs for **benzene**. Monitor well MW-1 was also found to exceed the GCLs for **1,2-dichloropropane** (refer to **Table 3**). Monitoring wells MW-3, MW-4 and VEW-1 were found to exceed NCAC 2L standards for various constituents and were found to be below the GCLs for all constituents. Monitoring well MW-5 was found to be below the NCAC 2L and GCL standards for all constituents (refer to **Table 3**).

Review of historical and current groundwater analytical data suggests that the estimated extent of impacted groundwater, which exceeds the GCL standards, is located in the center of the subject property originating at the location of the former UST basin and spanning north and west in the down-gradient direction (refer to **Figure 8** thru **Figure 10**). A review of groundwater quality data from samples collected from monitoring well MW-5, located up-gradient on the adjacent property to the west, did not exhibit constituents above agency standards. The estimated extent of groundwater impact is discussed in more detail in **Section 5.2** of this report.

9.0 Recommendations

Based on a review of the information in this report, Excel recommends the following:

- We recommend the development of a remediation strategy by completion of a Corrective Action Plan (CAP) which should incorporate restoring groundwater quality to the applicable standards using monitored natural attenuation.

10.0 References

Driscoll, Groundwater and Wells, 2nd edition, (St. Paul, Minnesota, Johnson Division), p. 219.

R. Perry and C. Chilton, Chemical Engineer's Handbook, 5th edition, (New York: McGraw Hill, Inc. 1973), p. 5-18.

"Guidelines for Assessment and Corrective Action for UST Releases" completed by the UST Section of the NCDEQ, Division of Waste Management dated July 15, 2008 with subsequent revisions.

"UST Closure Assessment Report" completed by Excel, dated October 20, 2015.

"Phase I Limited Site Assessment Report" completed by Excel, dated February 25, 2016.

11.0 Limitations

This report is based on a limited number of soil and groundwater samples and chemical analyses. The conclusions presented in this report are based only on the observation made during this investigation and on data provided by others. The report presents a description of the subsurface conditions observed at each boring and well location during this investigation. Subsurface conditions may vary significantly with time, particularly with respect to groundwater elevations and quality. Conclusions and recommendations set forth herein are applicable only to the observations, facts and conditions described at the time of this report.

In performing its professional services, Excel uses that degree of care and skill exercised under similar circumstances by members of the environmental profession practicing at the same or similar locality under similar conditions. The standard of care shall be judged exclusively as of the time these services are rendered and not according to later standards. Excel makes no express or implied warranty beyond its conformance to this standard. Excel shall not be responsible for conditions or consequences arising from the relevant facts that were concealed, withheld or not fully disclosed for this report. Excel believes that all information contained in this report is factual, but no guarantee is made or implied.

LIST OF TABLES

TABLE 1 – MONITORING WELL CONSTRUCTION DATA

TABLE 2 –SOIL SUMMARY DATA

TABLE 3 –GROUNDWATER SUMMARY AND LIQUID LEVEL DATA

Table 1 - Monitor Well Construction Data
Sam's Mart No. 782
1401 N. Main Street
High Point, North Carolina
Excel Project No. 2015059

WELL NUMBER	DATE INSTALLED	WELL DEPTH (ft)	SCREEN INTERVAL (ft)	TOC (ft)	DATE MEASURED	DTP (ft)	DTW (ft)	WTE (ft)
MW-1	1/21/16	35	25' - 35'	100.00	11/18/16	--	22.30	77.70
MW-2	11/15/16	30	15' - 30'	98.84	11/18/16	--	20.93	77.91
MW-3	11/15/16	30	15' - 30'	99.71	11/18/16	--	22.42	77.29
MW-4	11/15/16	30	15' - 30'	98.53	11/18/16	--	21.25	77.28
MW-5	4/17/17	30	15' - 30'	98.06	5/16/17	--	19.12	78.94
VEW-1	11/15/16	55	50' - 55'	100.14	11/18/16	--	28.48	71.66

NOTES:
Data provided in feet unless othwise noted
DTW - Depth to Water
WTE - Water Table Elevation
ft - feet

Table 2 - Soil Summary Data
Sam's Mart No. 782
1401 N. Main Street
High Point, North Carolina
Excel Project No. 2015059

	SAMPLE LOCATION	MW-1	MW-2	MW-3	MW-4	Soil-to-Water MSCCs	Residential Soil Cleanup Levels	*Industrial / Commercial Soil Cleanup Levels*
		18-20 FBGL	15 FBGL	15 FBGL	15 FBGL			
	DATE SAMPLED	21-Jan-16	15-Nov-16					
MADEP	VPH C_5 - C_8 Aliphatics	2,950	NA			68	939	*24,528*
MADEP	VPH C_9 - C_{12} Aliphatics	3,770				--	--	--
MADEP	VPH C_9 - C_{10} Aromatics	1,710 V				--	--	--
MADEP	TOTAL C_9 - C_{18} Aliphatics	3,770				540	1,500	*40,000*
MADEP	TOTAL C_9 - C_{22} Aromatics	1,710 V				31	469	*12,264*
VOCs	BENZENE	33.1	< 0.0027	< 0.0023	< 0.0027	0.0056	18	*164*
VOCs	TOLUENE	883	< 0.0027	0.0047 J	< 0.0027	4.3	1,200	*32,000*
VOCs	ETHYLBENZENE	276	< 0.0027	< 0.0023	< 0.0027	4.9	1,560	*40,000*
VOCs	XYLENES	1,420	< 0.0054	< 0.0046	< 0.0055	4.6	3,129	*81,760*
VOCs	MTBE	< 0.0174	< 0.0027	< 0.0023	< 0.0027	0.091	350	*3,100*
VOCs	DI-ISOPROPYL ETHER	< 0.0203	< 0.0027	< 0.0023	< 0.0027	0.37	156	*4,088*
VOCs	NAPHTHALENE	70.4	< 0.0027	< 0.0023	< 0.0027	0.16	313	*8,176*
VOCs	ACETONE	< 0.82	0.012 J	0.015 J	< 0.0055	24	14,000	*360,000*
VOCs	n-BUTYLBENZENE	13.5	< 0.0027	< 0.0023	< 0.0027	4.3	626	*16,350*
VOCs	sec-BUTYLBENZENE	7.18 J6	< 0.0027	< 0.0023	< 0.0027	3.3	626	*16,350*
VOCs	tert-BUTYLBENZENE	< 0.0169	< 0.0027	< 0.0023	< 0.0027	3.4	626	*16,350*
VOCs	DICHLORODIFLUOROMETHANE	< 0.0585	< 0.0027	< 0.0023	< 0.0027	210	3,129	*81,760*
VOCs	1.2-DICHLOROETHANE	< 0.0217	< 0.0027	< 0.0023	< 0.0027	0.0019	7	*63*
VOCs	ISOPROPYLBENZENE	22.2 V	< 0.0027	< 0.0023	< 0.0027	1.7	1,564	*40,880*
VOCs	p-ISOPROPYLTOLUENE	2.71	< 0.0027	< 0.0023	< 0.0027	0.12	100	*4,000*
VOCs	n-PROPYBENZENE	102	< 0.0027	< 0.0023	< 0.0027	1.7	626	*16,350*
VOCs	TRICHLOROFLUOROMETHANE	< 0.0313	< 0.0027	< 0.0023	< 0.0027	29	4,692	*122,640*
VOCs	1,2,4-TRIMETHYLBENZENE	595	< 0.0027	< 0.0023	< 0.0027	8.5	782	*20,440*
VOCs	1,3,5-TRIMETHYLBENZENE	161	< 0.0027	< 0.0023	< 0.0027	8.5	782	*20,440*
VOCs	2-BUTANONE (MEK)	< 0.384	< 0.0054	< 0.0046	< 0.0055	16	9,385	*245,280*
VOCs	STRYENE	< 0.0192	< 0.0027	< 0.0023	< 0.0027	1.5	3,128	*81,760*

NOTES:
Data in mg/kg
FBGL - Feet Below Grade Level
MADEP - Massachusetts Dept. of Environmental Protection
VPH - Volatile Petroleum Hydrocarbons
VOC - Volatile Organic Compound
MTBE - Methyl Tert Butyl Ether
NA- Not Analyzed
J - Reported value is an estimate
J6 - Sample matrix interfered with ability to make any accurate determination; spike value low
V - Sample concentration too high to evaluate accurate spike recoveries
Bold data represents constituents above Soil-to-Water MSCCs (Maximum Soil Contaminant Concentrations)
Highlighted data represent constituents above Residential Soil Cleanup Levels
Italicized data represent constituents above Industrial / Commercial Soil Cleanup Levels

Table 3 - Groundwater Summary and Liquid Level Data
Sam's Mart No. 782
1401 N. Main Street
High Point, North Carolina
Excel Project No. 2015059

	SAMPLE LOCATION	MW-1	MW-2	MW-3	MW-4	VEW-1	MW-5	NCAC 2L	GCL
	DATE SAMPLED	27-Jan-16	18-Nov-16				26-Apr-17		
MADEP	VPH C_5 - C_8 Aliphatics	72,100	NA				NA	400	--
	VPH C_9 - C_{12} Aliphatics	16,900						--	--
	VPH C_9 - C_{10} Aromatics	4,640 J						--	--
	TOTAL C_9 - C_{18} Aliphatics	16,900						700	--
	TOTAL C_9 - C_{22} Aromatics	4,640 J						200	--
VOCs	BENZENE	21,200	8,900	79	< 8	120	< 0.331	1	5,000
	TOLUENE	72,200	65,000	3,300	30	620	< 0.412	600	260,000
	ETHYLBENZENE	4,170	5,300	1,500	290	47	< 0.384	600	84,500
	TOTAL XYLENES	19,480	26,700	7,700	1,120	212	< 1.06	500	85,500
	MTBE	533 J	< 200	23 J	< 8	< 4	< 0.367	20	20,000
	NAPHTHALENE	1,020 J	610	260	69	< 4	< 1	6	6,000
	N-PROPYLBENZENE	524 J	510	260	410	6.9	< 0.349	70	30,000
	1,2-DICHLOROPROPANE	1,090	< 200	< 20	< 8	< 4	< 0.306	0.6	600
	1,2,4-TRIMETHYLBENZENE	3,220	3,100	2,000	1,600	22	< 0.373	400	28,500
	1,3,5-TRIMETHYLBENZENE	843 J	680	370	< 8	6.6	< 0.387	400	25,000
	BROMODICHLOROMETHANE	< 380	< 200	< 20	< 8	8.1	< 0.380	--	--
	SEC-BUTYLBENZENE	< 365	< 200	< 20	50	< 4	< 0.365	70	8,500
	CHLOROFORM	< 324	< 200	< 20	< 8	51	< 0.324	70	70,000
	ISOPROPYLBENZENE	< 326	230 J	100	100	< 4	< 0.326	70	25,000
	P-ISOPROPYLTOLUENE	< 350	< 200	< 20	29	< 4	< 0.350	25	11,700
	STYRENE	< 307	370	< 20	< 8	< 4	< 0.307	70	70,000
	DI-ISOPROPYL ETHER	4,200	< 200	< 20	< 8	< 2	< 0.320	70	70,000
	TERT-AMYL ALCOHOL (TAA)	NA	4,300 J	< 400	< 160	83 J	< 4..9	40	40,000
	TERT-AMYL METHYL ETHER (TAME)	NA	< 200	< 20	< 8	3.6 J	< 0.260	128	128,000
	LEAD	3.87 J	NA				NA	15	15,000

	Well ID	Date Measured	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)
Liquid Level Data	MW-1	2/18/2016	19.46	19.80	0.34
		11/15/2016	21.92	23.22	1.30
		11/18/2016	22.21	22.31	0.10
		12/22/2016	21.89	22.01	0.12

NOTES:

Data in ug/l
Bold data represents constituents above NCAC 2L Standards
Highlighted data represent constituents above GCL Standards

MADEP - Massachusetts Dept. of Environmental Protection
VOC - Volatile Organic Compound
VPH - Volatile Petroleum Hydrocarbons

MTBE - Methyl Tert Butyl Ether
NA - Not Analyzed
J - Reported value is an estimate

LIST OF FIGURES

FIGURE 1 - SITE VICINITY MAP

FIGURE 2 - SITE PLAN AND FORMER OPERATIONS

FIGURE 3 - WATER TABLE CONTOUR MAP

FIGURE 4 - A/A' GEOLOGIC CROSS-SECTION

FIGURE 5 - B/B' GEOLOGIC CROSS-SECTION

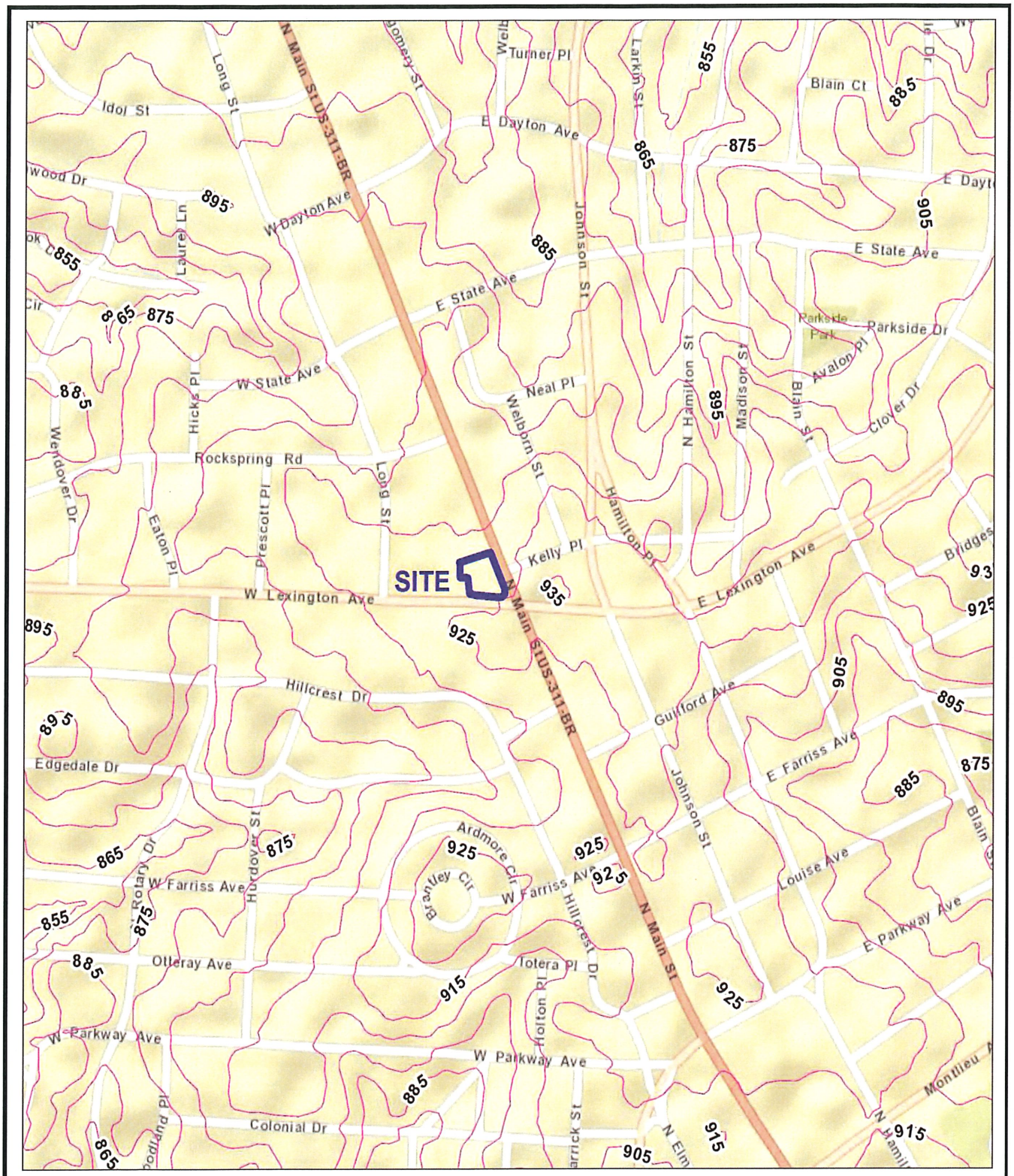
FIGURE 6 – SOIL CONSTITUENTS MAP

FIGURE 7 – ALIPHATICS & AROMATICS IN SOILS MAP

FIGURE 8 - GROUNDWATER CONSTITUENTS MAP

FIGURE 9 – BENZENE IN GROUNDWATER MAP

FIGURE 10 - MTBE IN GROUNDWATER MAP



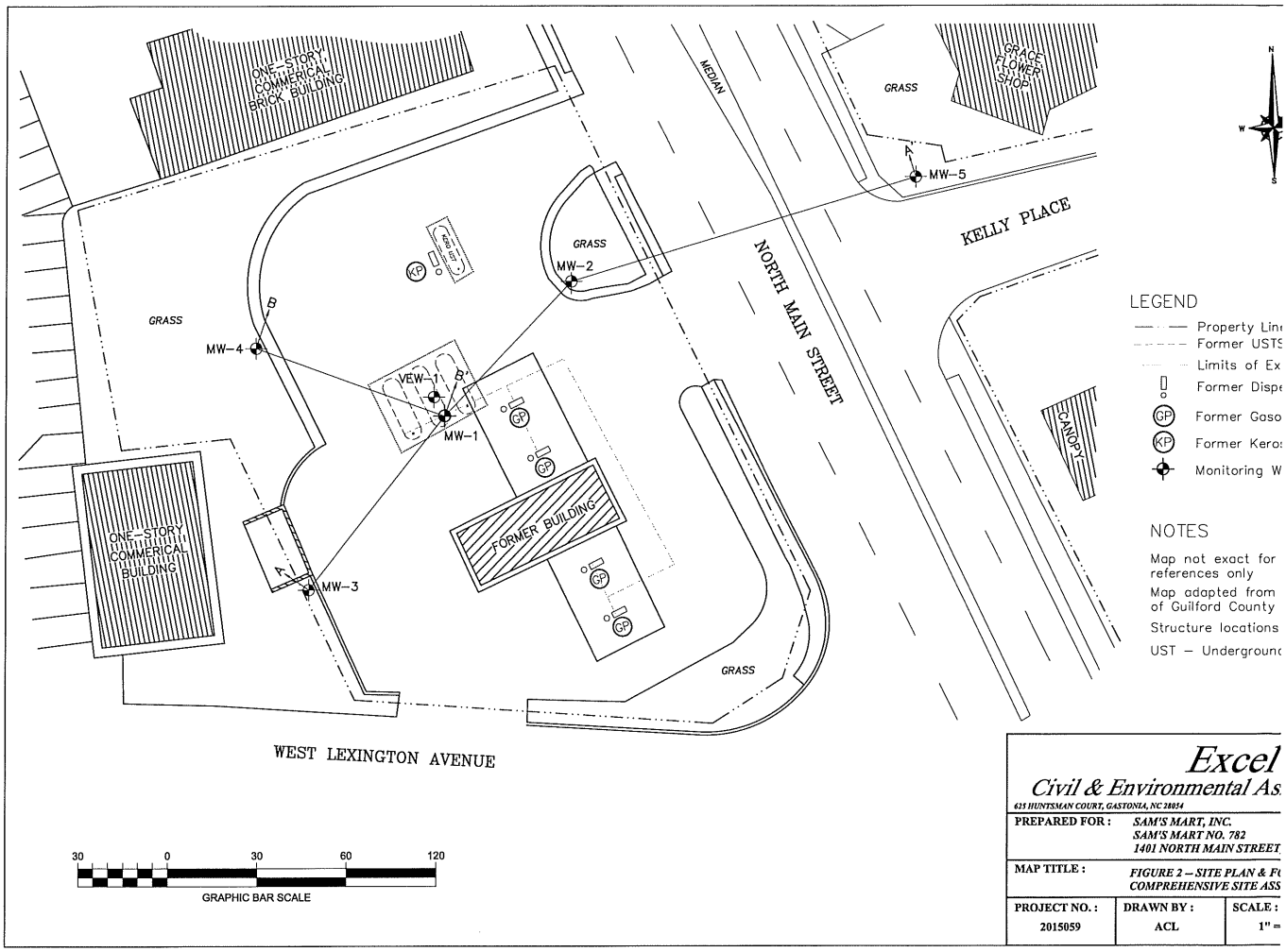
EXCEL CIVIL & ENVIRONMENTAL
ASSOCIATES, PLLC
625 HUNTSMAN COURT
GASTONIA, NC 28054
(704) 853-0800

FIGURE 1 – SITE VICINITY MAP

Excel Project Number 2015059

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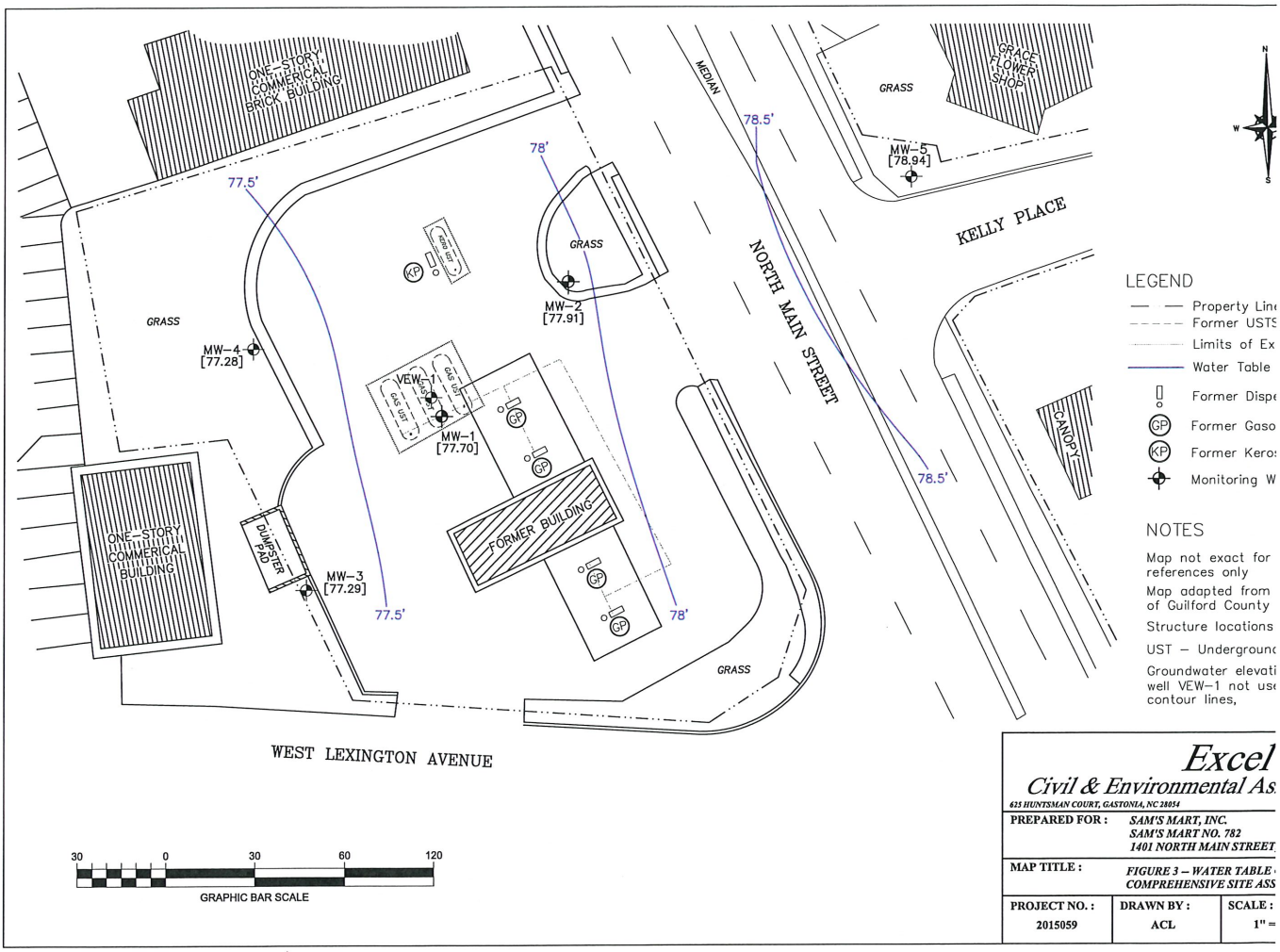
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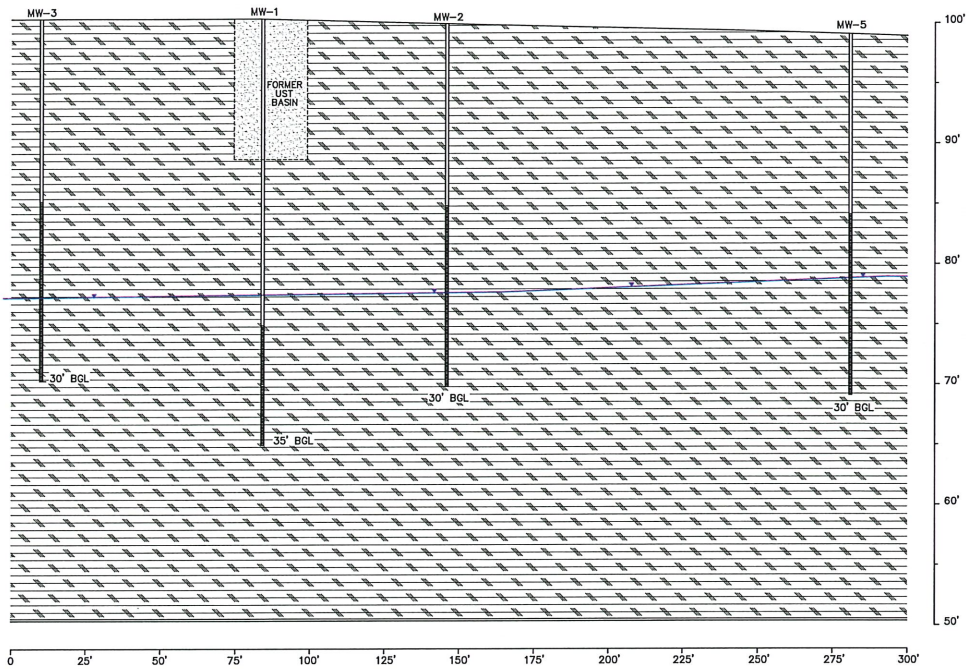
Civil & Environmental As

625 HUNTSMAN COURT, GASTONIA, NC 28054

PREPARED FOR :	*SAM'S MART, INC.* *SAM'S MART NO. 782* *1401 NORTH MAIN STREET*
MAP TITLE :	*FIGURE 2 – SITE PLAN & FI* *COMPREHENSIVE SITE ASS*

PROJECT NO. :	DRAWN BY :	SCALE :
2015059	ACL	1" =


ONE-STORY COMMERICAL BRICK BUILDING
GRASS
MW-4 [77.28]
MW-2 [77.91]
MW-5 [78.94]
MW-1 [77.70]
VEW-1
MW-3 [77.29]
77.5'
78'
78.5'
MEDIAN
NORTH MAIN STREET
KELLY PLACE
GRACE FLOWER SHOP
CANOPY
FORMER BUILDING
DUMPSTER PAD
ONE-STORY COMMERICAL BUILDING
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Structure locations
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Civil & Environmental As
625 HUNTSMAN COURT, GASTONIA, NC 28054
PREPARED FOR : SAM'S MART, INC.
SAM'S MART NO. 782
1401 NORTH MAIN STREET
MAP TITLE : FIGURE 3 – WATER TABLE
COMPREHENSIVE SITE ASS
PROJECT NO. : 2015059
DRAWN BY : ACL
SCALE : 1" =



LEGEND:

- Silt/Clay Mixture (CL – Native)
- Silt/Clay Mixture (CL – Backfill)
- Water Table Elevation

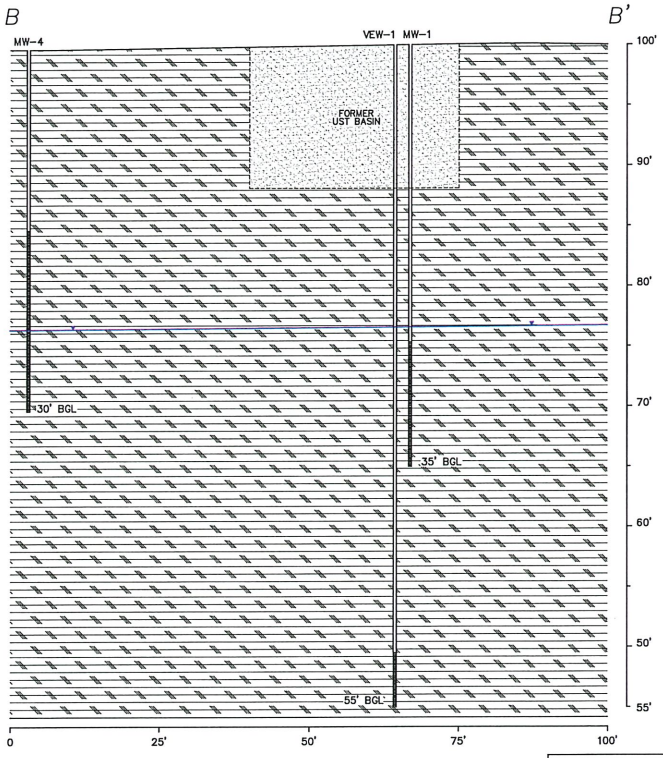
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Civil & Environmental Associates, PLI

302 SOUTH CHURCH ST., GASTONIA, NC *PHONE : (78*

PREPARED FOR :	*SAM'S MART, INC.* *SAM'S MART NO. 782* *1401 NORTH MAIN STREET, HIGH POINT, NC*
MAP TITLE :	*FIGURE 4 - A/A' CROSS SECTION* *COMPREHENSIVE SITE ASSESSMENT REPORT*

PROJECT NO. :	EDITED BY :	SCALE :	DATE :
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LEGEND:

- Silt/Clay Mixture (CL – Native)
- Silt/Clay Mixture (CL – Backfill)
- Water Table Elevation

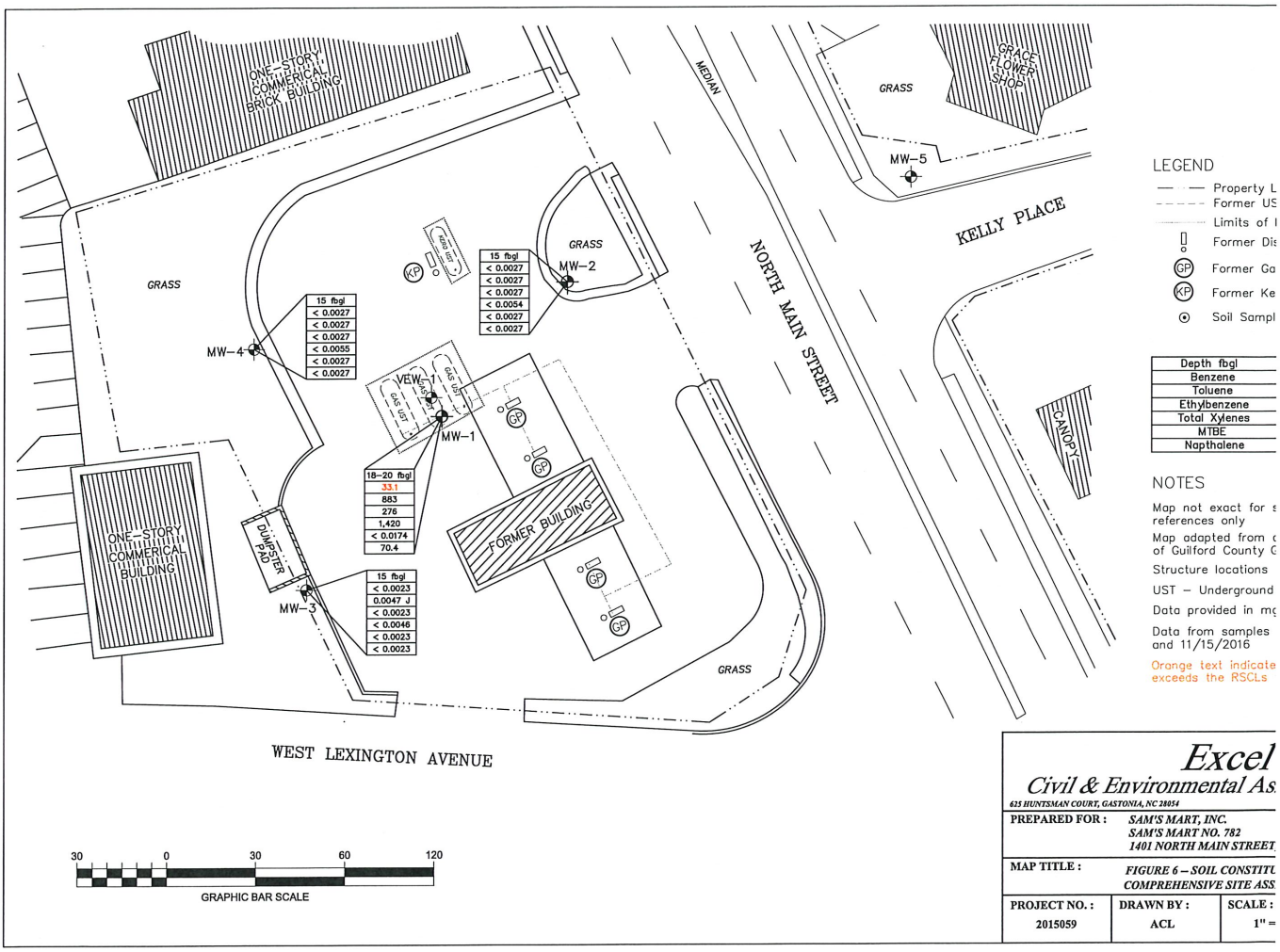
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PREPARED FOR :	*SAM'S MART, INC.* *SAM'S MART NO. 782* *1401 NORTH MAIN STREET, HIGH POINT, NC*
MAP TITLE :	*FIGURE 5 - B/B' CROSS SECTION* *COMPREHENSIVE SITE ASSESSMENT REPORT*

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Depth fbgl
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Map adapted from
of Guilford County

Structure locations

UST – Underground

Data provided in m

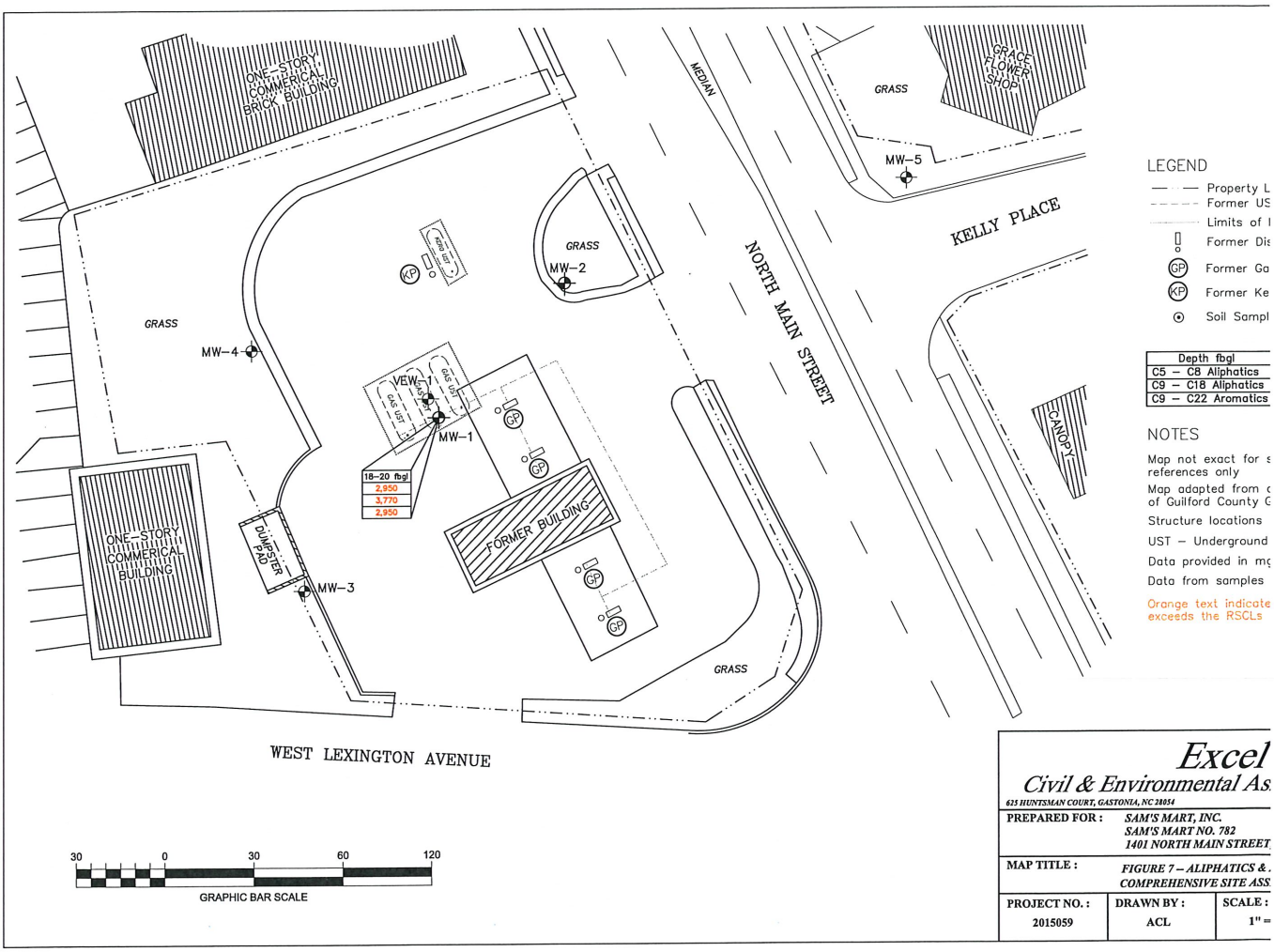
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Orange text indicate
exceeds the RSCLs

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Civil & Environmental As
625 HUNTSMAN COURT, GASTONIA, NC 28054

PREPARED FOR :	*SAM'S MART, INC.* *SAM'S MART NO. 782* *1401 NORTH MAIN STREET*
MAP TITLE :	*FIGURE 6 – SOIL CONSTITU* *COMPREHENSIVE SITE ASS*

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Depth fbgl
C5 – C8 Aliphatics
C9 – C18 Aliphatics
C9 – C22 Aromatics

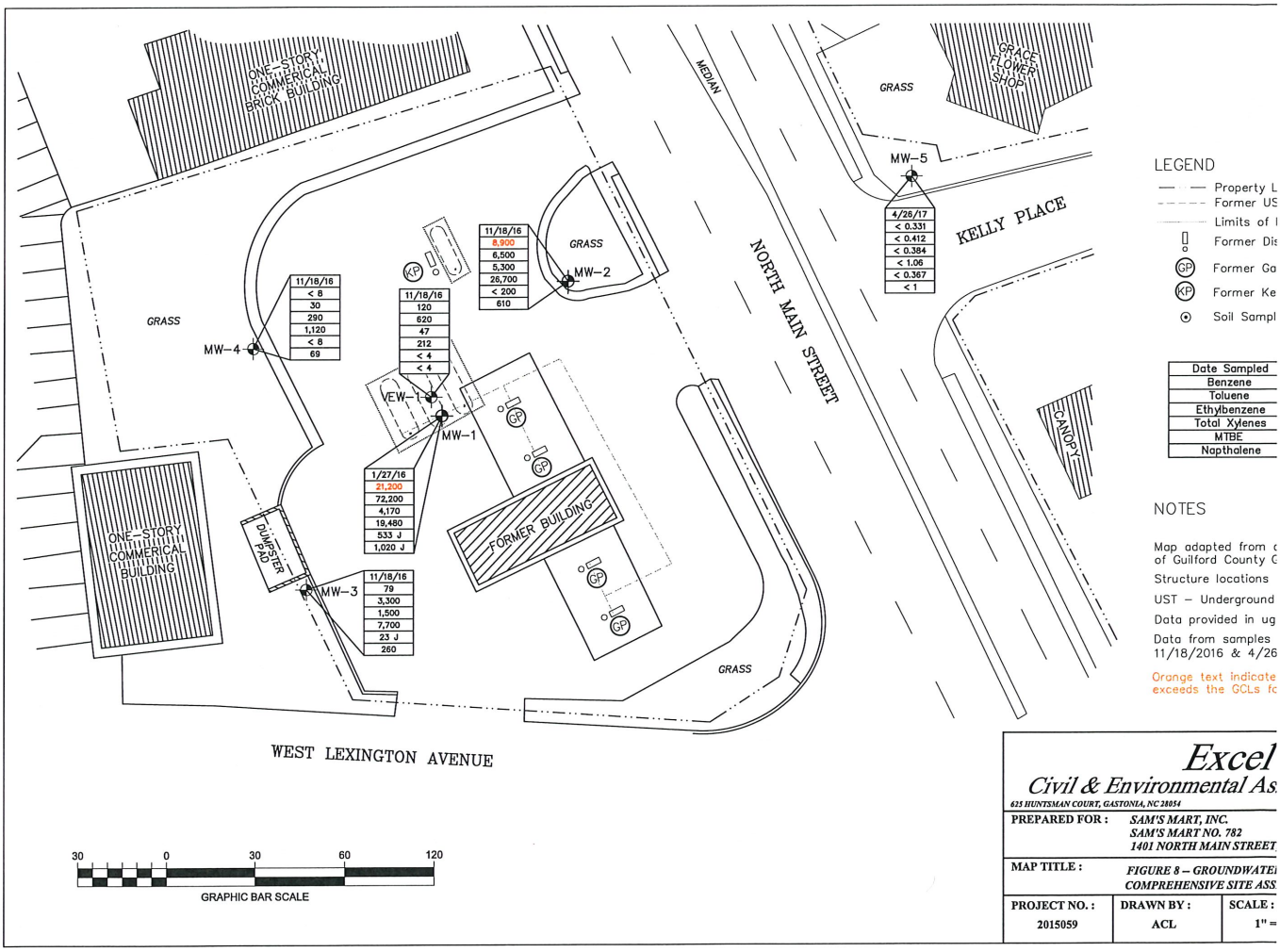
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Map not exact for s
references only
Map adapted from
of Guilford County G
Structure locations
UST – Underground
Data provided in mg
Data from samples
Orange text indicate
exceeds the RSCLs

Excel
Civil & Environmental As
625 HUNTSMAN COURT, GASTONIA, NC 28054

PREPARED FOR :	*SAM'S MART, INC.* *SAM'S MART NO. 782* *1401 NORTH MAIN STREET*
MAP TITLE :	*FIGURE 7 – ALIPHATICS &* *COMPREHENSIVE SITE ASS*

PROJECT NO. :	DRAWN BY :	SCALE :
2015059	ACL	1" =



LEGEND

— · — Property L
– – – – Former US
····· Limits of
Former Dis
GP Former Ga
KP Former Ke
Soil Sampl

Date Sampled
Benzene
Toluene
Ethylbenzene
Total Xylenes
MTBE
Napthalene

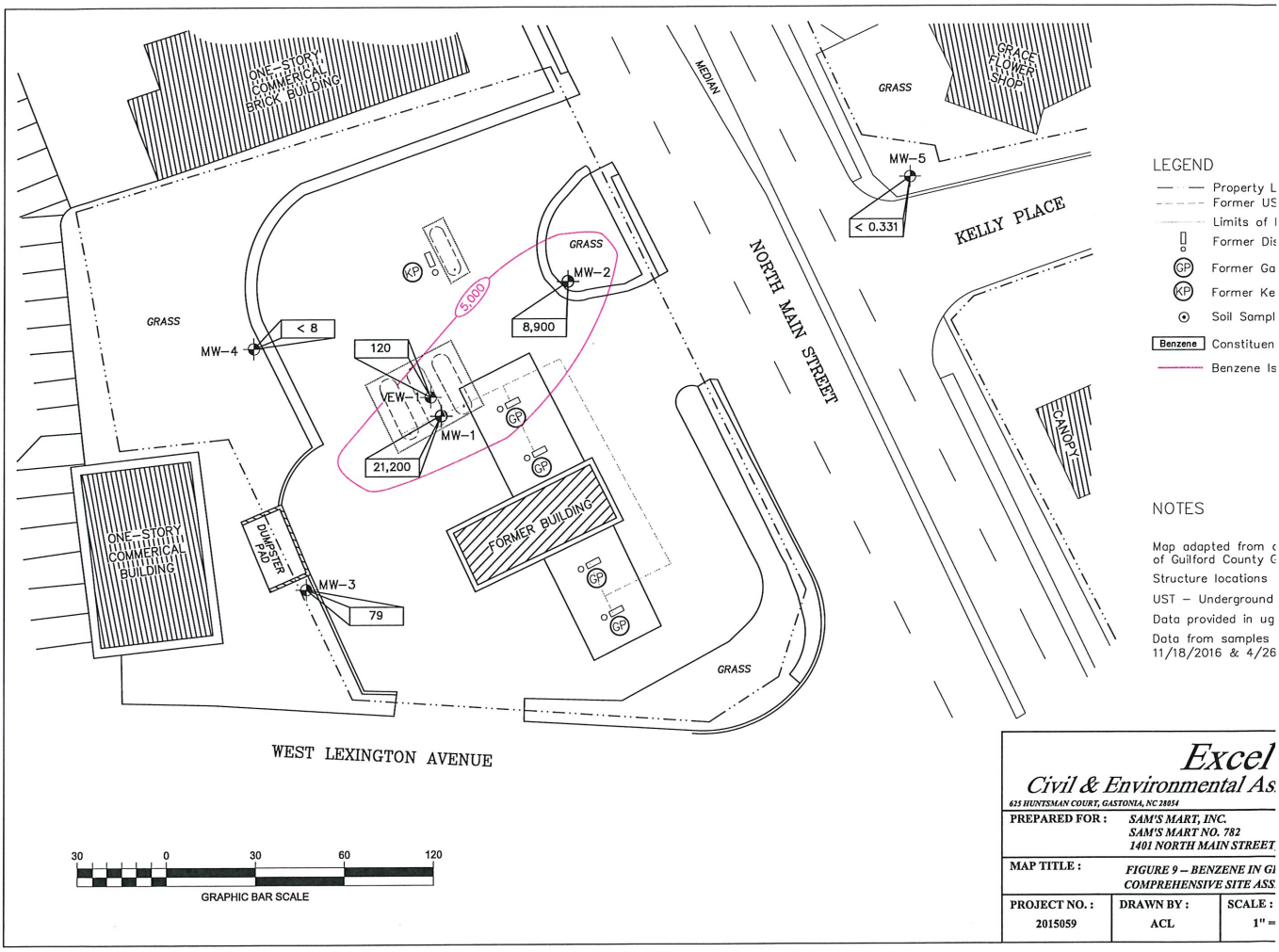
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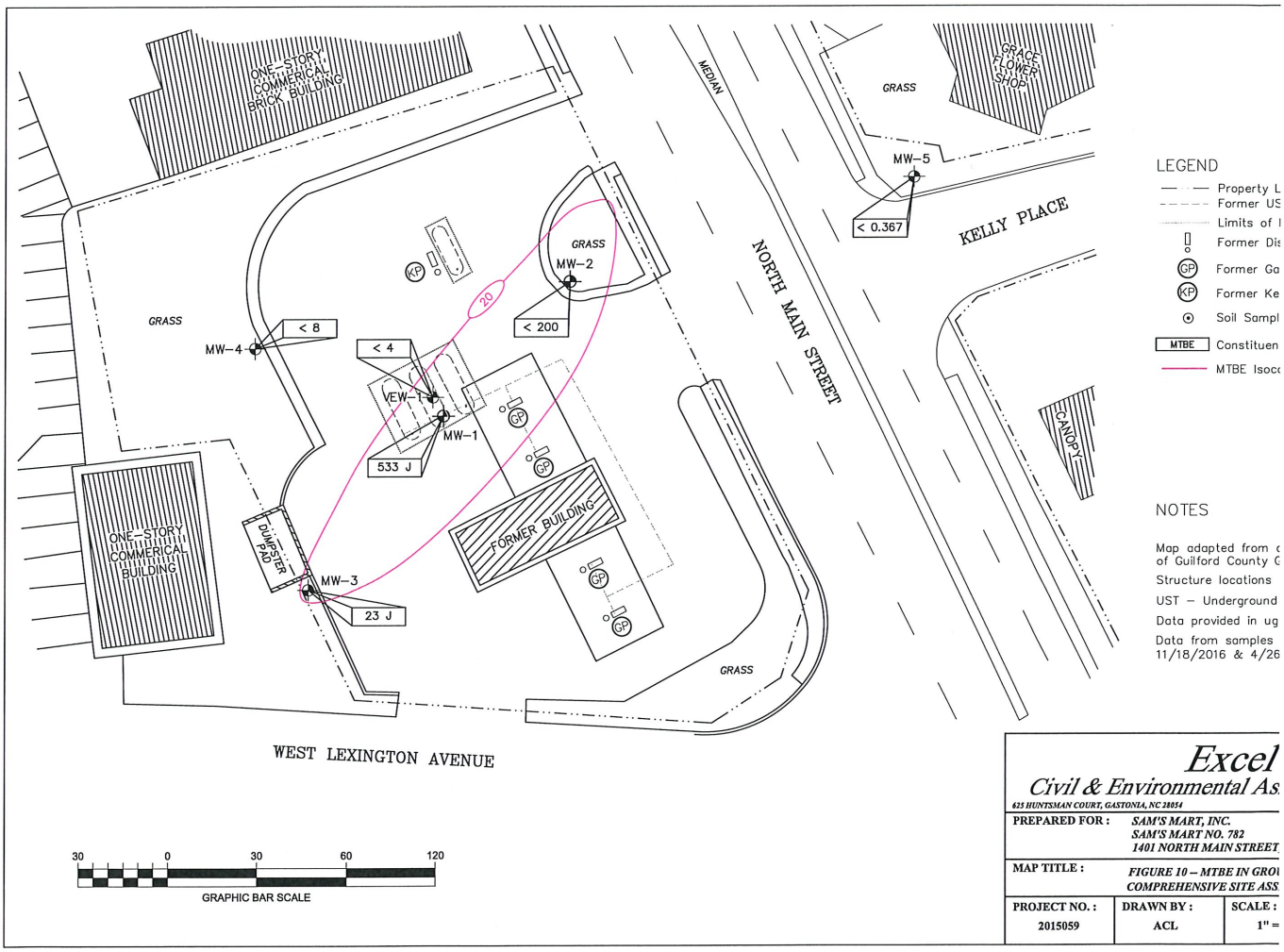
Map adapted from
of Guilford County
Structure locations
UST – Underground
Data provided in ug
Data from samples
11/18/2016 & 4/26
Orange text indicate
exceeds the GCLs fo

Excel
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PREPARED FOR :	*SAM'S MART, INC.* *SAM'S MART NO. 782* *1401 NORTH MAIN STREET*
MAP TITLE :	*FIGURE 8 – GROUNDWATE* *COMPREHENSIVE SITE ASS*

PROJECT NO. :	DRAWN BY :	SCALE :
2015059	ACL	1" =


ONE-STORY COMMERICAL BRICK BUILDING
GRASS
MEDIAN
GRASS
GRACE FLOWER SHOP
MW-5
< 0.331
KELLY PLACE
NORTH MAIN STREET
GRASS
MW-2
8,900
5,000
KP
GRASS
< 8
MW-4
120
VEW-1
MW-1
21,200
GP
GP
FORMER BUILDING
GP
GP
CANOPY
ONE-STORY COMMERICAL BUILDING
DUMPSTER PAD
MW-3
79
GRASS
WEST LEXINGTON AVENUE
30
0
30
60
120
GRAPHIC BAR SCALE
LEGEND
Property L
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NOTES
Map adapted from
of Guilford County
Structure locations
UST – Underground
Data provided in ug
Data from samples
11/18/2016 & 4/26
Excel
Civil & Environmental As
625 HUNTSMAN COURT, GASTONIA, NC 28054
PREPARED FOR : SAM'S MART, INC.
SAM'S MART NO. 782
1401 NORTH MAIN STREET
MAP TITLE : FIGURE 9 – BENZENE IN GI
COMPREHENSIVE SITE ASS
PROJECT NO. : 2015059
DRAWN BY : ACL
SCALE : 1" =


ONE-STORY COMMERICAL BRICK BUILDING
GRASS
MW-4
< 8
< 4
VEW-1
MW-1
533 J
20
MW-2
< 200
MEDIAN
NORTH MAIN STREET
GRASS
GRACE FLOWER SHOP
MW-5
< 0.367
KELLY PLACE
CANOPY
FORMER BUILDING
DUMPSTER PAD
MW-3
23 J
ONE-STORY COMMERICAL BUILDING
GRASS
WEST LEXINGTON AVENUE
30 0 30 60 120
GRAPHIC BAR SCALE
LEGEND
Property L
Former US
Limits of
Former Dis
Former Ga
Former Ke
Soil Sampl
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Constituen
MTBE Isoc
NOTES
Map adapted from
of Guilford County
Structure locations
UST – Underground
Data provided in ug
Data from samples
11/18/2016 & 4/26
Excel
Civil & Environmental As
625 HUNTSMAN COURT, GASTONIA, NC 28054
PREPARED FOR : SAM'S MART, INC.
SAM'S MART NO. 782
1401 NORTH MAIN STREET
MAP TITLE : FIGURE 10 – MTBE IN GRO
COMPREHENSIVE SITE ASS
PROJECT NO. : 2015059
DRAWN BY : ACL
SCALE : 1" =

List of Appendices

Appendix A - Monitoring Well Construction Records

Appendix B - Laboratory Reports & COC Forms

Appendix C - Right-of-Entry & Encroachment Agreements

Appendix D - Monitoring Well Permits

Appendix E - Rising-Head Slug Test Report

Appendix F - Public Notification Information

APPENDIX A

MONITORING WELL CONSTRUCTION RECORDS

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Bryan Vest

Well Contractor Name

3580

NC Well Contractor Certification Number

Ransier Environmental Drilling, Inc.

Company Name

2. Well Construction Permit#: _____

List all applicable well permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 11/15/16 **Well ID#** MW-2, 3, 4

5a. Well Location:

Sam's Mart # 782

Facility/Owner Name

Facility ID# (if applicable)

1401 N main St High Point

Physical Address, City, and Zip

Guilford

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees (if well field, one lat/long is sufficient)

35 58.24 N 80 01.04 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 3

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 30 (ft.)

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 21 (ft.)

If water level is above casing, use "+"

11. Borehole diameter: 6" (in.)

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	15 ft.	2 in.	sch 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
15 ft.	30 ft.	2 in.	010	sch 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	11 ft.	neat cement	tremmie
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
13 ft.	30 ft.	medium quartz	pour
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	30 ft.	red silty clay
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Bryan Vest — 11/21/16

Signature of Certified Well Contractor — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Bryan Vest

Well Contractor Name

3580

NC Well Contractor Certification Number

Ransier Environmental Drilling, Inc.

Company Name

2. Well Construction Permit#: _____

List all applicable well permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 11/15/16 **Well ID#** VEW-1

5a. Well Location:

Sam's Mart # 782

Facility/Owner Name

Facility ID# (if applicable)

1401 N main St High Point

Physical Address, City, and Zip

Guilford

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees (if well field, one lat/long is sufficient)

35 58.24 N 80 01.04 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

For multiple injection or non-water supply wells ONLY with the same construction, you can submit one form.

9. Total well depth below land surface: 55 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 31 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 8/5 **(in.)**

12. Well construction method: auger/mud

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	40 ft.	5 in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	50 ft.	2 in.	sch 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
50 ft.	55 ft.	2 in.	010	sch 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	46 ft.	neat cement	tremmie
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
48 ft.	55 ft.	medium quartz	pour
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	17 ft.	red silty clay
17 ft.	19 ft.	red silty clay w/gravel
19 ft.	55 ft.	red silty clay
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

22. Certification:

Bryan Vest 11/21/16

Signature of Certified Well Contractor Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Michael T. Stanforth, P.E.

Well Contractor Name

2525

NC Well Contractor Certification Number

Excel Civil & Environmental Associates, PLLC

Company Name

2. Well Construction Permit #: 001-16-MW5-RW0

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/17/2017 **Well ID#** MW-5

5a. Well Location:

Sam's Mart 782 — Facility/Owner Name

00-0-0000013106 — Facility ID# (if applicable)

1401 North Main Street, High Point, NC 27262

Physical Address, City, and Zip

Guilford — County

6891807782 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35.973693 N 80.017596 W

6. Is (are) the well(s): ☑Permanent or ☐Temporary

7. Is this a repair to an existing well: ☐Yes or ☑No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the same construction, you can submit one form.*

9. Total well depth below land surface: 30 (ft.)

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 19.12 (ft.)

If water level is above casing, use "+"

11. Borehole diameter: 2 (in.)

12. Well construction method: Auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
19.12 ft.	30 ft.	MW-5
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	15 ft.	2 in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
15 ft.	30 ft.	2 in.			
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	13 ft.	grout	
13 ft.	15 ft.	bentonite	
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
15 ft.	30 ft.	medium quartz	
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	30 ft.	Reddish brown silty clay
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

Water encountered at approximately 19 feet below ground surface

22. Certification:

Signature of Certified Well Contractor — Date 5/2/17

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

APPENDIX B

LABORATORY REPORTS & COC FORMS

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

Excel Civil & Environmental Associates, PLLC
PO Box 6172
Gastonia, NC 28056-6000
Attention: Michael Stanforth

Project Name: **Sam's Mart 782**

Project Number: **2015059**

Lot Number: **RK16085**

Date Completed: **11/25/2016**

Lucas Odom
Project Manager

This report shall not be reproduced, except in its entirety, without the written approval of Shealy Environmental Services, Inc.

The following non-paginated documents are considered part of this report: Chain of Custody Record and Sample Receipt Checklist.

Case Narrative
Excel Civil & Environmental Associates, PLLC
Lot Number: RK16085

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved NELAC standards, the Shealy Environmental Services, Inc. ("Shealy") Quality Assurance Management Plan (QAMP), standard operating procedures (SOPs), and Shealy policies. Any exceptions to the NELAC standards, the QAMP, SOPs or policies are qualified on the results page or discussed below.

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

VOCs by GC/MS

Due to matrix interferences, sample -003 has been analyzed at a 100X dilution. The sample was initially analyzed at a lesser dilution causing QC and instrumentation issues.

SHEALY ENVIRONMENTAL SERVICES, INC.

Sample Summary

Excel Civil & Environmental Associates, PLLC

Lot Number: RK16085

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MW-2-15	Solid	11/15/2016 1026	11/16/2016
002	MW-3-15	Solid	11/15/2016 1120	11/16/2016
003	MW-4-15	Solid	11/15/2016 1320	11/16/2016

(3 samples)

Executive Summary

Excel Civil & Environmental Associates, PLLC

Lot Number: RK16085

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MW-2-15	Solid	Acetone	8260B	12	J	ug/kg	5
002	MW-3-15	Solid	Acetone	8260B	15	J	ug/kg	7
002	MW-3-15	Solid	Toluene	8260B	4.7	J	ug/kg	8

(3 detections)

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-2-15**
Date Sampled: **11/15/2016 1026**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-001**
Matrix: **Solid**
% Solids: **67.4** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1823	ALL		27258	5.54

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Acetone	**67-64-1**	**8260B**	**12**	**J**	**27**	**5.4**	**ug/kg**	**1**
Benzene	71-43-2	8260B	ND		6.7	2.7	ug/kg	1
Bromobenzene	108-86-1	8260B	ND		6.7	2.7	ug/kg	1
Bromochloromethane	74-97-5	8260B	ND		6.7	2.7	ug/kg	1
Bromodichloromethane	75-27-4	8260B	ND		6.7	2.7	ug/kg	1
Bromoform	75-25-2	8260B	ND		6.7	2.7	ug/kg	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		6.7	2.7	ug/kg	1
2-Butanone (MEK)	78-93-3	8260B	ND		27	5.4	ug/kg	1
n-Butylbenzene	104-51-8	8260B	ND		6.7	2.7	ug/kg	1
sec-Butylbenzene	135-98-8	8260B	ND		6.7	2.7	ug/kg	1
tert-Butylbenzene	98-06-6	8260B	ND		6.7	2.7	ug/kg	1
Carbon tetrachloride	56-23-5	8260B	ND		6.7	2.7	ug/kg	1
Chlorobenzene	108-90-7	8260B	ND		6.7	2.7	ug/kg	1
Chloroethane	75-00-3	8260B	ND		6.7	2.7	ug/kg	1
Chloroform	67-66-3	8260B	ND		6.7	2.7	ug/kg	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		6.7	2.7	ug/kg	1
2-Chlorotoluene	95-49-8	8260B	ND		6.7	2.7	ug/kg	1
4-Chlorotoluene	106-43-4	8260B	ND		6.7	2.7	ug/kg	1
Dibromochloromethane	124-48-1	8260B	ND		6.7	2.7	ug/kg	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		6.7	2.7	ug/kg	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		6.7	2.7	ug/kg	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		6.7	2.7	ug/kg	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		6.7	2.7	ug/kg	1
Dichlorodifluoromethane	75-71-8	8260B	ND		6.7	2.7	ug/kg	1
1,1-Dichloroethane	75-34-3	8260B	ND		6.7	2.7	ug/kg	1
1,2-Dichloroethane	107-06-2	8260B	ND		6.7	2.7	ug/kg	1
1,1-Dichloroethene	75-35-4	8260B	ND		6.7	2.7	ug/kg	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		6.7	2.7	ug/kg	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		6.7	2.7	ug/kg	1
1,2-Dichloropropane	78-87-5	8260B	ND		6.7	2.7	ug/kg	1
1,3-Dichloropropane	142-28-9	8260B	ND		6.7	2.7	ug/kg	1
2,2-Dichloropropane	594-20-7	8260B	ND		6.7	2.7	ug/kg	1
1,1-Dichloropropene	563-58-6	8260B	ND		6.7	2.7	ug/kg	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		6.7	2.7	ug/kg	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		6.7	2.7	ug/kg	1
Diisopropyl ether (IPE)	108-20-3	8260B	ND		6.7	2.7	ug/kg	1
Ethylbenzene	100-41-4	8260B	ND		6.7	2.7	ug/kg	1
2-Hexanone	591-78-6	8260B	ND		13	5.4	ug/kg	1
Isopropylbenzene	98-82-8	8260B	ND		6.7	2.7	ug/kg	1
p-Isopropyltoluene	99-87-6	8260B	ND		6.7	2.7	ug/kg	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-2-15**
Date Sampled: **11/15/2016 1026**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-001**
Matrix: **Solid**
% Solids: **67.4** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1823	ALL		27258	5.54

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		6.7	2.7	ug/kg	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		13	5.4	ug/kg	1
Methylene chloride	75-09-2	8260B	ND		6.7	2.7	ug/kg	1
Naphthalene	91-20-3	8260B	ND		6.7	2.7	ug/kg	1
n-Propylbenzene	103-65-1	8260B	ND		6.7	2.7	ug/kg	1
Styrene	100-42-5	8260B	ND		6.7	2.7	ug/kg	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		6.7	2.7	ug/kg	1
Tetrachloroethene	127-18-4	8260B	ND		6.7	2.7	ug/kg	1
Toluene	108-88-3	8260B	ND		6.7	2.7	ug/kg	1
1,2,3-Trichlorobenzene	87-61-6	8260B	ND		6.7	2.7	ug/kg	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		6.7	2.7	ug/kg	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		6.7	2.7	ug/kg	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		6.7	2.7	ug/kg	1
Trichloroethene	79-01-6	8260B	ND		6.7	2.7	ug/kg	1
Trichlorofluoromethane	75-69-4	8260B	ND		6.7	2.7	ug/kg	1
1,2,3-Trichloropropane	96-18-4	8260B	ND		6.7	2.7	ug/kg	1
1,2,4-Trimethylbenzene	95-63-6	8260B	ND		6.7	2.7	ug/kg	1
1,3,5-Trimethylbenzene	108-67-8	8260B	ND		6.7	2.7	ug/kg	1
Vinyl acetate	108-05-4	8260B	ND		6.7	2.7	ug/kg	1
Vinyl chloride	75-01-4	8260B	ND		6.7	2.7	ug/kg	1
Xylenes (total)	1330-20-7	8260B	ND		13	5.4	ug/kg	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		106	53-142
Bromofluorobenzene		122	47-138
Toluene-d8		115	68-124

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-3-15**
Date Sampled: **11/15/2016 1120**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-002**
Matrix: **Solid**
% Solids: **74.5** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1846	ALL		27258	5.79

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Acetone	**67-64-1**	**8260B**	**15**	**J**	**23**	**4.6**	**ug/kg**	**1**
Benzene	71-43-2	8260B	ND		5.8	2.3	ug/kg	1
Bromobenzene	108-86-1	8260B	ND		5.8	2.3	ug/kg	1
Bromochloromethane	74-97-5	8260B	ND		5.8	2.3	ug/kg	1
Bromodichloromethane	75-27-4	8260B	ND		5.8	2.3	ug/kg	1
Bromoform	75-25-2	8260B	ND		5.8	2.3	ug/kg	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		5.8	2.3	ug/kg	1
2-Butanone (MEK)	78-93-3	8260B	ND		23	4.6	ug/kg	1
n-Butylbenzene	104-51-8	8260B	ND		5.8	2.3	ug/kg	1
sec-Butylbenzene	135-98-8	8260B	ND		5.8	2.3	ug/kg	1
tert-Butylbenzene	98-06-6	8260B	ND		5.8	2.3	ug/kg	1
Carbon tetrachloride	56-23-5	8260B	ND		5.8	2.3	ug/kg	1
Chlorobenzene	108-90-7	8260B	ND		5.8	2.3	ug/kg	1
Chloroethane	75-00-3	8260B	ND		5.8	2.3	ug/kg	1
Chloroform	67-66-3	8260B	ND		5.8	2.3	ug/kg	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		5.8	2.3	ug/kg	1
2-Chlorotoluene	95-49-8	8260B	ND		5.8	2.3	ug/kg	1
4-Chlorotoluene	106-43-4	8260B	ND		5.8	2.3	ug/kg	1
Dibromochloromethane	124-48-1	8260B	ND		5.8	2.3	ug/kg	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		5.8	2.3	ug/kg	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		5.8	2.3	ug/kg	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		5.8	2.3	ug/kg	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		5.8	2.3	ug/kg	1
Dichlorodifluoromethane	75-71-8	8260B	ND		5.8	2.3	ug/kg	1
1,1-Dichloroethane	75-34-3	8260B	ND		5.8	2.3	ug/kg	1
1,2-Dichloroethane	107-06-2	8260B	ND		5.8	2.3	ug/kg	1
1,1-Dichloroethene	75-35-4	8260B	ND		5.8	2.3	ug/kg	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		5.8	2.3	ug/kg	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		5.8	2.3	ug/kg	1
1,2-Dichloropropane	78-87-5	8260B	ND		5.8	2.3	ug/kg	1
1,3-Dichloropropane	142-28-9	8260B	ND		5.8	2.3	ug/kg	1
2,2-Dichloropropane	594-20-7	8260B	ND		5.8	2.3	ug/kg	1
1,1-Dichloropropene	563-58-6	8260B	ND		5.8	2.3	ug/kg	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		5.8	2.3	ug/kg	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		5.8	2.3	ug/kg	1
Diisopropyl ether (IPE)	108-20-3	8260B	ND		5.8	2.3	ug/kg	1
Ethylbenzene	100-41-4	8260B	ND		5.8	2.3	ug/kg	1
2-Hexanone	591-78-6	8260B	ND		12	4.6	ug/kg	1
Isopropylbenzene	98-82-8	8260B	ND		5.8	2.3	ug/kg	1
p-Isopropyltoluene	99-87-6	8260B	ND		5.8	2.3	ug/kg	1

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-3-15**
Date Sampled: **11/15/2016 1120**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-002**
Matrix: **Solid**
% Solids: **74.5** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1846	ALL		27258	5.79

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		5.8	2.3	ug/kg	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		12	4.6	ug/kg	1
Methylene chloride	75-09-2	8260B	ND		5.8	2.3	ug/kg	1
Naphthalene	91-20-3	8260B	ND		5.8	2.3	ug/kg	1
n-Propylbenzene	103-65-1	8260B	ND		5.8	2.3	ug/kg	1
Styrene	100-42-5	8260B	ND		5.8	2.3	ug/kg	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		5.8	2.3	ug/kg	1
Tetrachloroethene	127-18-4	8260B	ND		5.8	2.3	ug/kg	1
Toluene	**108-88-3**	**8260B**	**4.7**	**J**	**5.8**	**2.3**	**ug/kg**	**1**
1,2,3-Trichlorobenzene	87-61-6	8260B	ND		5.8	2.3	ug/kg	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		5.8	2.3	ug/kg	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		5.8	2.3	ug/kg	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		5.8	2.3	ug/kg	1
Trichloroethene	79-01-6	8260B	ND		5.8	2.3	ug/kg	1
Trichlorofluoromethane	75-69-4	8260B	ND		5.8	2.3	ug/kg	1
1,2,3-Trichloropropane	96-18-4	8260B	ND		5.8	2.3	ug/kg	1
1,2,4-Trimethylbenzene	95-63-6	8260B	ND		5.8	2.3	ug/kg	1
1,3,5-Trimethylbenzene	108-67-8	8260B	ND		5.8	2.3	ug/kg	1
Vinyl acetate	108-05-4	8260B	ND		5.8	2.3	ug/kg	1
Vinyl chloride	75-01-4	8260B	ND		5.8	2.3	ug/kg	1
Xylenes (total)	1330-20-7	8260B	ND		12	4.6	ug/kg	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		105	53-142
Bromofluorobenzene		121	47-138
Toluene-d8		115	68-124

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-4-15**
Date Sampled: **11/15/2016 1320**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-003**
Matrix: **Solid**
% Solids: **64.7** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1908	ALL		27258	5.65
2	5035	8260B	100	11/23/2016 1805	PAP		27627	5.67

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Acetone	67-64-1	8260B	ND		27	5.5	ug/kg	1
Benzene	71-43-2	8260B	ND		6.8	2.7	ug/kg	1
Bromobenzene	108-86-1	8260B	ND		6.8	2.7	ug/kg	1
Bromochloromethane	74-97-5	8260B	ND		6.8	2.7	ug/kg	1
Bromodichloromethane	75-27-4	8260B	ND		6.8	2.7	ug/kg	1
Bromoform	75-25-2	8260B	ND		6.8	2.7	ug/kg	1
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		6.8	2.7	ug/kg	1
2-Butanone (MEK)	78-93-3	8260B	ND		27	5.5	ug/kg	1
n-Butylbenzene	104-51-8	8260B	ND		6.8	2.7	ug/kg	1
sec-Butylbenzene	135-98-8	8260B	ND		6.8	2.7	ug/kg	1
tert-Butylbenzene	98-06-6	8260B	ND		6.8	2.7	ug/kg	1
Carbon tetrachloride	56-23-5	8260B	ND		6.8	2.7	ug/kg	1
Chlorobenzene	108-90-7	8260B	ND		6.8	2.7	ug/kg	1
Chloroethane	75-00-3	8260B	ND		6.8	2.7	ug/kg	1
Chloroform	67-66-3	8260B	ND		6.8	2.7	ug/kg	1
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		6.8	2.7	ug/kg	1
2-Chlorotoluene	95-49-8	8260B	ND		6.8	2.7	ug/kg	1
4-Chlorotoluene	106-43-4	8260B	ND		6.8	2.7	ug/kg	1
Dibromochloromethane	124-48-1	8260B	ND		6.8	2.7	ug/kg	1
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		6.8	2.7	ug/kg	1
1,2-Dichlorobenzene	95-50-1	8260B	ND		6.8	2.7	ug/kg	1
1,3-Dichlorobenzene	541-73-1	8260B	ND		6.8	2.7	ug/kg	1
1,4-Dichlorobenzene	106-46-7	8260B	ND		6.8	2.7	ug/kg	1
Dichlorodifluoromethane	75-71-8	8260B	ND		6.8	2.7	ug/kg	1
1,1-Dichloroethane	75-34-3	8260B	ND		6.8	2.7	ug/kg	1
1,2-Dichloroethane	107-06-2	8260B	ND		6.8	2.7	ug/kg	1
1,1-Dichloroethene	75-35-4	8260B	ND		6.8	2.7	ug/kg	1
cis-1,2-Dichloroethene	156-59-2	8260B	ND		6.8	2.7	ug/kg	1
trans-1,2-Dichloroethene	156-60-5	8260B	ND		6.8	2.7	ug/kg	1
1,2-Dichloropropane	78-87-5	8260B	ND		6.8	2.7	ug/kg	1
1,3-Dichloropropane	142-28-9	8260B	ND		6.8	2.7	ug/kg	1
2,2-Dichloropropane	594-20-7	8260B	ND		6.8	2.7	ug/kg	1
1,1-Dichloropropene	563-58-6	8260B	ND		6.8	2.7	ug/kg	1
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		6.8	2.7	ug/kg	1
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		6.8	2.7	ug/kg	1
Diisopropyl ether (IPE)	108-20-3	8260B	ND		6.8	2.7	ug/kg	1
Ethylbenzene	100-41-4	8260B	ND		6.8	2.7	ug/kg	1
2-Hexanone	591-78-6	8260B	ND		14	5.5	ug/kg	1
Isopropylbenzene	98-82-8	8260B	ND		6.8	2.7	ug/kg	1

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-4-15**
Date Sampled: **11/15/2016 1320**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-003**
Matrix: **Solid**
% Solids: **64.7** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1908	ALL		27258	5.65
2	5035	8260B	100	11/23/2016 1805	PAP		27627	5.67

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
p-Isopropyltoluene	99-87-6	8260B	ND		6.8	2.7	ug/kg	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		6.8	2.7	ug/kg	1
4-Methyl-2-pentanone	108-10-1	8260B	ND		14	5.5	ug/kg	1
Methylene chloride	75-09-2	8260B	ND		6.8	2.7	ug/kg	1
Naphthalene	91-20-3	8260B	ND		6.8	2.7	ug/kg	1
n-Propylbenzene	103-65-1	8260B	ND		6.8	2.7	ug/kg	1
Styrene	100-42-5	8260B	ND		6.8	2.7	ug/kg	1
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		6.8	2.7	ug/kg	1
Tetrachloroethene	127-18-4	8260B	ND		6.8	2.7	ug/kg	1
Toluene	108-88-3	8260B	ND		6.8	2.7	ug/kg	1
1,2,3-Trichlorobenzene	87-61-6	8260B	ND		6.8	2.7	ug/kg	1
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		6.8	2.7	ug/kg	1
1,1,1-Trichloroethane	71-55-6	8260B	ND		6.8	2.7	ug/kg	1
1,1,2-Trichloroethane	79-00-5	8260B	ND		6.8	2.7	ug/kg	1
Trichloroethene	79-01-6	8260B	ND		6.8	2.7	ug/kg	1
Trichlorofluoromethane	75-69-4	8260B	ND		6.8	2.7	ug/kg	1
1,2,3-Trichloropropane	96-18-4	8260B	ND		6.8	2.7	ug/kg	1
1,2,4-Trimethylbenzene	95-63-6	8260B	ND		6.8	2.7	ug/kg	1
1,3,5-Trimethylbenzene	108-67-8	8260B	ND		6.8	2.7	ug/kg	1
Vinyl acetate	108-05-4	8260B	ND		6.8	2.7	ug/kg	1
Vinyl chloride	75-01-4	8260B	ND		6.8	2.7	ug/kg	1
Xylenes (total)	1330-20-7	8260B	ND		14	5.5	ug/kg	1

Surrogate	Q	Run 1 % Recovery	Run 1 Acceptance Limits	Q	Run 2 % Recovery	Run 2 Acceptance Limits
1,2-Dichloroethane-d4	N	0.00	53-142		123	53-142
Bromofluorobenzene	N	0.00	47-138		114	47-138
Toluene-d8	N	0.00	68-124		117	68-124

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1908	ALL		27258	5.65
2	5035	8260B	100	11/23/2016 1805	PAP		27627	5.67

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Acetone	67-64-1	8260B	ND		2700	540	ug/kg	2
Benzene	71-43-2	8260B	ND		680	270	ug/kg	2
Bromobenzene	108-86-1	8260B	ND		680	270	ug/kg	2
Bromochloromethane	74-97-5	8260B	ND		680	270	ug/kg	2
Bromodichloromethane	75-27-4	8260B	ND		680	270	ug/kg	2
Bromoform	75-25-2	8260B	ND		680	270	ug/kg	2

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-4-15**
Date Sampled: **11/15/2016 1320**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-003**
Matrix: **Solid**
% Solids: **64.7** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1908	ALL		27258	5.65
2	5035	8260B	100	11/23/2016 1805	PAP		27627	5.67

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Bromomethane (Methyl bromide)	74-83-9	8260B	ND		680	270	ug/kg	2
2-Butanone (MEK)	78-93-3	8260B	ND		2700	540	ug/kg	2
n-Butylbenzene	104-51-8	8260B	ND		680	270	ug/kg	2
sec-Butylbenzene	135-98-8	8260B	ND		680	270	ug/kg	2
tert-Butylbenzene	98-06-6	8260B	ND		680	270	ug/kg	2
Carbon tetrachloride	56-23-5	8260B	ND		680	270	ug/kg	2
Chlorobenzene	108-90-7	8260B	ND		680	270	ug/kg	2
Chloroethane	75-00-3	8260B	ND		680	270	ug/kg	2
Chloroform	67-66-3	8260B	ND		680	270	ug/kg	2
Chloromethane (Methyl chloride)	74-87-3	8260B	ND		680	270	ug/kg	2
2-Chlorotoluene	95-49-8	8260B	ND		680	270	ug/kg	2
4-Chlorotoluene	106-43-4	8260B	ND		680	270	ug/kg	2
Dibromochloromethane	124-48-1	8260B	ND		680	270	ug/kg	2
1,2-Dibromoethane (EDB)	106-93-4	8260B	ND		680	270	ug/kg	2
1,2-Dichlorobenzene	95-50-1	8260B	ND		680	270	ug/kg	2
1,3-Dichlorobenzene	541-73-1	8260B	ND		680	270	ug/kg	2
1,4-Dichlorobenzene	106-46-7	8260B	ND		680	270	ug/kg	2
Dichlorodifluoromethane	75-71-8	8260B	ND		680	270	ug/kg	2
1,1-Dichloroethane	75-34-3	8260B	ND		680	270	ug/kg	2
1,2-Dichloroethane	107-06-2	8260B	ND		680	270	ug/kg	2
1,1-Dichloroethene	75-35-4	8260B	ND		680	270	ug/kg	2
cis-1,2-Dichloroethene	156-59-2	8260B	ND		680	270	ug/kg	2
trans-1,2-Dichloroethene	156-60-5	8260B	ND		680	270	ug/kg	2
1,2-Dichloropropane	78-87-5	8260B	ND		680	270	ug/kg	2
1,3-Dichloropropane	142-28-9	8260B	ND		680	270	ug/kg	2
2,2-Dichloropropane	594-20-7	8260B	ND		680	270	ug/kg	2
1,1-Dichloropropene	563-58-6	8260B	ND		680	270	ug/kg	2
cis-1,3-Dichloropropene	10061-01-5	8260B	ND		680	270	ug/kg	2
trans-1,3-Dichloropropene	10061-02-6	8260B	ND		680	270	ug/kg	2
Diisopropyl ether (IPE)	108-20-3	8260B	ND		680	270	ug/kg	2
Ethylbenzene	100-41-4	8260B	ND		680	270	ug/kg	2
2-Hexanone	591-78-6	8260B	ND		1400	540	ug/kg	2
Isopropylbenzene	98-82-8	8260B	ND		680	270	ug/kg	2
p-Isopropyltoluene	99-87-6	8260B	ND		680	270	ug/kg	2
Methyl tertiary butyl ether (MTBE)	1634-04-4	8260B	ND		680	270	ug/kg	2
4-Methyl-2-pentanone	108-10-1	8260B	ND		1400	540	ug/kg	2
Methylene chloride	75-09-2	8260B	ND		680	270	ug/kg	2
Naphthalene	91-20-3	8260B	ND		680	270	ug/kg	2
n-Propylbenzene	103-65-1	8260B	ND		680	270	ug/kg	2

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: **Excel Civil & Environmental Associates, PLLC**
Description: **MW-4-15**
Date Sampled: **11/15/2016 1320**
Date Received: **11/16/2016**

Laboratory ID: **RK16085-003**
Matrix: **Solid**
% Solids: **64.7** **11/17/2016 2225**

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Sample Wt.(g)
1	5035	8260B	1	11/18/2016 1908	ALL		27258	5.65
2	5035	8260B	100	11/23/2016 1805	PAP		27627	5.67

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Styrene	100-42-5	8260B	ND		680	270	ug/kg	2
1,1,2,2-Tetrachloroethane	79-34-5	8260B	ND		680	270	ug/kg	2
Tetrachloroethene	127-18-4	8260B	ND		680	270	ug/kg	2
Toluene	108-88-3	8260B	ND		680	270	ug/kg	2
1,2,3-Trichlorobenzene	87-61-6	8260B	ND		680	270	ug/kg	2
1,2,4-Trichlorobenzene	120-82-1	8260B	ND		680	270	ug/kg	2
1,1,1-Trichloroethane	71-55-6	8260B	ND		680	270	ug/kg	2
1,1,2-Trichloroethane	79-00-5	8260B	ND		680	270	ug/kg	2
Trichloroethene	79-01-6	8260B	ND		680	270	ug/kg	2
Trichlorofluoromethane	75-69-4	8260B	ND		680	270	ug/kg	2
1,2,3-Trichloropropane	96-18-4	8260B	ND		680	270	ug/kg	2
1,2,4-Trimethylbenzene	95-63-6	8260B	ND		680	270	ug/kg	2
1,3,5-Trimethylbenzene	108-67-8	8260B	ND		680	270	ug/kg	2
Vinyl acetate	108-05-4	8260B	ND		680	270	ug/kg	2
Vinyl chloride	75-01-4	8260B	ND		680	270	ug/kg	2
Xylenes (total)	1330-20-7	8260B	ND		1400	540	ug/kg	2

Surrogate	Q	Run 1 % Recovery	Acceptance Limits	Q	Run 2 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4	N	0.00	53-142		123	53-142
Bromofluorobenzene	N	0.00	47-138		114	47-138
Toluene-d8	N	0.00	68-124		117	68-124

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

QC Summary

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27258-001
Batch: 27258
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
Acetone	ND		1	20	4.0	ug/kg	11/18/2016 1451
Benzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Bromobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Bromochloromethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Bromodichloromethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Bromoform	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Bromomethane (Methyl bromide)	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
2-Butanone (MEK)	ND		1	20	4.0	ug/kg	11/18/2016 1451
tert-Butylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
sec-Butylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
n-Butylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Carbon tetrachloride	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Chlorobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Chloroethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Chloroform	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Chloromethane (Methyl chloride)	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
4-Chlorotoluene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
2-Chlorotoluene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Dibromochloromethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2-Dibromoethane (EDB)	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,4-Dichlorobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,3-Dichlorobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2-Dichlorobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Dichlorodifluoromethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2-Dichloroethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,1-Dichloroethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
trans-1,2-Dichloroethene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
cis-1,2-Dichloroethene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,1-Dichloroethene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
2,2-Dichloropropane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,3-Dichloropropane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2-Dichloropropane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
trans-1,3-Dichloropropene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
cis-1,3-Dichloropropene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,1-Dichloropropene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Diisopropyl ether (IPE)	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Ethylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
2-Hexanone	ND		1	10	4.0	ug/kg	11/18/2016 1451
Isopropylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
p-Isopropyltoluene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Methyl tertiary butyl ether (MTBE)	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
4-Methyl-2-pentanone	ND		1	10	4.0	ug/kg	11/18/2016 1451
Methylene chloride	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Naphthalene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27258-001
Batch: 27258
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
n-Propylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Styrene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,1,2,2-Tetrachloroethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Tetrachloroethene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Toluene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2,4-Trichlorobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2,3-Trichlorobenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,1,2-Trichloroethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,1,1-Trichloroethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Trichloroethene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Trichlorofluoromethane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2,3-Trichloropropane	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,3,5-Trimethylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
1,2,4-Trimethylbenzene	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Vinyl acetate	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Vinyl chloride	ND		1	5.0	2.0	ug/kg	11/18/2016 1451
Xylenes (total)	ND		1	10	4.0	ug/kg	11/18/2016 1451

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		122	47-138
1,2-Dichloroethane-d4		101	53-142
Toluene-d8		111	68-124

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27258-002
Batch: 27258
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Spike Amount (ug/kg)	Result (ug/kg)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Acetone	100	100		1	104	60-140	11/18/2016 1309
Benzene	50	46		1	93	69-123	11/18/2016 1309
Bromobenzene	50	49		1	99	53-137	11/18/2016 1309
Bromochloromethane	50	50		1	100	70-121	11/18/2016 1309
Bromodichloromethane	50	50		1	101	69-121	11/18/2016 1309
Bromoform	50	49		1	97	61-119	11/18/2016 1309
Bromomethane (Methyl bromide)	50	48		1	97	10-168	11/18/2016 1309
2-Butanone (MEK)	100	100		1	103	57-148	11/18/2016 1309
tert-Butylbenzene	50	49		1	98	38-149	11/18/2016 1309
sec-Butylbenzene	50	48		1	96	37-147	11/18/2016 1309
n-Butylbenzene	50	45		1	90	29-152	11/18/2016 1309
Carbon tetrachloride	50	48		1	96	58-136	11/18/2016 1309
Chlorobenzene	50	49		1	97	59-129	11/18/2016 1309
Chloroethane	50	49		1	97	60-140	11/18/2016 1309
Chloroform	50	49		1	99	71-125	11/18/2016 1309
Chloromethane (Methyl chloride)	50	49		1	98	34-134	11/18/2016 1309
4-Chlorotoluene	50	47		1	95	53-135	11/18/2016 1309
2-Chlorotoluene	50	48		1	95	53-133	11/18/2016 1309
Dibromochloromethane	50	50		1	100	66-119	11/18/2016 1309
1,2-Dibromoethane (EDB)	50	48		1	97	74-124	11/18/2016 1309
1,4-Dichlorobenzene	50	48		1	96	52-133	11/18/2016 1309
1,3-Dichlorobenzene	50	47		1	94	51-134	11/18/2016 1309
1,2-Dichlorobenzene	50	49		1	98	57-131	11/18/2016 1309
Dichlorodifluoromethane	50	49		1	99	10-157	11/18/2016 1309
1,2-Dichloroethane	50	51		1	101	67-129	11/18/2016 1309
1,1-Dichloroethane	50	50		1	100	71-127	11/18/2016 1309
trans-1,2-Dichloroethene	50	49		1	98	68-131	11/18/2016 1309
cis-1,2-Dichloroethene	50	48		1	96	70-122	11/18/2016 1309
1,1-Dichloroethene	50	50		1	100	69-138	11/18/2016 1309
2,2-Dichloropropane	50	47		1	94	59-129	11/18/2016 1309
1,3-Dichloropropane	50	50		1	101	70-130	11/18/2016 1309
1,2-Dichloropropane	50	48		1	96	72-124	11/18/2016 1309
trans-1,3-Dichloropropene	50	50		1	100	70-124	11/18/2016 1309
cis-1,3-Dichloropropene	50	50		1	100	70-126	11/18/2016 1309
1,1-Dichloropropene	50	48		1	96	60-133	11/18/2016 1309
Diisopropyl ether (IPE)	50	47		1	94	26-143	11/18/2016 1309
Ethylbenzene	50	47		1	93	59-128	11/18/2016 1309
2-Hexanone	100	100		1	100	54-137	11/18/2016 1309
Isopropylbenzene	50	49		1	97	50-136	11/18/2016 1309
p-Isopropyltoluene	50	44		1	88	36-146	11/18/2016 1309
Methyl tertiary butyl ether (MTBE)	50	47		1	93	70-130	11/18/2016 1309
4-Methyl-2-pentanone	100	100		1	101	60-134	11/18/2016 1309
Methylene chloride	50	49		1	99	70-130	11/18/2016 1309
Naphthalene	50	48		1	96	54-131	11/18/2016 1309

PQL = Practical quantitation limit
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
+ = RPD is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27258-002
Batch: 27258
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Spike Amount (ug/kg)	Result (ug/kg)	Q	Dil	% Rec	% Rec Limit	Analysis Date
n-Propylbenzene	50	46		1	92	41-144	11/18/2016 1309
Styrene	50	49		1	99	54-136	11/18/2016 1309
1,1,2,2-Tetrachloroethane	50	49		1	97	69-132	11/18/2016 1309
Tetrachloroethene	50	47		1	95	45-150	11/18/2016 1309
Toluene	50	48		1	96	61-129	11/18/2016 1309
1,2,4-Trichlorobenzene	50	46		1	93	34-145	11/18/2016 1309
1,2,3-Trichlorobenzene	50	48		1	96	40-143	11/18/2016 1309
1,1,2-Trichloroethane	50	47		1	95	55-128	11/18/2016 1309
1,1,1-Trichloroethane	50	48		1	96	63-128	11/18/2016 1309
Trichloroethene	50	47		1	95	62-126	11/18/2016 1309
Trichlorofluoromethane	50	53		1	106	45-138	11/18/2016 1309
1,2,3-Trichloropropane	50	48		1	96	67-126	11/18/2016 1309
1,3,5-Trimethylbenzene	50	46		1	93	46-139	11/18/2016 1309
1,2,4-Trimethylbenzene	50	48		1	95	47-138	11/18/2016 1309
Vinyl acetate	50	48		1	96	55-128	11/18/2016 1309
Vinyl chloride	50	49		1	97	42-132	11/18/2016 1309
Xylenes (total)	100	100		1	100	58-128	11/18/2016 1309

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		104	47-138
1,2-Dichloroethane-d4		102	53-142
Toluene-d8		107	68-124

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27627-001
Batch: 27627
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
Acetone	**250**	**J**	**50**	**1000**	**200**	**ug/kg**	**11/23/2016 0947**
Benzene	ND		50	250	100	ug/kg	11/23/2016 0947
Bromobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
Bromochloromethane	ND		50	250	100	ug/kg	11/23/2016 0947
Bromodichloromethane	ND		50	250	100	ug/kg	11/23/2016 0947
Bromoform	ND		50	250	100	ug/kg	11/23/2016 0947
Bromomethane (Methyl bromide)	ND		50	250	100	ug/kg	11/23/2016 0947
2-Butanone (MEK)	ND		50	1000	200	ug/kg	11/23/2016 0947
tert-Butylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
sec-Butylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
n-Butylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
Carbon tetrachloride	ND		50	250	100	ug/kg	11/23/2016 0947
Chlorobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
Chloroethane	ND		50	250	100	ug/kg	11/23/2016 0947
Chloroform	ND		50	250	100	ug/kg	11/23/2016 0947
Chloromethane (Methyl chloride)	ND		50	250	100	ug/kg	11/23/2016 0947
2-Chlorotoluene	ND		50	250	100	ug/kg	11/23/2016 0947
4-Chlorotoluene	ND		50	250	100	ug/kg	11/23/2016 0947
Dibromochloromethane	ND		50	250	100	ug/kg	11/23/2016 0947
1,2-Dibromoethane (EDB)	ND		50	250	100	ug/kg	11/23/2016 0947
1,3-Dichlorobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
1,2-Dichlorobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
1,4-Dichlorobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
Dichlorodifluoromethane	ND		50	250	100	ug/kg	11/23/2016 0947
1,2-Dichloroethane	ND		50	250	100	ug/kg	11/23/2016 0947
1,1-Dichloroethane	ND		50	250	100	ug/kg	11/23/2016 0947
trans-1,2-Dichloroethene	ND		50	250	100	ug/kg	11/23/2016 0947
cis-1,2-Dichloroethene	ND		50	250	100	ug/kg	11/23/2016 0947
1,1-Dichloroethene	ND		50	250	100	ug/kg	11/23/2016 0947
1,2-Dichloropropane	ND		50	250	100	ug/kg	11/23/2016 0947
2,2-Dichloropropane	ND		50	250	100	ug/kg	11/23/2016 0947
1,3-Dichloropropane	ND		50	250	100	ug/kg	11/23/2016 0947
trans-1,3-Dichloropropene	ND		50	250	100	ug/kg	11/23/2016 0947
cis-1,3-Dichloropropene	ND		50	250	100	ug/kg	11/23/2016 0947
1,1-Dichloropropene	ND		50	250	100	ug/kg	11/23/2016 0947
Diisopropyl ether (IPE)	ND		50	250	100	ug/kg	11/23/2016 0947
Ethylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
2-Hexanone	ND		50	500	200	ug/kg	11/23/2016 0947
Isopropylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
p-Isopropyltoluene	ND		50	250	100	ug/kg	11/23/2016 0947
Methyl tertiary butyl ether (MTBE)	ND		50	250	100	ug/kg	11/23/2016 0947
4-Methyl-2-pentanone	ND		50	500	200	ug/kg	11/23/2016 0947
Methylene chloride	ND		50	250	100	ug/kg	11/23/2016 0947
Naphthalene	ND		50	250	100	ug/kg	11/23/2016 0947

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27627-001
Batch: 27627
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
n-Propylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
Styrene	ND		50	250	100	ug/kg	11/23/2016 0947
1,1,2,2-Tetrachloroethane	ND		50	250	100	ug/kg	11/23/2016 0947
Tetrachloroethene	ND		50	250	100	ug/kg	11/23/2016 0947
Toluene	ND		50	250	100	ug/kg	11/23/2016 0947
1,2,4-Trichlorobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
1,2,3-Trichlorobenzene	ND		50	250	100	ug/kg	11/23/2016 0947
1,1,1-Trichloroethane	ND		50	250	100	ug/kg	11/23/2016 0947
1,1,2-Trichloroethane	ND		50	250	100	ug/kg	11/23/2016 0947
Trichloroethene	ND		50	250	100	ug/kg	11/23/2016 0947
Trichlorofluoromethane	ND		50	250	100	ug/kg	11/23/2016 0947
1,2,3-Trichloropropane	ND		50	250	100	ug/kg	11/23/2016 0947
1,3,5-Trimethylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
1,2,4-Trimethylbenzene	ND		50	250	100	ug/kg	11/23/2016 0947
Vinyl acetate	ND		50	250	100	ug/kg	11/23/2016 0947
Vinyl chloride	ND		50	250	100	ug/kg	11/23/2016 0947
Xylenes (total)	ND		50	500	200	ug/kg	11/23/2016 0947

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		113	47-138
1,2-Dichloroethane-d4		116	53-142
Toluene-d8		113	68-124

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27627-002
Batch: 27627
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Spike Amount (ug/kg)	Result (ug/kg)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Acetone	5000	4800		50	96	60-140	11/23/2016 1036
Benzene	2500	2300		50	92	69-123	11/23/2016 1036
Bromobenzene	2500	2400		50	95	53-137	11/23/2016 1036
Bromochloromethane	2500	2400		50	97	70-121	11/23/2016 1036
Bromodichloromethane	2500	2500		50	99	69-121	11/23/2016 1036
Bromoform	2500	2200		50	89	61-119	11/23/2016 1036
Bromomethane (Methyl bromide)	2500	2300		50	93	10-168	11/23/2016 1036
2-Butanone (MEK)	5000	4500		50	91	57-148	11/23/2016 1036
tert-Butylbenzene	2500	2600		50	103	38-149	11/23/2016 1036
sec-Butylbenzene	2500	2600		50	104	37-147	11/23/2016 1036
n-Butylbenzene	2500	2600		50	106	29-152	11/23/2016 1036
Carbon tetrachloride	2500	2600		50	104	58-136	11/23/2016 1036
Chlorobenzene	2500	2400		50	98	59-129	11/23/2016 1036
Chloroethane	2500	2100		50	85	60-140	11/23/2016 1036
Chloroform	2500	2500		50	98	71-125	11/23/2016 1036
Chloromethane (Methyl chloride)	2500	2400		50	96	34-134	11/23/2016 1036
2-Chlorotoluene	2500	2500		50	98	53-133	11/23/2016 1036
4-Chlorotoluene	2500	2500		50	100	53-135	11/23/2016 1036
Dibromochloromethane	2500	2300		50	93	66-119	11/23/2016 1036
1,2-Dibromoethane (EDB)	2500	2200		50	90	74-124	11/23/2016 1036
1,3-Dichlorobenzene	2500	2500		50	99	51-134	11/23/2016 1036
1,2-Dichlorobenzene	2500	2500		50	99	57-131	11/23/2016 1036
1,4-Dichlorobenzene	2500	2500		50	100	52-133	11/23/2016 1036
Dichlorodifluoromethane	2500	2000		50	78	10-157	11/23/2016 1036
1,2-Dichloroethane	2500	2500		50	99	67-129	11/23/2016 1036
1,1-Dichloroethane	2500	2400		50	97	71-127	11/23/2016 1036
trans-1,2-Dichloroethene	2500	2500		50	99	68-131	11/23/2016 1036
cis-1,2-Dichloroethene	2500	2300		50	93	70-122	11/23/2016 1036
1,1-Dichloroethene	2500	2500		50	98	69-138	11/23/2016 1036
1,2-Dichloropropane	2500	2300		50	92	72-124	11/23/2016 1036
2,2-Dichloropropane	2500	2500		50	100	59-129	11/23/2016 1036
1,3-Dichloropropane	2500	2300		50	93	70-130	11/23/2016 1036
trans-1,3-Dichloropropene	2500	2300		50	94	70-124	11/23/2016 1036
cis-1,3-Dichloropropene	2500	2400		50	96	70-126	11/23/2016 1036
1,1-Dichloropropene	2500	2700		50	106	60-133	11/23/2016 1036
Diisopropyl ether (IPE)	2500	2300		50	92	26-143	11/23/2016 1036
Ethylbenzene	2500	2400		50	98	59-128	11/23/2016 1036
2-Hexanone	5000	4400		50	88	54-137	11/23/2016 1036
Isopropylbenzene	2500	2600		50	104	50-136	11/23/2016 1036
p-Isopropyltoluene	2500	2500		50	98	36-146	11/23/2016 1036
Methyl tertiary butyl ether (MTBE)	2500	2200		50	89	70-130	11/23/2016 1036
4-Methyl-2-pentanone	5000	4600		50	92	60-134	11/23/2016 1036
Methylene chloride	2500	2300		50	93	70-130	11/23/2016 1036
Naphthalene	2500	2200		50	88	54-131	11/23/2016 1036

PQL = Practical quantitation limit
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
+ = RPD is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27627-002
Batch: 27627
Analytical Method: 8260B

Matrix: Solid
Prep Method: 5035

Parameter	Spike Amount (ug/kg)	Result (ug/kg)	Q	Dil	% Rec	% Rec Limit	Analysis Date
n-Propylbenzene	2500	2500		50	99	41-144	11/23/2016 1036
Styrene	2500	2500		50	98	54-136	11/23/2016 1036
1,1,2,2-Tetrachloroethane	2500	2200		50	89	69-132	11/23/2016 1036
Tetrachloroethene	2500	2600		50	106	45-150	11/23/2016 1036
Toluene	2500	2400		50	96	61-129	11/23/2016 1036
1,2,4-Trichlorobenzene	2500	2600		50	104	34-145	11/23/2016 1036
1,2,3-Trichlorobenzene	2500	2500		50	99	40-143	11/23/2016 1036
1,1,1-Trichloroethane	2500	2500		50	99	63-128	11/23/2016 1036
1,1,2-Trichloroethane	2500	2100		50	85	55-128	11/23/2016 1036
Trichloroethene	2500	2400		50	98	62-126	11/23/2016 1036
Trichlorofluoromethane	2500	2800		50	112	45-138	11/23/2016 1036
1,2,3-Trichloropropane	2500	2100		50	86	67-126	11/23/2016 1036
1,3,5-Trimethylbenzene	2500	2400		50	97	46-139	11/23/2016 1036
1,2,4-Trimethylbenzene	2500	2500		50	99	47-138	11/23/2016 1036
Vinyl acetate	2500	2500		50	98	55-128	11/23/2016 1036
Vinyl chloride	2500	2400		50	94	42-132	11/23/2016 1036
Xylenes (total)	5000	5100		50	102	58-128	11/23/2016 1036

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		104	47-138
1,2-Dichloroethane-d4		105	53-142
Toluene-d8		104	68-124

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
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J = Estimated result < PQL and ≥ MDL
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Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Shealy Environmental Services, Inc.
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

SHEALY ENVIRONMENTAL SERVICES, INC.

SHEALY ENVIRONMENTAL SERVICES, INC.
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.shealylab.com

Chain of Custody Record

Number 62875

RK16085

Client: ECEA	Report to Contact: MIKE STANFORTH
Address: 625 HUNTSMAN CT.	Sampler's Signature: X
City: GASTONIA	State: NC Zip Code: 28054
Printed Name: MIKE STANFORTH	
Project Name: SM 782	
Project No.: 2015059	P.O. No.: 2015059
Telephone No. / E-mail: 704 853 0800 M STANFORTH@EXCELSIOR.COM	Quote No.
Analysis (Attach list if more space is needed)	Page 1 of 1

Sample ID / Description (Containers for each sample may be combined on one line.)	Date	Time	Grab / Composite	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No of Containers by Preservative Type: Unpres.	HCl	HNO3	H2SO4	NaOH	Na2S2O3	8260 + MTBE + EDB	Sample Aliquot	Remarks / Cooler I.D.
MW-2-15	11/15/16	1026	G		X		6						X	X	
MW-3-15	11/15/16	1120	G		X		6						X		
MW-4-15	11/15/16	1320	G		X		6						X		

Turn Around Time Required (Prior lab approval required for expedited TAT.)
X Standard ☐ Rush (Specify)

Sample Disposal
☐ Return to Client ☐ Disposal by Lab

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time
1. Relinquished by	11/16/16	0758
2. Relinquished by: Donna E. Jarvis	11/16/16	1206
3. Relinquished by: Mark Kuhlmann	11/16/16	15:46
4. Relinquished by	11-16-16	16:50

	Date	Time
1. Received by: Donna E. Jarvis	11/16/16	0758
2. Received by: Mark Kuhlmann	11/16/16	1206
3. Received by	11-16-16	15:46
4. Laboratory received by: Tony Bradley	11/16/16	1650

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY
Received on Ice (Circle) (Yes) No Ice Pack

Receipt Temp. 2.9 °C

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: F-AD-133 Effective Date: 08-01-2014

SHEALY ENVIRONMENTAL SERVICES, INC.

Sample Receipt Checklist (SRC)

Client: ECEA Cooler Inspected by/date: JRR 11/16/16 Lot #: RK16085

Means of receipt: ☑ SESI ☐ Client ☐ UPS ☐ FedEx ☐ Other			
Yes ☐	No ☑		1. Were custody seals present on the cooler?
Yes ☐	No ☐	NA ☑	2. If custody seals were present, were they intact and unbroken?

pH strip ID: NA Cl strip ID: NA

Cooler ID/Original temperature upon receipt/Derived (corrected) temperature upon receipt:

12.7/2.9 °C ___/___ °C ___/___ °C ___/___ °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 6 IR Gun Correction Factor: 0.2 °C

Method of coolant: ☑ Wet Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Yes ☐	No ☐	NA ☑	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
Yes ☐	No ☐	NA ☑	4. Is the commercial courier's packing slip attached to this form?
Yes ☑	No ☐		5. Were proper custody procedures (relinquished/received) followed?
Yes ☑	No ☐		6. Were sample IDs listed on the COC?
Yes ☑	No ☐		7. Were sample IDs listed on all sample containers?
Yes ☑	No ☐		8. Was collection date & time listed on the COC?
Yes ☑	No ☐		9. Was collection date & time listed on all sample containers?
Yes ☑	No ☐		10. Did all container label information (ID, date, time) agree with the COC?
Yes ☑	No ☐		11. Were tests to be performed listed on the COC?
Yes ☑	No ☐		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
Yes ☑	No ☐		13. Was adequate sample volume available?
Yes ☑	No ☐		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
Yes ☐	No ☑		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
Yes ☐	No ☐	NA ☑	16. Were bubbles present >"pea-size" (¼" or 6mm in diameter) in any VOA vials?
Yes ☐	No ☐	NA ☑	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
Yes ☐	No ☐	NA ☑	18. Were all cyanide and/or sulfide samples received at a pH >12?
Yes ☐	No ☐	NA ☑	19. Were all applicable NH3/TKN/cyanide/phenol/BNA (<0.2mg/L) samples free of residual chlorine?
Yes ☐	No ☐	NA ☑	20. Were collection temperatures documented on the COC for NC samples?
Yes ☐	No ☐	NA ☑	21. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
Yes ☐	No ☑		22. Was the quote number used taken from the container label?

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with _____ (H_2SO_4, HNO_3, HCl, NaOH) using SR # _____.

Sample(s) _____ were received with bubbles >6 mm in diameter.

Samples(s) _____ were received with TRC >0.2 mg/L (If #21 is No) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: _____.

SC Drinking Water Project Sample(s) pH verified to be > 2 by _____ Date: _____

Sample(s) _____ were Not received at a pH of < 2 and were adjusted accordingly using SR# _____

Sample labels applied by: JRR Verified by: _____ Date: 11/16/16

Comments: _____

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

Excel Civil & Environmental Associates, PLLC
PO Box 6172
Gastonia, NC 28056-6000
Attention: Michael Stanforth

Project Name: Sam's Mart 782

Project Number: 2015059

Lot Number: RK21024

Date Completed: 11/29/2016

Lucas Odom
Project Manager

This report shall not be reproduced, except in its entirety, without the written approval of Shealy Environmental Services, Inc.

The following non-paginated documents are considered part of this report: Chain of Custody Record and Sample Receipt Checklist.

Case Narrative
Excel Civil & Environmental Associates, PLLC
Lot Number: RK21024

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved NELAC standards, the Shealy Environmental Services, Inc. ("Shealy") Quality Assurance Management Plan (QAMP), standard operating procedures (SOPs), and Shealy policies. Any exceptions to the NELAC standards, the QAMP, SOPs or policies are qualified on the results page or discussed below.

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

Sample Summary

Excel Civil & Environmental Associates, PLLC

Lot Number: RK21024

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	MW-2	Aqueous	11/18/2016 1211	11/21/2016
002	MW-3	Aqueous	11/18/2016 1057	11/21/2016
003	MW-4	Aqueous	11/18/2016 1017	11/21/2016
004	VSW-1	Aqueous	11/18/2016 1034	11/21/2016

(4 samples)

Executive Summary
Excel Civil & Environmental Associates, PLLC
Lot Number: RK21024

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	MW-2	Aqueous	Benzene	SM 6200B-	8900		ug/L	6
001	MW-2	Aqueous	Ethylbenzene	SM 6200B-	5300		ug/L	6
001	MW-2	Aqueous	Isopropylbenzene	SM 6200B-	230	J	ug/L	6
001	MW-2	Aqueous	Naphthalene	SM 6200B-	610		ug/L	7
001	MW-2	Aqueous	n-Propylbenzene	SM 6200B-	510		ug/L	7
001	MW-2	Aqueous	Styrene	SM 6200B-	370		ug/L	7
001	MW-2	Aqueous	Toluene	SM 6200B-	65000		ug/L	7
001	MW-2	Aqueous	1,3,5-Trimethylbenzene	SM 6200B-	680		ug/L	7
001	MW-2	Aqueous	1,2,4-Trimethylbenzene	SM 6200B-	3100		ug/L	7
001	MW-2	Aqueous	m+p - Xylenes	SM 6200B-	18000		ug/L	7
001	MW-2	Aqueous	o - Xylenes	SM 6200B-	8700		ug/L	7
001	MW-2	Aqueous	tert-Amyl alcohol (TAA)	SM 6200B-	4300	J	ug/L	7
002	MW-3	Aqueous	Benzene	SM 6200B-	79		ug/L	9
002	MW-3	Aqueous	Ethylbenzene	SM 6200B-	1500		ug/L	9
002	MW-3	Aqueous	Isopropylbenzene	SM 6200B-	100		ug/L	9
002	MW-3	Aqueous	Methyl tertiary butyl ether	SM 6200B-	23	J	ug/L	9
002	MW-3	Aqueous	Naphthalene	SM 6200B-	260		ug/L	10
002	MW-3	Aqueous	n-Propylbenzene	SM 6200B-	260		ug/L	10
002	MW-3	Aqueous	Toluene	SM 6200B-	3300		ug/L	10
002	MW-3	Aqueous	1,3,5-Trimethylbenzene	SM 6200B-	370		ug/L	10
002	MW-3	Aqueous	1,2,4-Trimethylbenzene	SM 6200B-	2000		ug/L	10
002	MW-3	Aqueous	m+p - Xylenes	SM 6200B-	5400		ug/L	10
002	MW-3	Aqueous	o - Xylenes	SM 6200B-	2300		ug/L	10
003	MW-4	Aqueous	sec-Butylbenzene	SM 6200B-	50		ug/L	12
003	MW-4	Aqueous	Ethylbenzene	SM 6200B-	290		ug/L	12
003	MW-4	Aqueous	Isopropylbenzene	SM 6200B-	100		ug/L	12
003	MW-4	Aqueous	p-Isopropyltoluene (p-	SM 6200B-	29		ug/L	12
003	MW-4	Aqueous	Naphthalene	SM 6200B-	69		ug/L	13
003	MW-4	Aqueous	n-Propylbenzene	SM 6200B-	410		ug/L	13
003	MW-4	Aqueous	Toluene	SM 6200B-	30		ug/L	13
003	MW-4	Aqueous	1,2,4-Trimethylbenzene	SM 6200B-	1600		ug/L	13
003	MW-4	Aqueous	m+p - Xylenes	SM 6200B-	810		ug/L	13
003	MW-4	Aqueous	o - Xylenes	SM 6200B-	310		ug/L	13
004	VSW-1	Aqueous	Benzene	SM 6200B-	120		ug/L	15
004	VSW-1	Aqueous	Bromodichloromethane	SM 6200B-	8.1		ug/L	15
004	VSW-1	Aqueous	Chloroform	SM 6200B-	51		ug/L	15
004	VSW-1	Aqueous	Ethylbenzene	SM 6200B-	47		ug/L	15
004	VSW-1	Aqueous	n-Propylbenzene	SM 6200B-	6.9		ug/L	16
004	VSW-1	Aqueous	Toluene	SM 6200B-	620		ug/L	16
004	VSW-1	Aqueous	1,3,5-Trimethylbenzene	SM 6200B-	6.6		ug/L	16
004	VSW-1	Aqueous	1,2,4-Trimethylbenzene	SM 6200B-	22		ug/L	16
004	VSW-1	Aqueous	m+p - Xylenes	SM 6200B-	150		ug/L	16
004	VSW-1	Aqueous	o - Xylenes	SM 6200B-	62		ug/L	16
004	VSW-1	Aqueous	tert-Amyl alcohol (TAA)	SM 6200B-	83	J	ug/L	16
004	VSW-1	Aqueous	tert-Amyl methyl ether	SM 6200B-	3.6	J	ug/L	16

Sample Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page

(45 detections)

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-2
Date Sampled: 11/18/2016 1211
Date Received: 11/21/2016

Laboratory ID: RK21024-001
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	500	11/25/2016 1810	TML		27737

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Benzene	71-43-2	SM 6200B-20	8900		250	200	ug/L	1
Bromobenzene	108-86-1	SM 6200B-20	ND		250	200	ug/L	1
Bromochloromethane	74-97-5	SM 6200B-20	ND		250	200	ug/L	1
Bromodichloromethane	75-27-4	SM 6200B-20	ND		250	200	ug/L	1
Bromoform	75-25-2	SM 6200B-20	ND		250	200	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	SM 6200B-20	ND		250	200	ug/L	1
n-Butylbenzene	104-51-8	SM 6200B-20	ND		250	200	ug/L	1
sec-Butylbenzene	135-98-8	SM 6200B-20	ND		250	200	ug/L	1
tert-Butylbenzene	98-06-6	SM 6200B-20	ND		250	200	ug/L	1
Carbon tetrachloride	56-23-5	SM 6200B-20	ND		250	200	ug/L	1
Chlorobenzene	108-90-7	SM 6200B-20	ND		250	200	ug/L	1
Chloroethane	75-00-3	SM 6200B-20	ND		250	200	ug/L	1
Chloroform	67-66-3	SM 6200B-20	ND		250	200	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	SM 6200B-20	ND		250	200	ug/L	1
2-Chlorotoluene	95-49-8	SM 6200B-20	ND		250	200	ug/L	1
4-Chlorotoluene	106-43-4	SM 6200B-20	ND		250	200	ug/L	1
Dibromochloromethane	124-48-1	SM 6200B-20	ND		250	200	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	SM 6200B-20	ND		250	200	ug/L	1
Dibromomethane (Methylene bromide)	74-95-3	SM 6200B-20	ND		250	200	ug/L	1
1,2-Dichlorobenzene	95-50-1	SM 6200B-20	ND		250	200	ug/L	1
1,3-Dichlorobenzene	541-73-1	SM 6200B-20	ND		250	200	ug/L	1
1,4-Dichlorobenzene	106-46-7	SM 6200B-20	ND		250	200	ug/L	1
Dichlorodifluoromethane	75-71-8	SM 6200B-20	ND		250	200	ug/L	1
1,1-Dichloroethane	75-34-3	SM 6200B-20	ND		250	200	ug/L	1
1,2-Dichloroethane	107-06-2	SM 6200B-20	ND		250	200	ug/L	1
1,1-Dichloroethene	75-35-4	SM 6200B-20	ND		250	200	ug/L	1
cis-1,2-Dichloroethene	156-59-2	SM 6200B-20	ND		250	200	ug/L	1
trans-1,2-Dichloroethene	156-60-5	SM 6200B-20	ND		250	200	ug/L	1
1,2-Dichloropropane	78-87-5	SM 6200B-20	ND		250	200	ug/L	1
1,3-Dichloropropane	142-28-9	SM 6200B-20	ND		250	200	ug/L	1
2,2-Dichloropropane	594-20-7	SM 6200B-20	ND		250	200	ug/L	1
1,1-Dichloropropene	563-58-6	SM 6200B-20	ND		250	200	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	SM 6200B-20	ND		250	200	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	SM 6200B-20	ND		250	200	ug/L	1
Ethylbenzene	100-41-4	SM 6200B-20	5300		250	200	ug/L	1
Hexachlorobutadiene	87-68-3	SM 6200B-20	ND		250	200	ug/L	1
Isopropylbenzene (Cumene)	98-82-8	SM 6200B-20	230	J	250	200	ug/L	1
p-Isopropyltoluene (p-Cymene)	99-87-6	SM 6200B-20	ND		250	200	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	SM 6200B-20	ND		250	200	ug/L	1
Methylene chloride	75-09-2	SM 6200B-20	ND		250	200	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-2
Date Sampled: 11/18/2016 1211
Date Received: 11/21/2016

Laboratory ID: RK21024-001
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	500	11/25/2016 1810	TML		27737

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Naphthalene	91-20-3	SM 6200B-20	610		250	200	ug/L	1
n-Propylbenzene	103-65-1	SM 6200B-20	510		250	200	ug/L	1
Styrene	100-42-5	SM 6200B-20	370		250	200	ug/L	1
1,1,1,2-Tetrachloroethane	630-20-6	SM 6200B-20	ND		250	200	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	SM 6200B-20	ND		250	200	ug/L	1
Tetrachloroethene	127-18-4	SM 6200B-20	ND		250	200	ug/L	1
Toluene	108-88-3	SM 6200B-20	65000		250	200	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	SM 6200B-20	ND		250	200	ug/L	1
1,2,3-Trichlorobenzene	87-61-6	SM 6200B-20	ND		250	200	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	SM 6200B-20	ND		250	200	ug/L	1
1,1,1-Trichloroethane	71-55-6	SM 6200B-20	ND		250	200	ug/L	1
1,1,2-Trichloroethane	79-00-5	SM 6200B-20	ND		250	200	ug/L	1
Trichloroethene	79-01-6	SM 6200B-20	ND		250	200	ug/L	1
Trichlorofluoromethane	75-69-4	SM 6200B-20	ND		250	200	ug/L	1
1,2,3-Trichloropropane	96-18-4	SM 6200B-20	ND		250	200	ug/L	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	SM 6200B-20	680		250	200	ug/L	1
1,2,4-Trimethylbenzene	95-63-6	SM 6200B-20	3100		250	200	ug/L	1
Vinyl chloride	75-01-4	SM 6200B-20	ND		250	200	ug/L	1
m+p - Xylenes	179601-23-1	SM 6200B-20	18000		250	200	ug/L	1
o - Xylenes	95-47-6	SM 6200B-20	8700		250	200	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		91	70-130
Bromofluorobenzene		100	70-130
Toluene-d8		101	70-130

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	500	11/29/2016 0558	ECP		27939

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
tert-Amyl alcohol (TAA)	75-85-4	SM 6200B-20	4300	J	10000	4000	ug/L	1
tert-Amyl methyl ether (TAME)	994-05-8	SM 6200B-20	ND		5000	200	ug/L	1
tert-Butyl formate (TBF)	762-75-4	SM 6200B-20	ND		2500	2000	ug/L	1
Diisopropyl ether (IPE)	108-20-3	SM 6200B-20	ND		500	200	ug/L	1
3,3-Dimethyl-1-butanol	624-95-3	SM 6200B-20	ND		10000	4000	ug/L	1
Ethanol	64-17-5	SM 6200B-20	ND		50000	20000	ug/L	1
Ethyl-tert-butyl ether (ETBE)	637-92-3	SM 6200B-20	ND		500	200	ug/L	1
tert-butyl alcohol (TBA)	75-65-0	SM 6200B-20	ND		10000	4000	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-2
Date Sampled: 11/18/2016 1211
Date Received: 11/21/2016

Laboratory ID: RK21024-001
Matrix: Aqueous

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		110	70-130
Toluene-d8		115	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-3
Date Sampled: 11/18/2016 1057
Date Received: 11/21/2016

Laboratory ID: RK21024-002
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	50	11/25/2016 1833	TML		27737

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Benzene	71-43-2	SM 6200B-20	79		25	20	ug/L	1
Bromobenzene	108-86-1	SM 6200B-20	ND		25	20	ug/L	1
Bromochloromethane	74-97-5	SM 6200B-20	ND		25	20	ug/L	1
Bromodichloromethane	75-27-4	SM 6200B-20	ND		25	20	ug/L	1
Bromoform	75-25-2	SM 6200B-20	ND		25	20	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	SM 6200B-20	ND		25	20	ug/L	1
n-Butylbenzene	104-51-8	SM 6200B-20	ND		25	20	ug/L	1
sec-Butylbenzene	135-98-8	SM 6200B-20	ND		25	20	ug/L	1
tert-Butylbenzene	98-06-6	SM 6200B-20	ND		25	20	ug/L	1
Carbon tetrachloride	56-23-5	SM 6200B-20	ND		25	20	ug/L	1
Chlorobenzene	108-90-7	SM 6200B-20	ND		25	20	ug/L	1
Chloroethane	75-00-3	SM 6200B-20	ND		25	20	ug/L	1
Chloroform	67-66-3	SM 6200B-20	ND		25	20	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	SM 6200B-20	ND		25	20	ug/L	1
2-Chlorotoluene	95-49-8	SM 6200B-20	ND		25	20	ug/L	1
4-Chlorotoluene	106-43-4	SM 6200B-20	ND		25	20	ug/L	1
Dibromochloromethane	124-48-1	SM 6200B-20	ND		25	20	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	SM 6200B-20	ND		25	20	ug/L	1
Dibromomethane (Methylene bromide)	74-95-3	SM 6200B-20	ND		25	20	ug/L	1
1,2-Dichlorobenzene	95-50-1	SM 6200B-20	ND		25	20	ug/L	1
1,3-Dichlorobenzene	541-73-1	SM 6200B-20	ND		25	20	ug/L	1
1,4-Dichlorobenzene	106-46-7	SM 6200B-20	ND		25	20	ug/L	1
Dichlorodifluoromethane	75-71-8	SM 6200B-20	ND		25	20	ug/L	1
1,1-Dichloroethane	75-34-3	SM 6200B-20	ND		25	20	ug/L	1
1,2-Dichloroethane	107-06-2	SM 6200B-20	ND		25	20	ug/L	1
1,1-Dichloroethene	75-35-4	SM 6200B-20	ND		25	20	ug/L	1
cis-1,2-Dichloroethene	156-59-2	SM 6200B-20	ND		25	20	ug/L	1
trans-1,2-Dichloroethene	156-60-5	SM 6200B-20	ND		25	20	ug/L	1
1,2-Dichloropropane	78-87-5	SM 6200B-20	ND		25	20	ug/L	1
1,3-Dichloropropane	142-28-9	SM 6200B-20	ND		25	20	ug/L	1
2,2-Dichloropropane	594-20-7	SM 6200B-20	ND		25	20	ug/L	1
1,1-Dichloropropene	563-58-6	SM 6200B-20	ND		25	20	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	SM 6200B-20	ND		25	20	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	SM 6200B-20	ND		25	20	ug/L	1
Ethylbenzene	100-41-4	SM 6200B-20	1500		25	20	ug/L	1
Hexachlorobutadiene	87-68-3	SM 6200B-20	ND		25	20	ug/L	1
Isopropylbenzene (Cumene)	98-82-8	SM 6200B-20	100		25	20	ug/L	1
p-Isopropyltoluene (p-Cymene)	99-87-6	SM 6200B-20	ND		25	20	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	SM 6200B-20	23	J	25	20	ug/L	1
Methylene chloride	75-09-2	SM 6200B-20	ND		25	20	ug/L	1

PQL = Practical quantitation limit
B = Detected in the method blank
E = Quantitation of compound exceeded the calibration range
H = Out of holding time
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-3
Date Sampled: 11/18/2016 1057
Date Received: 11/21/2016

Laboratory ID: RK21024-002
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	50	11/25/2016 1833	TML		27737

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Naphthalene	91-20-3	SM 6200B-20	260		25	20	ug/L	1
n-Propylbenzene	103-65-1	SM 6200B-20	260		25	20	ug/L	1
Styrene	100-42-5	SM 6200B-20	ND		25	20	ug/L	1
1,1,1,2-Tetrachloroethane	630-20-6	SM 6200B-20	ND		25	20	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	SM 6200B-20	ND		25	20	ug/L	1
Tetrachloroethene	127-18-4	SM 6200B-20	ND		25	20	ug/L	1
Toluene	108-88-3	SM 6200B-20	3300		25	20	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	SM 6200B-20	ND		25	20	ug/L	1
1,2,3-Trichlorobenzene	87-61-6	SM 6200B-20	ND		25	20	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	SM 6200B-20	ND		25	20	ug/L	1
1,1,1-Trichloroethane	71-55-6	SM 6200B-20	ND		25	20	ug/L	1
1,1,2-Trichloroethane	79-00-5	SM 6200B-20	ND		25	20	ug/L	1
Trichloroethene	79-01-6	SM 6200B-20	ND		25	20	ug/L	1
Trichlorofluoromethane	75-69-4	SM 6200B-20	ND		25	20	ug/L	1
1,2,3-Trichloropropane	96-18-4	SM 6200B-20	ND		25	20	ug/L	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	SM 6200B-20	370		25	20	ug/L	1
1,2,4-Trimethylbenzene	95-63-6	SM 6200B-20	2000		25	20	ug/L	1
Vinyl chloride	75-01-4	SM 6200B-20	ND		25	20	ug/L	1
m+p - Xylenes	179601-23-1	SM 6200B-20	5400		25	20	ug/L	1
o - Xylenes	95-47-6	SM 6200B-20	2300		25	20	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		89	70-130
Bromofluorobenzene		102	70-130
Toluene-d8		104	70-130

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	50	11/29/2016 0623	ECP		27939

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
tert-Amyl alcohol (TAA)	75-85-4	SM 6200B-20	ND		1000	400	ug/L	1
tert-Amyl methyl ether (TAME)	994-05-8	SM 6200B-20	ND		500	20	ug/L	1
tert-Butyl formate (TBF)	762-75-4	SM 6200B-20	ND		250	200	ug/L	1
Diisopropyl ether (IPE)	108-20-3	SM 6200B-20	ND		50	20	ug/L	1
3,3-Dimethyl-1-butanol	624-95-3	SM 6200B-20	ND		1000	400	ug/L	1
Ethanol	64-17-5	SM 6200B-20	ND		5000	2000	ug/L	1
Ethyl-tert-butyl ether (ETBE)	637-92-3	SM 6200B-20	ND		50	20	ug/L	1
tert-butyl alcohol (TBA)	75-65-0	SM 6200B-20	ND		1000	400	ug/L	1

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-3
Date Sampled: 11/18/2016 1057
Date Received: 11/21/2016

Laboratory ID: RK21024-002
Matrix: Aqueous

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		110	70-130
Toluene-d8		115	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-4
Date Sampled: 11/18/2016 1017
Date Received: 11/21/2016

Laboratory ID: RK21024-003
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SM 6200B-	SM 6200B-2011	20	11/28/2016 1702	PAP		27876

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Benzene	71-43-2	SM 6200B-20	ND		10	8.0	ug/L	2
Bromobenzene	108-86-1	SM 6200B-20	ND		10	8.0	ug/L	2
Bromochloromethane	74-97-5	SM 6200B-20	ND		10	8.0	ug/L	2
Bromodichloromethane	75-27-4	SM 6200B-20	ND		10	8.0	ug/L	2
Bromoform	75-25-2	SM 6200B-20	ND		10	8.0	ug/L	2
Bromomethane (Methyl bromide)	74-83-9	SM 6200B-20	ND		10	8.0	ug/L	2
n-Butylbenzene	104-51-8	SM 6200B-20	ND		10	8.0	ug/L	2
sec-Butylbenzene	135-98-8	SM 6200B-20	50		10	8.0	ug/L	2
tert-Butylbenzene	98-06-6	SM 6200B-20	ND		10	8.0	ug/L	2
Carbon tetrachloride	56-23-5	SM 6200B-20	ND		10	8.0	ug/L	2
Chlorobenzene	108-90-7	SM 6200B-20	ND		10	8.0	ug/L	2
Chloroethane	75-00-3	SM 6200B-20	ND		10	8.0	ug/L	2
Chloroform	67-66-3	SM 6200B-20	ND		10	8.0	ug/L	2
Chloromethane (Methyl chloride)	74-87-3	SM 6200B-20	ND		10	8.0	ug/L	2
2-Chlorotoluene	95-49-8	SM 6200B-20	ND		10	8.0	ug/L	2
4-Chlorotoluene	106-43-4	SM 6200B-20	ND		10	8.0	ug/L	2
Dibromochloromethane	124-48-1	SM 6200B-20	ND		10	8.0	ug/L	2
1,2-Dibromoethane (EDB)	106-93-4	SM 6200B-20	ND		10	8.0	ug/L	2
Dibromomethane (Methylene bromide)	74-95-3	SM 6200B-20	ND		10	8.0	ug/L	2
1,2-Dichlorobenzene	95-50-1	SM 6200B-20	ND		10	8.0	ug/L	2
1,3-Dichlorobenzene	541-73-1	SM 6200B-20	ND		10	8.0	ug/L	2
1,4-Dichlorobenzene	106-46-7	SM 6200B-20	ND		10	8.0	ug/L	2
Dichlorodifluoromethane	75-71-8	SM 6200B-20	ND		10	8.0	ug/L	2
1,1-Dichloroethane	75-34-3	SM 6200B-20	ND		10	8.0	ug/L	2
1,2-Dichloroethane	107-06-2	SM 6200B-20	ND		10	8.0	ug/L	2
1,1-Dichloroethene	75-35-4	SM 6200B-20	ND		10	8.0	ug/L	2
cis-1,2-Dichloroethene	156-59-2	SM 6200B-20	ND		10	8.0	ug/L	2
trans-1,2-Dichloroethene	156-60-5	SM 6200B-20	ND		10	8.0	ug/L	2
1,2-Dichloropropane	78-87-5	SM 6200B-20	ND		10	8.0	ug/L	2
1,3-Dichloropropane	142-28-9	SM 6200B-20	ND		10	8.0	ug/L	2
2,2-Dichloropropane	594-20-7	SM 6200B-20	ND		10	8.0	ug/L	2
1,1-Dichloropropene	563-58-6	SM 6200B-20	ND		10	8.0	ug/L	2
cis-1,3-Dichloropropene	10061-01-5	SM 6200B-20	ND		10	8.0	ug/L	2
trans-1,3-Dichloropropene	10061-02-6	SM 6200B-20	ND		10	8.0	ug/L	2
Ethylbenzene	100-41-4	SM 6200B-20	290		10	8.0	ug/L	2
Hexachlorobutadiene	87-68-3	SM 6200B-20	ND		10	8.0	ug/L	2
Isopropylbenzene (Cumene)	98-82-8	SM 6200B-20	100		10	8.0	ug/L	2
p-Isopropyltoluene (p-Cymene)	99-87-6	SM 6200B-20	29		10	8.0	ug/L	2
Methyl tertiary butyl ether (MTBE)	1634-04-4	SM 6200B-20	ND		10	8.0	ug/L	2
Methylene chloride	75-09-2	SM 6200B-20	ND		10	8.0	ug/L	2

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-4
Date Sampled: 11/18/2016 1017
Date Received: 11/21/2016

Laboratory ID: RK21024-003
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
2	SM 6200B-	SM 6200B-2011	20	11/28/2016 1702	PAP		27876

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Naphthalene	91-20-3	SM 6200B-20	69		10	8.0	ug/L	2
n-Propylbenzene	103-65-1	SM 6200B-20	410		10	8.0	ug/L	2
Styrene	100-42-5	SM 6200B-20	ND		10	8.0	ug/L	2
1,1,1,2-Tetrachloroethane	630-20-6	SM 6200B-20	ND		10	8.0	ug/L	2
1,1,2,2-Tetrachloroethane	79-34-5	SM 6200B-20	ND		10	8.0	ug/L	2
Tetrachloroethene	127-18-4	SM 6200B-20	ND		10	8.0	ug/L	2
Toluene	108-88-3	SM 6200B-20	30		10	8.0	ug/L	2
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	SM 6200B-20	ND		10	8.0	ug/L	2
1,2,3-Trichlorobenzene	87-61-6	SM 6200B-20	ND		10	8.0	ug/L	2
1,2,4-Trichlorobenzene	120-82-1	SM 6200B-20	ND		10	8.0	ug/L	2
1,1,1-Trichloroethane	71-55-6	SM 6200B-20	ND		10	8.0	ug/L	2
1,1,2-Trichloroethane	79-00-5	SM 6200B-20	ND		10	8.0	ug/L	2
Trichloroethene	79-01-6	SM 6200B-20	ND		10	8.0	ug/L	2
Trichlorofluoromethane	75-69-4	SM 6200B-20	ND		10	8.0	ug/L	2
1,2,3-Trichloropropane	96-18-4	SM 6200B-20	ND		10	8.0	ug/L	2
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	SM 6200B-20	ND		10	8.0	ug/L	2
1,2,4-Trimethylbenzene	95-63-6	SM 6200B-20	1600		10	8.0	ug/L	2
Vinyl chloride	75-01-4	SM 6200B-20	ND		10	8.0	ug/L	2
m+p - Xylenes	179601-23-1	SM 6200B-20	810		10	8.0	ug/L	2
o - Xylenes	95-47-6	SM 6200B-20	310		10	8.0	ug/L	2

Surrogate	Q	Run 2 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		93	70-130
Bromofluorobenzene		101	70-130
Toluene-d8		107	70-130

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	20	11/29/2016 0648	ECP		27939

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
tert-Amyl alcohol (TAA)	75-85-4	SM 6200B-20	ND		400	160	ug/L	1
tert-Amyl methyl ether (TAME)	994-05-8	SM 6200B-20	ND		200	8.0	ug/L	1
tert-Butyl formate (TBF)	762-75-4	SM 6200B-20	ND		100	80	ug/L	1
Diisopropyl ether (IPE)	108-20-3	SM 6200B-20	ND		20	8.0	ug/L	1
3,3-Dimethyl-1-butanol	624-95-3	SM 6200B-20	ND		400	160	ug/L	1
Ethanol	64-17-5	SM 6200B-20	ND		2000	800	ug/L	1
Ethyl-tert-butyl ether (ETBE)	637-92-3	SM 6200B-20	ND		20	8.0	ug/L	1
tert-butyl alcohol (TBA)	75-65-0	SM 6200B-20	ND		400	160	ug/L	1

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: MW-4
Date Sampled: 11/18/2016 1017
Date Received: 11/21/2016

Laboratory ID: RK21024-003
Matrix: Aqueous

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		94	70-130
Bromofluorobenzene		110	70-130
Toluene-d8		118	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: VSW-1
Date Sampled: 11/18/2016 1034
Date Received: 11/21/2016

Laboratory ID: RK21024-004
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	10	11/25/2016 1920	TML		27737

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Benzene	71-43-2	SM 6200B-20	120		5.0	4.0	ug/L	1
Bromobenzene	108-86-1	SM 6200B-20	ND		5.0	4.0	ug/L	1
Bromochloromethane	74-97-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
Bromodichloromethane	75-27-4	SM 6200B-20	8.1		5.0	4.0	ug/L	1
Bromoform	75-25-2	SM 6200B-20	ND		5.0	4.0	ug/L	1
Bromomethane (Methyl bromide)	74-83-9	SM 6200B-20	ND		5.0	4.0	ug/L	1
n-Butylbenzene	104-51-8	SM 6200B-20	ND		5.0	4.0	ug/L	1
sec-Butylbenzene	135-98-8	SM 6200B-20	ND		5.0	4.0	ug/L	1
tert-Butylbenzene	98-06-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
Carbon tetrachloride	56-23-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
Chlorobenzene	108-90-7	SM 6200B-20	ND		5.0	4.0	ug/L	1
Chloroethane	75-00-3	SM 6200B-20	ND		5.0	4.0	ug/L	1
Chloroform	67-66-3	SM 6200B-20	51		5.0	4.0	ug/L	1
Chloromethane (Methyl chloride)	74-87-3	SM 6200B-20	ND		5.0	4.0	ug/L	1
2-Chlorotoluene	95-49-8	SM 6200B-20	ND		5.0	4.0	ug/L	1
4-Chlorotoluene	106-43-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
Dibromochloromethane	124-48-1	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2-Dibromoethane (EDB)	106-93-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
Dibromomethane (Methylene bromide)	74-95-3	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2-Dichlorobenzene	95-50-1	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,3-Dichlorobenzene	541-73-1	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,4-Dichlorobenzene	106-46-7	SM 6200B-20	ND		5.0	4.0	ug/L	1
Dichlorodifluoromethane	75-71-8	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1-Dichloroethane	75-34-3	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2-Dichloroethane	107-06-2	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1-Dichloroethene	75-35-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
cis-1,2-Dichloroethene	156-59-2	SM 6200B-20	ND		5.0	4.0	ug/L	1
trans-1,2-Dichloroethene	156-60-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2-Dichloropropane	78-87-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,3-Dichloropropane	142-28-9	SM 6200B-20	ND		5.0	4.0	ug/L	1
2,2-Dichloropropane	594-20-7	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1-Dichloropropene	563-58-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
cis-1,3-Dichloropropene	10061-01-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
trans-1,3-Dichloropropene	10061-02-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
Ethylbenzene	100-41-4	SM 6200B-20	47		5.0	4.0	ug/L	1
Hexachlorobutadiene	87-68-3	SM 6200B-20	ND		5.0	4.0	ug/L	1
Isopropylbenzene (Cumene)	98-82-8	SM 6200B-20	ND		5.0	4.0	ug/L	1
p-Isopropyltoluene (p-Cymene)	99-87-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
Methyl tertiary butyl ether (MTBE)	1634-04-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
Methylene chloride	75-09-2	SM 6200B-20	ND		5.0	4.0	ug/L	1

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: VSW-1
Date Sampled: 11/18/2016 1034
Date Received: 11/21/2016

Laboratory ID: RK21024-004
Matrix: Aqueous

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	10	11/25/2016 1920	TML		27737

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
Naphthalene	91-20-3	SM 6200B-20	ND		5.0	4.0	ug/L	1
n-Propylbenzene	103-65-1	SM 6200B-20	6.9		5.0	4.0	ug/L	1
Styrene	100-42-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1,1,2-Tetrachloroethane	630-20-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1,2,2-Tetrachloroethane	79-34-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
Tetrachloroethene	127-18-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
Toluene	108-88-3	SM 6200B-20	620		5.0	4.0	ug/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2,3-Trichlorobenzene	87-61-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2,4-Trichlorobenzene	120-82-1	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1,1-Trichloroethane	71-55-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,1,2-Trichloroethane	79-00-5	SM 6200B-20	ND		5.0	4.0	ug/L	1
Trichloroethene	79-01-6	SM 6200B-20	ND		5.0	4.0	ug/L	1
Trichlorofluoromethane	75-69-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,2,3-Trichloropropane	96-18-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	SM 6200B-20	6.6		5.0	4.0	ug/L	1
1,2,4-Trimethylbenzene	95-63-6	SM 6200B-20	22		5.0	4.0	ug/L	1
Vinyl chloride	75-01-4	SM 6200B-20	ND		5.0	4.0	ug/L	1
m+p - Xylenes	179601-23-1	SM 6200B-20	150		5.0	4.0	ug/L	1
o - Xylenes	95-47-6	SM 6200B-20	62		5.0	4.0	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		96	70-130
Bromofluorobenzene		103	70-130
Toluene-d8		102	70-130

Volatile Organic Compounds by GC/MS

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	SM 6200B-	SM 6200B-2011	5	11/29/2016 0713	ECP		27939

Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
tert-Amyl alcohol (TAA)	75-85-4	SM 6200B-20	83	J	100	40	ug/L	1
tert-Amyl methyl ether (TAME)	994-05-8	SM 6200B-20	3.6	J	50	2.0	ug/L	1
tert-Butyl formate (TBF)	762-75-4	SM 6200B-20	ND		25	20	ug/L	1
Diisopropyl ether (IPE)	108-20-3	SM 6200B-20	ND		5.0	2.0	ug/L	1
3,3-Dimethyl-1-butanol	624-95-3	SM 6200B-20	ND		100	40	ug/L	1
Ethanol	64-17-5	SM 6200B-20	ND		500	200	ug/L	1
Ethyl-tert-butyl ether (ETBE)	637-92-3	SM 6200B-20	ND		5.0	2.0	ug/L	1
tert-butyl alcohol (TBA)	75-65-0	SM 6200B-20	ND		100	40	ug/L	1

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Client: Excel Civil & Environmental Associates, PLLC
Description: VSW-1
Date Sampled: 11/18/2016 1034
Date Received: 11/21/2016

Laboratory ID: RK21024-004
Matrix: Aqueous

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		93	70-130
Bromofluorobenzene		108	70-130
Toluene-d8		118	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
B = Detected in the method blank
J = Estimated result < PQL and ≥ MDL
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
H = Out of holding time
N = Recovery is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

QC Summary

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27737-001
Batch: 27737
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
Benzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Bromobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Bromochloromethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Bromodichloromethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Bromoform	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Bromomethane (Methyl bromide)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
tert-Butylbenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
sec-Butylbenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
n-Butylbenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Carbon tetrachloride	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Chlorobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Chloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Chloroform	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Chloromethane (Methyl chloride)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
4-Chlorotoluene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
2-Chlorotoluene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Dibromochloromethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2-Dibromoethane (EDB)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Dibromomethane (Methylene bromide)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,4-Dichlorobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,3-Dichlorobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2-Dichlorobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Dichlorodifluoromethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2-Dichloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1-Dichloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
trans-1,2-Dichloroethene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
cis-1,2-Dichloroethene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1-Dichloroethene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
2,2-Dichloropropane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,3-Dichloropropane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2-Dichloropropane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
trans-1,3-Dichloropropene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
cis-1,3-Dichloropropene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1-Dichloropropene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Ethylbenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Hexachlorobutadiene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Isopropylbenzene (Cumene)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
p-Isopropyltoluene (p-Cymene)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Methyl tertiary butyl ether (MTBE)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Methylene chloride	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Naphthalene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
n-Propylbenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Styrene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1,2,2-Tetrachloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27737-001
Batch: 27737
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
1,1,1,2-Tetrachloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Tetrachloroethene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Toluene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2,4-Trichlorobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2,3-Trichlorobenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1,2-Trichloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,1,1-Trichloroethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Trichloroethene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Trichlorofluoromethane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2,3-Trichloropropane	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,2,4-Trimethylbenzene	ND		1	0.50	0.40	ug/L	11/25/2016 1121
1,3,5-Trimethylbenzene (Mesitylene)	ND		1	0.50	0.40	ug/L	11/25/2016 1121
Vinyl chloride	ND		1	0.50	0.40	ug/L	11/25/2016 1121
o - Xylenes	ND		1	0.50	0.40	ug/L	11/25/2016 1121
m+p - Xylenes	ND		1	0.50	0.40	ug/L	11/25/2016 1121

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		103	70-130
1,2-Dichloroethane-d4		94	70-130
Toluene-d8		104	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27737-002
Batch: 27737
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Benzene	50	44		1	88	70-130	11/25/2016 1022
Bromobenzene	50	52		1	104	70-130	11/25/2016 1022
Bromochloromethane	50	45		1	90	70-130	11/25/2016 1022
Bromodichloromethane	50	51		1	101	70-130	11/25/2016 1022
Bromoform	50	49		1	97	70-130	11/25/2016 1022
Bromomethane (Methyl bromide)	50	44		1	89	60-140	11/25/2016 1022
tert-Butylbenzene	50	54		1	107	70-130	11/25/2016 1022
sec-Butylbenzene	50	53		1	107	70-130	11/25/2016 1022
n-Butylbenzene	50	50		1	100	70-130	11/25/2016 1022
Carbon tetrachloride	50	48		1	96	70-130	11/25/2016 1022
Chlorobenzene	50	49		1	99	70-130	11/25/2016 1022
Chloroethane	50	40		1	80	42-163	11/25/2016 1022
Chloroform	50	46		1	93	70-130	11/25/2016 1022
Chloromethane (Methyl chloride)	50	53		1	105	20-158	11/25/2016 1022
4-Chlorotoluene	50	51		1	102	70-130	11/25/2016 1022
2-Chlorotoluene	50	51		1	103	70-130	11/25/2016 1022
Dibromochloromethane	50	48		1	96	70-130	11/25/2016 1022
1,2-Dibromoethane (EDB)	50	49		1	98	70-130	11/25/2016 1022
Dibromomethane (Methylene bromide)	50	47		1	94	70-130	11/25/2016 1022
1,4-Dichlorobenzene	50	49		1	98	70-130	11/25/2016 1022
1,3-Dichlorobenzene	50	50		1	100	70-130	11/25/2016 1022
1,2-Dichlorobenzene	50	50		1	100	70-130	11/25/2016 1022
Dichlorodifluoromethane	50	50		1	100	60-140	11/25/2016 1022
1,2-Dichloroethane	50	47		1	94	70-130	11/25/2016 1022
1,1-Dichloroethane	50	45		1	90	70-130	11/25/2016 1022
trans-1,2-Dichloroethene	50	43		1	85	70-130	11/25/2016 1022
cis-1,2-Dichloroethene	50	44		1	89	70-130	11/25/2016 1022
1,1-Dichloroethene	50	42		1	84	70-130	11/25/2016 1022
2,2-Dichloropropane	50	44		1	89	70-130	11/25/2016 1022
1,3-Dichloropropane	50	48		1	97	70-130	11/25/2016 1022
1,2-Dichloropropane	50	47		1	94	70-130	11/25/2016 1022
trans-1,3-Dichloropropene	50	47		1	95	70-130	11/25/2016 1022
cis-1,3-Dichloropropene	50	47		1	95	70-130	11/25/2016 1022
1,1-Dichloropropene	50	47		1	95	70-130	11/25/2016 1022
Ethylbenzene	50	50		1	100	70-130	11/25/2016 1022
Hexachlorobutadiene	50	51		1	102	70-130	11/25/2016 1022
Isopropylbenzene (Cumene)	50	50		1	100	70-130	11/25/2016 1022
p-Isopropyltoluene (p-Cymene)	50	49		1	98	70-130	11/25/2016 1022
Methyl tertiary butyl ether (MTBE)	50	43		1	86	70-130	11/25/2016 1022
Methylene chloride	50	40		1	80	70-130	11/25/2016 1022
Naphthalene	50	50		1	100	50-140	11/25/2016 1022
n-Propylbenzene	50	48		1	95	70-130	11/25/2016 1022
Styrene	50	53		1	106	70-130	11/25/2016 1022
1,1,2,2-Tetrachloroethane	50	50		1	99	70-130	11/25/2016 1022

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27737-002
Batch: 27737
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
1,1,1,2-Tetrachloroethane	50	52		1	103	70-130	11/25/2016 1022
Tetrachloroethene	50	48		1	97	70-130	11/25/2016 1022
Toluene	50	50		1	100	70-130	11/25/2016 1022
1,1,2-Trichloro-1,2,2-Trifluoroethane	50	41		1	82	70-130	11/25/2016 1022
1,2,4-Trichlorobenzene	50	49		1	98	70-130	11/25/2016 1022
1,2,3-Trichlorobenzene	50	49		1	97	70-130	11/25/2016 1022
1,1,2-Trichloroethane	50	49		1	98	70-130	11/25/2016 1022
1,1,1-Trichloroethane	50	46		1	91	70-130	11/25/2016 1022
Trichloroethene	50	48		1	96	70-130	11/25/2016 1022
Trichlorofluoromethane	50	50		1	101	60-140	11/25/2016 1022
1,2,3-Trichloropropane	50	52		1	104	70-130	11/25/2016 1022
1,2,4-Trimethylbenzene	50	52		1	105	70-130	11/25/2016 1022
1,3,5-Trimethylbenzene (Mesitylene)	50	47		1	93	70-130	11/25/2016 1022
Vinyl chloride	50	46		1	91	60-140	11/25/2016 1022
o - Xylenes	50	53		1	106	70-130	11/25/2016 1022
m+p - Xylenes	50	52		1	105	70-130	11/25/2016 1022

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		100	70-130
1,2-Dichloroethane-d4		83	70-130
Toluene-d8		102	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27876-001
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
Benzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Bromobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Bromochloromethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Bromodichloromethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Bromoform	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Bromomethane (Methyl bromide)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
tert-Butylbenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
sec-Butylbenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
n-Butylbenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Carbon tetrachloride	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Chlorobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Chloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Chloroform	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Chloromethane (Methyl chloride)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
4-Chlorotoluene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
2-Chlorotoluene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Dibromochloromethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2-Dibromoethane (EDB)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Dibromomethane (Methylene bromide)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,4-Dichlorobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,3-Dichlorobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2-Dichlorobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Dichlorodifluoromethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2-Dichloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1-Dichloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
trans-1,2-Dichloroethene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
cis-1,2-Dichloroethene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1-Dichloroethene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
2,2-Dichloropropane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,3-Dichloropropane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2-Dichloropropane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
trans-1,3-Dichloropropene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
cis-1,3-Dichloropropene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1-Dichloropropene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Ethylbenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Hexachlorobutadiene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Isopropylbenzene (Cumene)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
p-Isopropyltoluene (p-Cymene)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Methyl tertiary butyl ether (MTBE)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Methylene chloride	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Naphthalene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
n-Propylbenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Styrene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1,2,2-Tetrachloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27876-001
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
1,1,1,2-Tetrachloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Tetrachloroethene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Toluene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2,4-Trichlorobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2,3-Trichlorobenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1,2-Trichloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,1,1-Trichloroethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Trichloroethene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Trichlorofluoromethane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2,3-Trichloropropane	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,2,4-Trimethylbenzene	ND		1	0.50	0.40	ug/L	11/28/2016 0957
1,3,5-Trimethylbenzene (Mesitylene)	ND		1	0.50	0.40	ug/L	11/28/2016 0957
Vinyl chloride	ND		1	0.50	0.40	ug/L	11/28/2016 0957
o - Xylenes	ND		1	0.50	0.40	ug/L	11/28/2016 0957
m+p - Xylenes	ND		1	0.50	0.40	ug/L	11/28/2016 0957

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		101	70-130
1,2-Dichloroethane-d4		92	70-130
Toluene-d8		106	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27876-002
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Benzene	50	48		1	95	70-130	11/28/2016 0859
Bromobenzene	50	54		1	107	70-130	11/28/2016 0859
Bromochloromethane	50	49		1	98	70-130	11/28/2016 0859
Bromodichloromethane	50	55		1	110	70-130	11/28/2016 0859
Bromoform	50	50		1	100	70-130	11/28/2016 0859
Bromomethane (Methyl bromide)	50	40		1	81	60-140	11/28/2016 0859
tert-Butylbenzene	50	55		1	111	70-130	11/28/2016 0859
sec-Butylbenzene	50	54		1	109	70-130	11/28/2016 0859
n-Butylbenzene	50	52		1	104	70-130	11/28/2016 0859
Carbon tetrachloride	50	52		1	103	70-130	11/28/2016 0859
Chlorobenzene	50	52		1	103	70-130	11/28/2016 0859
Chloroethane	50	37		1	74	42-163	11/28/2016 0859
Chloroform	50	50		1	100	70-130	11/28/2016 0859
Chloromethane (Methyl chloride)	50	50		1	99	20-158	11/28/2016 0859
4-Chlorotoluene	50	53		1	107	70-130	11/28/2016 0859
2-Chlorotoluene	50	54		1	108	70-130	11/28/2016 0859
Dibromochloromethane	50	50		1	100	70-130	11/28/2016 0859
1,2-Dibromoethane (EDB)	50	51		1	101	70-130	11/28/2016 0859
Dibromomethane (Methylene bromide)	50	49		1	99	70-130	11/28/2016 0859
1,4-Dichlorobenzene	50	51		1	102	70-130	11/28/2016 0859
1,3-Dichlorobenzene	50	51		1	103	70-130	11/28/2016 0859
1,2-Dichlorobenzene	50	52		1	103	70-130	11/28/2016 0859
Dichlorodifluoromethane	50	43		1	86	60-140	11/28/2016 0859
1,2-Dichloroethane	50	51		1	102	70-130	11/28/2016 0859
1,1-Dichloroethane	50	50		1	100	70-130	11/28/2016 0859
trans-1,2-Dichloroethene	50	48		1	96	70-130	11/28/2016 0859
cis-1,2-Dichloroethene	50	49		1	97	70-130	11/28/2016 0859
1,1-Dichloroethene	50	46		1	93	70-130	11/28/2016 0859
2,2-Dichloropropane	50	50		1	100	70-130	11/28/2016 0859
1,3-Dichloropropane	50	50		1	100	70-130	11/28/2016 0859
1,2-Dichloropropane	50	50		1	101	70-130	11/28/2016 0859
trans-1,3-Dichloropropene	50	49		1	99	70-130	11/28/2016 0859
cis-1,3-Dichloropropene	50	51		1	102	70-130	11/28/2016 0859
1,1-Dichloropropene	50	51		1	103	70-130	11/28/2016 0859
Ethylbenzene	50	53		1	106	70-130	11/28/2016 0859
Hexachlorobutadiene	50	52		1	105	70-130	11/28/2016 0859
Isopropylbenzene (Cumene)	50	52		1	104	70-130	11/28/2016 0859
p-Isopropyltoluene (p-Cymene)	50	50		1	101	70-130	11/28/2016 0859
Methyl tertiary butyl ether (MTBE)	50	47		1	93	70-130	11/28/2016 0859
Methylene chloride	50	45		1	91	70-130	11/28/2016 0859
Naphthalene	50	52		1	103	50-140	11/28/2016 0859
n-Propylbenzene	50	50		1	100	70-130	11/28/2016 0859
Styrene	50	55		1	109	70-130	11/28/2016 0859
1,1,2,2-Tetrachloroethane	50	51		1	103	70-130	11/28/2016 0859

PQL = Practical quantitation limit
P = The RPD between two GC columns exceeds 40%
N = Recovery is out of criteria
ND = Not detected at or above the MDL
J = Estimated result < PQL and ≥ MDL
+ = RPD is out of criteria
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27876-002
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
1,1,1,2-Tetrachloroethane	50	54		1	109	70-130	11/28/2016 0859
Tetrachloroethene	50	51		1	101	70-130	11/28/2016 0859
Toluene	50	52		1	104	70-130	11/28/2016 0859
1,1,2-Trichloro-1,2,2-Trifluoroethane	50	44		1	87	70-130	11/28/2016 0859
1,2,4-Trichlorobenzene	50	51		1	102	70-130	11/28/2016 0859
1,2,3-Trichlorobenzene	50	50		1	101	70-130	11/28/2016 0859
1,1,2-Trichloroethane	50	51		1	102	70-130	11/28/2016 0859
1,1,1-Trichloroethane	50	51		1	102	70-130	11/28/2016 0859
Trichloroethene	50	52		1	103	70-130	11/28/2016 0859
Trichlorofluoromethane	50	45		1	91	60-140	11/28/2016 0859
1,2,3-Trichloropropane	50	53		1	106	70-130	11/28/2016 0859
1,2,4-Trimethylbenzene	50	54		1	108	70-130	11/28/2016 0859
1,3,5-Trimethylbenzene (Mesitylene)	50	48		1	97	70-130	11/28/2016 0859
Vinyl chloride	50	39		1	78	60-140	11/28/2016 0859
o - Xylenes	50	56		1	111	70-130	11/28/2016 0859
m+p - Xylenes	50	56		1	111	70-130	11/28/2016 0859

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		99	70-130
1,2-Dichloroethane-d4		89	70-130
Toluene-d8		102	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MS

Sample ID: RK21024-003MS
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
Benzene	ND	1000	980		20	98	70-130	11/28/2016 1836
Bromobenzene	ND	1000	1000		20	103	70-130	11/28/2016 1836
Bromochloromethane	ND	1000	1000		20	100	70-130	11/28/2016 1836
Bromodichloromethane	ND	1000	1000		20	105	70-130	11/28/2016 1836
Bromoform	ND	1000	780		20	78	70-130	11/28/2016 1836
Bromomethane (Methyl bromide)	ND	1000	790		20	79	60-140	11/28/2016 1836
n-Butylbenzene	ND	1000	1200		20	116	70-130	11/28/2016 1836
sec-Butylbenzene	50	1000	1100		20	109	70-130	11/28/2016 1836
tert-Butylbenzene	ND	1000	920		20	92	70-130	11/28/2016 1836
Carbon tetrachloride	ND	1000	1100		20	108	70-130	11/28/2016 1836
Chlorobenzene	ND	1000	1000		20	103	70-130	11/28/2016 1836
Chloroethane	ND	1000	750		20	75	42-163	11/28/2016 1836
Chloroform	ND	1000	1000		20	103	70-130	11/28/2016 1836
Chloromethane (Methyl chloride)	ND	1000	1200		20	125	20-158	11/28/2016 1836
2-Chlorotoluene	ND	1000	1300	N	20	134	70-130	11/28/2016 1836
4-Chlorotoluene	ND	1000	1000		20	104	70-130	11/28/2016 1836
Dibromochloromethane	ND	1000	900		20	90	70-130	11/28/2016 1836
1,2-Dibromoethane (EDB)	ND	1000	1000		20	101	70-130	11/28/2016 1836
Dibromomethane (Methylene bromide)	ND	1000	990		20	99	70-130	11/28/2016 1836
1,2-Dichlorobenzene	ND	1000	1000		20	102	70-130	11/28/2016 1836
1,3-Dichlorobenzene	ND	1000	1000		20	102	70-130	11/28/2016 1836
1,4-Dichlorobenzene	ND	1000	990		20	99	70-130	11/28/2016 1836
Dichlorodifluoromethane	ND	1000	1100		20	105	60-140	11/28/2016 1836
1,1-Dichloroethane	ND	1000	1000		20	103	70-130	11/28/2016 1836
1,2-Dichloroethane	ND	1000	1000		20	101	70-130	11/28/2016 1836
1,1-Dichloroethene	ND	1000	990		20	99	70-130	11/28/2016 1836
cis-1,2-Dichloroethene	ND	1000	990		20	99	70-130	11/28/2016 1836
trans-1,2-Dichloroethene	ND	1000	1000		20	100	70-130	11/28/2016 1836
1,2-Dichloropropane	ND	1000	1000		20	102	70-130	11/28/2016 1836
1,3-Dichloropropane	ND	1000	1000		20	101	70-130	11/28/2016 1836
2,2-Dichloropropane	ND	1000	980		20	98	70-130	11/28/2016 1836
1,1-Dichloropropene	ND	1000	1100		20	109	70-130	11/28/2016 1836
cis-1,3-Dichloropropene	ND	1000	940		20	94	70-130	11/28/2016 1836
trans-1,3-Dichloropropene	ND	1000	910		20	91	70-130	11/28/2016 1836
Ethylbenzene	290	1000	1400		20	108	70-130	11/28/2016 1836
Hexachlorobutadiene	ND	1000	1000		20	100	70-130	11/28/2016 1836
Isopropylbenzene (Cumene)	100	1000	1200		20	105	70-130	11/28/2016 1836
p-Isopropyltoluene (p-Cymene)	29	1000	1100		20	103	70-130	11/28/2016 1836
Methyl tertiary butyl ether (MTBE)	ND	1000	940		20	94	70-130	11/28/2016 1836
Methylene chloride	ND	1000	910		20	91	70-130	11/28/2016 1836
Naphthalene	69	1000	1100		20	107	50-140	11/28/2016 1836
n-Propylbenzene	410	1000	1400		20	95	70-130	11/28/2016 1836
Styrene	ND	1000	1100		20	110	70-130	11/28/2016 1836
1,1,1,2-Tetrachloroethane	ND	1000	1100		20	106	70-130	11/28/2016 1836

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MS

Sample ID: RK21024-003MS
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
1,1,2,2-Tetrachloroethane	ND	1000	980		20	98	70-130	11/28/2016 1836
Tetrachloroethene	ND	1000	1100		20	107	70-130	11/28/2016 1836
Toluene	30	1000	1100		20	108	70-130	11/28/2016 1836
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	1000	940		20	94	70-130	11/28/2016 1836
1,2,3-Trichlorobenzene	ND	1000	970		20	97	70-130	11/28/2016 1836
1,2,4-Trichlorobenzene	ND	1000	1000		20	100	70-130	11/28/2016 1836
1,1,1-Trichloroethane	ND	1000	1100		20	108	70-130	11/28/2016 1836
1,1,2-Trichloroethane	ND	1000	1000		20	102	70-130	11/28/2016 1836
Trichloroethene	ND	1000	1100		20	108	70-130	11/28/2016 1836
Trichlorofluoromethane	ND	1000	930		20	93	60-140	11/28/2016 1836
1,2,3-Trichloropropane	ND	1000	1000		20	101	70-130	11/28/2016 1836
1,3,5-Trimethylbenzene (Mesitylene)	ND	1000	1100		20	109	70-130	11/28/2016 1836
1,2,4-Trimethylbenzene	1600	1000	2600		20	103	70-130	11/28/2016 1836
Vinyl chloride	ND	1000	840		20	84	60-140	11/28/2016 1836
m+p - Xylenes	810	1000	1900		20	111	70-130	11/28/2016 1836
o - Xylenes	310	1000	1500		20	114	70-130	11/28/2016 1836

Surrogate	Q	% Rec	Acceptance Limit
1,2-Dichloroethane-d4		86	70-130
Bromofluorobenzene		98	70-130
Toluene-d8		103	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MSD

Sample ID: RK21024-003MD
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% RPD	% Rec Limit	% RPD Limit	Analysis Date
Benzene	ND	1000	1100		20	108	9.2	70-130	20	11/28/2016 1859
Bromobenzene	ND	1000	1200		20	116	11	70-130	20	11/28/2016 1859
Bromochloromethane	ND	1000	1100		20	108	7.6	70-130	20	11/28/2016 1859
Bromodichloromethane	ND	1000	1100		20	114	8.5	70-130	20	11/28/2016 1859
Bromoform	ND	1000	860		20	86	8.8	70-130	20	11/28/2016 1859
Bromomethane (Methyl bromide)	ND	1000	830		20	83	5.6	60-140	20	11/28/2016 1859
n-Butylbenzene	ND	1000	1300		20	129	11	70-130	20	11/28/2016 1859
sec-Butylbenzene	50	1000	1300		20	124	12	70-130	20	11/28/2016 1859
tert-Butylbenzene	ND	1000	1000		20	104	12	70-130	20	11/28/2016 1859
Carbon tetrachloride	ND	1000	1200		20	118	9.4	70-130	20	11/28/2016 1859
Chlorobenzene	ND	1000	1100		20	113	9.2	70-130	20	11/28/2016 1859
Chloroethane	ND	1000	750		20	75	0.59	42-163	20	11/28/2016 1859
Chloroform	ND	1000	1100		20	111	7.3	70-130	20	11/28/2016 1859
Chloromethane (Methyl chloride)	ND	1000	1300		20	128	2.4	20-158	20	11/28/2016 1859
2-Chlorotoluene	ND	1000	1500	N	20	151	12	70-130	20	11/28/2016 1859
4-Chlorotoluene	ND	1000	1200		20	118	12	70-130	20	11/28/2016 1859
Dibromochloromethane	ND	1000	970		20	97	7.2	70-130	20	11/28/2016 1859
1,2-Dibromoethane (EDB)	ND	1000	1100		20	110	8.6	70-130	20	11/28/2016 1859
Dibromomethane (Methylene bromide)	ND	1000	1100		20	106	7.1	70-130	20	11/28/2016 1859
1,2-Dichlorobenzene	ND	1000	1100		20	115	12	70-130	20	11/28/2016 1859
1,3-Dichlorobenzene	ND	1000	1100		20	114	12	70-130	20	11/28/2016 1859
1,4-Dichlorobenzene	ND	1000	1100		20	111	11	70-130	20	11/28/2016 1859
Dichlorodifluoromethane	ND	1000	1100		20	112	6.7	60-140	20	11/28/2016 1859
1,1-Dichloroethane	ND	1000	1100		20	110	7.2	70-130	20	11/28/2016 1859
1,2-Dichloroethane	ND	1000	1100		20	108	6.7	70-130	20	11/28/2016 1859
1,1-Dichloroethene	ND	1000	1100		20	106	6.7	70-130	20	11/28/2016 1859
cis-1,2-Dichloroethene	ND	1000	1100		20	106	7.0	70-130	20	11/28/2016 1859
trans-1,2-Dichloroethene	ND	1000	1100		20	107	6.6	70-130	20	11/28/2016 1859
1,2-Dichloropropane	ND	1000	1100		20	111	8.2	70-130	20	11/28/2016 1859
1,3-Dichloropropane	ND	1000	1100		20	108	7.4	70-130	20	11/28/2016 1859
2,2-Dichloropropane	ND	1000	1100		20	105	6.8	70-130	20	11/28/2016 1859
1,1-Dichloropropene	ND	1000	1200		20	118	7.7	70-130	20	11/28/2016 1859
cis-1,3-Dichloropropene	ND	1000	1000		20	102	7.9	70-130	20	11/28/2016 1859
trans-1,3-Dichloropropene	ND	1000	990		20	99	9.2	70-130	20	11/28/2016 1859
Ethylbenzene	290	1000	1500		20	121	8.6	70-130	20	11/28/2016 1859
Hexachlorobutadiene	ND	1000	1100		20	114	13	70-130	20	11/28/2016 1859
Isopropylbenzene (Cumene)	100	1000	1300		20	115	8.5	70-130	20	11/28/2016 1859
p-Isopropyltoluene (p-Cymene)	29	1000	1200		20	117	12	70-130	20	11/28/2016 1859
Methyl tertiary butyl ether (MTBE)	ND	1000	1000		20	101	6.9	70-130	20	11/28/2016 1859
Methylene chloride	ND	1000	980		20	98	7.4	70-130	20	11/28/2016 1859
Naphthalene	69	1000	1200		20	115	6.8	50-140	20	11/28/2016 1859
n-Propylbenzene	410	1000	1500		20	114	12	70-130	20	11/28/2016 1859
Styrene	ND	1000	1200		20	120	9.2	70-130	20	11/28/2016 1859
1,1,1,2-Tetrachloroethane	ND	1000	1200		20	116	8.7	70-130	20	11/28/2016 1859

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MSD

Sample ID: RK21024-003MD
Batch: 27876
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Sample Amount (ug/L)	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% RPD	% Rec Limit	% RPD Limit	Analysis Date
1,1,2,2-Tetrachloroethane	ND	1000	1100		20	112	13	70-130	20	11/28/2016 1859
Tetrachloroethene	ND	1000	1200		20	116	8.3	70-130	20	11/28/2016 1859
Toluene	30	1000	1200		20	116	7.2	70-130	20	11/28/2016 1859
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	1000	1100		20	105	12	70-130	20	11/28/2016 1859
1,2,3-Trichlorobenzene	ND	1000	1100		20	108	11	70-130	20	11/28/2016 1859
1,2,4-Trichlorobenzene	ND	1000	1100		20	110	9.7	70-130	20	11/28/2016 1859
1,1,1-Trichloroethane	ND	1000	1200		20	116	7.4	70-130	20	11/28/2016 1859
1,1,2-Trichloroethane	ND	1000	1100		20	111	8.2	70-130	20	11/28/2016 1859
Trichloroethene	ND	1000	1200		20	117	7.9	70-130	20	11/28/2016 1859
Trichlorofluoromethane	ND	1000	1000		20	104	11	60-140	20	11/28/2016 1859
1,2,3-Trichloropropane	ND	1000	1100		20	114	12	70-130	20	11/28/2016 1859
1,3,5-Trimethylbenzene (Mesitylene)	ND	1000	1200		20	122	11	70-130	20	11/28/2016 1859
1,2,4-Trimethylbenzene	1600	1000	2900		20	130	9.9	70-130	20	11/28/2016 1859
Vinyl chloride	ND	1000	880		20	88	3.7	60-140	20	11/28/2016 1859
m+p - Xylenes	810	1000	2100		20	125	6.9	70-130	20	11/28/2016 1859
o - Xylenes	310	1000	1600		20	125	7.2	70-130	20	11/28/2016 1859

Surrogate	Q	% Rec	Acceptance Limit
1,2-Dichloroethane-d4		87	70-130
Bromofluorobenzene		99	70-130
Toluene-d8		103	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - MB

Sample ID: RQ27939-001
Batch: 27939
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Result	Q	Dil	PQL	MDL	Units	Analysis Date
tert-Amyl alcohol (TAA)	ND		1	20	8.0	ug/L	11/28/2016 2231
tert-Amyl methyl ether (TAME)	ND		1	10	0.40	ug/L	11/28/2016 2231
tert-Butyl formate (TBF)	ND		1	5.0	4.0	ug/L	11/28/2016 2231
Diisopropyl ether (IPE)	ND		1	1.0	0.40	ug/L	11/28/2016 2231
3,3-Dimethyl-1-butanol	ND		1	20	8.0	ug/L	11/28/2016 2231
Ethanol	ND		1	100	40	ug/L	11/28/2016 2231
Ethyl-tert-butyl ether (ETBE)	ND		1	1.0	0.40	ug/L	11/28/2016 2231
tert-butyl alcohol (TBA)	ND		1	20	8.0	ug/L	11/28/2016 2231

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		105	70-130
1,2-Dichloroethane-d4		92	70-130
Toluene-d8		119	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Volatile Organic Compounds by GC/MS - LCS

Sample ID: RQ27939-002
Batch: 27939
Analytical Method: SM 6200B-2011

Matrix: Aqueous
Prep Method: SM 6200B-2011

Parameter	Spike Amount (ug/L)	Result (ug/L)	Q	Dil	% Rec	% Rec Limit	Analysis Date
tert-Amyl alcohol (TAA)	1000	930		1	93	70-130	11/28/2016 2123
tert-Amyl methyl ether (TAME)	50	45		1	90	70-130	11/28/2016 2123
tert-Butyl formate (TBF)	250	220		1	88	70-130	11/28/2016 2123
Diisopropyl ether (IPE)	50	42		1	84	70-130	11/28/2016 2123
3,3-Dimethyl-1-butanol	1000	950		1	95	70-130	11/28/2016 2123
Ethanol	5000	4600		1	92	40-140	11/28/2016 2123
Ethyl-tert-butyl ether (ETBE)	50	46		1	92	70-130	11/28/2016 2123
tert-butyl alcohol (TBA)	1000	940		1	94	70-130	11/28/2016 2123

Surrogate	Q	% Rec	Acceptance Limit
Bromofluorobenzene		107	70-130
1,2-Dichloroethane-d4		88	70-130
Toluene-d8		113	70-130

PQL = Practical quantitation limit
ND = Not detected at or above the MDL
P = The RPD between two GC columns exceeds 40%
J = Estimated result < PQL and ≥ MDL
N = Recovery is out of criteria
+ = RPD is out of criteria

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

Note: Calculations are performed before rounding to avoid round-off errors in calculated results

Chain of Custody
and
Miscellaneous Documents

Shealy Environmental Services, Inc.
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

SHEALY ENVIRONMENTAL SERVICES, INC.

SHEALY ENVIRONMENTAL SERVICES, INC.

106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.shealylab.com

Chain of Custody Record

Number 54567

Client: EXCEL CIVIL & ENV. ASSOCIATES	Report to Contact: MIKE STANFORD	Telephone No. / E-mail: 704 853 0800 MSTANFORD@EXCELCIVIL.COM	Quote No.
Address: 625 HUNTSMAN CT.	Sampler's Signature:	Analysis (Attach list if more space is needed)	Page 1 of 1
City: GASTONIA	State: NC	Zip Code: 28054	
Project Name: SM 782	Printed Name: MIKE STANFORD		
Project No.: 2015059	P.O. No.: 2015059		

RK21024

Sample ID / Description (Containers for each sample may be combined on one line)	Date	Time	Sample Composition	Matrix: Aqueous	Matrix: Solid	Matrix: Non-Aqueous	No. of Containers by Preservative Type: Unpres.	HNO3	H2SO4	HCl	NaOH	ZnAc/NaOH	GRO 6200B+	EXTENDED MTBE
MW-2	11/18/16	1211	G	✓									X	
MW-3	11/18/16	1057	G	✓									X	
MW-4	11/18/16	1017	G	✓									X	
VEW-1	11/18/16	1034	G	✓									X	

Turn Around Time Required (Prior lab approval required for expedited TAT.): ☒ Standard ☐ Rush (Specify)

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished by	11/21/16	0930	1. Received by	11/21/16	09:30
2. Relinquished by	11/21/16	1130	2. Received by	11-21-16	1130
3. Relinquished by	11.21.16	1650	3. Received by	Date	Time
4. Relinquished by	Date	Time	4. Laboratory received by	11.21.16	1650

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle): (Yes) No Ice Pack — Receipt Temp: 2.0 °C

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Shealy Environmental Services, Inc.
Document Number: ME0018C-06

Page 1 of 1
Effective Date: 11/18/2016
Expiry Date: 11/18/2021

Sample Receipt Checklist (SRC)

Client: Red Civil Cooler Inspected by/date: SBG 11/21/16 Lot #: RK2102A

Means of receipt: ☐ SESI ☐ Client ☐ UPS ☐ FedEx ☐ Other			
Yes ☐	No ☑		1. Were custody seals present on the cooler?
Yes ☐	No ☐	NA ☐	2. If custody seals were present, were they intact and unbroken?
pH strip ID:			Cl strip ID:
Cooler ID/Original temperature upon receipt/Derived (corrected) temperature upon receipt: 11-8 12.0 °C / / °C / / °C / / °C			
Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 6 IR Gun Correction Factor: +0.2 °C			
Method of coolant: ☑ Wet Ice ☐ Blue Ice ☐ Dry Ice ☐ None			
Yes ☐	No ☐	NA ☑	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
Yes ☐	No ☐	NA ☑	4. Is the commercial courier's packing slip attached to this form?
Yes ☑	No ☐		5. Were proper custody procedures (relinquished/received) followed?
Yes ☑	No ☐		6. Were sample IDs listed on the COC?
Yes ☑	No ☐		7. Were sample IDs listed on all sample containers?
Yes ☑	No ☐		8. Was collection date & time listed on the COC?
Yes ☑	No ☐		9. Was collection date & time listed on all sample containers?
Yes ☑	No ☐		10. Did all container label information (ID, date, time) agree with the COC?
Yes ☑	No ☐		11. Were tests to be performed listed on the COC?
Yes ☑	No ☐		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
Yes ☑	No ☐		13. Was adequate sample volume available?
Yes ☐	No ☑		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
Yes ☐	No ☑		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
Yes ☐	No ☑	NA ☐	16. Were bubbles present >"pea-size" (¼"or 6mm in diameter) in any VOA vials?
Yes ☐	No ☐	NA ☑	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
Yes ☐	No ☐	NA ☑	18. Were all cyanide and/or sulfide samples received at a pH >12?
Yes ☐	No ☐	NA ☑	19. Were all applicable NH3/TKN/cyanide/phenol/BNA (<0.2mg/L) samples free of residual chlorine?
Yes ☐	No ☐	NA ☑	20. Were collection temperatures documented on the COC for NC samples?
Yes ☐	No ☐	NA ☑	21. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc...) correctly transcribed from the COC into the comment section in LIMS?
Yes ☐	No ☐		22. Was the quote number used taken from the container label?

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with _____ (H_2SO_4, HNO_3, HCl, NaOH) using SR # _____.

Sample(s) _____ were received with bubbles >6 mm in diameter.

Samples(s) _____ were received with TRC >0.2 mg/L (If #21 is No) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: _____.

SC Drinking Water Project Sample(s) pH verified to be < 2 by _____ Date: _____

Sample(s) _____ were Not received at a pH of < 2 and were adjusted accordingly using SR# _____

Sample labels applied by: EH Verified by: _____ Date: 11/21/16

Comments: _____

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

May 05, 2017

myESC
REAL TIME DATA ACCESS

Excel Civil & Environmental Associates

Sample Delivery Group:	L905401
Samples Received:	04/27/2017
Project Number:	201008
Description:	SM 782

Report To:

Mr. Mike Stanforth
PO Box 6172
Gastonia, NC 28056-6000

Entire Report Reviewed By:

Jimmy Hunt
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

MW-5 L905401-01 GW

Collected by: Mike Stanforth
Collected date/time: 04/26/17 10:34
Received date/time: 04/27/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 6200B-1997	WG975531	1	05/02/17 06:15	05/02/17 06:15	GLN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jimmy Hunt
Technical Service Representative

Volatile Organic Compounds (GC/MS) by Method 6200B-1997

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U	J3	10.0	50.0	1	05/02/2017 06:15	WG975531
Acrolein	U	J4	8.87	50.0	1	05/02/2017 06:15	WG975531
Acrylonitrile	U		1.87	10.0	1	05/02/2017 06:15	WG975531
Benzene	U		0.331	1.00	1	05/02/2017 06:15	WG975531
Bromobenzene	U		0.352	1.00	1	05/02/2017 06:15	WG975531
Bromodichloromethane	U		0.380	1.00	1	05/02/2017 06:15	WG975531
Bromoform	U		0.469	1.00	1	05/02/2017 06:15	WG975531
Bromomethane	U		0.866	5.00	1	05/02/2017 06:15	WG975531
n-Butylbenzene	U		0.361	1.00	1	05/02/2017 06:15	WG975531
sec-Butylbenzene	U		0.365	1.00	1	05/02/2017 06:15	WG975531
tert-Butylbenzene	U		0.399	1.00	1	05/02/2017 06:15	WG975531
Carbon tetrachloride	U		0.379	1.00	1	05/02/2017 06:15	WG975531
Chlorobenzene	U		0.348	1.00	1	05/02/2017 06:15	WG975531
Chlorodibromomethane	U		0.327	1.00	1	05/02/2017 06:15	WG975531
Chloroethane	U		0.453	5.00	1	05/02/2017 06:15	WG975531
Chloroform	U		0.324	5.00	1	05/02/2017 06:15	WG975531
Chloromethane	U		0.276	2.50	1	05/02/2017 06:15	WG975531
2-Chlorotoluene	U		0.375	1.00	1	05/02/2017 06:15	WG975531
4-Chlorotoluene	U		0.351	1.00	1	05/02/2017 06:15	WG975531
1,2-Dibromo-3-Chloropropane	U		1.33	5.00	1	05/02/2017 06:15	WG975531
1,2-Dibromoethane	U		0.381	1.00	1	05/02/2017 06:15	WG975531
Dibromomethane	U		0.346	1.00	1	05/02/2017 06:15	WG975531
1,2-Dichlorobenzene	U		0.349	1.00	1	05/02/2017 06:15	WG975531
1,3-Dichlorobenzene	U		0.220	1.00	1	05/02/2017 06:15	WG975531
1,4-Dichlorobenzene	U		0.274	1.00	1	05/02/2017 06:15	WG975531
Dichlorodifluoromethane	U		0.551	5.00	1	05/02/2017 06:15	WG975531
1,1-Dichloroethane	U		0.259	1.00	1	05/02/2017 06:15	WG975531
1,2-Dichloroethane	U		0.361	1.00	1	05/02/2017 06:15	WG975531
1,1-Dichloroethene	U		0.398	1.00	1	05/02/2017 06:15	WG975531
cis-1,2-Dichloroethene	U		0.260	1.00	1	05/02/2017 06:15	WG975531
trans-1,2-Dichloroethene	U		0.396	1.00	1	05/02/2017 06:15	WG975531
1,2-Dichloropropane	U		0.306	1.00	1	05/02/2017 06:15	WG975531
1,1-Dichloropropene	U		0.352	1.00	1	05/02/2017 06:15	WG975531
1,3-Dichloropropane	U		0.366	1.00	1	05/02/2017 06:15	WG975531
2,2-Dichloropropane	U		0.321	1.00	1	05/02/2017 06:15	WG975531
Di-isopropyl ether	U		0.320	1.00	1	05/02/2017 06:15	WG975531
Ethylbenzene	U		0.384	1.00	1	05/02/2017 06:15	WG975531
Hexachloro-1,3-butadiene	U		0.256	1.00	1	05/02/2017 06:15	WG975531
Isopropylbenzene	U		0.326	1.00	1	05/02/2017 06:15	WG975531
p-Isopropyltoluene	U		0.350	1.00	1	05/02/2017 06:15	WG975531
2-Butanone (MEK)	U		3.93	10.0	1	05/02/2017 06:15	WG975531
Methylene Chloride	U		1.00	5.00	1	05/02/2017 06:15	WG975531
4-Methyl-2-pentanone (MIBK)	U		2.14	10.0	1	05/02/2017 06:15	WG975531
Methyl tert-butyl ether	U		0.367	1.00	1	05/02/2017 06:15	WG975531
Naphthalene	U		1.00	5.00	1	05/02/2017 06:15	WG975531
n-Propylbenzene	U		0.349	1.00	1	05/02/2017 06:15	WG975531
Styrene	U		0.307	1.00	1	05/02/2017 06:15	WG975531
1,1,1,2-Tetrachloroethane	U		0.385	1.00	1	05/02/2017 06:15	WG975531
1,1,2,2-Tetrachloroethane	U		0.130	1.00	1	05/02/2017 06:15	WG975531
Tetrachloroethene	U		0.372	1.00	1	05/02/2017 06:15	WG975531
Toluene	U		0.412	1.00	1	05/02/2017 06:15	WG975531
1,2,3-Trichlorobenzene	U		0.230	1.00	1	05/02/2017 06:15	WG975531
1,2,4-Trichlorobenzene	U		0.355	1.00	1	05/02/2017 06:15	WG975531
1,1,1-Trichloroethane	U		0.319	1.00	1	05/02/2017 06:15	WG975531
1,1,2-Trichloroethane	U		0.383	1.00	1	05/02/2017 06:15	WG975531
Trichloroethene	U		0.398	1.00	1	05/02/2017 06:15	WG975531

Volatile Organic Compounds (GC/MS) by Method 6200B-1997

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Trichlorofluoromethane	U		1.20	5.00	1	05/02/2017 06:15	WG975531
1,2,3-Trichloropropane	U		0.807	2.50	1	05/02/2017 06:15	WG975531
1,2,4-Trimethylbenzene	U		0.373	1.00	1	05/02/2017 06:15	WG975531
1,3,5-Trimethylbenzene	U		0.387	1.00	1	05/02/2017 06:15	WG975531
Vinyl chloride	U		0.259	1.00	1	05/02/2017 06:15	WG975531
o-Xylene	U		0.341	1.00	1	05/02/2017 06:15	WG975531
m&p-Xylenes	U		0.719	2.00	1	05/02/2017 06:15	WG975531
Ethanol	U	J4	42.0	100	1	05/02/2017 06:15	WG975531
Ethyl tert-butyl ether	U		0.270	1.00	1	05/02/2017 06:15	WG975531
t-Amyl Alcohol	U		4.90	50.0	1	05/02/2017 06:15	WG975531
tert-Butyl alcohol	U		2.40	5.00	1	05/02/2017 06:15	WG975531
tert-Amyl Methyl Ether	U		0.260	1.00	1	05/02/2017 06:15	WG975531
(S) Toluene-d8	*104*			*80.0-120*		*05/02/2017 06:15*	WG975531
(S) Dibromofluoromethane	*103*			*76.0-123*		*05/02/2017 06:15*	WG975531
(S) a,a,a-Trifluorotoluene	*98.0*			*80.0-120*		*05/02/2017 06:15*	WG975531
(S) 4-Bromofluorobenzene	*97.2*			*80.0-120*		*05/02/2017 06:15*	WG975531

4-Chlorotoluene	U	0.351	1.00
1,2-Dibromo-3-Chloropropane	U	1.33	5.00
1,2-Dibromoethane	U	0.381	1.00
Dibromomethane	U	0.346	1.00
1,2-Dichlorobenzene	U	0.349	1.00
1,3-Dichlorobenzene	U	0.220	1.00
1,4-Dichlorobenzene	U	0.274	1.00
Dichlorodifluoromethane	U	0.551	5.00
1,1-Dichloroethane	U	0.259	1.00
1,2-Dichloroethane	U	0.361	1.00
1,1-Dichloroethene	U	0.398	1.00
cis-1,2-Dichloroethene	U	0.260	1.00
trans-1,2-Dichloroethene	U	0.396	1.00
1,2-Dichloropropane	U	0.306	1.00
1,1-Dichloropropene	U	0.352	1.00
1,3-Dichloropropane	U	0.366	1.00
2,2-Dichloropropane	U	0.321	1.00
Di-isopropyl ether	U	0.320	1.00
Ethylbenzene	U	0.384	1.00
Ethanol	U	42.0	100
Hexachloro-1,3-butadiene	U	0.256	1.00
Isopropylbenzene	U	0.326	1.00

1,2,3-Trichloropropane	U	0.867	2.50
1,2,4-Trimethylbenzene	U	0.373	1.00
1,3,5-Trimethylbenzene	U	0.387	1.00
Vinyl chloride	U	0.259	1.00
o-Xylene	U	0.341	1.00
m&p-Xylenes	U	0.719	2.00
tert-Amyl Methyl Ether	U	0.260	1.00
Ethyl tert-butyl ether	U	0.270	1.00
tert-Butyl alcohol	U	2.40	5.00
t-Amyl Alcohol	U	4.90	50.0
(S) Toluene-d8	*104*		*80.0-120*
(S) Dibromofluoromethane	*103*		*76.0-123*
(S) a,a,a-Trifluorotoluene	*98.8*		*80.0-120*
(S) 4-Bromofluorobenzene	*96.8*		*80.0-120*

4-Chlorotoluene	25.0	22.6	22.6	90.4	90.2	79.0-120		0.170	20
1,2-Dibromo-3-Chloropropane	25.0	20.7	21.1	82.7	84.3	64.0-127		2.03	20
1,2-Dibromoethane	25.0	22.8	23.3	91.4	93.3	77.0-123		2.05	20
Dibromomethane	25.0	21.9	22.3	87.6	89.3	78.0-120		1.90	20
1,2-Dichlorobenzene	25.0	24.6	24.4	98.3	97.6	80.0-120		0.700	20
1,3-Dichlorobenzene	25.0	23.0	23.3	91.8	93.0	72.0-123		1.31	20
1,4-Dichlorobenzene	25.0	24.5	24.2	98.1	96.8	77.0-120		1.37	20
Dichlorodifluoromethane	25.0	25.1	24.5	100	97.8	49.0-155		2.50	20
1,1-Dichloroethane	25.0	24.1	23.6	96.6	94.5	70.0-126		2.21	20
1,2-Dichloroethane	25.0	20.0	20.0	80.0	80.0	67.0-126		0.110	20
1,1-Dichloroethene	25.0	23.6	22.9	94.3	91.7	64.0-129		2.85	20
cis-1,2-Dichloroethene	25.0	24.4	23.9	97.7	95.4	73.0-120		2.40	20
trans-1,2-Dichloroethene	25.0	23.8	23.7	95.0	94.9	71.0-121		0.160	20
1,2-Dichloropropane	25.0	25.0	25.2	99.9	101	75.0-125		1.05	20
1,1-Dichloropropene	25.0	23.3	23.0	93.3	92.0	71.0-129		1.37	20
1,3-Dichloropropane	25.0	25.0	25.0	100	100	80.0-121		0.0600	20
2,2-Dichloropropane	25.0	18.5	18.1	73.9	72.4	60.0-125		2.13	20
Di-isopropyl ether	25.0	24.3	24.3	97.3	97.4	59.0-133		0.0800	20
Ethylbenzene	25.0	23.3	23.3	93.2	93.0	77.0-120		0.180	20
Hexachloro-1,3-butadiene	25.0	20.1	19.3	80.4	77.4	64.0-131		3.79	20
Isopropylbenzene	25.0	21.8	21.7	87.1	87.0	75.0-120		0.170	20
p-Isopropyltoluene	25.0	20.4	20.4	81.4	81.6	74.0-126		0.180	20

1,2,4-Trimethylbenzene	25.0	21.4	21.1	85.6	84.6	75.0-120	1.20	20
1,3,5-Trimethylbenzene	25.0	21.0	21.1	84.1	84.6	75.0-120	0.500	20
Vinyl chloride	25.0	28.5	27.9	114	112	64.0-133	2.12	20
o-Xylene	25.0	23.2	23.3	92.7	93.2	78.0-120	0.560	20
m&p-Xylenes	50.0	46.2	46.4	92.5	92.8	77.0-120	0.340	20
(S) Toluene-d8				*104*	*104*	*80.0-120*		
(S) Dibromofluoromethane				*104*	*102*	*76.0-123*		
(S) a,a,a-Trifluorotoluene				*98.9*	*99.1*	*80.0-120*		
(S) 4-Bromofluorobenzene				*98.4*	*99.3*	*80.0-120*		

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.

ACCREDITATIONS & LOCATIONS

ONE LAB. NATIONWIDE.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

[1] Cp
[2] Tc
[3] Ss
[4] Cn
[5] Sr
[6] Qc
[7] Gl
[8] Al
[9] Sc

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [14]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

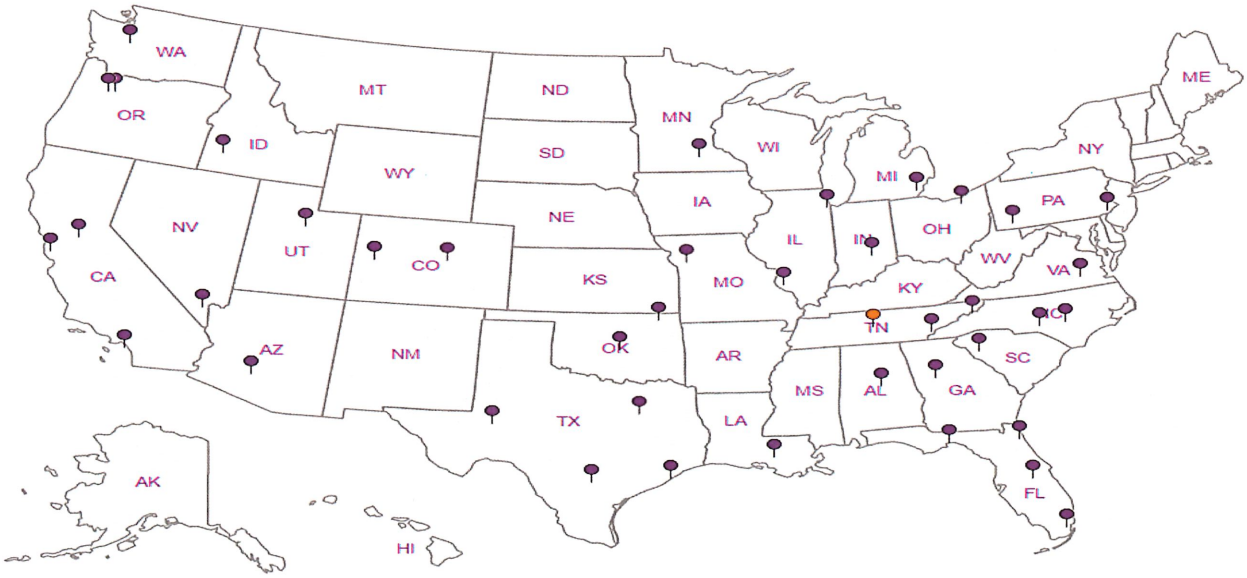
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



| | | |

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

APPENDIX C

RIGHT-OF-ENTRY & ENCROACHMENT AGREEMENTS

RE: (Former) SM782

RIGHT OF ENTRY AGREEMENT

Grace 1 LLC, hereinafter called and referred to as **OWNER**, in consideration of the covenants, promises, and undertakings hereinafter provided, hereby grants to **Sams Mart Companies**, its consultants, contractors, and subcontractors, and the officers, agents, servants, and employees of any of them ("**Sams Mart**"), a right to enter upon that plot of real property owned by OWNER and known as the Guilford County Tax Assessor Parcel ID. No. 6891900920 located at 1500 Main Street, High Point, North Carolina, hereinafter called and referred to as the ("Property"), for the purpose of making certain geotechnical investigations as hereinafter described.

In consideration of this right of entry, SAMS MART covenants, promises and agrees as follows:

1. SAMS MART shall enter upon the Property only as reasonably necessary to make the subsurface exploration and install, monitor and maintain one groundwater monitoring well to fulfill SAMS MART's environmental assessment and remedial work as required by federal, state, and/or local regulations. The groundwater monitoring well would be removed by SAMS MART as soon as practicable after abandonment approval from the regulatory agency.
2. SAMS MART shall disturb the Property no more than reasonably necessary to accomplish the aforesaid purposes, and shall restore the site as nearly as practicable to its condition before its entry, shall leave the site clean and in good order.
3. SAMS MART agrees that all activities in, under, and upon the Property pursuant to this right of entry, by SAMS MART shall be conducted with reasonable care to avoid damage to the existing structures, or to any utilities that are or may be beneath the Property, and that SAMS MART shall be responsible for any damage that may be done to the said structures, or to any other such utilities as a result, directly or indirectly, of any such activity.

4. SAMS MART shall have in effect, at its expense, at all times during the course of work on the OWNER'S property, at least the following coverages and limits of insurance: General Liability Insurance, Bodily Injury and Property Damage, including Contractual Liability Insurance covering the indemnification hereinafter provided, with limits not less than $1,000,000.00 per occurrence.

5. SAMS MART shall indemnify and save harmless the OWNER and its officers, agents, servants, and employees from and against any death of or injury to the person, or damage to the property, of them or any of them, directly resulting from or arising out of the negligence of SAMS MART, its consultant or of any contractor or sub-contractor engaged by SAMS MART, or of any officer, agent, servant, or employee of any of them, who at the time of such act or omission, is in or upon the Property.

6. OWNER shall have the right to full use and enjoyment of the Property except for such use as may unreasonably interfere with the exercise by SAMS MART of the rights granted by this Right of Entry.

7. OWNER has the right, capacity and authority to grant the Right of Entry granted herein.

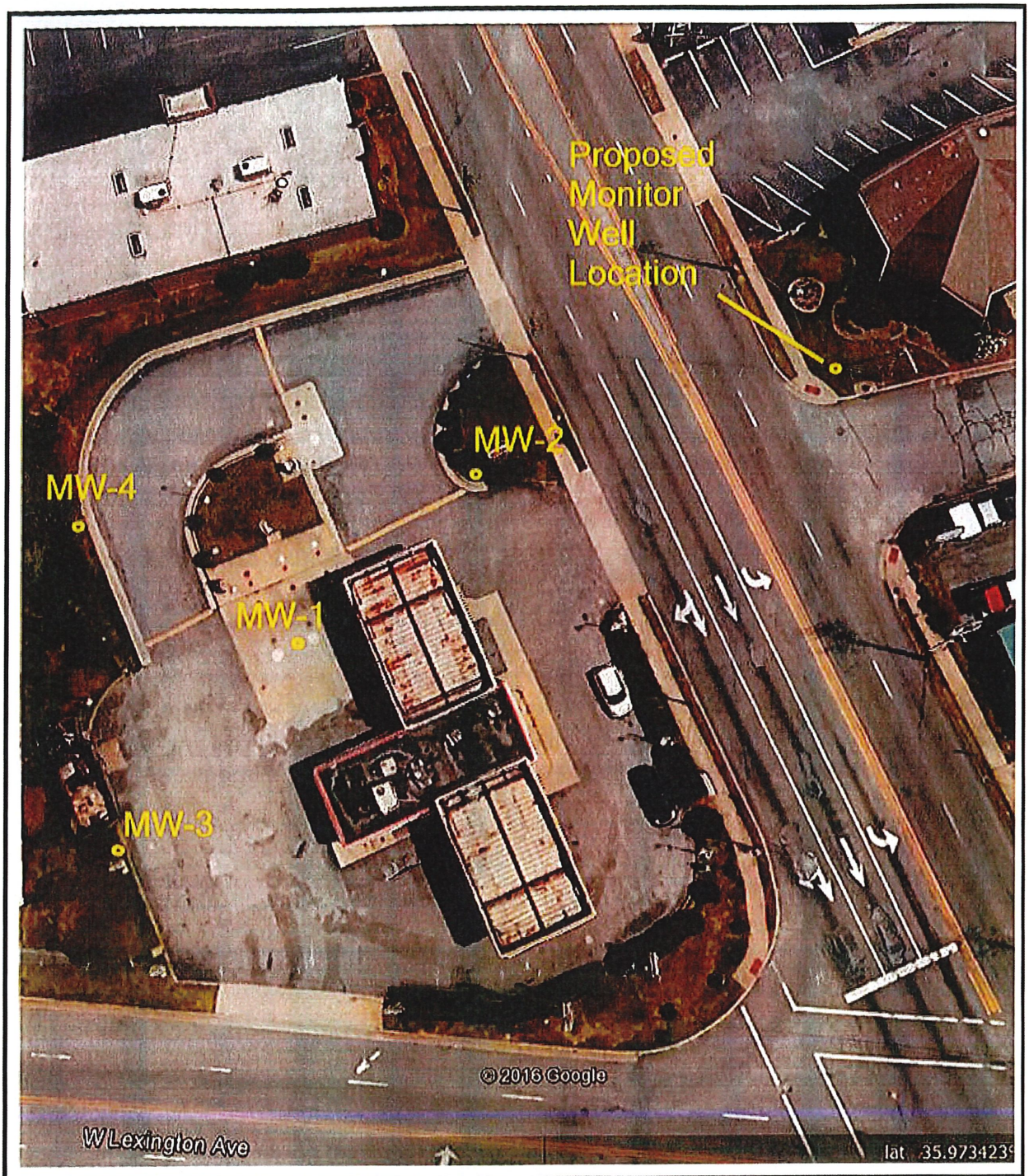
8. SAMS MART shall provide OWNER with copies of test results and environmental reports related to the environmental assessment as required by federal, state, and/or local regulations at the time of the submittal to the respective regulatory agencies.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be signed on their behalf, and their seals to be affixed hereto, this 14th day of March, 2017.

By: _____
OWNER

Sams Mart Companies, (SAMS MART)

By: _____
Mike Stanforth, Agent of SAMS MART



EXCEL CIVIL & ENVIRONMENTAL
ASSOCIATES, PLLC
625 HUNTSMAN COURT
GASTONIA, NC 28054
(704) 853-08000

PROPOSED WELLS LOCATION MAP

Source: Guilford County GIS

⇑
N

February 1, 2017

Excel Civil & Environmental Associates, PLLC

Post Office Box 6172
Gastonia, NC 28056-6000
Telephone 704.853.0800
Facsimile 704.853.3949

Grace 1 LLC
2147 North Fayetteville Street
Asheboro, North Carolina 27203

Re: **Right-of-Entry Request - Installation of Monitor Well**
(Former) SM 782
1401 North Main Street
High Point, North Carolina 27262
NCDENR Incident No. **44644**
Excel Project No. **2015059**

Dear Sir or Madam:

This letter is provided to serve as a request to install one monitoring well on the property identified as the Guilford County Tax Assessor Parcel ID. No. 6891900920 (1500 Main Street) located to the east of the (Former) SM 782 gas station (see attached **Figure**). The well would be installed in reasonable cooperation with the current property operation and completed with flush-mount cover. Attached please find a copy of the Right-Of-Entry agreement for your review and signature. Once reviewed and approved, please forward a signed copy to our attention.

If you have any questions, please feel free to contact Excel at (704) 853-0800.

Sincerely yours,

EXCEL CIVIL & ENVIRONMENTAL ASSOCIATES, PLLC

Mike Stanforth, P. E. DEE
Principal Engineer

p.c. Mitch Rose, Sams Mart, Matthews, NC

APPENDIX D

MONITORING WELL PERMITS

411 W. Market St.
Greensboro, NC 27401

March 22, 2017

BWN INVESTMENTS
Attn.: MITCH ROSE
7935 CORNER PLACE # 200
MATTHEWS, NC 28105

SUBJECT: MONITOR WELL CONSTRUCTION
PERMIT #: 001-16-MW6-RW0
SITE NAME: SAM'S MART #782
GUILFORD COUNTY

In accordance with the application submitted for a monitor well system, we are herewith amending your Monitor Well Construction Permit # 001-16-MW5-RW0 to reflect the correct number of monitor and/or recovery wells at the subject site. The new Monitor Well Construction Permit number now assigned to Sam's Mart #782 is 001-16-MW6-RW0.

Henceforth, correspondence and data relating to these wells shall be designated as specified here. This permit will be effective from the date of its issuance and must be renewed annually. A fee will be due at each annual renewal date.

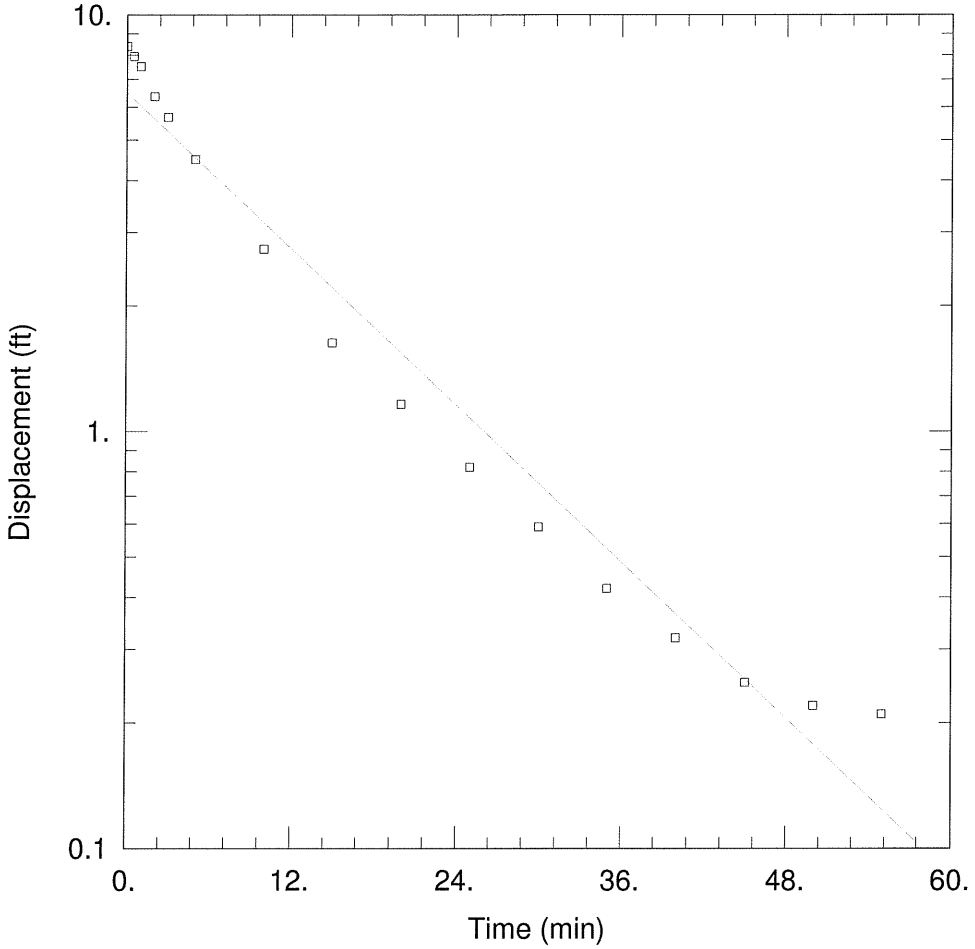
Any additional wells installed at the site in excess of the number permitted above requires that a *new application be submitted* so that the permit may be amended to reflect the correct number of wells on the site. This Permit shall also be subject to the conditions and limitations specified in your original permit.

Sincerely,

Donna J. Mack
Sr. Office Specialist
Environmental Health
336-641-6798

APPENDIX E

RISING-HEAD SLUG TEST REPORT



WELL TEST ANALYSIS

Data Set:
Date: 05/17/17 Time: 10:37:46

PROJECT INFORMATION

Company: ECEA
Client: Sams Mart
Project: 2015059
Test Location: SM 782
Test Well: MW2
Test Date: 11/18/16

AQUIFER DATA

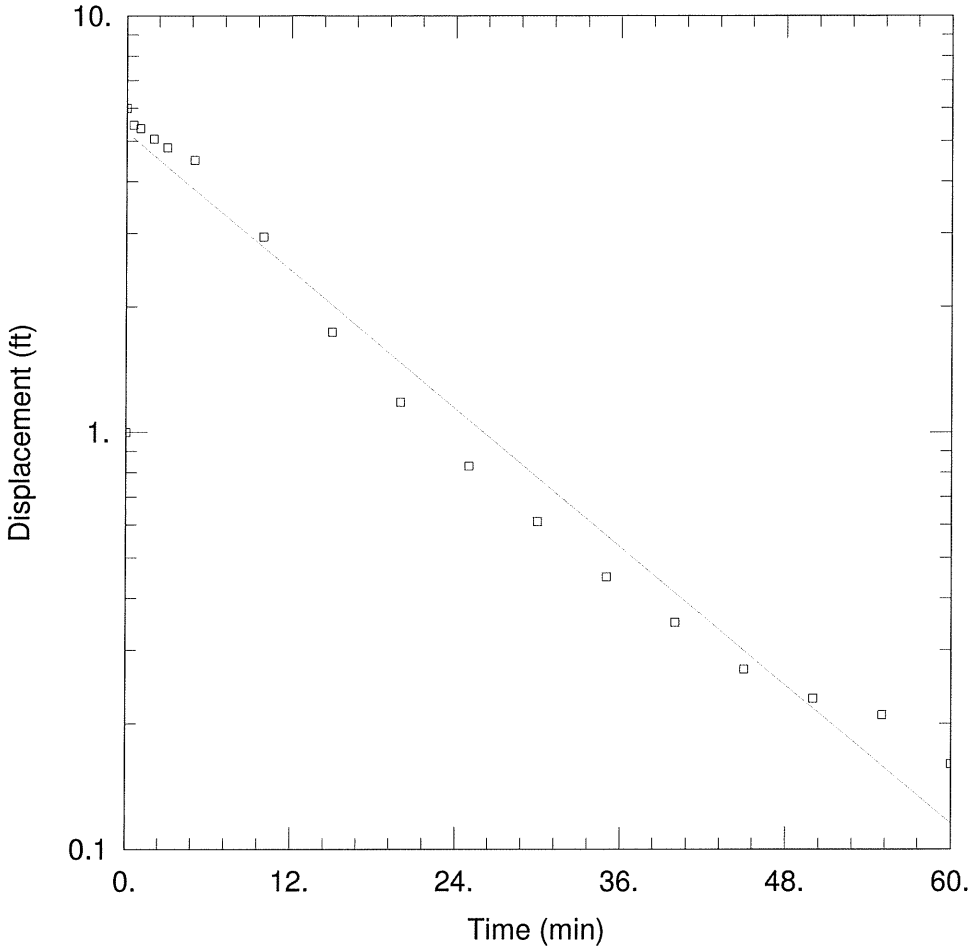
Saturated Thickness: 9. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 8.39 ft
Casing Radius: 0.0833 ft
Screen Length: 9. ft
Water Column Height: 9. ft
Wellbore Radius: 0.177 ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.000142 ft/min
y0 = 6.503 ft



WELL TEST ANALYSIS

Data Set:
Date: 05/17/17 Time: 10:24:45

PROJECT INFORMATION

Company: ECEA
Client: Sams Mart
Project: 2015059
Test Location: SM782
Test Well: MW-3
Test Date: 11/18/16

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1. ft
Casing Radius: 0.0833 ft
Screen Length: 8. ft
Water Column Height: 8. ft
Wellbore Radius: 0.177 ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001368 ft/min
y0 = 5.248 ft

APPENDIX F

PUBLIC NOTIFICATION INFORMATION

LIST OF INDIVIDUALS MEETING PUBLIC NOTICE REQUIREMENT

Ms. Merle Green, Public Health Director
Guilford County Public Health Department
1203 Maple Street
Greensboro, NC 27405

Mr. Marty Lawing, County Manager
Guilford County Administration
PO Box 3427
Greensboro, NC 27402

End of Email #1 with Attachment(s)

Emails # 2, 3, and 4

#2

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 12:21 AM
To: Public Comment
Subject: ZA-20-20 Foxwood Meadows Flooding

To:you (Bcc) + 1 more Details Slideshow

Resized_PSX_20201112_184832_90...jpg (556 KB)

Resized95PSX952020111295185437...jpg (487 KB)

Resized_PSX_20201112_190449_70...jpg (560 KB)

Resized_PSX_20201112_185801_83...jpg (602 KB)

Resized_PSX_20201112_190851_27...jpg (587 KB)

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Resized95PSX952020111595142319...jpg (666 KB)

Resized95PSX952020111595142547...jpg (616 KB)

Resized95PSX952020111595142828...jpg (606 KB)

Resized_PSX_20201115_143005_29...jpg (529 KB)

Resized_PSX_20201112_175953_22...jpg (556 KB)

Dear Mayor, City Manager, and Town Council

Please find flooding pictures of Foxwood Meadows, which occurred the end if October 2020.
When I speak of the flooding there, I want you to be able to see it.

Thank you
Vesta Kennedy

#3

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 12:38 AM
To: Public Comment
Subject: ZA-20-20 USGS impervious surface

Slideshow

Screenshot_20201208-090649_Chr...jpg (584 KB)

Screenshot_20201208-095731_Chr...jpg (484 KB)

Screenshot_20201208-095750_Chr...jpg (452 KB)

Screenshot_20201208-093718_Goo...jpg (432 KB)

Dear Mayor, City Manager and Town Council,

Please do not allow the rezoning of 1809 Eastchester Dr (or any other location) that would increase impervious surfaces, leading to even more flooding of Foxwood Meadows.

As you can see from the screenshot of USGS website tool, a 4 acre impervious surface (the proposed rezoning site is 3.6 acres) area with 1.5 inches of rainfall leads to 162,924 gallons of storm water runoff. This equates to 21,781 cubic feet of water, which could raise floodwater in a half acre lot an entire foot. This area also has to acclimate for at least 2 extra lanes on Eastchester Dr, per the improvements by the state on the I-74 interchange.

I know all of you have been working to provide a safe exit for our neighbors at Foxwood Meadows. An engineered plan to stop the flooding seems impossible, as it is illegal on a state and federal level to "dig out" in a floodplain. Would it not be prudent to "stay" ANY development adding to impervious surface area in the immediate vicinity? Food for thought.

Thank you,
Vesta Kennedy

#4

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 1:17 AM
To: Public Comment
Subject: ZA-20-20 EPA diesel corrosion report

Detail

diesel-corrosion-report_0.pdf (1.3 MB)

ZA-20-20

Dear Jay Wagner, Randy McCaslin, and Town Council,

Attached please find study released by EPA in July of 2016 on the sudden, rapid and often hidden rust and corrosion of USTs containing diesel fuels. In this report's executive summary 83 percent of inspected tanks had moderate to severe corrosion. Prior to inspection, less than 25 percent of owners reported knowledge of corrosion in their UST systems. It states the cross contamination of fuels and their storage tanks seems to be the "norm", not the exception. This study openly talks about how UST technology has not kept up with new and emerging fuels of today.

This problem did not go away in the 90's and "discovery of release" does NOT happen fast, as stated by BRC Spirit Group's Underground Storage Tank expert in the Planning and Zoning Commissioner's meeting on December 9th,

Please, don't just consider the grading of the parking lot of ZA-20-20 to go into the GW of High Point City Lake (via the classified stream to the West Fork of Deep River...Foxwood Meadows) to be "the only thing that has to happen here". The rest won't "take care of itself". This potential rezoning puts falliable Underground Storage Tanks in with our groundwater which effects BOTH Oak Hollow and High Point City Lake. It is common sense and good judgement not to allow this. An ounce of prevention is worth a pound of cure...in this case, several pounds.

Thank you,
Vesta Kennedy

End of Emails #2, 3, and 4

Email #5 with Attachment(s)

Lisa Vierling

From: rollovernclover <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 1:35 AM
To: Public Comment
Subject: ZA-20-20 EPA comparison of guidelines/1988vs2015
Attachments: regs2015-crosswalk.pdf; 20201208_141920.jpg

ZA-20-20
Dear Mayor, City Manager, and Town Council,

In the recent Zoning and Planning Commissioner's meeting on December 9th, BRC Spirit Group's attorney stated that High Point is not best served by a 2020 Land Use Analysis based on what was "said in the 80's". I beg to differ in that the current Land Use Assessment of the I-74 and Eastchester Drive study was done in 2020, as was the TIA and the NCDOT reccomendation. The current Watershed restrictions of Tier 2 and Tier 3 are just as (maybe even more with population growth and urban development) important today as they were in the 80's.

Ms Stalder stated that " out-dated policies don't reflect how we live in the present". Agreed.

Please find attached comparison of Federal 1988 guidelines to Federal 2015 guidelines, and a screenshot from the EPA's website. Our NC state regulations are currently based off of the 1988 guidelines, as is the majority of the Eastern seaboard.
While state regulations tend to be more stringent than federal guidelines and NC IS working toward this goal of meeting 2015 standards, our state still falls short of officially meeting these requirements.

Thank you,
Vesta Kennedy

Comparison Of 1988 UST Regulations And Revised 2015 UST Regulations September 2015

EPA's Office of Underground Storage Tanks developed this document to describe the significant differences between the 1988 federal underground storage tank (UST) and State Program Approval (SPA) regulations and the revised UST regulatory changes, as well as provide additional information about the changes. See EPA's website (http://www.epa.gov/ust/revising-underground-storage-tank-regulations-revisions-existing-requirements-and-new) for the revised federal UST and SPA regulations and additional information to help UST stakeholders understand the changes.

This document provides information about EPA's changes to the 1988 federal UST and SPA regulations. It is not a substitute for the information in 40 CFR parts 280 and 281 or EPA's notice of final rulemaking published in the *Federal Register*.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Operator Training	None	New Requirement that includes: ▪ Owners and operators designate at least one individual for A and B operator classes and all individuals that meet Class C operator definition. Designated operators must be trained on minimum defined areas and may need to be retrained if the UST system is not in compliance. ▪ Owners and operators retain a list of designated operators currently trained at each facility and proof of training or retraining. Documentation can be kept offsite. ▪ EPA adds definitions for Class A operator, Class B operator, Class C operator, and training program. **Implementation:** within three years [Section IV.A.1]	The Energy Policy Act of 2005 (EPAct) required operator training in states that receive money from EPA. This proposed change will ensure that all operators across the country, including those in Indian country and in states without operator training requirements, are trained to prevent releases. States that have already implemented their own operator training programs that meets the grant guidelines will not have to change their program.

[1] Implementation is the time frame the regulated community has to meet the requirement after the effective date of the final UST regulation.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Secondary Containment	Secondary containment and interstitial monitoring for hazardous substance tanks only [§ 280.42]	New Requirement that includes: ▪ Owners and operators install secondary containment and interstitial monitoring for all (including petroleum) new and replaced tanks and piping (except safe suction piping and piping associated with field-constructed tanks greater than 50,000 gallons in size and airport hydrant systems). Owners and operators must replace the entire piping run when 50 percent or more of piping, excluding connectors, is removed and other piping is installed. ▪ Owners and operators install under-dispenser containment for all new dispenser systems. ▪ EPA adds definitions for dispenser, dispenser system, replaced, secondary containment, and under-dispenser containment. **Implementation:** 180 days [Section IV.A.2]	EPAct required states to implement additional measures to protect groundwater as a condition of receiving money from EPA.[2] EPA is implementing secondary containment and under-dispenser containment (UDC) to meet this provision. This change will ensure secondary containment and UDC are required for all new and replaced UST systems across the country, including those in Indian country and in states without additional measures to protect groundwater requirements. States that have already implemented secondary containment that meets the grant guidelines will not have to change their requirements.
Operation And Maintenance (O&M)	Triennial cathodic protection testing; periodic internal lining inspections; annual line leak detector (LLD) testing; and release detection equipment operation and maintenance according to manufacturer's instructions	▪ EPA adds requirements for walkthrough inspections - owners and operators conduct walkthrough inspections which look at: spill prevention equipment and release detection equipment every 30 days; and containment sumps and hand held release detection equipment annually **Implementation:** within three years [Section IV.B.1]	The 1988 UST regulation required equipment be in place to reduce and prevent releases to the environment. These changes will ensure owners and operators maintain their equipment to ensure it is working properly and preventing releases.

[2] EPAct allows states the option of meeting the additional measures to protect groundwater requirement by either secondary containment and under-dispenser containment or evidence of financial responsibility and installer certification.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
	[§ 280.31, § 280.21(b)(1)(ii), § 280.44(a), and § 280.40(a)(2)]	▪ EPA adds a spill prevention equipment test requirement - owners and operators test at least every three years for liquid tightness or use a double-walled spill bucket with periodic interstitial monitoring. **Implementation:** within three years [Section IV.B.2]	• Walkthrough inspections ensure owners are looking regularly at their equipment to catch problems early and prevent releases. • Spill prevention equipment was required under the 1988 UST regulation, but testing is not required. Spill prevention equipment will eventually fail; testing will ensure the integrity of the spill bucket because it will catch small spills when the delivery hose is disconnected from the fill pipe. • Overfill prevention equipment was required under the 1988 UST regulation, but does not have to be inspected regularly. Inspections will ensure overfill prevention equipment will activate properly and notify the delivery person that the tank is nearly full. • Testing containment sumps used for piping interstitial monitoring will ensure leaks will be caught before reaching the environment. • Release detection equipment was required under the 1988 UST regulation, but does not have to be tested regularly. Testing release detection equipment will ensure the equipment is operating properly and will detect a release quickly.
		▪ EPA adds an overfill prevention equipment inspection requirement - owners and operators inspect every three years to ensure equipment is set to activate at the appropriate level in the tank and will activate when regulated substances reach that height. **Implementation:** within three years [Section IV.B.3]	
		▪ EPA adds a testing requirement for containment sumps used for piping interstitial monitoring - owners and operators test every three years for liquid tightness or use a double-walled containment sump with periodic interstitial monitoring. **Implementation:** within three years [Section IV.B.4]	
		▪ EPA adds a release detection equipment testing requirement (including LLDs) - owners and operators test annually to ensure equipment is operating properly. **Implementation:** within three years [Section IV.B.5]	

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Deferrals	UST systems storing fuel for use by emergency power generators deferred from release detection [§ 280.10(d)]	▪ EPA removes deferral and requires owners and operators to perform release detection. **Implementation:** within three years [Section IV.C.1]	The 1988 UST regulation deferred emergency generator tanks from release detection because technology was not available to monitor remote sites. The technology is now available to monitor and detect releases from remote locations. These systems have releases similar to other regulated UST systems and need to have release detection monitoring. These UST systems have been subject to all other parts of the UST regulation since 1988.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
	Field-constructed tanks (FCT), airport hydrant systems (AHS) and wastewater treatment tank systems deferred from subparts B, C, D, E, G, and H [§ 280.10(c)(1), (4), and (5)]	▪ EPA removes deferral and modifies the requirements by regulating FCT and AHS under new subpart K. Owners and operators may use alternative release detection options for FCT and AHS systems. EPA adds hydrant pits and hydrant piping vaults to the periodic walkthrough inspection requirement. EPA partially excludes aboveground tanks associated with FCT and AHS. ▪ EPA adds definitions for airport hydrant fuel distribution system and field-constructed tank. ▪ EPA reclassifies wastewater treatment tank systems, USTs containing radioactive material, and emergency generator UST systems at NRC facilities under the new category: Partially Excluded UST systems. **Implementation:** three years for subparts B (except notification), C, and D (except periodic bulk piping pressure testing which has a phase in over seven years) and immediate for subparts E, G, H, and notification [Sections IV.C.2, 3, and 4]	The 1988 UST regulation deferred wastewater treatment tanks, USTs containing radioactive material, and emergency generator UST systems at NRC facilities because of uncertainty about the universe and the appropriateness of some release detection methods for these systems. EPA intended to continue evaluating whether or not to regulate these tanks at a future date. EPA reconsidered these tanks and made the final determination to exclude these tanks from most of the UST requirements. Owners and operators of these tanks have always been required to comply with subparts A and F, and the regulatory requirements for these systems remain the same. The 1988 UST regulation deferred AHSs and FCTs because sufficient information and technology was not readily available for these unique systems. Technology is now available to monitor and detect releases at alternative leak rates and frequencies. These changes will prevent and quickly detect releases from these systems.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Flow Restrictors In Vent Lines	USTs may use flow restrictors in vent lines (also called ball float valves) to meet the overfill prevention equipment requirement. [§ 280.20(c)(ii)]	▪ EPA eliminates flow restrictors in vent lines as an option for owners and operators to meet the overfill prevention equipment requirement for newly installed UST systems and when flow restrictors in vent lines are replaced. **Implementation:** immediately [Section IV.D.1]	This technology has several inherent weaknesses and can result in tanks being over pressurized. This change eliminates flow restrictors in vent lines as an option for overfill protection in new and replaced systems. Owners and operators must use one of the other overfill prevention methods listed in 40 CFR part 280.
Internal Lining	USTs using internal lining as the sole method of corrosion protection can add another internal lining, cathodic protection, or both if the internal lining fails the periodic inspection and cannot be repaired in accordance with a code of practice. [§ 280.21(b)]	▪ EPA revises the internal lining requirement such that owners and operators must permanently close tanks using internal lining as the sole method of corrosion protection, if the internal lining fails the periodic inspection and cannot be repaired according to a code of practice. **Implementation:** immediately [Section IV.D.2]	The 1988 UST regulation allowed lining as an upgrade option to extend the life of some tanks. While linings extended the life of many tanks, this is not a permanent solution. As the tank linings fail, these older tanks must be taken out of service to prevent releases to the environment.
Notification	Owners notify the state or local agency within 30 days of bringing an UST system into use. [§ 280.22]	▪ EPA adds a requirement that owners notify the implementing agency within 30 days of UST system ownership change. ▪ EPA adds a requirement that, within three years, owners submit a one-time notification for previously deferred FCTs and AHSs. ▪ EPA updated the notification form to reflect the new changes and editorial/formatting revisions. ▪ EPA created new notification of ownership change form for owners to submit when necessary. **Implementation:** immediately [Section IV.D.3]	This change provides implementing agencies with important information about regulated UST systems. Owners were required to notify state and local agencies using an outdated list in the 1988 UST regulation. In addition, owners were not required to notify EPA about USTs in Indian country. This change will help implementing agencies carry out the program effectively.

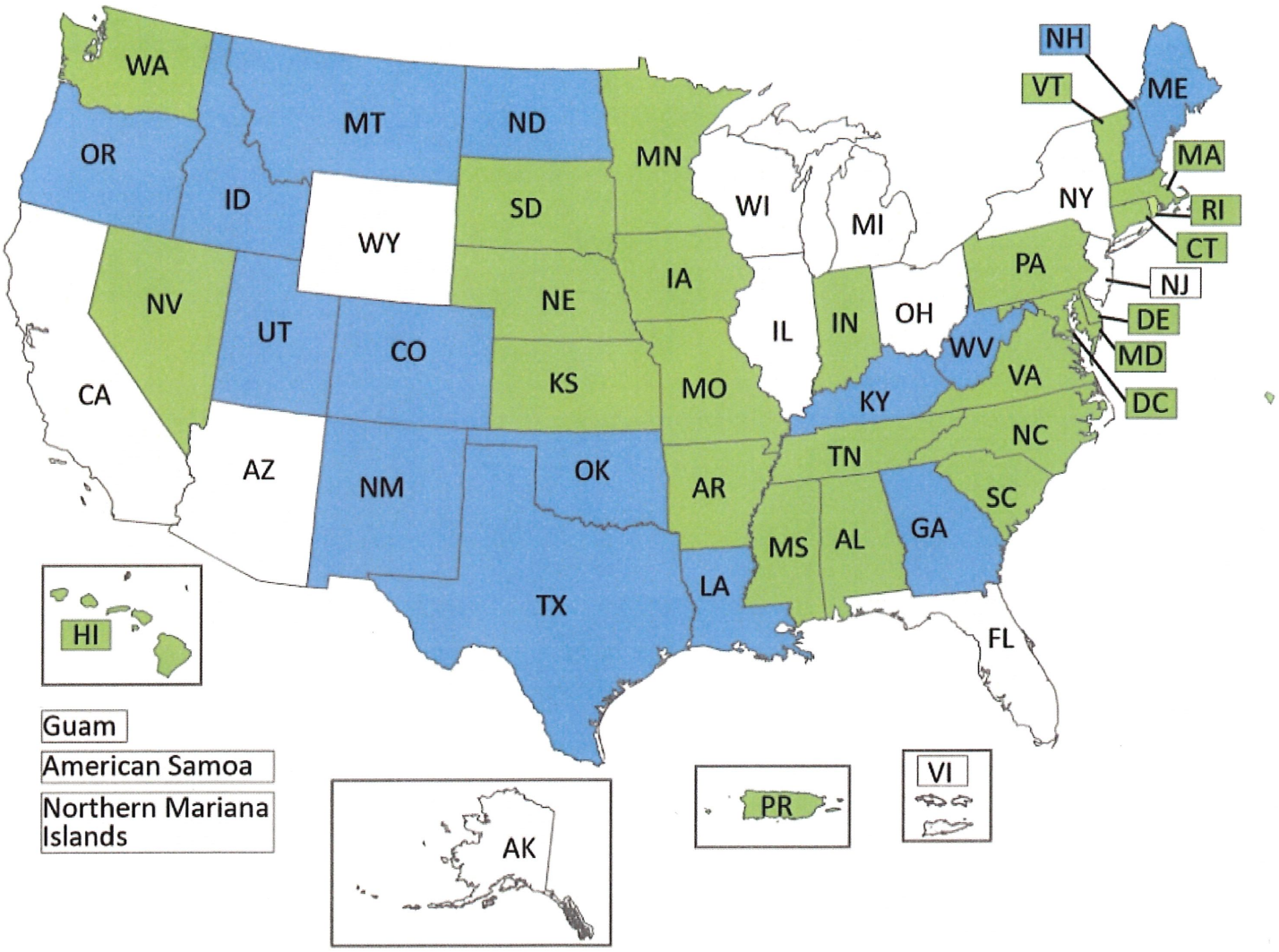
Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Compatibility	Owners and operators must use UST systems made of or lined with materials that are compatible with the substance stored in the UST system. Two codes of practice are referenced in a note. [§ 280.32]	▪ EPA adds a requirement that owners and operators notify the implementing agency at least 30 days prior to switching to a regulated substance containing greater than 10 percent ethanol, greater than 20 percent biodiesel, or any other regulated substance the implementing agency identifies and meet one of the following: o Demonstrate compatibility through a listing by a nationally recognized independent testing laboratory or through equipment or component manufacturer approval; o or Use another method determined by the implementing agency to be no less protective of human health and the environment than the compatibility demonstration methods listed above ▪ EPA adds a requirement to maintain records to demonstrate compliance with 280.32 for as long as the UST system is storing regulated substances containing greater than 10 percent ethanol, greater than 20 percent biodiesel, or any other regulated substance the implementing agency identifies. ▪ EPA removes references to one code of practice. ▪ EPA revises definitions of motor fuel and regulated substance. **Implementation:** immediately [Section IV.D.4]	The 1988 UST regulation required UST systems to be compatible with the substance stored in them. This change does not alter that, but rather helps owners demonstrate their UST system is compatible with certain fuels before storing them. As newer fuels with different chemical properties enter the market place, it is even more important for owners and operators to clearly understand how to demonstrate that their UST systems are compatible with these fuels before storing them to ensure there are no releases to the environment due to stored fuels being incompatible with UST systems.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Repairs	Definition of repair links a repair to a release; testing following a repair applies only to the tank, piping, and cathodic protection system. [§ 280.12 and § 280.33]	▪ EPA revises definition to remove the link that a repair must be associated with a release and adds examples of other UST system components that can be repaired. ▪ EPA adds a requirement for owners and operators to test within 30 days after a repair to spill or overfill equipment and secondary containment areas. **Implementation:** immediately [Section IV.D.5]	This change provides clarity that fixing parts of the UST system not linked to a release are also repairs, therefore testing following these activities is necessary.
Vapor And Groundwater Monitoring	Vapor and groundwater monitoring allowed as monthly methods of release detection. [§ 280.43(e) and (f)]	▪ EPA continues to allow vapor and groundwater monitoring as release detection options. ▪ Owners and operators must maintain site assessment as long as methods are used. ▪ EPA established minimal criteria for new or re-established site assessments. ▪ EPA established separate criteria for use of methods with FCT and AHS **Implementation:** record of site assessment within three years [Section IV.D.6]	EPA received a significant number of public comments requesting that these methods remain available to meet release detection requirement. These comments were primarily received from commenters in one concentrated area of the country. EPA's compromise to avoid severe economic impact to this area of the country was to require a site assessment maintained for as long as methods are used.
Interstitial Monitoring Results	Reporting suspected releases and system testing associated with release investigation and confirmation. [§ 280.50 and § 280.52]	▪ EPA adds interstitial monitoring alarms as an example of an unusual operating condition under release reporting. ▪ EPA adds a choice for secondary containment testing for secondarily contained tanks and piping using interstitial monitoring for the system test under release investigation and confirmation. ▪ EPA adds closure as an option if a system test confirms a leak. ▪ EPA clarifies use of the terms release and leak. **Implementation:** immediately [Section IV.D.7]	As interstitial monitoring becomes used more widely, it is important to ensure the regulation is clear on all aspects of its use. This change provides clarity about reporting, response, and testing for interstitial alarms. It also clarifies that closure is allowed if a leak is confirmed.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
Newer Technologies	Includes technologies from 1988 and before. [§ 280.20 and § 280.43]	▪ EPA adds newer technologies: clad and jacketed tanks, non-corrodible piping, continuous in-tank leak detection, and statistical inventory reconciliation. [Section IV E.1]	This change updates the 1988 UST regulation to include current technologies.
Codes Of Practice	Includes codes of practice from 1988 and before. [throughout 40 CFR part 280]	▪ EPA adds newer codes of practices, updates titles of codes of practices, and removes codes of practice that are not applicable or no longer exist. [Section IV E.2]	This change updates the 1988 UST regulation to include current codes of practice.
Upgrade Requirements	Includes options and requirements for upgrading UST systems with spill, overfill, corrosion protection, release detection, and financial responsibility. [§ 280.21, § 280.40, § 280.41, § 280.42, and § 280.91]	▪ EPA removes references to 1993 through 1998 upgrades and phase in schedules associated with the original upgrade deadlines. [Section IV E.3]	The upgrade deadlines passed more than ten years ago and no longer need to be included as part of the requirements. This change removes references to this outdated information.
Editorial And Technical Corrections	Not applicable	▪ EPA corrects spelling, numbering, and other editorial errors. EPA adds guidance and interpretations we developed and implemented since 1988. [Section IV E.4]	This change corrects previous errors in the 1988 UST regulation.

Area	1988 Requirement And Citation	Significant Changes To Requirements, Implementation,[1] And Preamble Location	Additional Information About The Change
State Program Approval Requirements	Includes criteria for states choosing to obtain state program approval (SPA). [40 CFR part 281]	▪ EPA updates SPA requirements to address proposed changes to 40 CFR part 280 and implement delivery prohibition, operator training, and additional measures to protect groundwater requirements contained in the Energy Policy Act of 2005. ▪ **Implementation:** States with program approval have 3 years to submit a revised SPA package. [Section V]	This change ensures states will also update their programs with the increased environmental protections. It provides consistency between federal and state UST regulations.

Map of States with Approved UST Programs (2020)



- List of States with Approved UST Programs and links to the respective Federal Register Notices

End of Email #5 with Attachment(s)

Email #6 with Attachment(s)

Lisa Vierling

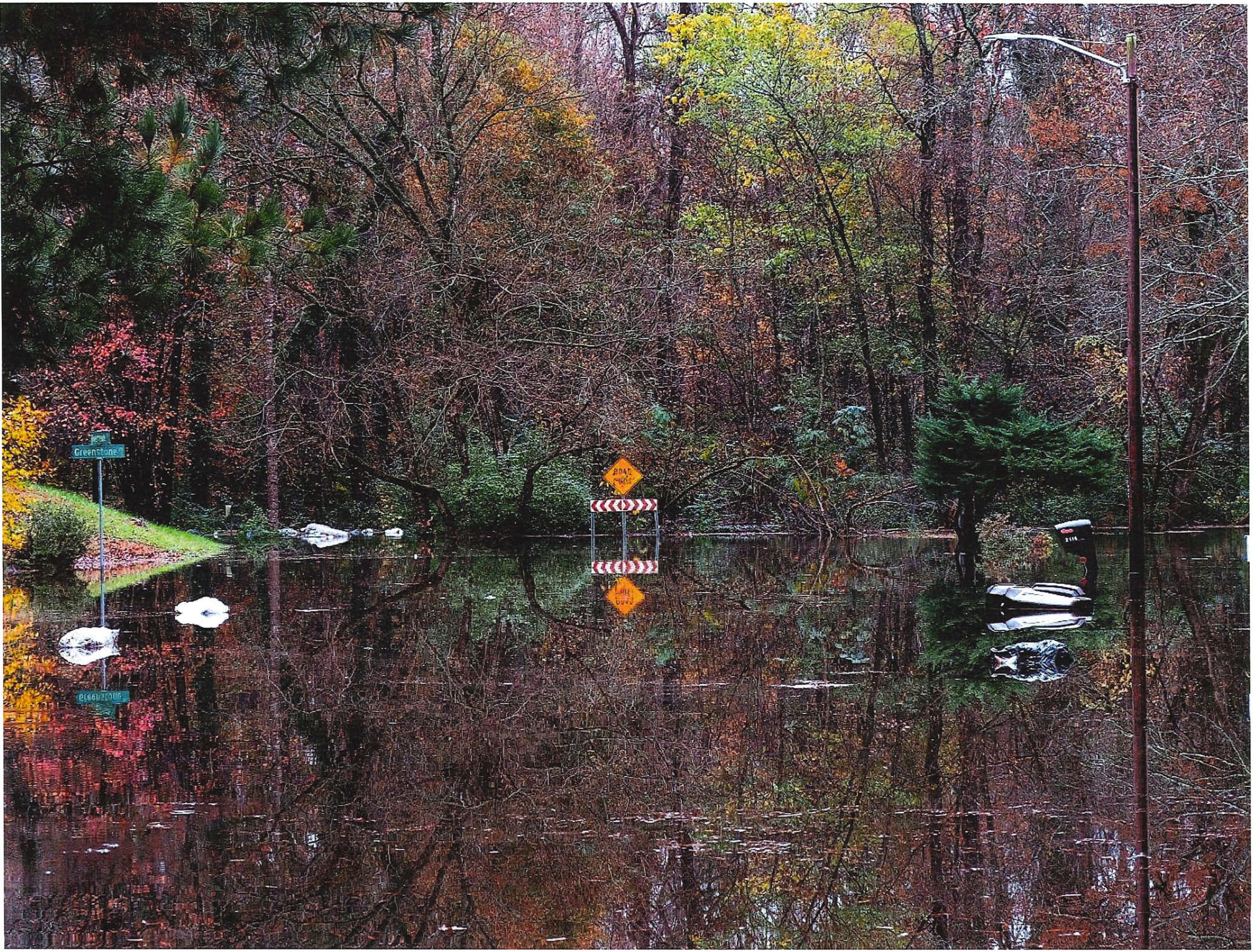
From: rollovernclover <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 1:48 AM
To: Public Comment
Subject: ZA-20-20 pictures of Foxwood Meadows Flooding
Attachments: Resized_PSX_20201112_175638_9132.jpg; Resized_PSX_20201112_175953_2211.jpg; Resized_PSX_20201112_180359_731.jpg; Resized95PSX952020111295181004953082.jpg; Resized95PSX952020111295181248958115.jpg; Resized_PSX_20201112_182508_9304.jpg; Resized_PSX_20201112_182909_9612.jpg; Resized_PSX_20201112_184832_9027.jpg; Resized95PSX952020111295185437951072.jpg; Resized_PSX_20201112_185801_8326.jpg; Resized_PSX_20201112_190449_7012.jpg; Resized_PSX_20201112_190851_2731.jpg; Resized95PSX952020111595141155955181.jpg; Resized_PSX_20201115_141527_9803.jpg; Resized95PSX952020111595141728953526.jpg; Resized95PSX952020111595141928956610.jpg; Resized_PSX_20201115_142101_6885.jpg; Resized95PSX952020111595142319951115.jpg; Resized95PSX952020111595142547959934.jpg; Resized95PSX952020111595142828951264.jpg; Resized_PSX_20201115_143005_2966.jpg

Dear Mayor, City Manager and Town Council,

Please find flooding pictures of Foxwood Meadows, which occurred the end of October 2020. When I reference the flooding there, I thought those of you who haven't seen it might like to.

Thank you,
Vesta Kennedy

Sent from my Galaxy


Greenstone P


YIELD





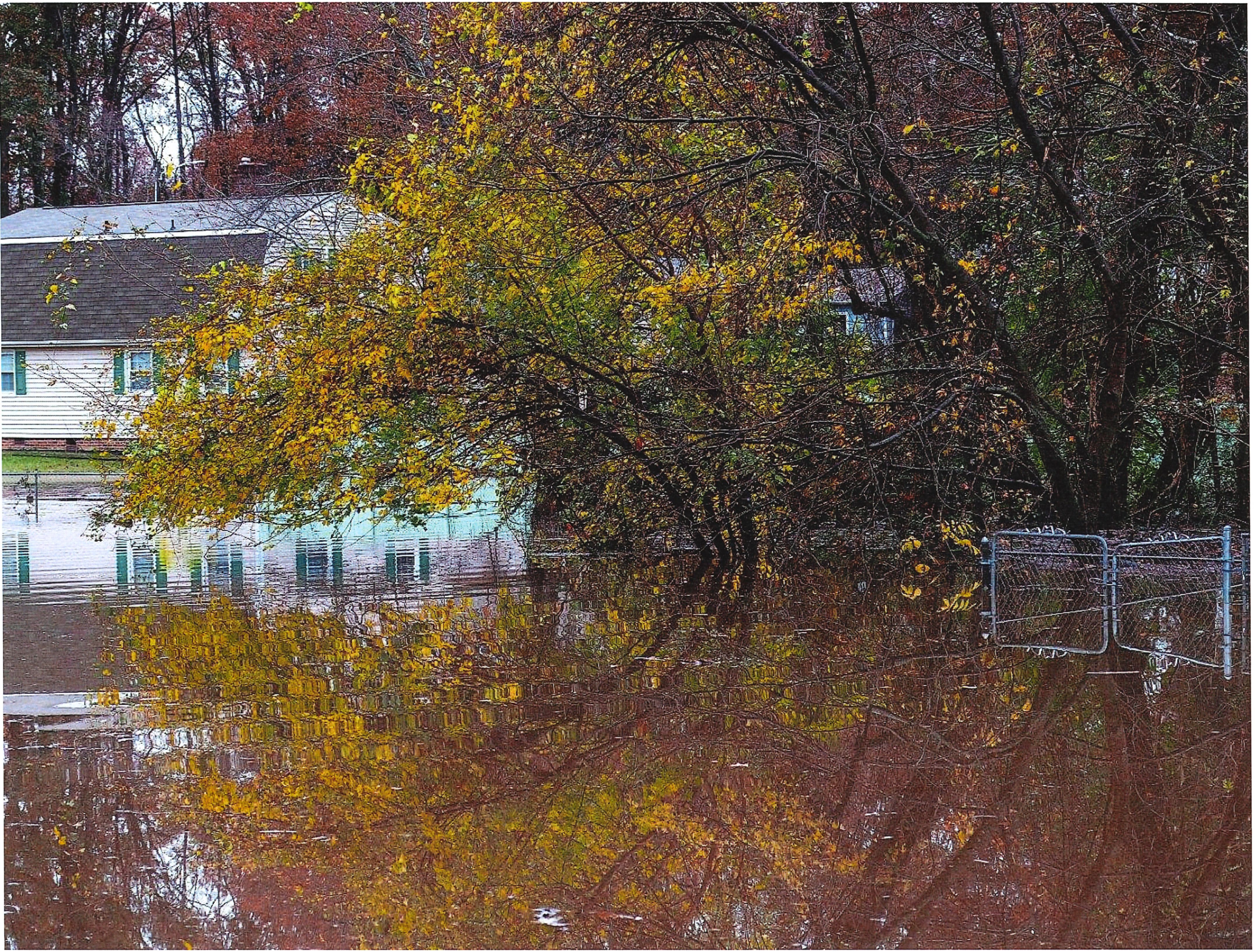
























Greenstone




Rivermeade


Rivermeade
YIELD

End of Email #6 with Attachment(s)

Email #7 with Attachment(s)

Lisa Vierling

From: rollovernclover <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 2:02 AM
To: Public Comment
Subject: ZA-20-20 attachments for USGS impervious surface email
Attachments: 20210104_015632.jpg; 20210104_015659.jpg; 20210104_015721.jpg; 20210104_015742.jpg

Ms Vierling or Ms Brooks,

Please accept my apologies that these 4 attachments did not come through on their initial email. Would it be possible to group them with the email noted in the subject line?

Thank you,
Vesta Kennedy

Sent from my Galaxy

Learn More

Water Science Activity Center

Opinion Surveys:
- Biggest water problem in the future?
- Vote for your favorite water body!
- How serious are these environmental problems?
- Water Shortage! How would you fix it?
- Where does the water cycle begin?

Challenge Questions:
- How much water falls during a storm?
- How much water does a dripping faucet waste?
- How much water does it take to grow a hamburger?

True/False Quizzes:
- Water properties
- Groundwater

Questionnaires:
- How does your home drinking water taste?
- What is your daily home water use?

Rainfall calculator (English units) How much water falls during a storm?

Use our metric-system version.



It is the middle of July in Georgia, and both you and your tomatoes are wilting in your yard, both looking to the sky and hoping for rain. Or, maybe a low-pressure cell has been napping overhead and your arm is hurting from holding that umbrella while you watch your basement fill up with water.

Either way, you would like to know how much rain has fallen—how many gallons have come down from the skies onto your roof, yard, block, or town. You might even want to know how many baths you could get from your rainstorm?

The amount of rain that fell during "your" storm is dispayed below.

Area	Rainfall (inches)	Total gallons (US)	Cubic feet	40-gallon baths

How many cubic feet are in an acre?

43,560 cubic feet

As the name suggests, an **acre-foot** is defined as the volume of one **acre** of surface area to a depth of one **foot**. Since an **acre** is defined as a chain by a furlong (i.e. 66 **ft** × 660 **ft** or 20.12 m × 201.17 m), an **acre-foot** is 43,560 **cubic feet** (1,233.5 m^3).

W Wikipedia › wiki › Acre-foot

Acre-foot - Wikipedia

How much does it rain in High Point?

Throughout the year, in High Point, North Carolina, there are **112 rainfall days**, and **42.5" (1079.5mm)** of precipitation is accumulated.

When does it snow in High Point?

January through **March**, **November** and **December** are months **with snowfall** in High

How much does it snow in High Point?

In High Point, North Carolina, during the entire year, snow aggregates up to **7.6" (193.1mm)**.

When does it snow the most in High Point?

The month with **the most**

End of Email #7 with Attachment(s)

Email #8 with Attachment(s)

Lisa Vierling

From: rollovernclover <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 2:08 AM
To: Public Comment
Subject: ZA-20-20 diesel-corrosion-report_0.pdf
Attachments: diesel-corrosion-report_0.pdf

Ms Vierling or Ms Brooks

It seems my attachments are not sending properly. Please accept my apologies. This attachment should open.

Thanks
Vesta Kennedy

Sent from my Galaxy



Investigation Of Corrosion-Influencing Factors In Underground Storage Tanks With Diesel Service

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Abbreviations And Acronyms

ALS	ALS Environmental
ANOVA	analysis of variance
API	American Petroleum Institute
ASTM	ASTM International
ATG	automatic tank gauge
ATR	attenuated total reflectance
CDFA	Clean Diesel Fuel Alliance
CRC	Coordinating Research Council
DNA	deoxyribonucleic acid
EGT	emergency generator tank
EPA	Environmental Protection Agency
FAME	fatty acid methyl esters
FID	flame ionization detector
FTIR	Fourier transform infrared
GC-MS	gas chromatography-mass spectrometry
IC	ion chromatography
ID	identification
L	liter
LOQ	limit of quantitation
LSD	low sulfur diesel
mg/kg	milligrams per kilogram
mg KOH/g	milligrams potassium hydroxide per gram
mg/L	milligrams per liter
MIC	microbiologically-influenced corrosion
mm Hg	millimeter of mercury
MRL	method reporting limit
mS/cm	millisiemens per centimeter
NACE	National Association of Corrosion Engineers International
NAVFAC	Naval Facilities Engineering Command
NIOSH	National Institute for Occupational Safety and Health
OOB	out of bag
ORD	Office of Research and Development
OUST	Office of Underground Storage Tanks
PEI	Petroleum Equipment Institute

PLS	partial least square
POM	polyoxymethylene
ppbv	parts per billion by volume
ppm	part per million
pS/m	picosiemens per meter
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RFS	Renewable Fuel Standard
STP	submersible turbine pump
STREAMS	Scientific, Technical, Research, Engineering and Modeling Support
SW	EPA Test Methods for Evaluating Solid Waste
TAN	total acid number
ULSD	ultra-low sulfur diesel
US	United States
UST	underground storage tank

Executive Summary
Investigation Of Corrosion-Influencing Factors In Underground Storage Tanks With Diesel Service

This research focused on better understanding a type of rapid and severe corrosion of metal components in underground storage tanks (USTs) storing diesel fuel. UST owners first began reporting this corrosion to UST industry servicing companies in 2007. Several changes to the national fuel supply and fuel storage practices have occurred since the mid-2000s. To address the potential for corrosion problems, the U.S. Environmental Protection Agency's (EPA) Office of Underground Storage Tanks began working on this research in 2014 to understand how serious and widespread the metal corrosion problem could be. In addition, to help identify the cause or solutions, we wanted to identify predictive factors between UST systems with corrosion issues and UST systems relatively free of the problem. EPA's objective for the research was to develop a better understanding of potential risks to human health and the environment caused by the evolving corrosion problem in USTs storing diesel fuel.

In 2014, EPA held discussions with UST industry experts and worked collaboratively to develop field-based research that would further the understanding of corrosion inside USTs storing diesel. EPA designed our research to examine many factors on a diverse population of 42 UST systems in order to find potential predictive factors among them. We thought any predictive factors identified in our research would help focus the search of potential causes for the next phase of follow-on research.

In January and February 2015, EPA conducted on-site inspections of 42 diverse, operating UST systems at 40 sites across the country. Of these UST systems, 24 had fiberglass tanks, and 18 had steel tanks. Field teams documented the conditions of the UST systems with in-tank video cameras and photos so they could later assign a category of corrosion coverage to each system. The field teams also collected samples of vapor, fuel, and aqueous phase (also known as water bottom), if present, from each of the tanks. Field teams used a detailed questionnaire to gather information from each owner about the storage history, operation, and maintenance practices of each UST system.

EPA chemically analyzed the vapor, fuel, and aqueous phase samples. Three assessors reviewed the videos of each UST and categorized the USTs by the extent of the corrosion judged to be present: minimal, moderate, or severe. In an attempt to identify corrosion predicting factors among UST systems experiencing either minimal corrosion or severe corrosion, we then statistically evaluated the analytical results and responses from the questionnaires against the corrosion categories.

The major finding from our research is that moderate or severe corrosion on metal components in UST systems storing diesel fuel in the United States could be a very common occurrence. Observations suggest that corrosion may be commonly severe on metal surfaces in the upper vapor space of UST systems, an area that before 2007 was not known to be prone to corrosion. Furthermore, it appears many owners may not be aware of the corrosion nor are they aware that corrosion, which could affect the operability of their UST systems, could already be at

an advanced stage. We observed 83 percent of the inspected tanks had moderate or severe metal corrosion. Prior to our research inspections, less than 25 percent of owners reported knowledge of corrosion in their UST systems.

It appears from our research that corrosion inside of UST systems could result in an increased chance of releases of fuel to the environment and subsequent groundwater contamination. Across the sample population, EPA observed corrosion occurring on all types of UST system metal components, including submersible turbine pump shafts, automatic tank gauge probe shafts, risers, overfill equipment like flapper valves and ball valves, bungs around tank penetrations, inner walls of tanks, and fuel suction tubes. Many of these UST system components are designed to prevent overfilling the tank or to identify leaks, and the components must be able to move and function as designed. Corrosion of some metal components could hinder their proper operation and possibly allow a release of fuel to occur or continue unnoticed. Anecdotal reports since EPA began our research suggest that other metal components in UST systems, such as tank walls, could also eventually fail by corroding completely through the metal if corrosion is not stopped. This would most likely occur in the bottom of an UST where aqueous phase and tank sludge collect. Corrosion through the bottom or wall of a tank could potentially allow fuel to leak into secondary containment areas or release to the environment.

EPA has heard anecdotes of functionality failures of release prevention equipment and leak detectors, as well as failures of metal walls resulting in leaks into secondary containment areas. Outside of anecdotes, however, very little verifiable data exists about how equipment functionality and integrity are being affected by corrosion in USTs storing diesel fuel. However, that information should become more available as owners become more aware of the findings of our research and corrosion in USTs storing diesel becomes more visible.

Even absent a release of fuel to the environment, severe corrosion poses concerns for owners. Corrosion increases servicing and equipment maintenance costs for UST system owners. Anecdotes suggests that dispenser filters may become clogged with corrosion debris that resembles coffee grounds, resulting in filters needing to be changed more frequently. Other equipment may need to be repaired more often and sometimes may need to be prematurely replaced.

The data and analyses could not pinpoint a cause of corrosion that UST owners began reporting in 2007. It appears multiple underlying factors and corrosion mechanisms could be contributing to the corrosion; one such mechanism is microbiologically-influenced corrosion (MIC). Previous research on the recent corrosion phenomenon is limited, but suggests that the reduced sulfur in diesel could be allowing microbial life to proliferate in ultra-low sulfur diesel tanks and, through MIC, cause corrosive conditions that were less possible in USTs storing low sulfur diesel. Several independent organizations have produced publicly available resources that suggest following certain enhanced maintenance practices when storing diesel fuel in USTs. If followed, these practices can likely minimize MIC risks by reducing bacterial populations or preventing an environment where microbial life can thrive.

EPA's research builds on industry's first study about rapid and severe corrosion in USTs storing diesel, which the Clean Diesel Fuel Alliance (CDFA) completed in 2012.[1] The objective

of CDFA's study was to produce an initial hypothesis about the mechanism of corrosion from data collected on six UST systems. EPA's Office of Research and Development (ORD) completed research shortly after CDFA.[2] Both the CDFA and ORD research hypothesized that biofuel components in diesel, such as ethanol and biodiesel, could be providing the energy source for microbial populations of bacteria like *Acetobacter* in USTs. This genus of bacteria was the most abundant in samples that underwent DNA sequencing in CDFA's study. EPA's research plan to identify any predictive factors by default included checking the plausibility of the hypotheses previously suggested. However, there are numerous other types of bacteria that could also be consuming chemical components of the fuel or fuel contaminants found in USTs. In addition to bacteria, there are also a number of other microorganisms that could cause or contribute to the corrosion attacks, including fungi, archaea, and eukaryotic organisms. A combination of one or more of these factors could also be responsible, but we did not test for those factors in our research.

Because only limited scientific research was available, EPA assumed from the beginning of our research that, within our research scope, it was not feasible to definitively pinpoint a cause of the corrosion. Further, most familiarity with the extent and geographic spread of the problem was anecdotal. Therefore, an exploratory approach was most helpful in expanding the knowledge around the issue. Our research suggests that MIC is likely involved in the moderate or severe internal corrosion in USTs storing diesel. However, further identification of specific bacteria was not possible within the scope of our research. Therefore, while previous research hypotheses about the role of specific species of a genus oxidizing biofuel components were not disproven by the results of our research, validation would be speculative.

EPA's research population of 42 USTs was geographically, materially, and operationally diverse and was the largest field research of this issue to date. However, the population is a small percentage of diesel USTs across the United States, and the types of USTs and maintenance practices by owners in the research population may differ from those in the national population of USTs storing diesel. Therefore, EPA cannot predict if the presence of moderate or severe corrosion in diesel USTs across the United States will be higher or lower than identified in our research.

EPA recommends owners check their diesel UST systems for corrosion and take steps to ensure the proper operability of their UST systems. EPA is recommending this because 83 percent of USTs in the study affected by moderate or severe corrosion is very high, most of the owners were not aware of the extent of the corrosion in their USTs, and it appears that corrosion could potentially affect equipment functionality and potentially lead to a release of fuel to the environment.

Our research provided us with key takeaways that, by increasing the knowledge around corrosion, may help prevent releases of diesel fuel from UST systems. Below we list our key takeaways; see Chapter 6 for additional discussion about them.

- Corrosion of metal components in UST systems storing diesel appears to be common.
- Many owners are likely not aware of corrosion in their diesel UST systems.

- The corrosion is geographically widespread, affects UST systems with steel tanks and with fiberglass tanks, and poses a risk to most internal metal components.
- Ethanol was present in 90 percent of 42 samples, suggesting that cross-contamination of diesel fuel with ethanol is likely the norm, not the exception.
- The quality of diesel fuel stored in USTs was mixed.
- Particulates and water content in the fuel were closest to being statistically significant predictive factors for metal corrosion, but causation cannot be discerned.
- MIC could be involved as hypothesized by previous research.
- EPA recommends owners visually inspect USTs storing diesel as part of routine monitoring.

Chapter 1
Introduction And Background

The U.S. Environmental Protection Agency (EPA) Office of Underground Storage Tanks is responsible for ensuring that, in order to prevent releases and avoid contaminating vital underground water supplies, fuels and hazardous substances are safely stored in underground storage tank systems (USTs). This report describes the process and results of EPA's research to understand the extent, severity, and potential impacts of severe and rapid corrosion occurring in USTs storing ultra-low sulfur diesel (ULSD), hereafter referred to as diesel, that has been reported across the country since soon after the fuel was introduced in 2006. Our research also attempted to identify predictive variables that could narrow the search of possible causes of and solutions for the corrosion of metal components in UST systems storing diesel fuel.

EPA is working proactively with industry to help solve the problem because some anecdotes about the severe or rapid corrosion reported compromised functionality and failure of some metal components of UST systems. If corrosion prevents UST system equipment from functioning properly, then UST systems may be at higher risk of operational failures, which could result in the release of fuel into the environment. EPA heard anecdotes about new submersible turbine pumps that were replaced due to corrosion in as few as six months after being installed. Reports of UST system components corroding with this combination of speed, severity, and location within the vapor spaces of USTs were not reported prior to 2007.

EPA worked with industry experts to design our field research, which built on the Clean Diesel Fuel Alliance's (CDFA) 2012 research findings. EPA contracted with Battelle to execute the work. We designed our research to be exploratory in nature, examining data from 42 operational USTs storing diesel. The goals of the research were twofold: to understand the extent, severity, and potential risks of the corrosion; and to identify any predictive factors between UST systems with severe corrosion issues and UST systems relatively free of the problem. We wanted to identify predictive factors so they could help narrow the scope of investigation for future research efforts. EPA appreciates the efforts of our contractor, industry partners and stakeholders, as well as volunteer UST owners, who helped make our research possible.

New And Historical Trends In Corrosion In USTs Storing Diesel

The first known report of severe corrosion on internal metal components in the vapor space of an UST system storing diesel was posted on the Petroleum Equipment Institute's (PEI) website in 2007.[3] This location of corrosion in USTs storing diesel fuels has since been commonly reported, with anecdotes often describing the corrosion as severe and sometimes occurring rapidly on new equipment.

Prior to 2007, corrosion risks identified in tanks storing diesel fuels were generally thought to be limited to the bottoms of tanks and were not observed in upper portions of tanks. The risk of corrosion in the bottoms was usually considered to be easily addressed with good UST system maintenance practices. The corrosion observed since 2007, however, may affect owners who have followed the same maintenance practices for years and previously had no

corrosion issues. Reports of the corrosion of metal components in the upper portions of USTs indicate the functionality of metal components of UST systems can be compromised. EPA and the fueling industry do not yet understand the exact cause of the corrosion nor its full effects on equipment.

Unchecked corrosion in UST systems could result in a potentially higher risk of an environmental release and subsequent groundwater contamination by fuel. A release could potentially occur either from malfunctioning overfill prevention, fuel level monitoring, or leak detection equipment that cannot operate properly due to restricted movement or from a direct failure of integrity of metal components.

The shaft of the submersible turbine pump (STP) is the component most often observed as being severely corroded, but corrosion anecdotes often discuss corrosion on other metal components in UST systems as well. Reports range from severe corrosion in only a few small areas or on certain equipment to uniform coverage of metal components in the vapor space. Sometimes corrosion is reported or observed on metal surfaces in wetted portions of the UST system in areas normally submerged in fuel. The corrosion has also been sometimes described as layers of tubercles that coat the metal surfaces of equipment.

Even in the absence of a release, the metal corrosion observed in UST systems can be harmful to industry because corrosion creates increased expenses for UST system owners through more frequent servicing and filter changes, as well as likely shorter lifespans for equipment.

Early Efforts To Understand The Issue: 2010 Industry Survey

In 2010, PEI gathered more information around the corrosion anecdotes by conducting a five-question survey for owners, operators, field technicians, and equipment manufacturers. PEI's survey resulted in a list of UST system equipment that was reportedly affected by operational problems, accelerated corrosion, rust, gasket or seal problems, or premature failure since 2007.[4] Results from PEI's survey suggested that all metals in contact with the fuel or exposed to vapors inside the UST could potentially be negatively impacted. Table 1 lists the UST equipment or components most frequently reported in additional comments submitted to the survey as problematic, and how they were affected. Figure 1 shows a simplified diagram of a typical diesel UST system and identifies the equipment.

Proper functionality of all UST equipment is crucial to ensuring fuel can be stored safely in the UST system and preventing releases of fuel to the environment or quickly detecting releases should they occur. Components most commonly affected by the corrosion are inside the UST system, so operators may not easily or readily notice the problem.

Changes In Fuel And The Fueling Industry

As industry became more aware of the corrosion, momentum to search for the cause and a solution grew. The onset of corrosion reports in USTs storing diesel began around the time of several notable changes to fuel supplies in the United States that affect diesel fuel storage. A

direct change to diesel fuel was introducing cleaner burning diesel to help reduce atmospheric pollution from diesel powered engines. Prior to 2006, diesel fuel was characterized as low sulfur diesel (LSD) and requirements limited fuel to a maximum of 500 parts per million (ppm) sulfur. Beginning in 2006 and phasing in over the next several years, EPA's standards required diesel fuel contain no more than 15 ppm sulfur; this was referred to as ultra-low sulfur diesel (ULSD). Lowering the sulfur in diesel necessitated additional modifications to the fuel, which sometimes included adding to diesel formulations lubricity additives, cold flow improvers, corrosion inhibitors, and conductivity additives.

Table 1. UST Equipment Reported Most Frequently Experiencing Operational Problems In Additional Comments Of 2010 Survey

Affected Equipment	Operational Malfunction
Dispenser fuel filters	Clogging and requiring more frequent replacement
Seals, gaskets, O-ring	Deterioration
STP and pump components	Replacement/column pipe wear/motor problems
Tanks	Rusting and leaking (includes tanks on vehicles)
Meters	Premature failure
Line leak detectors	Damaged or broken
Automatic nozzle shutoff	Failure/shorter lifespan
Tank probes	Malfunctioning
Check valves	Not seating
Shear valves	Not sealing/failing tests
Hose swivels	Failing prematurely
Dispenser	Leaks/failure/premature replacement
Solenoid valves	Clogged/failing
Riser pipe	Corrosion
Pipes	Failure

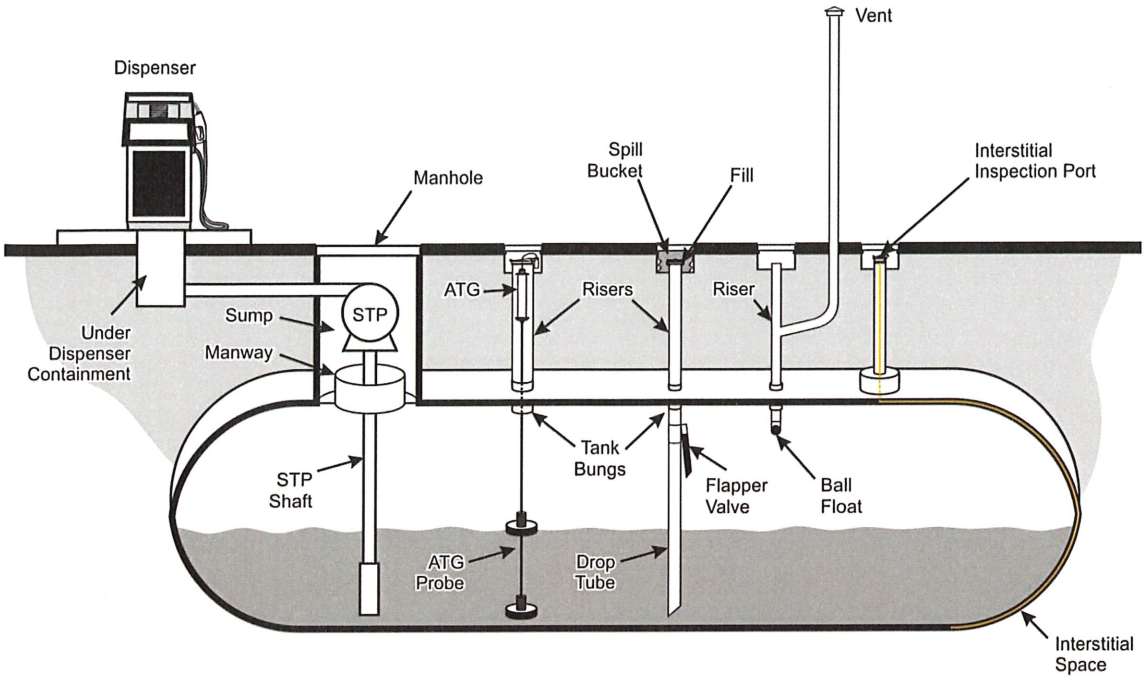


Figure 1. Simplified Diagram Of Diesel UST System Equipment

Around the same timeframe, Congress, which enacted the Renewable Fuel Standard (RFS) established by the Energy Policy Act of 2005 and amended by the Energy Independence and Security Act of 2007, directed EPA to require the volume of ethanol and biodiesel available for blending into petroleum-based fuels to increase significantly. Ethanol is blended into gasoline, and biodiesel is now regularly blended into diesel fuel, partly because biodiesel adds lubricity lost from the reduction of sulfur. Some microorganisms may preferentially degrade biofuel components in petroleum-biofuel mixtures.

A third change in the mid-2000s was a trend of more retailers storing and selling diesel. Retailers transitioned tanks that formerly stored mid-grade gasoline to diesel when blender pumps reduced the need for storing all three grades of gasoline. Diesel fuel infrastructure and blending and distribution practices vary across companies and over time as market conditions and fuels change. It is possible that any combination of these factors affecting the diesel fuel supply could be involved in the first-identified-in-2007 corrosion in USTs.

Initial Research Efforts

Because of the relative newness of this situation, little is known about the cause of the manifestation of vapor space corrosion in USTs storing diesel. Although extensive literature on corrosion in industrial applications is available, EPA thinks research specific to vapor space corrosion in USTs storing diesel is limited. Two pieces of research of particular interest are a 2012 hypotheses investigation by the Clean Diesel Fuel Alliance (CDFA) and an EPA Office of Research and Development (ORD) poster about research investigating corrosion in USTs.[5, 6]

In 2012, CDFA completed the first major field study on the issue. CDFA physically and analytically examined six operating UST systems storing diesel and concluded that the corrosion of UST metallic equipment was caused or enhanced by low molecular weight acids, such as acetic acid and formic acid, distributed throughout the system. CDFA believed the acids were the metabolic byproducts of microorganisms proliferating within diesel USTs and were contributing to corrosion through a mechanism called microbiologically-influenced corrosion (MIC). MIC is defined as the deterioration of metals due to the metabolic activities of microorganisms and is well-established in corrosion literature, although the mechanisms are not fully understood.[7] CDFA hypothesized that MIC is occurring when microbial populations degrade ethanol present in the fuel to low molecular weight acids. This was based partially on CDFA's study findings of ethanol presence in some of the fuel and aqueous phase samples collected from the population of tanks.

Ethanol was not expected to be present in diesel fuel. CDFA hypothesized the source of the ethanol was contamination of the fuel supply through cross or switch loading of fuel transportation trucks with no or inadequate cleaning procedures between deliveries or through other methods. CDFA further hypothesized that in the presence of oxygen and water, *Acetobacter* bacteria living in the aqueous phase of the USTs could use, or oxidize, the ethanol. Because a byproduct of that species' microbial metabolism is acetic acid, CDFA's hypothesis suggested that acid could then volatilize into the vapor space of the USTs, coating the metal equipment and causing corrosion.

Further examination of CFDA's results suggested that some of the organic acids indicated another possibility of MIC occurring as a result of microbial populations feeding on constituents of the diesel fuel itself and not only ethanol contamination. This could include the diesel fuel, fatty acid methyl esters (FAME) components of biodiesel in the fuel, and trace amounts of glycerol remaining from biodiesel production.[8] USTs storing diesel may contain up to 5 percent biodiesel blended, according to ASTM D975 standard for diesel fuel.[9] This biodiesel in turn may contain glycerol, a byproduct of the production process, also referred to as glycerin in the analytical methods used in our research. Most glycerol is removed after biodiesel production, but a low concentration is allowed to remain according to ASTM fuel standard D6751.[10] Specifically, free glycerin may not exceed 0.02 percent mass and total glycerin may not exceed 0.24 percent mass in the 100 percent biodiesel blend stock.[11]

Metabolic consumption of glycerol by microbial populations could produce volatile organic acids such as propionic, lactic, or glyceric acids. In CDFA's study, acetic acid prompted the hypothesis of ethanol presence being the cause of the corrosion; however, other organic acids were found. In 2013, EPA's ORD conducted a research study on ethanol and glycerol's potential role in microbial corrosion in USTs.[12] Comparison of ORD's findings on corrosion in water bottoms to CDFA's hypothesis suggested that CDFA's hypothesis of ethanol's role in MIC could also apply to glycerol in diesel fuel, although it was not listed as a hypothesis in CDFA's report conclusions. The role of biofuels in diesel corrosion has been suggested but not proven by these previous research efforts. The exploratory nature of our research was designed with the intent of being able to examine for any predictive factors in the corrosion and not just the hypothesized role of biofuels. By checking for predictive factors, the feasibility of either of

these hypotheses should be determined in our research along with possible identification of other common patterns in the operation or maintenance, fuel distribution, environmental conditions, or UST equipment demographic areas.

While research publications specific to understanding the root cause of post-2007 corrosion in diesel USTs is limited, independent groups and private companies have developed several documents targeted towards minimizing the corrosion associated with storing diesel fuel. Five examples are the Coordinating Research Council's (CRC) *Preventive Maintenance Guide for Diesel Storage and Dispensing Systems* and *Diesel Fuel Storage and Handling Guide*; Clean Diesel Fuel Alliance's *Guidance for Underground Storage Tank Management at ULSD Dispensing Facilities*; Steel Tank Institute's (STI) *Recommended Practice for Storage Tank Maintenance R111 Revision*; and ASTM D6469, *Standard Guide for Microbial Contamination in Fuels and Fuel Systems*.[13, 14, 15, 16, 17]

Some owners indicated that following treatments presented in these documents has been effective in slowing corrosion in their affected USTs. These documents generally focus on minimizing water in order to limit microbial growth in USTs, among other enhanced maintenance practices. These practices may suggest more frequent water or fuel monitoring, using different filters, or using biocides or corrosion inhibitors. Other fuel treatment products intended to dissolve and remove microbial colonies and protect submerged metal surfaces anecdotally suggest success in limiting corrosion. Preliminary anecdotal results of limiting oxygen in USTs through the use of nitrogen blanketing equipment in order to prevent the growth of microorganisms that require oxygen for survival show potential to limit corrosion in the vapor space of USTs, as do filtration systems designed to remove particulates in fuel and water in which microbial colonies could live. These results are circumstantial, but together suggest probable supporting evidence from field experiences for laboratory research, which has hypothesized that MIC is likely involved in corrosion in USTs storing diesel and suggested limiting microbial populations is key to minimizing corrosion.

Changes to diesel fuel formulation, distribution, or storage practices over the last ten years could also be allowing natural processes other than bacterial oxidation of fuel or fuel contaminants to occur. These natural processes may not have been possible or may not have been as prevalent before diesel fuel began to change around 2006. Fungi, archaea, and eukaryotic organisms are other mechanisms that could be causing or contributing to corrosion attacks in UST systems storing diesel. A combination of these and other yet to be identified factors could also be responsible. Because the base of scientific research specific to corrosion in underground storage tanks since 2007 was limited, and because of the multitude of variables potentially involved, our research needed to have a broad focus that could best help all involved in the diesel fuel industry understand the issue more completely.

EPA Research Plans

EPA worked with industry to design research that would maximize the understanding of the issue within budget constraints. EPA collaborated extensively with CRC during the development of our research; CRC was already planning to complete an additional research study after EPA completed our work. EPA's collaboration with industry was important to avoid

duplicating or overlapping efforts. EPA, by beginning research first, had the opportunity to focus on understanding the risks and best narrowing down, without needing to pinpoint, the possible causes. CRC's research plans are moving forward and taking into account preliminary findings from EPA's report.

After significant consultation with CRC, EPA decided that the most useful approach was to undertake exploratory field research of a large population of UST systems and look for predictive factors with UST systems experiencing severe corrosion. We present our findings in this report. EPA attempted to identify any corrosion predicting factors across 42 UST systems, a much larger group than examined before. This approach allowed EPA to look for anything that could be common to UST systems with corrosion, including the opportunity to examine if the hypotheses suggested by previous research would hold true across a larger and more diverse sample population. EPA weighed the opportunity to examine dozens of systems nationwide with the significant cost involved in laboratory work for the most extensive analysis options. Therefore, our research design required careful balance in selecting laboratory analyses that would reveal the most information about corrosion development without adding such significant cost that we would have to reduce the research population.

After we finalized our plan, we selected 42 operational USTs storing diesel. We inspected all UST systems in the diverse sample population for corrosion; gathered samples of fuel, vapor, and aqueous phase where possible; recorded site observations; and gathered available historical information about the UST systems from owners. We then categorized the UST systems according to the observed corrosion coverage as minimal, moderate, or severe. Next, we combined analytical results of the collected samples with historical information about the USTs, the site observations, and corrosion coverage categorizations and analyzed for predictive factors. The research results will add information to the body of knowledge about the extent of corrosion in USTs storing diesel fuel. We thought any predictive factors identified in our research would help focus the search of potential causes for the next phase of follow-on research.

Chapter 2
Methodology

EPA's research attempted to identify predictive factors for severe or minimal corrosion in USTs storing diesel by (1) inspecting and sampling UST systems and categorizing the USTs by corrosion extent, (2) analyzing the collected samples and building a large data set, and (3) statistically evaluating those data for predictive factors.

EPA developed and implemented our research according to a quality assurance project plan (QAPP); see Supplement A. The QAPP presents procedures for inspecting, categorizing, and sampling the 42 USTs storing diesel; methods for analyzing the samples; and methods for evaluating the data. The QAPP ensured uniform inspections of equipment. The QAPP also ensured that we accurately conducted a comprehensive analysis of samples and data. Our procedures and methods are described in detail in the QAPP and summarized briefly below.

I. Information Gathering

We followed the procedures and methods presented in the QAPP and conducted on-site inspections of 42 UST systems. The inspections included visually examining the UST system equipment and collecting samples of vapor, fuel, and aqueous phase, when present. This research also attempted to gather significant additional information from owners via questionnaire about each UST system's operation, maintenance, fuel supply, and storage history.

The on-site inspections were conducted between January 26 and February 13, 2015 at 40 different sites (at two sites, two USTs were inspected). EPA chose a diverse population of UST systems from available sites voluntarily offered by owners; some of the UST systems had known corrosion issues prior to the inspections. It is important to note that when attempting to organize inspection sites, EPA specifically asked potential volunteer owners for sites with a history of corrosion. Because EPA had no data on the percentage of systems actually affected by corrosion, we wanted to examine a population where 50 percent of sites had previous corrosion and 50 percent had no corrosion. Ultimately, EPA selected a research population that included less than 25 percent reporting knowledge of past or present corrosion. Regardless, the population of inspected systems in our research is not a random or representative sample of the diversity of USTs storing diesel in the United States. We discuss this and other differences between the sample and national population in more detail later in Chapter 2.

The USTs inspected during this research included both UST systems with steel tanks and UST systems with fiberglass tanks. CDFA's 2012 study gathered information through deeper analysis, but only focused on UST systems with fiberglass tanks. When planning EPA's research, we wanted to include an equal number of steel and fiberglass tanks in the sample population; however, due to logistical challenges of arranging available volunteered sites in clustered locations so as to minimize the amount of our research budget spent on travel, we inspected more fiberglass tanks than steel tanks, 24 and 18, respectively. The storage capacity of the tanks ranged from 5,000 to 20,000 gallons, with many of them 12,000 gallons, which is a typical size for the industry. Figure 2 presents the tank population by storage capacity and tank material. The inspection locations represented various geographic areas across the United States

and were arranged in 10 general clusters to minimize inspection expenses and maximize the number of USTs sampled. Figure 3 presents a map depicting the site cluster locations. Site inspections were conducted on UST systems that had been operational for time periods ranging from 1 to 29 years. Eight different owners volunteered their systems. The owners included a federal agency, a local government, several commercial fuel retailers, and a non-fueling servicing company that maintains an UST storing diesel for its fleet. Some of the commercial retailers own one UST storing diesel and some own multiple USTs storing diesel. Details about the 42 USTs inspected in this study are presented in Supplement B.

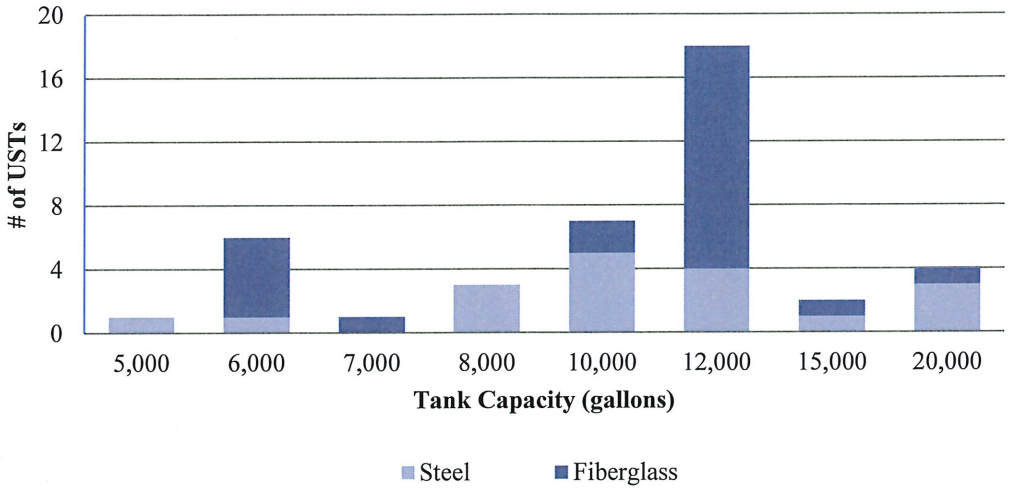


Figure 2. Summary Of 42 UST Systems By Capacity And Material



Figure 3. Locations Of Clusters Of USTs In Study Population

Difference In The Sample Population And National UST Population

The sample population of USTs storing diesel EPA examined is diverse, but most likely does not accurately represent the national demographic of the owners of federally regulated USTs storing diesel for three reasons. First, EPA estimates that more than 50 percent of federally regulated retail UST locations are the responsibility of owners with only one retail station, but because of limitations associated with coordinating volunteered sites, our research included only one individual site owner out of the eight participating owners. This is significant because owners of multiple UST systems are generally likely to be more aware of UST system issues and maintenance needs simply because of the requirements associated with operating multiple fueling systems. Large company owners of USTs at multiple locations often have employees specifically dedicated to managing these systems.

The second reason the diesel USTs selected for our research are not an accurate representation is because the sample was not random. During research design, EPA originally attempted to use a population with 50 percent of the UST systems with current or prior corrosion problems and 50 percent of the population without corrosion issues, according to the owners self-reporting. EPA specifically looked for UST systems whose owners believed or knew whether their UST had previous or current corrosion issues in order to use an equally split corrosion population to begin our research. However, EPA was not able to obtain a 50-50 split of reported corroded and non-corroded sites from the viable site options before the research began.

EPA and our contractor asked about corrosion histories through email and phone calls when scheduling potential participant USTs. The vast majority of potential volunteer owners said that although they would participate and allow inspection of their sites as part of the research, they were not aware of their UST systems having current or past corrosion issues. To verify the corrosion history of each UST system in the final research population, we asked all owners of USTs in the population if they knew of current or past corrosion in the UST. This was the first question on the questionnaire in Supplement A, Appendix B, which is discussed in more detail later in this chapter.

Of the 27 USTs for which this questionnaire was mostly answered, only five affirmatively reported current or past corrosion. The other answers were mixed: 15 owners replied to the question with unknown; two replied no; four replied none known about; and one did not answer the question. Of the remaining 15 USTs in the research population from whom responses were not collected, EPA is aware through conversations prior to beginning the research that at least three had reported prior corrosion issues. EPA believes for the other 12 of 42 sites the owners were not aware of past corrosion issues. In total EPA thinks eight of the 42 sites, or 19 percent of the total population, were aware of current or past corrosion issues prior to EPA beginning its research, but acknowledge that we cannot be certain.

We did not factor the number of sites with current or past corrosion into the statistical analysis of potential predictive factors, so it did not affect the research results. However, the number of owners who were aware of corrosion prior to research beginning is relevant to interpreting the findings. Therefore, we wanted to err on the side of more conservative results

and use less than 25 percent to describe the number of UST systems reporting current or prior corrosion to account for the fact that it could actually be higher than the 19 percent we believe actually knew of corrosion. Therefore, despite an intentionally biased sample for the research population, overall less than 25 percent of the 42 chosen UST system owners reported a prior knowledge of corrosion in their system before EPA inspections.

The third reason the results are not an accurate representation of federally regulated USTs storing diesel fuel is that no emergency generator tanks (EGTs) were included in this study. EGTs number in the thousands nationwide; they store fuel for long periods of time with fuel storage turnover rates much lower than USTs for refueling at retail stations and non-retail locations. Therefore, many conditions in EGTs will be different and corrosion may be more or less of an issue than in USTs used for fueling vehicles or equipment other than emergency generators.

A. UST System Background Information

After EPA identified the UST systems to be inspected, we gathered additional background information by asking owners, via a detailed questionnaire, about their UST system service and maintenance histories. The goal of collecting this information was to include UST system storage history, fuel supply, maintenance, and oversight practices in the search for predictive factors for USTs having severe corrosion. We gathered some of this information on site during inspections, but much of it was collected via emails with owners or managers before and after the on-site inspections. Some owners of multiple USTs across several locations did not allow on-site employees to provide information, while other owners allowed direct communications only with local site managers. For some of the UST systems, maintenance records were housed on site, while other records were maintained in centralized databases.

Overall, much of this background information was incomplete or unavailable from the owners, regardless of the UST maintenance documentation method. This was the case for several reasons; for example, owners and operators may not have received the records when they purchased the UST from previous owners, or owners may not have retained records unessential to compliance reporting. Other reasons included staffing or procedural changes that made continuity of recordkeeping difficult. Sometimes the reason for incomplete answers was unknown.

Of the 42 UST systems inspected in our research, we obtained answers to all or the majority of the background questions for 27 of the systems; see information in Supplement B. Of the answers obtained, the level of detail and certainty varied greatly among the various owners. For example, some owners reported an estimated monthly throughput rounded to the nearest one thousand with no indication of the delivery volumes or number of deliveries. Others sent delivery records of the past 12 months containing the dates and accurate volumes of the deliveries. Owners were approached no more than three times for gaps or clarifications about the information.

B. On-Site Inspections And Corrosion Classification

On-site inspections included visual documentation of the UST system conditions with an internal tank video and photos and sample collection. We conducted one site inspection for each UST system, capturing the conditions of the UST system on the day of inspection. We then collected samples of fuel, vapor, and the aqueous phase, or water bottom, from each UST system following the detailed inspection procedure in the QAPP, which included completion of a checklist and sample collection log sheet. Inspection teams packed and shipped samples to laboratories for analysis of composition and various chemical properties according to the QAPP. The QAPP in Supplement A details our inspection procedures and contains the inspection checklist and sample collection log sheet used for the inspections. We used the recordings of the internal video inspections to categorize the level of corrosion in each of the USTs in the sample population.

The CRC Diesel Performance Group, comprised of industry stakeholders, developed a standard protocol to be used as an on-site corrosion coverage classification assessment procedure.[18] The CRC protocol was finalized in 2014 and was intended to be used by researchers in selecting UST systems for researching corrosion. The protocol instructs an assessor to inspect the dispenser filter and then estimate the amount of corrosion coverage on the STP shaft as an indication of the extent of corrosion throughout the system. The metal shaft is commonly reported as being affected by corrosion and is an integral piece of equipment for system operation. The STP shaft is a good indicator to assess corrosion because it is oriented vertically within the tank and has portions of the shaft that are almost always wetted with fuel, sometimes wetted with fuel, and almost always in the vapor space.

EPA used much of CRC's protocol as the basis for determining the level of corrosion in each UST system. However, our procedure diverged from CRC's protocol in that CRC's protocol was designed for selecting specific sites to investigate, where EPA's sites were predetermined. Our process also included more metal components than just the STP shaft in the assessments if the STP shaft did not appear to accurately represent the overall amount of corrosion observed on other metal surfaces in the UST. EPA's process also diverged from CRC's protocol because we based the final assessment of corrosion coverage on three independent assessments, and for some systems, finalized the categorization only after follow-up discussion by assessors. The field team camera operator made an initial assessment during the inspection, then EPA and our contractor each independently assessed the corrosion coverage present in an UST system by reviewing the internal tank videos. Similar to CRC's protocol, the assessments in our research initially estimated the percent of corrosion coverage on the STP shaft. Then if necessary, we reviewed and discussed the overall corrosion coverage. The end result was a determination of the extent of corrosion coverage inside the UST systems according to three categories.

- Minimal: less than 5 percent coverage
- Moderate: 5 percent to 49 percent coverage
- Severe: 50 percent or greater corrosion coverage

Often, the three independent assessments were accurately made based only on the STP shaft, and often agreed unanimously on which corrosion category best represented the condition of the UST systems. However, the assessors did not agree unanimously on 22 initial assessments. In the situations where the three initial assessments were not in agreement, EPA, our contractor, and the field team manager discussed the UST system classification. For those observations where we did not reach unanimous consent after this additional discussion, the QAPP called for EPA to make the final determination. In each of those few situations where unanimous consensus was not reached through discussion, EPA made the final determination to classify the UST system in the category where there were already at least two of the same assessments out of the three, regardless of what EPA's individual assessment was.

II. Sample Collection

EPA collected vapor, fuel, and aqueous phase samples, if present, from each UST system per the QAPP procedures; the samples were then shipped to various laboratories for multiple analyses. See Table 2 for analytical methods by sample type. The first step of the inspection was to open the UST system and immediately collect vapor samples, as well as in-tank temperature and relative humidity readings. The vapor samples were collected from the vapor space above the fuel inside each UST. This space is also called the ullage space. In order to minimize mixing of fresh air in the tank, only one cap was opened during the vapor sampling, and the vapor collection was completed before opening any other parts of the UST. The vapor was collected at a rate of 1 liter (L) per minute for 100 minutes through a single tank opening, either the fill opening after removing the drop tube or the ATG opening after removing the ATG probe.

Once vapor sampling was complete, we collected a fuel sample from the tank through either the fill opening or the ATG opening. We did not collect fuel samples from the fuel dispenser because tank collection more accurately captures the condition of the bulk, unfiltered fuel stored.

Field teams then attempted to collect aqueous phase samples. Water in USTs can be entrained in fuel, separated into an aqueous phase at the bottom of the tank, or both. For this reason, the aqueous phase is more commonly referred to as a water bottom in the fueling industry. Approximately 0.5 L of aqueous phase water was needed to fill the sample jars per the QAPP; we collected this volume from 11 of the 42 UST systems. The low number of aqueous phase samples collected could be attributed to the sampling techniques and tank openings sampled in relation to the sloping of the tanks. USTs storing diesel are generally prone to have water accumulation that require active management to regularly remove it, so we acknowledge that a sufficient water sample collection from only 26 percent of the UST sample population could have been a result of the limitations of the sampling approach.

The field teams had two sampling methods available to them to attempt to collect the water. One was a closed-core type grab sampler, commonly known as the Bacon Bomb. This device can be swung slightly and drug along the bottom of the tank to collect water directly under the opening and in relatively close proximity to the area under the opening. The second

sampling device was the Tanknology Vacuum Sampler (TVS), which was designed for the specific purpose of sampling water at the bottom of USTs. Tubing for this device is weighted and can be maneuvered to either side, reaching areas along the bottom of the tank further away from the area directly under the opening. All access points were available for entry to the USTs except for the point where the STP was installed. Depending on the sloping of the tank, the lowest point of the tank where water would collect may be under the STP. We did not remove and disassemble the STPs for our research. STPs are quite heavy and cumbersome to remove, and if severe corrosion were found, the corrosion could have hindered reinstallation of the pump or required replacement. This risk to an operational system, in addition to the possible interruption of diesel service to customers, was undesirable to research participants and EPA. EPA decided in the research planning stages not to remove STPs because of these concerns, and that may have affected our ability to gather more than 11 water samples for analyses.

For 10 of the 11 aqueous phase samples collected, an aliquot (~0.25 L) was filtered through a cellulose filter to capture biological material until the filter clogged. We did not conduct microbial community analysis on these filters as part of this investigation; rather, the filters remain archived at less than -60°C for potential deoxyribonucleic acid (DNA) identification analysis by EPA or any other interested entity researching the diesel corrosion issue.

EPA intended for all samples to be handled according to the QAPP; however, upon analysis of the samples, we identified isopropyl alcohol in 18 of the fuel samples. Isopropyl alcohol was specified in the QAPP as the cleaning agent for the sampling equipment because it should quickly volatilize into air, leaving the equipment clean and dry. We could not determine with certainty the source of the isopropyl alcohol in the sample results, but it is likely that the equipment may have been used before the isopropyl alcohol completely evaporated. Isopropyl alcohol was chosen as the cleaning agent because it is not expected to be present in diesel or in the UST environment through microbial metabolic processes; therefore, the identified isopropyl alcohol is most likely contamination from the cleaning procedure. Because the key findings of this study relate to general trends of corrosion observations and the search for predictive factors, the contamination does not change the results reported or impact the final conclusions of the report.

III. Sample Analyses

The samples were shipped from inspection sites directly to various analytical laboratories. Table 2 summarizes the chemical analyses conducted. Each laboratory was responsible for performing one or more of the analysis methods uniformly for all of the relevant samples collected. Table 2 is organized by sample type (fuel, aqueous phase, and vapor) and includes the method title and standard method number, if applicable, for each analysis performed on the samples. Each method listed in Table 2 has quality control (QC) procedures and samples that were required for analysis, along with the field samples, to ensure the quality of the measurements. A duplicate liquid fuel and aqueous phase sample was collected for at least 10 percent of the total samples collected. For the vapor samples, a field blank and a duplicate sample were collected and submitted for analysis for 10 percent of the samples. In addition, analytical QC samples were included by all the laboratories to verify that there was no cross-

contamination or carry-over between samples during analysis. The QC requirements and acceptance criteria for fuel, aqueous phase, and vapor samples are presented in the QAPP.

IV. Statistical Analysis Approach

EPA's research was primarily exploratory in nature and sought the most likely association and pathway between corrosion of metal components inside diesel USTs and the potential predictor variables collected. For the main analysis, in terms of classification and prediction accuracy, the machine learning technique known as random forest classification was used. This technique is considered one of the best among all available methods as shown recently by Fernandez-Delgado, Cernadas, and Barro.[19] It is also particularly well suited to situations with more variables than observations. This approach helps to define the problem and to understand what characteristics are potential predictors of an UST system experiencing corrosion.

In addition, since previous research hypothesized that acids in the vapor space resulting from MIC were the cause of corrosion, an analysis was conducted to determine if the amount of acids correlated with the presence of corrosion. A calculation was performed to sum the concentrations of the low molecular weight acids to a single value of acid concentration, represented as total acidic hydrogen value, in order to compare this value across USTs in the population. An analysis of variance (ANOVA) was performed for this outcome, and simultaneous 95 percent confidence intervals were obtained for all three pairwise contrasts of the corrosion categories. This total acidic hydrogen quantity was also analyzed as a potential predictor in a random forest classification along with the other variables to see how it measures in importance compared to the rest of the variables.

Table 2. Analytical Methods By Sample Type

Determination Of	Fuel Analysis Methods	Method Identifier
Water content	Water in petroleum products, lubricating oils, and additives by coulometric Karl Fischer titration (Procedure B)	ASTM D6304
Density	Determination of density, relative density, and American Petroleum Institute (API) gravity of liquids by digital density meter	ASTM D4052
Total acid number (TAN)	Acid number of petroleum products by potentiometric titration	ASTM D664
Corrosion rating	Determining corrosive properties of cargoes in petroleum product pipelines	NACE TM-0172
Particulates	Particulate contamination in middle distillate fuels by laboratory filtration	ASTM D6217
Biodiesel content	Determination of biodiesel (FAME) content in diesel fuel oil using mid-infrared spectroscopy (FTIR-ATR-PLS method)	ASTM D7371
Flashpoint	Flash point by Pensky-Martens closed cup tester	ASTM D93
Free and total glycerin	Determination of free and total glycerin in biodiesel blends by anion exchange chromatography	ASTM D7591
Unknowns of interest	Gas chromatography mass spectrometry (GC-MS) full scan	Lab in-house method
Sulfur content	Determination of total sulfur in light hydrocarbons, spark ignition engine fuel, diesel engine fuel, and engine oil by ultraviolet fluorescence	ASTM D5453
Conductivity	Electrical conductivity of aviation and distillate fuels	ASTM D2624
Acetic, formic, propionic, butyric, and lactic acids	Determination of short-chain fatty acids by GC-MS	Lab in-house method
Determination Of	**Aqueous Phase Analysis Methods**	**Method Identifier**
Acetic, formic, propionic, lactic acids	Ion chromatography (IC) for short-chain fatty acids	Modified EPA 300
Glycerin	IC test for free glycerin	Lab in-house method
Cations (sodium, calcium, magnesium, potassium, ammonium) and anions (chloride, sulfate, nitrate and fluoride)	Determination of dissolved alkali and alkaline earth cations and ammonium in water and wastewater by ion chromatography	ASTM D6919[21]
pH	pH (electric)	EPA 150.1
Conductivity	Conductance (specific conductance, µmhos at 25°C)	EPA 120.1
Ethanol and methanol	Nonhalogenated organics using GC-flame ionization detector (FID)	SW846 8015B
Determination Of	**Vapor Analysis Methods**	**Method Identifier**
Percent relative humidity	Vapor space percent relative humidity	Hygrometer
Acetic, formic, propionic, and butyric acids	Carboxylic acids in ambient air using GC-MS	ALS Method 102
Lactic acid	Determination of lactic acid in ambient air	Modified NIOSH 7903

Chapter 3
Observations And Results

I. Corrosion Observations In USTs Storing Diesel

Data collected on site by the field teams were combined with the UST system information provided by owners through the questionnaire. Table 3 lists the UST systems that were inspected, along with some basic characteristics of each of the systems: location, installation year, tank material, and tank capacity. The UST systems are presented by corrosion category and then by geographical cluster. Table 3 also shows, with shaded rows, where aqueous phases were found and successfully sampled from 11 UST systems. We were unable to collect aqueous phases of sufficient volume from the other UST systems. An asterisk in the corrosion coverage column indicates where the three independent assessments were not in initial unanimous agreement and EPA, our contractor, and subcontractor discussed the classification before a category was assigned; we discuss this in Chapter 2. See Supplement B for additional UST system characteristics and inspection data.

Corrosion Was More Prevalent Than Expected

Approximately 83 percent – 35 of 42 – of the USTs evaluated in the 10 clusters around the United States were classified with moderate or severe corrosion; 17 of the 42 USTs were classified as having moderate corrosion and 18 of the 42 were classified as having severe corrosion. The remaining seven USTs were classified as having minimal corrosion. Figure 4 groups the UST systems by corrosion category and tank material – fiberglass and steel. The data showed that minimal, moderate, and severe corrosion of metal components occurred in both types of tank construction. Within the research population, even some of the few USTs classified as having minimal corrosion had corrosion. The inspections were a snapshot in time, and therefore predicting future corrosion is not possible. However, it is possible that even those USTs exhibiting minimal corrosion were at the beginning stages of more advanced metal corrosion. The corroded bung in Figure 6, an UST with overall minimal corrosion, is an example.

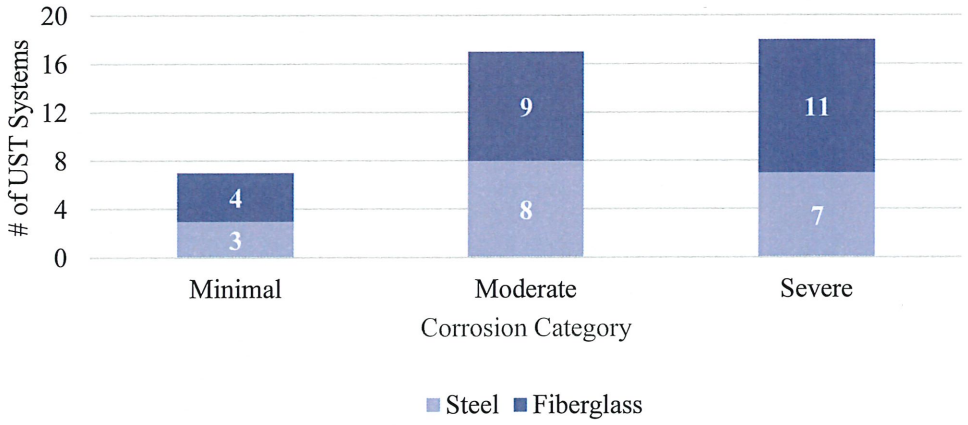


Figure 4. Forty-Two USTs By Corrosion Category And Material

For the USTs categorized as moderate or severe, visual corrosion observations from this research were consistent with observations of corrosion reported from PEI's 2010 industry corrosion survey and CDFA's 2012 study as well as general anecdotes from the UST industry.[20, 21]

Table 3. Characteristics And Corrosion Coverage Of USTs Inspected For This Research

UST System ID	Corrosion Coverage	Geographic Cluster	State	Installation Year	Tank Material	Capacity
22-CO-FG	Minimal	Denver	CO	2012	Fiberglass	12,000
48-CO-FG	Minimal	Denver	CO	2012	Fiberglass	12,000
14-LA-ST	Minimal*	Louisiana	LA	2012	Steel	8,000
29-CA-FG	Minimal	San Francisco	CA	2003	Fiberglass	20,000
31-CA-ST	Minimal	San Francisco	CA	1987	Steel (coated)	12,000
42-PA-ST	Minimal	Southeast PA	PA	1994	Steel	10,000
45-VA-FG	Minimal	Washington, DC	VA	Unknown	Fiberglass	10,000
2-IL-FG	Moderate	Chicago/Northern Indiana	IL	1995	Fiberglass	6,000
1-IL-FG	Moderate*	Chicago/Northern Indiana	IL	2006	Fiberglass	12,000
5-IL-FG	Moderate*	Chicago/Northern Indiana	IL	2005	Fiberglass	12,000
46-IL-ST	Moderate*	Chicago/Northern Indiana	IL	1992	Steel	20,000
23-CO-FG	Moderate*	Denver	CO	2014	Fiberglass	12,000
8-IN-FG	Moderate	Ft. Wayne	IN	2006	Fiberglass	12,000
12-MO-FG	Moderate	Kansas City	MO	2006	Fiberglass	12,000
10-MO-FG	Moderate*	Kansas City	MO	2005	Fiberglass	12,000
17-TN-FG	Moderate	Knoxville	TN	2011	Fiberglass	12,000
18-TN-ST	Moderate*	Knoxville	TN	1986	Steel	12,000
34-NY-ST	Moderate*	Long Island	NY	1992	Steel	12,000
37-NY-ST	Moderate*	Long Island	NY	1991	Steel	5,000
49-NY-ST	Moderate*	Long Island	NY	2010	Steel	10,000
27-CA-ST	Moderate*	San Francisco	CA	1998	Steel	12,000
39-NJ-ST	Moderate*	Southeast PA	NJ	1990	Steel	10,000
40-PA-ST	Moderate*	Southeast PA	PA	1994	Steel	10,000
44-VA-FG	Moderate*	Washington, DC	VA	Unknown	Fiberglass	10,000
3-IL-ST	Severe	Chicago/Northern Indiana	IL	1992	Steel (coated)	20,000
6-IN-ST	Severe*	Chicago/Northern Indiana	IN	1992	Steel	8,000
9-IN-FG	Severe*	Chicago/Northern Indiana	IN	2006	Fiberglass	12,000
26-CO-FG	Severe	Denver	CO	1996	Fiberglass	6,000
24-CO-ST	Severe*	Denver	CO	Unknown	Steel	8,000
7-IN-ST	Severe*	Ft. Wayne	IN	1992	Steel	6,000
11-KS-FG	Severe	Kansas City	KS	Unknown	Fiberglass	15,000
16-TN-FG	Severe	Knoxville	TN	2004	Fiberglass	12,000
32-NY-FG	Severe	Long Island	NY	2007	Fiberglass	12,000
33-NY-FG	Severe	Long Island	NY	2010	Fiberglass	7,000
35-NY-FG	Severe*	Long Island	NY	1986	Fiberglass	6,000
36-NY-ST	Severe*	Long Island	NY	1991	Steel	15,000
13-LA-FG	Severe	Louisiana	LA	2008	Fiberglass	12,000
15-LA-FG	Severe	Louisiana	LA	2000	Fiberglass	6,000
47-LA-FG	Severe*	Louisiana	LA	2002	Fiberglass	12,000
30-CA-FG	Severe	San Francisco	CA	2003	Fiberglass	6,000
28-CA-ST	Severe*	San Francisco	CA	1999	Steel	10,000
43-MD-ST	Severe	Washington, DC	MD	1992	Steel	20,000

Shading indicates aqueous phase was present and sampled.
*Indicates where initial classifications were not in unanimous agreement and EPA, our contractor, and subcontractor discussed the classifications as described in Chapter 2.

Observations sometimes included tubercle formations covering various metal surfaces of components within these UST systems. In many of the 42 USTs, we observed corrosion or tubercle coverage of the STP shaft only on the portion of the shaft in the vapor space. In some severe cases, we observed corrosion or tubercle coverage on the entire length of the STP shaft. Corrosion coverage patterns are discussed in more detail later in this report.

Most Owners Likely Not Aware This Could Be Affecting Their UST Systems

Approximately 83 percent of the inspected tanks showed moderate or severe metal corrosion. Owners reported having known corrosion in less than 25 percent of the USTs. As discussed earlier, the systems inspected may not be a representative sample of the United States; however, considering the many anecdotal reports from owners and service companies, previous research efforts, and results of the classification effort, the true prevalence of severe corrosion of metal components in UST systems storing diesel appears to be significant. Many owners are likely unaware that such corrosion may be affecting their UST systems.

Corrosion Of Metals Affects Both USTs With Steel Tanks And USTs With Fiberglass Tanks

In our research, we attempted to identify and include an equal number of USTs with steel tanks and fiberglass tanks in the sample population. However, our research used 24 fiberglass tanks and 18 steel tanks in the sample population. Our research shows that corrosion of metals is not dependent on the type of tank. Corrosion on metal components of diesel USTs was present in both UST systems with fiberglass tanks and UST systems with steel tanks. The corrosion was not limited to particular geographic regions. Our observations of the corrosion suggest that metal components in the vapor portions of tanks are most susceptible to corrosion, but several UST systems showed corrosion of metal equipment in lower portions, which generally remain wetted by fuel.

We observed corrosion on metals in the vapor space, including STP shafts, ATG shafts, drop tubes, and overfill prevention devices such as flapper valves and ball floats. Anecdotes from industry suggest that flapper valves and ball floats may be particularly prone to malfunction due to corrosion. These anecdotes also suggest that equipment not within the tank area, including shear valves, which are also known as fire valves or impact valves, and line leak detectors may be prone to functional failure from corrosion in diesel UST systems. In our research, we observed corrosion on metal bungs in the top of the tank and on the walls of some steel tanks.

Most Severe Corrosion Was Observed In The Highest Parts Of The Tank

One important observation was that the steel surfaces exposed to the vapor phase above the fuel generally appeared to show more corrosion than the surfaces that were generally fully immersed in the fuel. In multiple USTs, we observed corrosion appearing to be more advanced on portions of the STP shaft, which are generally in the vapor space than on the section generally in the fuel level. See an example from UST system 9-IN-FG in Figure 5.

From the inspections and general observations, the corrosion is more commonly severe in vapor spaces versus wetted portion of the tanks. Please note that because diesel fuel is often opaque, our assessment of the bottoms of the tanks was generally limited unless fuel levels were very low. However, in some USTs we evaluated, we observed severe corrosion nearly to the bottom of the UST.

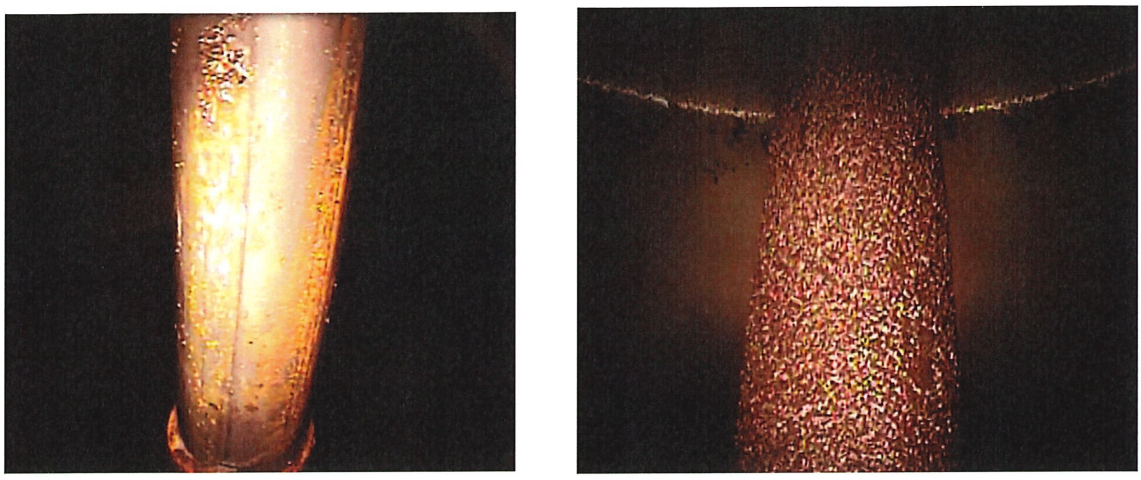


Figure 5. UST System 9-IN-FG STP Shaft Corrosion (Left Photo: Middle Of Shaft [Generally Submersed], Right Photo: Top Of Shaft [Generally Exposed To Air])

The STP shaft is situated vertically in the tank, and much of the shaft is exposed to both fuel and vapor space as fuel is dispensed and resupplied and the fuel level line rises and lowers in the tank. In some moderate corrosion cases observed in our research, the STP shaft was coated with corrosion in the vapor space, but was not yet affected in the wetted or sometimes wetted portions of the shaft. In some severe cases, the STP was entirely covered with corrosion. With the corrosion generally appearing heaviest in the highest points of the vapor space, the ATG riser and undersides of the manways, also referred to as tank bungs, are where the initial signs of corrosion should be expected, making these areas ideal for observing the beginning of corrosion development. In addition, we observed heavier corrosion in some areas of the ATG riser where vapor cannot circulate as easily around the rest of the tank.

Examples Of The Range Of Corrosion Effects

In general, there are limitations in drawing one corrosion assessment conclusion from many pieces of equipment within USTs. Different equipment reacts to the UST environment in different ways; components may be of different ages and constructed of different materials. However, inspecting other metal components in the UST when our first assessments using the STP shaft were not in unanimous agreement allowed us to confidently determine whether the corrosion problem existed in an UST system. Figures 6 through 9 show four examples of UST systems observed in our research: minimal corrosion in an UST system with a fiberglass tank, minimal corrosion in an UST system with a steel tank, severe corrosion in an UST system with

a fiberglass tank, and severe corrosion in an UST system with a steel tank. These cases provide examples of the range of corrosion observed during our research.

Figure 6 presents an example of minimal corrosion coverage of metal components in an UST with a fiberglass tank that is approximately 12 years old (29-CA-FG). The riser and STP shaft are completely free of corrosion, and the filter is so new it gives no indication of the state of the UST. The bottom right photo of the bung at the top of the tank shows that some tubercles are forming around the inside of the bung. The formation of corrosion on the metal bung indicates that metals in this tank could be at the beginning of more advanced corrosion development.

Figure 7 shows photos of an UST with a steel tank that was also classified as having minimal corrosion (42-PA-ST). This tank has been in operation for approximately 21 years. The steel shell itself is in excellent condition for the age, as are the risers and the drop tube. This system uses a safe suction system rather than an STP to dispense fuel. The suction tube is also devoid of corrosion. It is unknown if any of this equipment has been replaced.

Figure 8 shows UST 35-NY-FG; with 29 years in service, this is the oldest tank in our research. The fiberglass tank in this UST system is expected to show signs of aging; however, corrosion development on the bungs is particularly severe, as is the corrosion coverage along the entire length of the STP shaft. It is interesting to note that this UST had the highest Total Acid Number (TAN) result; at 0.36 mg KOH/g it was significantly higher than all but one other UST. 48-CO-FG, at .28 mg KOH/g, was the only other UST to have a TAN result over .06 mg KOH/g. One additional general observation from some particularly severe cases is that the aluminum pieces, such as the ATG shaft and the drop tube, were sometimes coated with white deposits. Generally, aluminum will not corrode in environments with a pH above 4, so the white deposits in these severe cases suggest that the UST environment has been below pH 4 at least at some point in their service histories.

Figure 9 shows UST 43-MD-ST, a 23-year-old steel tank. The fill riser that was used for the video camera access lacks almost any evidence of corrosion. However, because it is generally protected from vapor by the drop tube, the riser is not a good indicator of the overall extent of corrosion in this UST system. The STP shaft is completely covered by corrosion and the ATG has some deposits along the length of the shaft and on top of the float.

II. Corrosion Coverage Classification Process

As discussed earlier in this report, we classified three levels of corrosion coverage by using a modified approach to the CRC protocol. For all but one UST classified as having minimal corrosion, our three assessments were in unanimous agreement. Classification consensus was most difficult to reach between moderate and severe coverage categories. The asterisks in Table 3 indicate when we discussed differing initial assessments of the videos before making final decisions.

Using the STP shaft as a surrogate piece of equipment for determining corrosion severity throughout the systems worked well for 20 of the 42 USTs, but the other 22 required more discussion to adequately assess the overall condition of each UST. This was particularly

true with suction systems that do not use STPs for dispensing fuel. It appeared that some STP shafts or suction pipes were brand new, made of a different metal, coated or painted, or somehow non-corrodible because they appeared pristine; but other metal components in those USTs showed varying levels of corrosion, sometimes severe. It is possible that some shafts or pipes had been recently replaced due to corrosion, resulting in the appearance of less corrosion relative to other metals. Such information on maintenance histories was not always available from owners. We recognized that sometimes the entire system needed to be taken into account because of unique conditions observed in each UST inspection video (for example, differing visible portions of the STP and other equipment due to the fuel height, tank entry point, equipment orientation, and the technique of the camera operator).

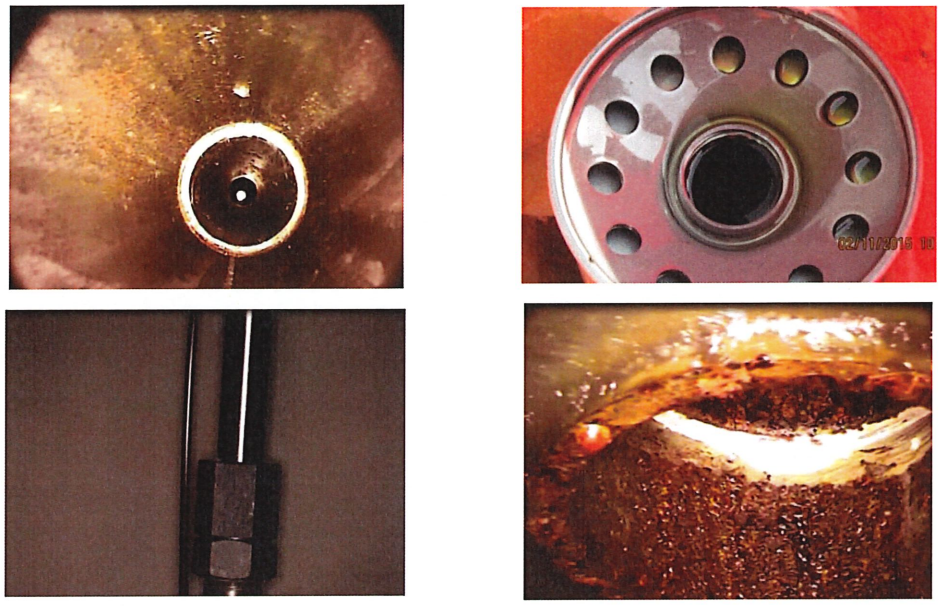


Figure 6. UST System With Fiberglass Tank With Minimal Metal Corrosion (29-CA-FG: Installed 2003, Age Of Filter < 1 Month). Top Left: Fill Pipe Opening; Top Right: Fuel Filter; Bottom Left: STP Shaft; Bottom Right: Tank Top Opening

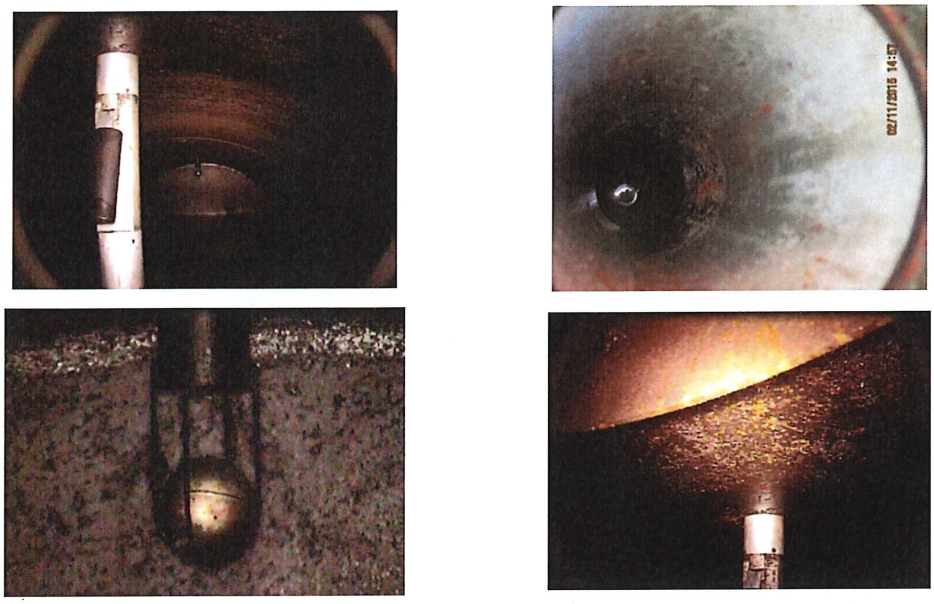


Figure 7. UST System With Steel Tank With Minimal Metal Corrosion (42-PA-ST: Installed 1994; Age Of Filter Unknown). Top Left: Drop Tube And Tank Overview; Top Right: ATG Opening; Bottom Left: Ball Float; Bottom Right: Tank Top Showing Manway

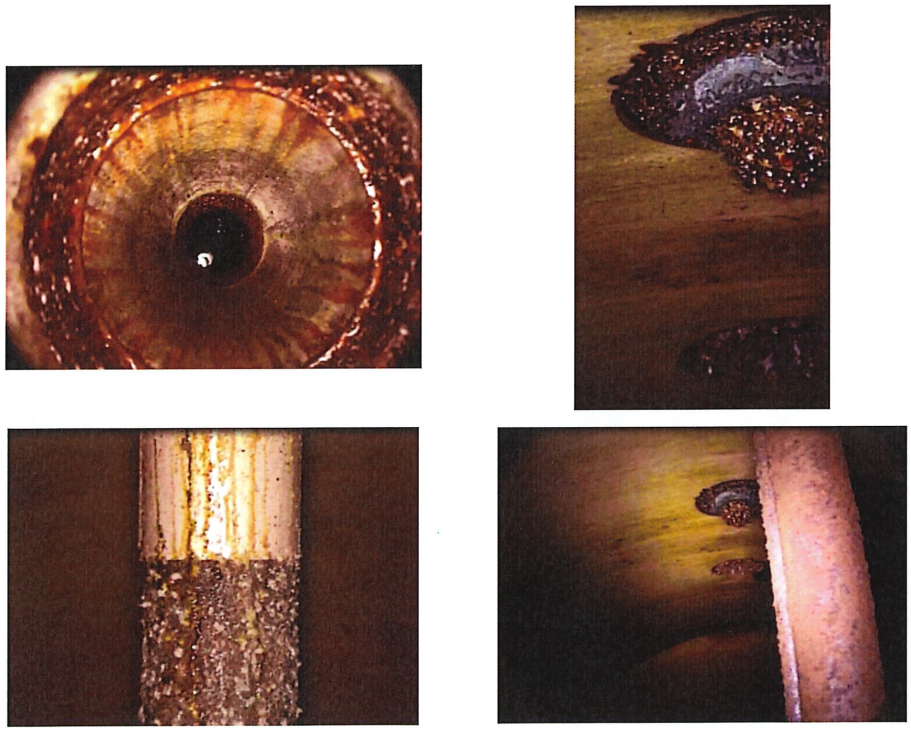


Figure 8. UST System With Fiberglass Tank With Severe Metal Corrosion (35-NY-FG: Installed 1986; Age Of Filter Unknown). Top Left: ATG Opening; Top Right: Tank Top Openings; Bottom Left: Drop Tube; Bottom Right: STP Shaft And Tank Top Openings

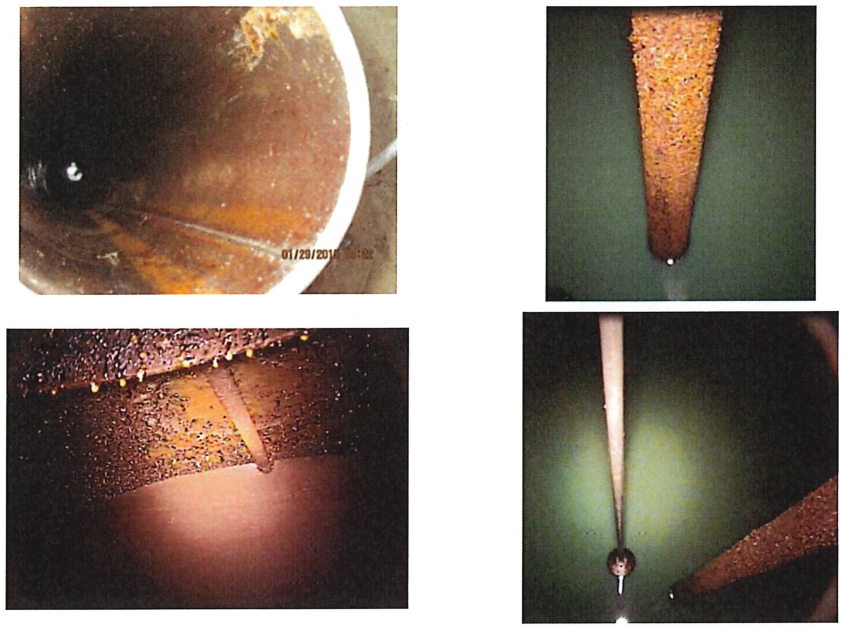


Figure 9. UST System With Steel Tank With Severe Metal Corrosion (43-MD-ST: Installed 1992; Age Of Filter Unknown). Top Left: Fill Pipe Opening; Top Right: STP Shaft; Bottom Left: Tank Top Showing Manway; Bottom Right: ATG Probe And STP Shaft

In the video inspections showing the condition of each STP shaft or suction pipe, it was not clear if the black steel pipes were seamless or welded; however, according to the Steel Tank Institute, these fittings are generally made from seam-welded steel. Black steel pipe has a black oxide coating that forms during the forging process. The black coating is magnetite (Fe_3O_4) and provides some protection to atmospheric corrosion but can form red rust in the presence of water. The degree of corrosion depends on several factors, including, but not limited to, pH of the aqueous phase, availability of oxygen, duration of exposure, temperature, and presence of other contaminants such as chlorides.

In cases where the assessments disagreed, we launched the discussion with the state of the STP, but made the classification decision based on the discussion of the overall extent of corrosion coverage visible in the UST system video. In an ideal corrosion assessment, we would inspect each metal component of the UST system to determine the severity of corrosion. Although some pieces are easier to inspect than others, the most useful pieces of equipment to observe are the fuel filter, STP shaft, ATG riser, and undersides of the manways and bungs. Dispenser filters, while generally not reported as corroded equipment, may collect corrosion product and particulates over time and can be accessed without entering the tank. Anecdotes suggest that in some severe corrosion cases, what has been described as looking like coffee ground deposits clog the filter, causing the need for more frequent filter replacements. Clogged dispenser filters have sometimes prompted further investigation of the UST system for corrosion. However, if the service life of the filter is unknown or is known to be only a short period, it might not be a good indicator of the presence of corrosion inside the UST.

III. Analytical Results

Analytical results derived by performing the methods listed in Table 2 on the available vapor, aqueous phase, and fuel samples obtained from each UST system are summarized in table format in the following sections and are presented in full in Supplement B. The associated quality assurance (QA)/QC data summary tables are provided in Supplement C.

A. Quality Assessment And Oversight

The QAPP presents the QA assessment and oversight activities established to conduct our research. Supplement E includes a summary of the QA assessments performed throughout our inspections, data collection, and reporting process, as well as the audit reports and deviation reports. During our research, we identified six deviations from the QAPP, and we assessed the impact to the data quality in deviation reports. These deviation reports concluded there was no negative impact to the data quality or the conclusions of our report.

B. Vapor Analytical Testing And Results

In our research, the vapor analysis focused on identifying several acids that were hypothesized in previous research by CDFA and ORD as likely contributors to MIC. Additional acids were added to our research in order to test the feasibility of other contributors to corrosion. Table 4 summarizes a subset of the results. Vapor measurements from the 42 tanks showed both acidic and high moisture content conditions, which are conducive to corrosion development. Either acetic acid or formic acid, or both acids, were present in the vapor space of every UST inspected. These acids are the most abundant and volatile of the microbial byproducts hypothesized by previous research to be produced in the aqueous phases through MIC. Concentrations of acetic and formic acid were as high as 6,200 parts per billion by volume (ppbv) and 2,100 ppbv, respectively. Another acid suggested by previous research to be related to microbial consumption of biofuel components in diesel, propionic acid, was found in 12 of the samples at much lower concentrations (up to 8 ppbv). The vapor pressure of propionic acid, at 2.4 millimeters of mercury (mm Hg) at 20°C is significantly lower than acetic and formic acids, at 11.4 and 31.5 mm HG at 20°C, respectively.[22,23,24] Therefore, propionic acid would be expected to be at lower concentrations in the vapor even if liquid-phase concentrations of these acids were similar. Lactic acid was tested but not detected in any of the samples, possibly due to its low volatility (0.0813 mm Hg at 25°C).[25] The method reporting limit (MRL) for the vapor analysis is approximately 0.5 ppbv for these acids.

Hygrometer readings were also taken during the vapor sampling. The average relative humidity inside the USTs was 68 percent with a standard deviation of 15 percent; readings ranged from 33 percent to 98 percent. The sampling took place in January and February in different climates where the average annual ambient relative humidity ranged from 52 percent to 79 percent. We observed condensation produced by high humidity along the top of many of the tanks. In general, corrosion is more severe in humid environments than in dry environments. On some metals, corrosion can be slowed when humidity is reduced to below 50 percent.[26] High humidity and subsequent condensation allows the acids in the vapor space to sustain contact with the equipment as an aggressive electrolyte and liquid condensate. This facilitates corrosion

development on the metal components. Furthermore, when the liquid condensate evaporates, the acids may concentrate on the surface, although the corrosive action may vary on the metal components.

USTs storing diesel are vented to the atmosphere, allowing ambient air to continually enter the tank. Therefore, USTs storing diesel are not expected to be free from climate influence on the UST environment, and relative humidity inside USTs storing diesel may be especially influential on corrosion development. Although the effect may be varied due to climate, USTs in all regions of the United States are susceptible to ambient air affecting conditions inside of the USTs. In humid climates, the UST is expected to have nearly continual high humidity, which promotes condensation in an UST, possibly making the UST more susceptible to corrosion development. Where the ambient humidity varies due to season, weather events, or geographic location, the relative humidity in the tank will also vary, allowing for the condensation and drying cycles that could affect the susceptibility and severity of corrosion development. Even in areas where humidity is low, daily temperature swings can produce periods of high humidity in USTs when warmer and cooler air mix. Again, this allows for condensation of liquids on surfaces inside the UST that may increase the severity of the corrosion on UST system components.

Table 4. Vapor Results In Order Of Corrosion Classification And Increasing Acetic Acid Concentration

UST System ID	Corrosion Class	Acetic Acid (ppbv)	Formic Acid (ppbv)	Propionic Acid (ppbv)	Average Relative Humidity in Tank (%)	Cluster Location Designation*	Cluster Location Annual Average Ambient Relative Humidity (%)**
14-LA-ST	Minimal	15	ND	ND	73	Louisiana	76
45-VA-FG	Minimal	29	650	ND	82	Washington, D.C.	64
31-CA-ST	Minimal	80	490	ND	82	San Francisco	74
22-CO-FG	Minimal	100	ND	3.5	36	Denver	52
42-PA-ST	Minimal	150	76	4.5	69	Southeast PA	67
48-CO-FG	Minimal	550	470	ND	58	Denver	52
29-CA-FG	Minimal	1500	86	ND	62	San Francisco	74
8-IN-FG	Moderate	ND	210	ND	65	Ft. Wayne	79***
17-TN-FG	Moderate	ND	120	ND	71	Knoxville	76***
18-TN-ST	Moderate	ND	71	ND	70	Knoxville	76***
46-IL-ST	Moderate	ND	2100	ND	55	Chicago/ Northern Indiana	70
49-NY-ST	Moderate	14	840	ND	77	Long Island	63
10-MO-FG	Moderate	28	76	ND	88	Kansas City	68
40-PA-ST	Moderate	31	100	1.1	57	Southeast PA	67
37-NY-ST	Moderate	39	160	0.96	71	Long Island	63
27-CA-ST	Moderate	87	74	2.1	57	San Francisco	74
12-MO-FG	Moderate	88	85	3.1	59	Kansas City	68
1-IL-FG	Moderate	200	320	ND	41	Chicago/ Northern Indiana	70
23-CO-FG	Moderate	230	64	ND	52	Denver	52
34-NY-ST	Moderate	230	250	1	98	Long Island	63
5-IL-FG	Moderate	340	570	ND	33	Chicago/ Northern Indiana	70
44-VA-FG	Moderate	630	ND	ND	83	Washington, D.C.	64
39-NJ-ST	Moderate	1200	83	ND	76	Southeast PA	67
2-IL-FG	Moderate	2700	140	ND	83	Chicago/ Northern Indiana	70
3-IL-ST	Severe	ND	960	ND	59	Chicago/ Northern Indiana	70
6-IN-ST	Severe	ND	1500	ND	80	Chicago/ Northern Indiana	70

UST System ID	Corrosion Class	Acetic Acid	Formic Acid	Propionic Acid	Average Relative Humidity in Tank (%)	Cluster Location Designation*	Cluster Location Annual Average Ambient Relative Humidity (%)**
		(ppbv)					
9-IN-FG	Severe	15	270	ND	74	Chicago/ Northern Indiana	70
24-CO-ST	Severe	21	300	ND	72	Denver	52
26-CO-FG	Severe	28	ND	ND	35	Denver	52
30-CA-FG	Severe	62	96	1.4	61	San Francisco	74
33-NY-FG	Severe	81	330	8	83	Long Island	63
7-IN-ST	Severe	150	1700	ND	86	Ft. Wayne	79***
15-LA-FG	Severe	220	70	ND	95	Louisiana	76
36-NY-ST	Severe	230	620	1.2	77	Long Island	63
32-NY-FG	Severe	400	150	5.5	68	Long Island	63
11-KS-FG	Severe	990	300	ND	79	Kansas City	68
43-MD-ST	Severe	1000	140	3.8	66	Washington, D.C.	64
16-TN-FG	Severe	1100	65	ND	67	Knoxville	76***
28-CA-ST	Severe	1900	69	ND	56	San Francisco	74
47-LA-FG	Severe	2500	ND	ND	61	Louisiana	76
35-NY-FG	Severe	2600	110	ND	72	San Francisco	74
13-LA-FG	Severe	6200	ND	ND	84	Louisiana	76

ND = not detected at approximate MRL of 0.5 ppbv
* Weather data for cluster location based on the following cities (Cluster name - city used for weather data): Louisiana - New Orleans, LA; Washington, D.C. - Washington, D.C.; San Francisco - San Francisco, CA; Denver - Denver, CO; Southeast PA - Philadelphia, PA; Ft. Wayne - Ft. Wayne, IN; Knoxville - Knoxville, TN; Chicago/Northern Indiana - Chicago, IL; Long Island - New York, NY; Kansas City - Kansas City, MO.
**Data obtained from http://www.currentresults.com/Weather/US/humidity-city-annual.php unless otherwise noted.
*** Data obtained from http://www.usa.com/.

C. Aqueous Phase Analytical Testing And Results

EPA sampled aqueous phase per the QAPP at 11 of the 42 USTs inspected. Samples were analyzed by the methods presented in Table 2 and a subset of results is presented in Table 5. The aqueous phase analyses focused on identification of acids that were hypothesized in previous research to result from MIC and other water quality factors that may influence corrosion development. These methods included analysis for low molecular weight acids, glycerin, cations and anions, pH, conductivity, and nonhalogenated organics, in particular ethanol and methanol.

Acetic, formic, and propionic acids were identified in the majority of water samples analyzed. Acetic acid was measured in all 11 samples, ranging from 7 ppm to about 27,000 ppm. Formic acid was found in 10 of the 11 samples, ranging from 1.3 to 269 ppm. Lactic and propionic acids, both less likely to be measured in vapor due to their heavier vapor pressures, were detectable in most of the water samples. Lactic acid was found in nine samples at concentrations up to 1,900 ppm, and propionic acid was measured in seven samples up to 480

ppm. The water samples were also analyzed for ethanol and methanol content. All of the samples had measurable ethanol concentrations that ranged from 210 to 71,000 ppm. Methanol was measured in eight of the 11 samples from 33 to 3,200 ppm. Glycerol was measured in five of the samples as high as 18,322 ppm. pH measurements were acidic, ranging from 3.4 to 6.2.

Unfortunately, we did not have information available about the tilt of the tank or location of the lowest point in the tank. As a result, we may not have been sampling at the lowest point where water would collect. This is of note because UST management best practices suggest water levels should always be maintained as low as possible, so a well-maintained tank may not have water in one end of the tank because of the tilt. Despite not knowing where the water was located in the tanks, we were still successful at gathering the required volume of water for sample collection from 11 of the USTs.

D. Fuel Analytical Testing And Results

EPA analyzed fuel samples according to the methods presented in Table 2; Table 6 summarizes some fuel variables of note for our research. The fuel analyses focused on characterizing diesel fuel properties that may be affected by the presence of corrosion or contribute to or signal the presence of corrosion. In addition, we used a broad screening for identification of unknown chemicals.

The density, flashpoint, and sulfur concentrations were all within the expected ranges for all fuel samples. All conductivity results were above the minimum level of 25 picosiemens per meter (pS/m).[27] A qualitative full-scan analysis did not identify short-chain fatty acids or methanol. Water content of the fuel was above the benchmark of 200 milligrams per kilogram (mg/kg) in 10 percent of the samples.[28]

Biodiesel was identified in 70 percent – or 29 out of 42 – of the samples, with one sample (5-IL-FG) appreciably higher than the 5 percent allowable limit according to the ASTM D975 standard, measuring at 11 percent biodiesel. Free glycerin was measured in five samples, and all five results were at levels equal to or greater than the maximum amount of 0.001 percent when using 5 percent of the B100 D6751 standard of 0.02 percent. Even though 70 percent of fuel contained biodiesel, less than half – or 20 out of 42 – had a measurable total glycerin. Only two of those were over the maximum limit of 0.012 percent, when compared to 5 percent of the D6751 standard at 0.24 percent. Similarly without a standard, the TAN allowable for the B100 is 0.50 mg KOH/g, meaning an expected level in diesel samples should be no more than 0.025 mg KOH/g; however, 16 samples exceeded this value. These comparisons to D6751 provide a bench mark for what could be expected when assuming that any glycerin or acid measured was due to the biodiesel blending. Knowing there are acids in the vapor and aqueous phases, these glycerin and TAN levels may be elevated from another source, like microbial byproducts. In addition, there were three instances where the free glycerin result was higher than the total glycerin result. These results may have been affected by water that was entrained in the fuel during sampling but separated into an aqueous phase containing some glycerin before analysis. The results could have also been affected by systemic variation of the analysis method, since the results were close to each other.

Ninety percent, or 37 out of 41, of the National Association of Corrosion Engineers (NACE) International corrosivity tests of the fuel reported 0 percent corrosion observed on the testing material surface, which equals an A rating.[29] One NACE result was not available from the 42 USTs because the sample was lost in transport. The NACE test results for the other four available samples received the worst rating of E, meaning greater than 75 percent corrosion coverage on the testing material surface; having no ratings in between the A and E results is an interesting result. Possibly confounding the NACE result was that one of the four fuel samples receiving an E rating was collected from an UST categorized as having minimal corrosion. This is very possible because the NACE test is performed on a sample in a lab as a measure of the corrosivity only of the fuel that was gathered at the time of sampling, and is not a measurement of all conditions inside of an UST that could lead to corrosion of internal metal components. Even if this instance of highly corrosive fuel coming from a minimally corroded UST is accurate, the uniformity of the NACE fuel corrosivity test results on both extremes appears suspect, suggesting it may not have been performed correctly. However, this does not affect our research results because the key findings relate to general trends of corrosion observations and the search for predictive factors, none of which were found with any statistical significance.

Contaminants Identified In Fuel Samples

The most notable observation from the fuel analyses is contamination in the form of particulates, ethanol, and possibly gasoline, which is identified as gas contamination C4-C8 in Table 6 in the report and Table B-5 in Supplement B. We observed contamination from ethanol at high occurrences. The results of the qualitative gas chromatography-mass spectrometry (GC-MS) full scan for unknown chemicals of interest found ethanol was present in 90 percent – or 38 out of 42 – of the samples. The test also identified C4-C8 carbon chains in all of the fuel samples. We performed this test with the intention of identifying any gasoline contamination, but now understand that C-8 carbon chains could possibly be present from allowable sources in the fuel, such as biodiesel, and not only gasoline. We cannot therefore definitively say if gasoline was the source of the C4-C8 findings in 100 percent of the samples. Fuel particulate results are generally accepted by the industry under 10 milligrams per liter (mg/L); however, 40 percent – or 17 out of 42 – of the samples were above this threshold, with five of the results well over 100 mg/L.[30, 31]

Table 5. Aqueous Phase Results In Order Of Corrosion Classification And Increasing Acetic Acid Concentration

UST system ID	Corrosion Class	pH	Conductivity (µS/cm)	Ethanol (ppm)	Methanol (ppm)	Acetic Acid (ppm)	Formic Acid (ppm)	Propionic Acid (ppm)	Lactic Acid (ppm)	Glycerin (ppm)
45-VA-FG	Minimal	3.37	4,450	320	33	5,421	19.1	<0.26	80.0	2,183
48-CO-FG	Minimal	4.55	6,470	4,800	3,200	25,157	196	<0.26	1,915	2,590
37-NY-ST	Moderate	4.14	3,700	210	140	6.98	<0.14	<0.14	0.70	<0.006
18-TN-ST	Moderate	6.24	5,280	71,000	ND	1,517	54.3	481	38.2	<0.50
2-IL-FG	Moderate	4.07	2,670	4,100	100	13,003	43.4	12.5	28.1	<0.10
44-VA-FG	Moderate	3.86	6,180	5,100	440	17,684	106	2.40	599	18,322
6-IN-ST	Severe	4.86	2,540	230	ND	3,745	269	32.1	<2.56	<0.25
13-LA-FG	Severe	4.14	1,010	8,400	110	8,790	1.29	11.0	17.4	<0.025
7-IN-ST	Severe	5.04	7,530	4,100	ND	19,078	123	22.6	<2.53	<0.10
26-CO-FG	Severe	4.49	8,610	2,000	2,400	19,919	67.0	<0.26	1,464	2,399
35-NY-FG*	Severe	5.43	6,390	5,700	650	26,971	73.9	4.08	345	496

µS/cm – microsiemens per centimeter
ND – not detected
*Not enough sample volume to collect filtered water sample.

Table 6. Fuel Results In Order Of Corrosion Classification And Increasing Particulate Contamination

UST System ID	Corrosion Class	Particulates (mg/L)	TAN (mg KOH/g)	NACE* (Rating)	Water Content (ppm)	Aqueous phase Presence	Biodiesel Content (%)	Free Glycerin (wt. %)	Total Glycerin (wt. %)	Ethanol Presence	Gas Contamination (C4-C8)
Standard		**< 10[32, 33]**	**0.025[34]**	**A[35]**	**< 200[36]**		**5[37]**	**0.001[38]**	**0.012[39]**	**Not Expected**	**Not Expected**
42-PA-ST	Minimal	3.2	0.03	A	48		2.7	<LOQ	0.002	x	x
29-CA-FG	Minimal	3.6	0.03	A	62		3.5	<LOQ	0.003	x	x
31-CA-ST	Minimal	4.0	0.00	A	46		0.6	<LOQ	<LOQ	x	x
14-LA-ST	Minimal	4.8	0.01	A	63		0.0	<LOQ	<LOQ	x	x
45-VA-FG	Minimal	5.2	0.01	A	76	x	0.1	<LOQ	<LOQ	x	x
22-CO-FG	Minimal	6.8	0.01	A	67		2.0	<LOQ	0.001	x	x
48-CO-FG	Minimal	103	0.28	E	322	x	2.0	0.068	0.109	x	x
5-IL-FG	Moderate	3.6	0.02	A	83		11	<LOQ	0.004	x	x
39-NJ-ST	Moderate	4.4	0.00	A	41		0.98	<LOQ	<LOQ	x	x
23-CO-FG	Moderate	4.8	0.01	A	50		2.3	<LOQ	0.001	x	x
1-IL-FG	Moderate	5.2	0.01	A	76		4.9	<LOQ	<LOQ	x	x
49-NY-ST	Moderate	5.2	0.04	A	73		5.1	<LOQ	0.002	x	x
17-TN-FG	Moderate	5.6	0.01	A	16		0.0	<LOQ	<LOQ	x	x
34-NY-ST	Moderate	5.6	0.03	A	74		5.1	<LOQ	0.006	x	x
18-TN-ST	Moderate	6.0	0.00	A	26	x	0.0	<LOQ	<LOQ	x	x
12-MO-FG	Moderate	6.8	0.01	A	58		4.5	<LOQ	0.005	x	x
27-CA-ST	Moderate	8.0	0.04	A	58		2.1	<LOQ	0.001	x	x
8-IN-FG	Moderate	9.6	0.02	A	40		0.0	<LOQ	<LOQ	x	x
10-MO-FG	Moderate	13	0.01	A	172		4.4	0.028	0.021	x	x
40-PA-ST	Moderate	13	0.02	A	218		2.4	<LOQ	0.002		x
2-IL-FG	Moderate	17	0.01	A	78	x	0.0	<LOQ	<LOQ	x	x
44-VA-FG	Moderate	52	0.03	E	72	x	0.3	0.004	0.001	x	x
37-NY-ST	Moderate	63	0.01	A	154	x	1.2	<LOQ	<LOQ		x
46-IL-ST	Moderate	85	0.00	A	32		0.7	<LOQ	<LOQ	x	x
36-NY-ST	Severe	2.0	0.01	A	41		0.1	<LOQ	<LOQ	x	x
15-LA-FG	Severe	5.6	0.01	A	66		0.0	<LOQ	<LOQ	x	x

Table 6. Fuel Results In Order Of Corrosion Classification And Increasing Particulate Contamination (Continued)

UST System ID	Corrosion Class	Particulates (mg/L)	TAN (mg KOH/g)	NACE* (Rating)	Water Content (ppm)	Aqueous phase Presence	Biodiesel Content (%)	Free Glycerin (wt. %)	Total Glycerin (wt. %)	Ethanol Presence	Gas Contamination (C4-C8)
Standard		**< 10[40,41]**	**0.025[42]**	**A[43]**	**< 200[44]**		**5[45]**	**0.001[46]**	**0.012[47]**	**Not Expected**	**Not Expected**
43-MD-ST	Severe	5.6	0.00	NA	41		0.0	<LOQ	<LOQ	x	x
13-LA-FG	Severe	6.4	0.02	A	81	x	0.0	<LOQ	<LOQ	x	x
47-LA-FG	Severe	8.4	0.03	A	58		1.7	<LOQ	0.003	x	x
33-NY-FG	Severe	9.2	0.04	A	84		5.3	<LOQ	0.003	x	x
7-IN-ST	Severe	9.6	0.01	A	68	x	0.0	<LOQ	<LOQ	x	x
16-TN-FG	Severe	10	0.02	A	50		0.0	<LOQ	<LOQ	x	x
3-IL-ST	Severe	11	0.03	A	38		0.0	<LOQ	<LOQ	x	x
32-NY-FG	Severe	11	0.04	A	96		5.2	<LOQ	0.003	x	x
30-CA-FG	Severe	12	0.02	A	94		3.3	<LOQ	0.002		x
6-IN-ST	Severe	19	0.04	A	105	x	0.0	<LOQ	<LOQ	x	x
35-NY-FG	Severe	41	0.36	A	186	x	3.4	<LOQ	0.003	x	x
26-CO-FG	Severe	78	0.03	A	134	x	0.9	<LOQ	<LOQ	x	x
28-CA-ST	Severe	112	0.03	E	107		0.8	<LOQ	<LOQ	x	x
11-KS-FG	Severe	158	0.06	A	127		4.3	0.001	0.006		x
9-IN-FG	Severe	286	0.04	A	202		0.0	<LOQ	<LOQ	x	x
24-CO-ST	Severe	294	0.02	E	264		2.1	0.008	0.006	x	x

*The NACE rating corresponds to the percent of the test surface corroded in the laboratory (A = 0%, B++ = less than 0.1%, B+ = less than 5%, B = 5-25%, C = 25 – 50%, D = 50-75%, E = 75 – 100%)
mg/L – milligrams per liter
NA – not available; samples lost in transport.
Blank space – not present
LOQ – limit of quantitation

Since ethanol is routinely blended at 10 percent in gasoline, identifying in diesel tanks high occurrences of contamination of both ethanol and possible gasoline, represented by C4-C8 carbon chains, suggests these contaminants could be present because the diesel was delivered in trucks that previously shipped gasoline. Shipping multiple fuels in the same truck is referred to as transport switch loading. Ethanol generally is not transported in pipelines and is almost exclusively transported by trains or transport trucks to the blending terminals and blended with gasoline in trucks for distribution. The contamination attributed to switch loading occurs when gasoline is not completely removed between loads due to incomplete emptying or residual gasoline on the tanker walls due to surface tension. Switch loading may be the main source of the ethanol contamination measured in the samples; however, the presence of ethanol could also be attributed to or partially attributed to other unknown sources, such as shared venting from neighboring tanks, proprietary additives, or other unidentified sources.

EPA compared the fuel sample results to a variety of specifications and guidelines, including ASTM D975, ASTM D6751, NACE corrosion ratings, and CRC fuel selection guidelines.[48,49,50,51] ASTM D975 and ASTM 6751 standard specifications were developed to help ensure these fuels are fit for use at the point of production, but these specifications do not guarantee that contamination will not occur downstream of the production facility during transport or storage. These guidelines and specifications cannot individually guarantee that the fuel dispensed is fit for use when it leaves the UST. By comparing each of the fuel samples collected to all of these fuel criteria, EPA tried to determine a better overall picture of the quality of the fuel mixtures being stored in the sample population USTs. When we assessed the fuel samples by looking at all the criteria together, the results were mixed; 90 percent or more of the fuel samples met the ASTM D975 criteria examined, while only 62 percent met the proportional TAN limit if using 5 percent of the maximum limit per D6751. Only 62 percent passed the CRC protocol for particulate. Fuel quality is usually verified against standards at various points in the production and distribution chain; however, by the time fuel reaches the final UST destination, fuel quality may be degraded or may become degraded by poor conditions in the UST. Our research results indicate that the fuel quality, including water or contaminants present in the UST, is moderate at best in the sample population.

Overall, the diesel fuel stored in the USTs in our research appears to meet the requirements for D975. Fuel filters are designed to remove most of the particulate contaminants found in fuel. However, water collecting at the bottom of the tank and the condition of the tank and equipment could also influence the quality of fuel stored. Additionally, water may not be caught in the filter. Excessive water in an UST system could be pumped up and dispensed with the fuel. Water-stopping filters are available to owners of USTs, but cost more than filters that do not stop water. The presence of contaminants and acids in all aqueous phase samples indicates that the fuel and water mixture stored in USTs may not meet all standard specifications required for fuel further upstream.

If a fueling mixture including water, contaminants, or acids is dispensed into vehicles, it could cause performance problems for end users of the fuel. This assumption is supported by reports of severely corroded vehicle fuel system parts. Automakers have found formic and acetic acids in fuel obtained from the dispensers at filling stations, in residual fuel from vehicle fuel tanks, and absorbed by vehicles' organic tank inner coating.[52]

Chapter 4
Statistical Analysis Procedure And Results

EPA's research was primarily exploratory in nature and sought to determine the most likely connections between predictor variables and UST corrosion severity, as well as if those connections would be strong enough to be predictive or show causation. Overall, none of the variables is considered statistically significant to predict with certainty when severe corrosion will be present. However, variables that were the closest to being significant predictors were particulates in the fuel and entrained water content in the fuel, which is different from aqueous phase presence on the bottom of the UST. These do not necessarily suggest causation, but may be areas for further investigation.

Supplement D presents full descriptions of all variables collected, the assessed corrosion coverage category, which is considered as the main outcome of interest, and all others as potential explanatory variables. Continuous-scale variables such as acid concentrations, descriptive statistics such as the mean, standard deviation, minimum, maximum and the 10^{th}, 25^{th}, 75^{th}, and 90^{th} percentiles, as well as counts of missing and non-missing measurements, are also provided in Supplement D.

For variable classification and prediction accuracy, the machine-learning technique known as random forest classification is considered one of the best available methods, as shown recently by Fernandez-Delgado et al.[53] It also is particularly well suited to situations with more variables than data points. With a random forest classification for corrosion category, two associated measures of variable importance were calculated for prediction for all variables: the mean decrease in accuracy and the mean decrease in Gini index, which is a measure of homogeneity with respect to corrosion category. Each of the 10,000 trees generated for the forest is fit on a bootstrap sample of approximately two-thirds of the UST systems. The predictive accuracy is then estimated by using the tree to classify the corrosion category for the UST systems not used in the current fit, referred to as out-of-bag (OOB) estimates, and comparing them with their true corrosion category. The mean decrease in accuracy measure is computed by randomly rearranging the values of the OOB UST systems and comparing the number of UST systems correctly classified with the true corrosion category. Thus, those variables with a higher mean decrease in accuracy over all the trees are more important for prediction. Alternatively, the mean decrease in Gini index gives an estimate of how homogeneous the partitions of the data become when using that variable to make decision rules that define the tree structure. While this does not provide an estimate of the variable's direction of effect, both measures quantify how important a particular variable is for classification and prediction accuracy. We provide the results of these analyses for corrosion classified as minimal, moderate, or severe, as well as combined categories of only minimal versus moderate plus severe.

In another supporting analysis, univariate analyses are presented by examining how well corrosion is predicted by each variable on its own. Corrosion is assessed by a three-category ordered scale, so the natural, parametric model to use is proportional odds logistic regression. Due to the limited number of tanks sampled in comparison to the number of explanatory variables that can be used for analysis, the quantitative results of statistical significance presented

as p-values serve as a general guide to the most likely indicators of corrosion examined in our research. These analyses provide intuition for expected marginal effects. Similarly, we provide the ordered p-values from the logistic regressions with corrosion classification further combined to minimal versus moderate plus severe.

The results of the two measures of variable importance, the mean decrease in accuracy and the mean decrease in Gini index, are presented in Figures 10 and 11. Variables with scores farther right on the horizontal axes are more important for predictive accuracy in terms of the given criteria. Overall, when evaluating all three corrosion categories, the model does reasonably well at prediction with an OOB estimate of the error rate of 52.38 percent. The sulfur and particulate measures from the fuel are deemed more important across the two importance measures. Variable names include a description and a letter at the end. These letters refer to the variable type, identifying explanatory variables without a letter and continuous-scale variables by sample type of fuel (f) or vapor (v).

When evaluating minimal corrosion against moderate and severe together, the OOB estimate of error rate associated with Figure 11 is 19.05 percent. For the dichotomous corrosion outcome, particulate measurement from the fuel is the one covariate singled out across both importance scores. The random forest does better at the OOB error rate, but does so by classifying all but one UST system as corroded. But, because the random forest model for the combined corrosion classification does not have good discriminatory ability on its own, its value is to again find that the particulate measurement from the fuel is the one most associated with a corrosion classification. The marginal p-value ranking from the ordered logistic regression is presented in Table 7, with smaller p-values providing a higher ranking of variable significance in predicting corrosion category. In the proportional odds logistic model, the conditional odds of going from the lower to higher corrosion category on the three-category scale are the same from minimal to moderate or severe and from minimal or moderate to severe. A positive log odds estimate means that a higher value for the relevant variable is associated with increased odds of having a more severe corrosion classification.

Statistical Analysis Results

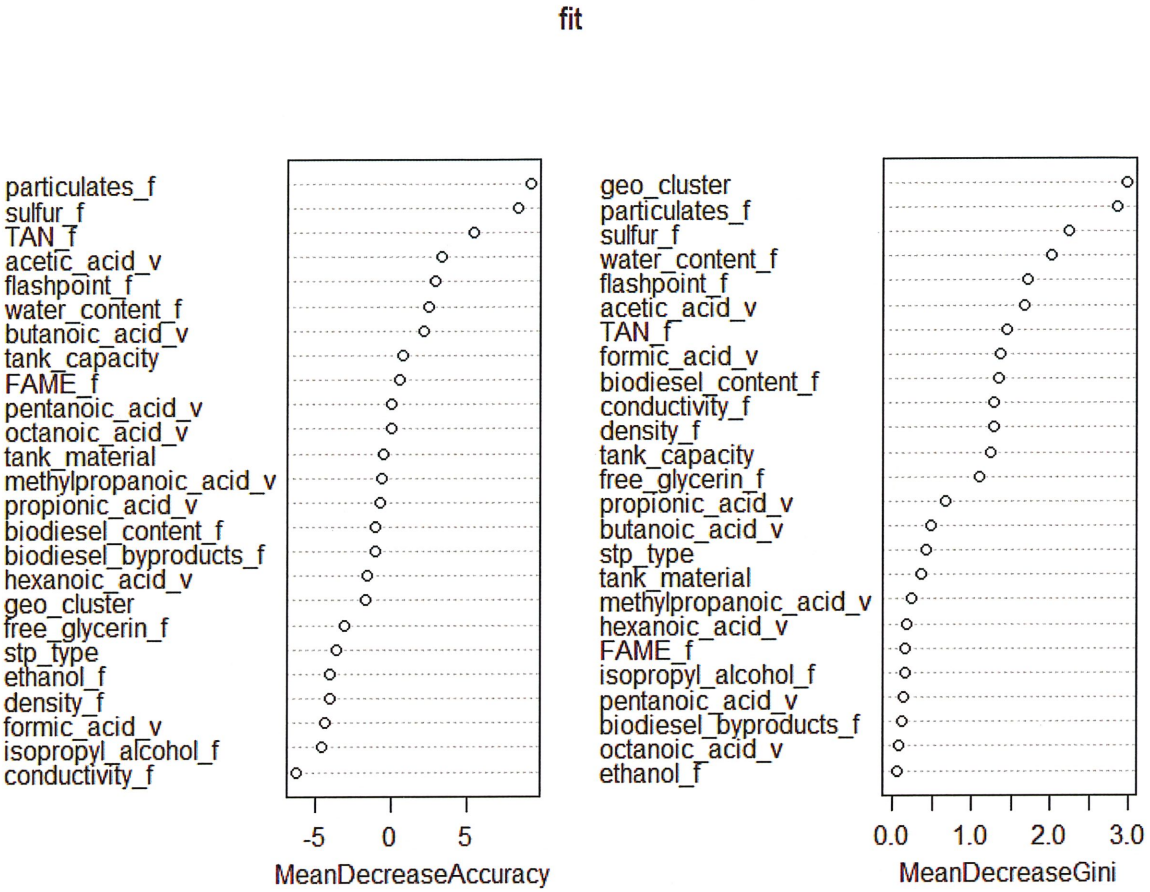
Overall, due to the complexity of the processes at play, none of the findings is statistically significant to identify a definitive predictor of factors leading to the corrosion. We did not find a statistical significance with respect to tank age, size, material, geographic location, or owner. Many variables are interrelated and represent various portions of an ongoing process. No statistical significance was found in having or not having an aqueous phase, although as discussed earlier, we acknowledge that we expected water to be present in a larger percentage of the tanks than in the 26 percent where samples were collected; we do not know if a larger sample size may have yielded a different result.

None of the variables is considered statistically significant to predict with certainty when severe corrosion will be present. However, these variables were the closest to being significant: water content in the fuel, which is different from aqueous phase presence, and fuel particulates, with the particulates measurement being one of the more significant variables. A high

measurement on the random forest analyses combined with a positive log-odds coefficient is associated with higher odds of having a more severe corrosion assessment.

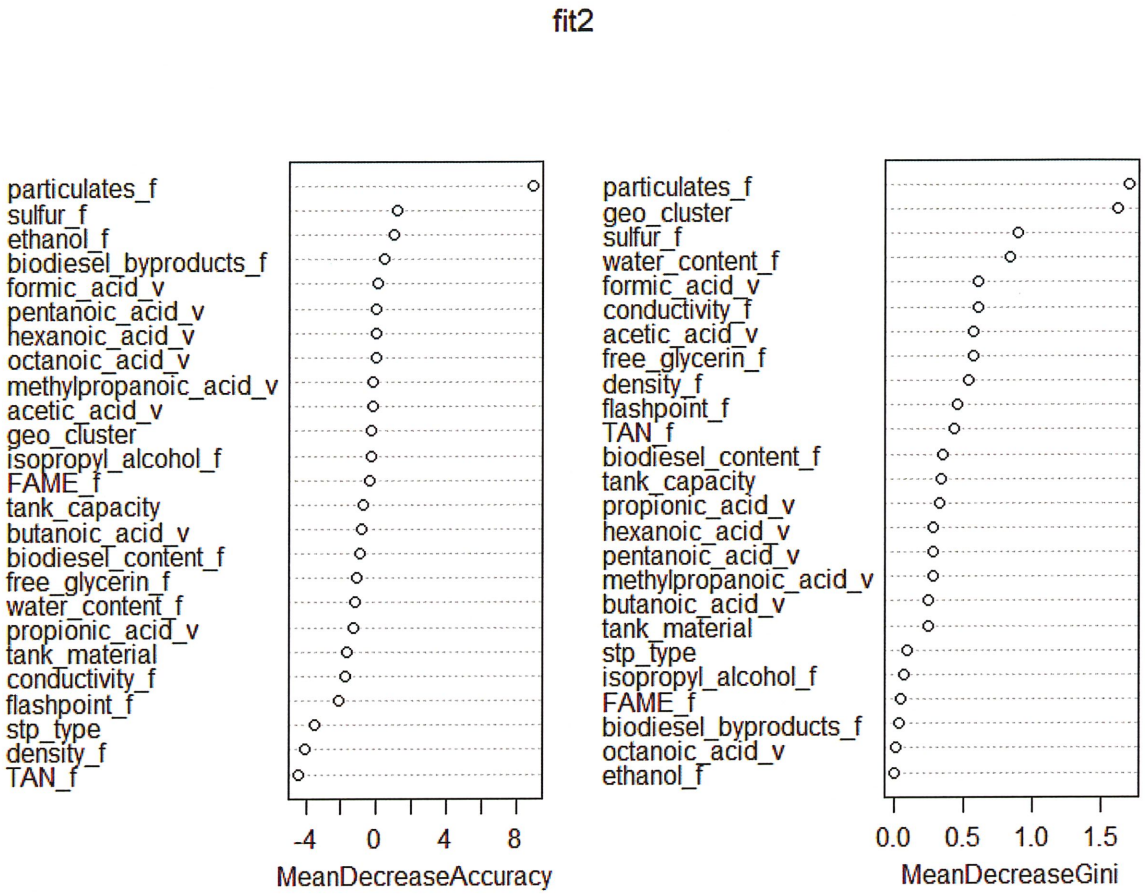
While tank capacity is not ranked highly in terms of variable importance scores from the random forest model analyses, when entered as a categorical covariate with eight levels representing different sizes of tanks, tank capacity is close to significant at 0.059, which is just outside the 0.05 significance level. However, the p-values for each individual level are all greater than 0.16 with large standard errors due to the small cell sizes in each. As a continuous covariate, it is also not significant with a p-value of 0.445 from the ordered logistic regression model.

We completed the same analytical approach when the data set included a throughput variable but was restricted to the 26 UST systems with throughput data available. The OOB estimate of error rate is 57.69 percent. This does a reasonably better job than chance at predictive accuracy and again finds particulates and water content near the top of the variable importance scores, with acetic acid measurements from vapor the third most important by both criteria. The results of the variable importance results and the univariate, ordered logistic regression are presented in Supplement D.



Corrosion Class	Predicted Class			Error In Predicting Class
	Minimal	Moderate	Severe	
Minimal	0	3	4	1
Moderate	2	9	6	0.471
Severe	0	7	11	0.389

Figure 10. Random Forest Analysis And OOB Accuracy Assessment Results Of Each Variable Evaluated Individually According To Three Corrosion Categories



Corrosion Class	Predicted Class		Error In Predicting Class
	Minimal	Moderate + Severe	
Minimal	0	7	1
Moderate + Severe	1	34	0.03

Figure 11. Random Forest Analysis And OOB Accuracy Assessment Results Of Each Variable Evaluated Individually According To Minimal And Moderate + Severe Categories

Table 7. P-Value Rankings From The Ordered Logistic Regression For The Variables For All 42 USTs

Variable	P-Value	Log Odds Estimate
tank capacity	0.059	NA
particulates_f	0.103	0.0125
free_glycerin_f	0.132	-0.0051
acetic_acid_v	0.133	0.0006
hexanoic_acid_v	0.134	-2.436
total_glycerin_f	0.242	-0.0045
owner	0.279	NA
biodiesel_byproducts_f	0.328	-0.5739
methylpropanoic_acid_v	0.353	-0.2700
stp_type	0.464	NA
water_content_f	0.516	0.0033
biodiesel_content_f	0.532	-0.0727
ethanol_f	0.562	-0.5635
formic_acid_v	0.564	0.0004
sulfur_f	0.571	-0.0759
butanoic_acid_v	0.643	0.1226
propionic_acid_v	0.653	0.0808
octanoic_acid_v	0.670	-0.8899
TAN_f	0.676	2.234
isopropyl_alcohol_f	0.728	-0.2033
geo_cluster	0.751	NA
conductivity_f	0.760	0.0004
density_f	0.792	-8.672
tank_material	0.882	NA
FAME_f	0.889	-0.0819
NACE_f	0.919	NA
flashpoint_f	0.990	-0.0008
pentanoic_acid_v	0.991	-16.42

NA - Not Applicable

Total Acidic Hydrogen Analysis

In an alternate statistical analytical approach, we used the total acidic hydrogen in micromoles per liter, which is designated as AcidH_mml in the analysis, as an outcome measure with corrosion category as the predictor in an ANOVA. Since this quantity is a concentration, it was first log-transformed to better satisfy the normality and constant variance assumptions of the ANOVA model. Indeed, after examining the normal probability, quantile plots, residuals, and Bartlett's test for equal variances from the natural scale analysis, these assumptions were not satisfied. The probability and quantile plots showed deviations from normality near the center and tail of the distribution, and the residual plots and Bartlett's test ($p=0.01$) showed evidence of a lack of constant variance across corrosion categories. These discrepancies were

all alleviated after transforming to the log scale. The ANOVA results in Table 8 give an overall F-test p-value of 0.13, and the resulting contrasts and confidence intervals are also presented, along with the natural scale ratio of geometric means and associated 95 percent confidence intervals.

The variable importance plots in Figure 12 show that when included with the other variables considered, total acidic hydrogen ranks near the top in terms of value for classification. However, we did not perform a test to identify which, if any, of the acids is most significant of the total acidic hydrogen.

Table 8. Statistical Results Acidic Hydrogen Using ANOVA

Source	SS	df	MS	F	Probability > F
Between groups	6.753	2	3.377	2.14	0.1314
Within groups	61.57	39	1.579		
Total	68.33	41	1.666		

Log Scale Contrast And Confidence Interval (CI)					Natural Scale Contrast And CI For Ratio		
Corrosion Class	**Contrast**	**Std. Error**	**Scheffe 95% CI**		**Contrast Ratio**	**Scheffe 95% CI**	
Moderate vs minimal	0.1968	0.5643	-1.239	1.633	1.218	0.2896	5.118
Severe vs minimal	0.9381	0.5597	-0.4862	2.362	2.555	0.6150	10.62
Severe vs moderate	0.7413	0.4249	-0.3402	1.823	2.099	0.7117	6.188

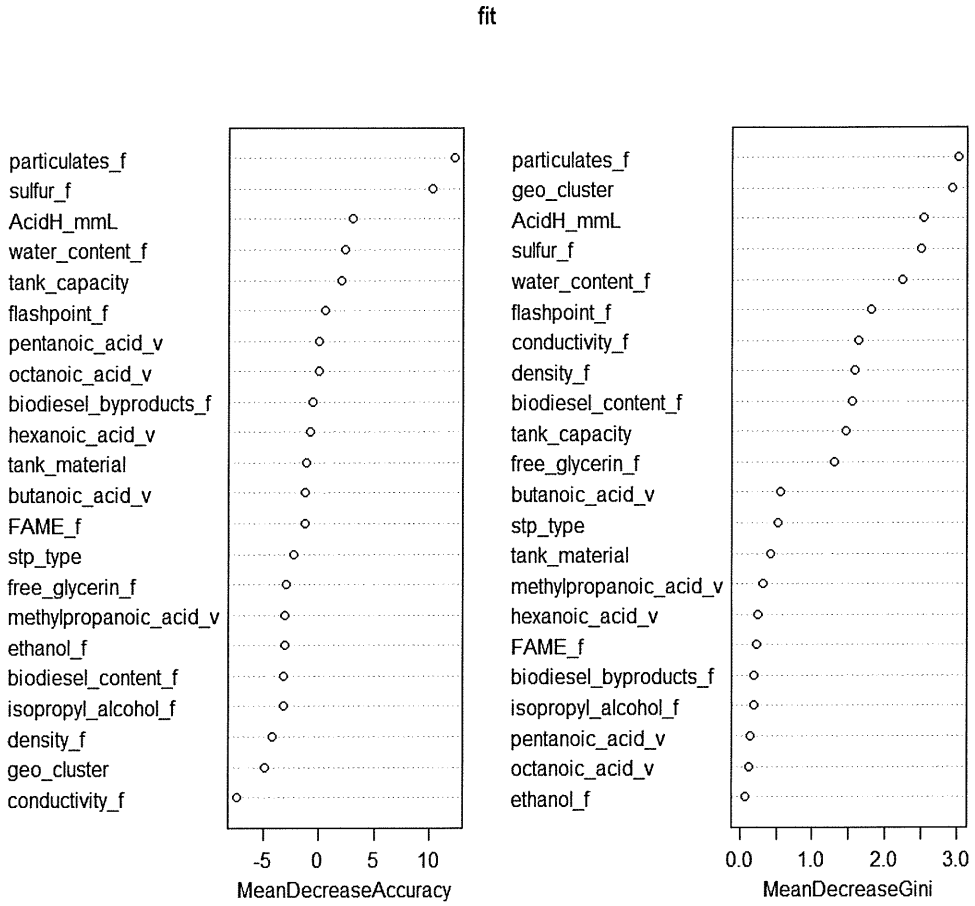


Figure 12. Random Forest Analysis Results Of Each Variable Evaluated Individually According To Three Corrosion Categories And Including The Acidic Hydrogen Variable

Chapter 5
Discussion Of Results

I. Corrosion Process

Metal corrosion is almost always caused by an electrochemical reaction. An electrochemical reaction is defined as a chemical reaction involving the transfer of electrons. During that transfer, there is a simultaneous oxidation reaction, which is also called an anodic reaction, and reduction reaction, which is also called a cathodic reaction. Electrons are produced in an anodic reaction and are consumed in a cathodic reaction. The number of electrons produced and consumed in any reaction must always be equal to maintain charge balance.

Corrosion is categorized as MIC when metals deteriorate due to the metabolic activities of microorganisms enhancing or accelerating the corrosion reaction. In the MIC process, any bacteria present do not directly participate in the electrochemical reaction—hence the term microbiologically influenced corrosion. In our research and the underlying assumptions, the role of MIC was assumed based on prevailing theories and previous research. The results of our research could not rule out MIC under the previously suggested hypotheses as a factor in the corrosion. However, in our research we did not perform a microbiological analysis that could prove bacterial contributions to corrosion.

In order to understand why corrosion is occurring in a specific environment, such as an UST system storing diesel fuel, we need to understand the relationships of the factors involved in the corrosion processes. One factor needed for corrosion in liquids and vapor phases is the presence of an electrolyte, which is defined as a substance in solution that conducts ions. It is the transfer of ions that participates in aqueous corrosion reactions. The higher the concentration of ions, the higher the conductivity of the solution, which can determine the limits of the corrosion rate. Specifically, corrosion-inducing factors for UST equipment include the following:

- a surface that is susceptible to corrosion, such as UST equipment,
- an electrolyte from chemical or biological processes,
- a distribution mechanism for the electrolyte to be transferred to the surface, and
- the pH of the aqueous component of the electrolyte.

Susceptible Surface

Equipment parts used in the UST are made from a variety of materials such as polymers and other metals. One of the key observations used in our research was the relative corrosion seen on the STP shaft within the UST. There are a couple of different vendors for these pumps, but they use several common metals and polymers in their materials of construction, including cast aluminum, wrought aluminum, brass, steel, grey cast iron, black steel pipe, and stainless steel such as Type 304. The polymers include Buna-N, Viton, and polyoxymethylene (POM).

Each of the metals comprising UST system tanks and equipment has its own distinct electrochemistry and corrosion susceptibility, depending on the specifics of the environment.

Additionally, some components may receive nickel coatings for corrosion resistance, while others may be coated with various epoxy, enamels, varnish rust inhibitors, or lacquer topcoats.

Electrolyte

The ingredients for an aggressive electrolyte from either a chemical or biological process exist within the UST systems inspected for our research. Specifically, available water, oxygen, and acids can create an environment that we expect would have the potential to attack most of the metals used in USTs. Water can be present in the vapor or condensed as a liquid along with other fuel or contaminant components on the inner walls of the UST, entrained in the diesel, or collected at the bottom of USTs. Minimizing water presence is and has always been an important part of UST maintenance. However, diesel blended with biodiesel can hold in solution more water than diesel without a biodiesel component. This means more water is likely arriving in USTs entrained in fuel today since biodiesel is more common in diesel than prior to 2007.

Oxygen is readily available from the atmosphere since diesel tanks are vented to the atmosphere. When fuel is delivered, the entire contents of the tank, both liquid and vapor, are disturbed and the contents of the vapor space are pushed into the environment. When fuel is dispensed, fresh air is pulled into the tank. In an UST, intake of ambient air can result in the vapor space above the product level being very humid, with condensation often occurring.

The previous research efforts discussed earlier in this report suggest that moisture and oxygen rich environmental characteristics of an UST system can support the growth of microorganisms. In this process, microorganisms can influence corrosion in USTs by producing acids; several industry sources recommend limiting water and performing other actions to prevent or limit active microbial growth in order to minimize corrosion in USTs storing diesel. Whether present due to a biological or chemical process, acids were present in the vapor spaces of all of the 42 USTs systems inspected. Therefore, all three of the ingredients for an aggressive electrolyte were present in all of the 42 UST systems inspected. Other processes that cause corrosion could also be more impactful under these environmental conditions.

Distribution Of The Electrolyte

The distribution of the electrolyte and the mode of contact between a metal and its environment have direct bearing on corrosion development. For example, three distinct regions within the USTs are represented along the STP shaft: always in liquid, always in the vapor, and the intermediate region that is sometimes in the liquid and sometimes in the vapor space. Metals can be constantly exposed to water as a bulk liquid electrolyte or as thin electrolyte layers with wetting and drying cycles in the vapor space, depending on where they are located in the tank. The vapor space at the top of the tank theoretically does not see liquid fuel but exists at relatively high humidity and with condensation. The tank bottom is constantly submerged and may contain water that drops out of the diesel or water that enters the tank from ambient air intake and condenses on the walls of the UST. Finally, an intermediate region, which depends on the product level in the UST, can be either submerged or in the vapor space.

Each region experiences a different set of conditions that directly influence the type and extent of corrosion development. In the vapor space, corrosion could occur under thin electrolyte layers from a high relative humidity or from the condensate, readily available oxygen, and presence of acids in the vapor space. When the fuel level drops as fuel is dispensed, an intermediate region that was previously submerged in fuel effectively becomes exposed to conditions that simulate the vapor space (and to residue and contaminants in the fuel that may be left behind). In these regions that experience wetting and drying cycles, the variation in thickness of the electrolyte results in a change in the corrosion rate.[54] When we included in the analysis fuel throughput data available from 26 of the UST systems, no statistical significance was indicated for fuel throughput; however, the distribution of the low molecular weight acids and the mode of contact are mechanically dependent on how often the UST environment is disturbed by changes in fuel level through delivery or dispensing of fuel. These disturbances also allow for additional water, oxygen, and carbon sources to enter the UST in the new fuel or ambient air that is drawn in when fuel is dispensed. This continual resupply of ingredients necessary to some microbial life could enhance the rate of MIC or other corrosion mechanisms. While metals in those areas most often exposed to the vapor space of USTs appeared to be most susceptible to heavy corrosion, anecdotes suggest all of the metal equipment in all three regions of USTs are susceptible to corrosion when the right conditions are present. Such corrosion of any metal component in USTs could potentially lead to a failure of functionality of the equipment and an increased risk of release of fuel to the environment.

pH Of The Electrolyte

The pH of either the bulk liquid electrolyte or the thin electrolyte layers in the vapor space will also impact the degree of corrosion on various exposed UST equipment alloys. For example, for carbon steel such as the tank, the corrosion rate is relatively low in aqueous solution, around a couple of thousandths of an inch per year, when the pH is between 3 and 9; however, below 3 it dramatically increases, and above 9 the corrosion rate decreases. See Figure 13.[55] In the case of aluminum such as the drop tube, however, the corrosion rate in aqueous solution will increase below 4 and above 8.5, as illustrated by the Pourbaix diagram of electrochemical potential-pH equilibrium for corrosion susceptibility of aluminum; see Figure 14.[56]

The water pH may have contributed to corrosion reactions. In all tanks where we detected measurable water, the pH values were between 3.4 and 6.2, which are favorable values for the growth of some acid-generating microorganisms but not always indicative of corrosion as seen in Figures 13 and 14. The bacteria identified and hypothesized as the leading species in MIC in CDFA's 2012 study, *Acetobacter,* exhibit optimal growth under moderately acidic pH of 5.2 to 6.5 conditions and are capable of growth at pH 4.5.[57] The water in four of the five severely corroded tanks in our research had pH at or above 4.5; the fifth had a pH of 4.1. In contrast, water from five of the six minimally or moderately corroded tanks had pH at or below 4.5. The pH is an important indicator of the corrosivity of the electrolyte adjacent to a metal surface, but the presence of other contaminants that can allow corrosion to proceed at pH values normally not associated with susceptibility to corrosion is important.

The actual corrosion rate on a metal will also depend on other factors, mainly the presence or absence of oxygen and contaminants such as chlorides, sulfides, other chemicals, and particulates, which may be found in UST environments. These factors can disrupt protective films on the metal surface, thereby allowing corrosion reactions to proceed at intermediate pH values.

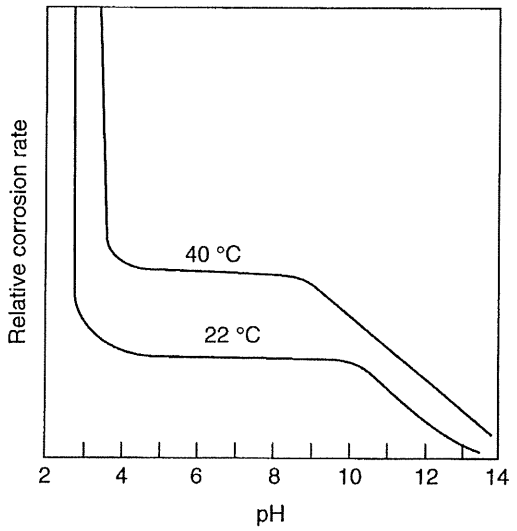


Figure 13. Relative Corrosion Rate Versus pH And Temperature Of Carbon Steel In Water[58]

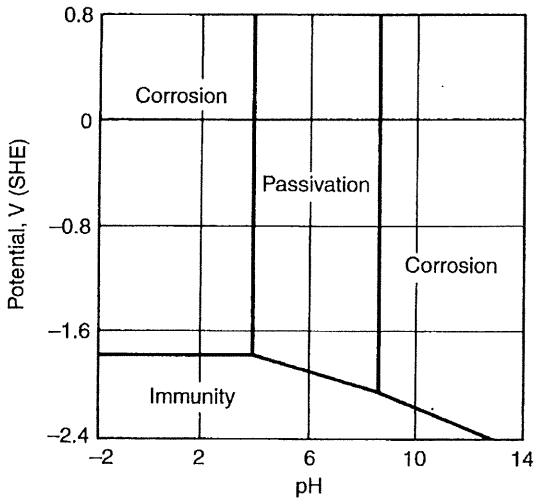


Figure 14. Potential Versus pH Equilibrium Diagram For Aluminum (vertical axis, standard hydrogen electrode (SHE); horizontal axis, pH)[59]

II. Feasibility Of Previous Hypotheses About Biofuels And MIC

Although no microbial analyses were performed in our research, the inspections and chemical examinations conducted as part of a search for predictive factors tested the feasibility of previously suggested hypotheses about MIC and biofuels. We evaluated observations and data from the UST sample population to identify if a suitable environment was available for microbial growth and if potential evidence of microbial metabolism pathways suggested by previous research could be identified or could be correlated with corrosion presence. The results cannot prove or disprove those theories of MIC in which microorganisms oxidize biofuel components found in diesel fuel.

For MIC to occur, the presence of water is required for microbial growth. An aqueous phase with sufficient water present to allow sampling for chemical analysis was collected from 11 tanks. We rated five out of 11 tanks from which water was collected as severely corroded. However, the statistical analysis did not determine that the presence of free water in the USTs corresponds with any particular corrosion rating. We observed dissolved water in fuel over the allowable standard specification limit in 10 percent of samples, although the water would likely need to separate from the fuel into an aqueous phase for most microorganisms to use it.

MIC typically occurs in two environments: aerobic and anaerobic. In aerobic environments, the corrosion reactions are electrochemical with multiple reactions that are mediated by many organisms. Localized ion concentration cells may form with aerobic biofilms, as well as concentrations of acid-producing bacteria. In aerobic environments, the biotic and abiotic corrosion processes enhance one another and are difficult to distinguish.[60] Another process in aerobic environments is tubercle formation, in which cathodic oxygen reduction occurs at the tubercle base and anodic iron dissolution occurs underneath the tubercle. Once initiated, tubercle formation results in sustained reducing conditions within the tubercle despite the overall aerobic environment.[61]

In anaerobic environments, MIC tends to be dominated by sulfate-reducing bacteria. Differential aeration cells form by oxygen depletion under microbial surface films.[62, 63] In adjacent aerobic environments, sulfur oxidizers such as *Thiobacilli* can convert hydrogen sulfide if present to corrosive sulfuric acid.[64]

An indication of MIC suggested by previous research was the presence in the aqueous phases of alcohols or certain acids, which would be consistent with bacterial oxidization of those alcohols. In our research, we found such acids in many tanks. All the aqueous phase samples had an acidic pH and all contained ethanol, as well as volatile low molecular weight organic acids. Previous research suggested these acids are likely contributing to a corrosive environment in the USTs.[65] For example, in UST system 18-TN-ST, ethanol was present in the water phase at a concentration of 7 percent. Ethanol is likely present from gasoline ethanol-blend contamination entering with the diesel fuel delivery or from diesel and gasoline USTs improperly manifolded together. Acetic acid can be generated directly from ethanol by acetic acid bacteria such as *Acetobacter.*[66] *Acetobacter* was the genus identified as most prevalent in the microbiological analyses in CDFA's 2012 study. In addition to ethanol, we identified glycerin in many of the tanks; glycerin can be fermented into propionic acid, glyceric acid, and other organic acids by acid-producing bacteria.[67, 68] Similarly, acetic acid, lactic acid, and formic

acid could be products of glycerol utilization for bacteria from the *Enterobacteriaceae* family.[69] Many other bacteria may also may thrive in UST environments and may also contribute to MIC.

Biodiesel in fuel is indicated by the presence of fatty acids of typically 16- and 18-carbon lengths and FAME characteristic of commonly used vegetable oil and animal feed stocks. As such, shorter-chain-length fatty acids such as those in our research are likely not an initial component of the biofuel. Free fatty acids can also represent the decomposition of FAME into its primary components by hydrolysis of the ester chemical bond. Hydrolysis of biodiesel occurs relatively slowly at neutral pH; however, it is catalyzed in the presence of acids, and the formation of acids further accelerates the decomposition reaction. Other residual constituents in biodiesel include mono-, di-, and triglycerides (more commonly referred to as animal or vegetable oils and fats), which also represent a source of glycerol in the form of glycerol esters as differentiated from free, unbound glycerol. Although there is an allowance within the specification for mono-, di-, and triglycerides, data indicate that the acidic environment in USTs may contribute to the glycerol concentration approaching and exceeding the specification.

As noted previously, the presence of glycerol in diesel can suggest a source of residual glycerin from the biodiesel component. Since ASTM 6584 allows for maximum concentrations of 0.02 percent free glycerol, and glycerol would selectively partition to the water phase of a biodiesel-water mixture, relatively high glycerol concentrations (for example, >2,000 ppm) in the water phase are theoretically achievable when using an octanol-water partition coefficient for glycerol of 0.017 and assuming partitioning would be similar in a water-biodiesel system. It can also be insightful when an anticipated component is not present, or is not present at the level commensurate with other related components (for example, biodiesel FAME, free fatty acids, and glycerol) based on historic levels or fixed chemical relationships. This may indicate that a particular component has undergone degradation or been converted by a chemical or biological process to another compound. For example, free fatty acids, sources of energy for microorganisms, can be metabolized, producing fatty acids of successively shorter chain lengths. Thus, if the glycerol measurement is low and the three organic acid measurements are high, the acids could have been produced by the degradation of the glycerol. However, other processes or combinations of processes could also have a similar result.

Vapor measurements from the 42 tanks showed both acidic and high moisture content conditions, which are conducive to corrosion development. The presence of acetic, formic, and propionic acids could indicate that MIC, where bacterial populations feed on ethanol and glycerol as suggested by previous research, could be occurring as part of the many microbial processes occurring in the tanks. The most volatile among the detected organic acids, such as formic acid or acetic acid, were found in the vapor phase of each tank. We observed the highest concentrations of organic acids in the vapor phase of severely corroded tanks.

The data collected could not disprove the MIC hypothesis suggested by previous research, but microbiological analysis would be required to confirm that these processes were taking place. However, numerous processes are occurring at the microscopic level. Attributing microbial activity to only a handful of bacteria is not supportable by the evidence collected in our research. If MIC in which certain bacteria feed on biofuels is occurring as suggested by previous

research, it could be a contributor to the corrosion in USTs, but may be occurring alongside other species actively involved. The role of other corrosion influencing organisms such as fungi, archaea, or eukaryotic organisms cannot be determined by these results. In general, it appears that MIC is likely happening in USTs storing diesel, and taking action to limit the environmental conditions necessary for microbial growth is recommended by multiple industry groups and anecdotally appears to be successful in minimizing the chances of severe corrosion in USTs. Future research by CRC or others may help to further understand the feasibility of the hypotheses of biofuels' role in MIC.

Chapter 6
Key Takeaways

EPA's research determined that corrosion is very common; it appears all USTs storing diesel could be susceptible to developing corrosion. We could not identify predictive factors that pinpointed a cause, but our results suggest that previous research by EPA and others hypothesizing MIC remains a likely possible contributor. However, MIC is likely not the only contributor. We noted several key observations, discussed below, that may help prevent releases of diesel from UST systems.

Corrosion Of Metal Components In UST Systems Storing Diesel Appears To Be Common

Based on the inspections of the 42 UST systems evaluated in 10 clusters around the United States, severe corrosion of metal components in the vapor space of USTs storing diesel appears to be a common occurrence. Approximately 83 percent of the UST systems – or 35 of 42 – were experiencing moderate or severe corrosion of metal components; 18 UST systems had severe corrosion and 17 had moderate corrosion. This sample is biased because EPA specifically looked for UST systems experiencing corrosion; however, less than 25 percent of the USTs in the study reported knowledge of corrosion prior to the site investigation. Only seven of 42, or 17 percent, of inspected tanks were classified with minimal corrosion. However, even some of the USTs classified with minimal corrosion showed some corrosion, suggesting that they may be at the beginning stage of increased corrosion. The true prevalence of severe corrosion of metal components across the entire nationwide population of UST systems storing diesel, including UST systems storing fuel for emergency generator systems, could be higher or lower than observed in our research. The number of tanks storing diesel fuels potentially affected by severe corrosion and potentially at an increased risk of releasing fuel to the environment – including ASTs, home-heating oil, and smaller, unregulated USTs – is many times larger than the estimated 100,000 federally-regulated USTs storing diesel fuel.

Many Owners Are Likely Not Aware Of Corrosion In Their Diesel UST Systems

Less than 25 percent of our UST sample population owners reported that they were aware of any corrosion in their UST systems. But we found moderate or severe corrosion in 83 percent of the USTs. It appears most owners were not aware of the corrosion. This may be the case across the country for many owners of UST systems storing diesel fuel. An owner may be able to identify severe corrosion problems easily if it affects fuel flow, but without proactive best management practices and visual inspection, an owner may be unable to identify the onset of the problem before equipment becomes corroded and potentially compromised.

The Corrosion Is Geographically Widespread, Affects UST Systems With Steel Tanks And With Fiberglass Tanks, And Poses A Risk To Most Internal Metal Components

Corrosion coverage on metal components of USTs was present in both UST systems with fiberglass tanks and UST systems with steel tanks; the corrosion was not limited to specific geographic regions. Our observations suggest that metal components in the vapor space of tanks are most susceptible to this corrosion, and severe cases showed corrosion of metal equipment in

lower wetted portions of UST systems as well. Corrosion in aqueous phase contact areas of steel tanks has been a known risk for decades, but has generally been prevented with good maintenance practices that focus on limiting water in USTs.

EPA's research initially focused on investigating only corrosion reported in vapor spaces of tanks. However, we heard during the course of our research from several companies that they now routinely remove significant quantities of sludge from the bottoms of USTs storing diesel; we also heard several anecdotes of pinhole corrosion through tank bottoms. Corrosion in the bottoms of steel tanks where water or sludge could collect has been a known risk for decades, but generally has been prevented with good maintenance practices. Historically, internal corrosion failure in UST bottoms has been very rare or undocumented.

At least three of the aqueous phase corrosion anecdotes came directly from UST regulators in three different states. All three discussed cases of metal tank bottoms, with one regulated tank an AST, which apparently failed from corrosion from the inside of the primary wall of double walled tanks storing diesel fuel. Other anecdotes of probably corrosion-induced failure in double walled tanks have been reported. In many cases, an investigation was prompted when owners learned via an interstitial alarm that there was fluid in the interstitial space between the walls. In some cases, it appears other leak detection equipment did not identify any release of fuel, but the leak detection equipment appeared to be working properly. Therefore, it appears that pinhole leaks from tank bottoms could slowly develop and leak for a period of time, with the leak below the threshold for some leak detection equipment. In these anecdotes, no fuel released to the environment because the fuel was contained by the secondary wall of double walled tanks. However, the anecdotes suggest that if similar corrosion occurred under sludge or in an aqueous phase in the bottoms of single wall tanks, the tanks could potentially slowly leak undetected under the threshold for leak detection, if no interstitial space exists to identify the leak.

The type of corrosion observed in aqueous phases may or may not appear the same as the visual corrosion seen in the vapor spaces during internal tank inspections; corrosion in vapor spaces is often described as having tubercles and extensive surface coverage. Instead, aqueous phase corrosion under water or sludge may be of the pinhole or burrowing corrosion presentation that generally does not appear with tubercles or cover large amounts of surfaces. However, corrosion of this kind could also occur in the vapor space and remain undetected without a detailed examination or test. Overall, it appears from our research and anecdotes from industry and regulators that corrosion of metal components either in the vapor or fuel or aqueous phase may be more prevalent than prior to 2007, and this presents an elevated risk to the integrity and functionality of all internal metal components in UST systems. Shear valves, overfill valves, ball floats, risers, ATG probe shafts, tank bungs, STP shafts, and other metal components in the vapor space of fiberglass and steel tanks may be particularly susceptible to functional failure due to corrosion.

Ethanol Was Present In 90 Percent Of 42 Samples, Suggesting Cross Contamination Of Diesel Fuel With Ethanol Is Likely The Norm, Not The Exception

EPA identified ethanol in 90 percent of the fuel samples. We also identified C4-C8 carbon chains in all tanks; these carbon chains could represent gasoline contamination. It is

reasonable to assume that ethanol's presence in diesel is at least partially due to diesel being delivered in the same truck as ethanol or gasoline-ethanol blended fuels.

The Quality Of Diesel Fuel Stored In USTs Was Mixed

We tested the diesel in each UST against several fuel specifications and guidelines in order to characterize the fuel quality at the end user point of the distribution process. Fuel may or may not be tested between the time it leaves the terminal and before it is delivered to the end user, but numerous opportunities exist for fuel to become off specification during the distribution or storage process. We compared the results of the samples tested in this population to a variety of specifications and guidelines to determine if the fuels are acceptable; our results were mixed. The presence of water, particulates and contaminants in the fuel, and acids in all of the water samples suggest that the fuel stored in many of our sample population USTs did not generally meet all the quality standards applied at different points in the production and distribution chain. If the same conditions observed in the collected fuel and water samples are representative of UST systems storing diesel across the country, we can assume that many UST systems may be storing fuel that is less clean and dry than many standards intend.

Particulates And Water Content In The Fuel Were Closest To Being Statistically Significant Predictive Factors For Metal Corrosion, But Causation Cannot Be Discerned

Although EPA did not identify any statistically significant predictive factors, it appears that USTs with cleaner and drier fuel could be less likely to be associated with severe corrosion issues. All corrosion assessments and data collected were analyzed statistically for predictive accuracy in identifying UST corrosion severity categorized as minimal, moderate, or severe or alternatively as with corrosion (moderate + severe) or without corrosion (minimal).

According to the statistical analysis, factors that scored closer to being predictors of metal corrosion severity, albeit with low accuracy, are fuel particulates and water content in the fuel. It is important to remember that even if significant, the findings of these would not necessarily signal causation. Correlation could be possible. Many variables are interrelated and represent various portions of an ongoing process. However, industry generally agrees that one factor that would significantly reduce corrosion seen in the field is minimizing the presence of water in USTs.

MIC Could Be Involved As Hypothesized By Previous Research

The data do not contradict the hypotheses suggested by CDFA's 2012 study and EPA ORD's research that MIC is occurring in USTs when bacteria oxidize biofuels or residuals from biodiesel production found in diesel fuel. Previous research suggested that acid-producing bacteria, including those of the genus *Acetobacter,* and other acid-producing bacteria, can metabolize ethanol from switch-loading fuel delivery or biodiesel components of diesel, such as glycerol and FAME breakdown products. Our research could not verify or disprove the role of this specific bacteria, but there are numerous other types of bacteria that could also be consuming chemical components of the fuel or fuel contaminants found in USTs. In addition to bacteria, there are also a number of other microorganisms that could cause or contribute to the corrosion

attacks, including fungi, archaea, and eukaryotic organisms. Although other mechanisms of corrosion are possible, MIC is likely playing a major role in the corrosive environments in USTs storing diesel. Preventing and treating MIC is recognized throughout industry as a standard recommended approach to maintaining UST systems.

Impacts, Recommendations, And Next Steps

The results of our research suggest that USTs storing diesel are susceptible to developing rapid and severe corrosion. It is possible that increased corrosion could lead to the potential for an increased risk of release due to failure of release prevention equipment, release detection equipment, or the UST itself. Aboveground storage tanks (ASTs) storing diesel are outside of the regulatory purview of EPA's Office of Underground Storage Tanks, but during the course of this research it has come to EPA's attention that ASTs and USTs may both be at risk of corrosion. Small, non-federally regulated USTs storing diesel fuels both aboveground and belowground are likely also at risk of corrosion.

Multiple approaches to addressing the corrosion in UST systems nationwide may be called for. Initially, awareness that the problem exists is imperative for owners, industry, and state and federal agencies so that owners know they should inspect their UST systems. Via our state and industry partners, EPA will notify UST owners about the findings of our research. The notice will share the findings with owners and recommend steps for identifying and minimizing corrosion risks in their UST systems.

Recommendation To Visually Inspect USTs Storing Diesel As Part Of Routine Monitoring

Our research on 42 UST systems demonstrates the wide variation of corrosion that can be seen in USTs storing diesel. The high percentage of the sample population experiencing moderate or severe corrosion suggests that a large percentage of USTs nationwide could be affected by this corrosion, so EPA recommends that owners inspect their USTs for corrosion. It is important to check visually from the surface when possible, but a more in-depth examination by internal photo, video, or manned access could also be helpful since corrosion may not be visible from visual observations when opening access points on the surface. Figure 9, UST 43-MD-ST, is an example. In that UST, noting the lack of corrosion in the fill riser is important, but using it as the sole indicator of the extent of corrosion in the UST system would be misleading because some of the equipment inside the tank had severe corrosion. Owners should be aware that visual inspections from the surface of only risers may lead owners to believe corrosion is not an issue in their systems, when in fact corrosion could be very advanced on other components.

Going forward, research should continue to foster further understanding of influencing factors and to find solutions. EPA provided our early research results to CRC to assist them as they considered a new phase of research that could attempt to pinpoint the cause or causes of corrosion development. Industry also is continually working to improve equipment and ensure functionality with various fuels on the market, including designing and offering equipment in corrosion resistant versions like stainless steel.

Enhanced UST system maintenance and routine inspections are immediate steps owners of USTs storing diesel can take to combat this issue. Vigilant aqueous phase monitoring and removal is a critical maintenance step; most owners of diesel tanks are already aware and may already be practicing this maintenance. In our research, the presence of water appears possibly correlated, albeit not statistically significantly, with an increased prevalence of corrosion. Industry documents suggest the removal of any water when found, possibly more often than owners have traditionally done in the past, should be considered to limit the potential for microbial growth in USTs storing diesel fuel. Owners should understand where water collects in their particular systems due to tank tilt and ensure water sensor equipment is monitoring at the most appropriate place. EPA suggests owners consult industry documents as sources of helpful information about limiting the potential impacts of corrosion.

Knowing the condition of equipment through routine inspections is key to identifying corrosion development over time. This could include looking at filters and filter housings for signs of debris or deterioration and removing the drop tube and ATG probes to assess whether automatic shutoff overfill devices and monitoring floats can function properly. In-tank video inspections, if available to the owner, are a proactive and useful way to visualize and document the conditions inside the tank, because visual observations from the surface may not always show the true extent of corrosion inside an UST. Addressing corrosion issues at early stages could reduce repair and replacement costs later, as well as reduce the risk of extremely expensive environmental release clean-up costs.

Below are several approaches, but not an exhaustive list, that may be helpful with limiting corrosion. These are available now or in development in the market.

- Regularly monitor and remove any water present in the UST
- Filter fuel for water and particulates before it is delivered into the UST or recirculate and filter water and particulates while it is stored
- Add nitrogen generating equipment to limit an oxygen rich atmosphere inside tanks
- Use liquid corrosion inhibitor additives or other corrosion inhibitors, including filming amines
- Use biocides to kill or other fuel treatments to disrupt existing microbial colonies or prevent future MIC

Research is ongoing in an attempt to pinpoint the cause of corrosion in USTs storing diesel and identify a solution. Until the cause and solution are identified, a combination of actions may be helpful. These actions include: education and outreach, additional investigations, preventive maintenance, adoption of corrosion mitigating products in the market, and potential modifications to fuel distribution and storage practices throughout the industry. These may help reduce corrosion and the risk of potential releases of fuel to the environment from USTs and other tanks storing diesel fuel.

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United States Environmental Protection Agency
5401R
Washington, D.C. 20460

EPA 510-R-16-001
July 2016

End of Email #8 with Attachment(s)

Email #9 with Attachment(s)

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 2:42 AM
To: Public Comment
Subject: UST Incidents with NRP on deed ZA-20-20
Attachments: WS-10178_45311_C_NFA_2020424_NFAII.pdf; WS-27764_47075_CA_LSA_20200611.pdf

Dear Town Council, Mayor and City Manager,

The next 2 incidents I put together, as they sit close together, close to a tributary of the West Fork of Deep River, and they BOTH have had to PERMANENTLY attach Notice of Residual Petroleum in groundwater and soil to their prospective deeds. These are not old, outdated USTs at these locations either.

Incident #45311
Pop Shoppe
2400 Eastchester Dr/Hickswood Rd
10/2019
This was related to the spill bucket failure of both the 12,000gl regular gas and the 8,000gl premium gas tanks.

Incident #47075
Oak Hollow Tire
2410 Eastchester Dr
6/11/2020
This was related to soil and groundwater contamination found under the maintenance area. I would like to point out that the start date of this business was in 2000.

Thanks,
Vesta Kennedy

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

April 24, 2020

Attn: Mr. Tony Perez
Registered Agent
Mid-State Petroleum
4192 Mendenhall Oaks Parkway
High Point, NC 27265

Re: Notice of No Further Action 15A
NCAC 2L .0407(d)
Risk-based Assessment and Corrective
Action for Petroleum Underground
Storage Tanks

Hickswood Road Pop Shoppe
2400 Eastchester Drive
High Point, Guilford County
Incident Number: 45311
Risk Classification: Low
Risk Ranking: L60D

Dear Mr. Perez:

The Limited Site Assessment received by the UST Section, Division of Waste Management, Winston-Salem Regional Office on February 6, 2020 has been reviewed. The review indicates that soil contamination exceeds the residential maximum soil contaminant concentrations (MSCCs) established in Title 15A NCAC 2L .0411 and groundwater contamination meets the cleanup requirements for a low-risk site but exceeds the groundwater quality standards established in Title 15A NCAC 2L .0202.

The UST Section determines that no further action is warranted for this incident. All required actions have been completed. On April 13, 2020, the UST Section received a certified copy of the Notice of Residual Petroleum which is filed with the Register of Deeds and was provided with proof of receipt of the conditional Notice of No Further Action letter or of refusal by the addressee to accept delivery of the letter or with a description of the manner in which the letter was posted.

This determination shall apply unless the UST Section later finds that the discharge or release poses an unacceptable risk or a potentially unacceptable risk to human health or the environment. Pursuant to Title 15A NCAC 2L .0407(a) you have a continuing obligation to notify the Department of Environmental Quality of any changes that might affect the risk or land use classifications that have been assigned.

Be advised that as groundwater contamination exceeds the groundwater quality standards established in Title 15A NCAC 2L .0202, groundwater within the area of contamination or within the area where

groundwater contamination is expected to migrate is not suitable for use as a water supply. Be advised that as soil contamination exceeds the residential MSCCs, the property containing the contamination is suitable only for industrial/commercial use, as stipulated in the Notice of Residual Petroleum.

Interested parties may examine the incident file by contacting **Ashley Dinkins** at **(336) 641-5557** and may submit comments on the site to her at the Guilford County Department of Health and Human Services office located at 400 West Market Street, Suite 300, Greensboro, NC 27401.

This No Further Action determination applies only to the subject incident; for any other incidents at the subject site, the responsible party must continue to address contamination as required.

Sincerely,

Carin Lee Kromm

Carin Lee Kromm, L.G.
Regional Supervisor
Winston-Salem Regional Office
UST Section, Division of Waste Management, NCDEQ

cc: Guilford County Department of Health and Human Services
Mr. Brandon Moore, Paragon Environmental Consultants via email paragonenv@northstate.net

Received: 6/11/2020

PHASE I LIMITED SITE ASSESSMENT REPORT

OAK HOLLOW TIRE

2410 EASTCHESTER DRIVE
HIGH POINT, GUILFORD CO., NC
JUNE 11, 2020

Facility ID:	**Not Applicable**
Site Risk Classification:	**Low**
Incident #:	**Pending**
Release Discovery Date:	**May 20, 2020**
Source of Release:	**Hydraulic lift**
Quantity of Release:	**Unknown**
Capacity/Content:	**Approximately 40 gal. / Hydraulic Oil**
Latitude/Longitude of Release:	**N36.025470 / W79.971374**
Report prepared for:	**Mr. Dave Caster** **Bank of Oak Ridge** **400 Pisgah Church Road** **Greensboro, NC 27455**

Report prepared by:

Brett S. Higgins
Project Manager

Report reviewed by:

Michael G. Jones, LG
NC License #1168

NORTH CAROLINA LICENSED SEAL 1168 GEOLOGIST MICHAEL GALIK JONES 06/11/2020

PYRAMID ENVIRONMENTAL & ENGINEERING, P.C.
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27406
(336) 335-3174

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APPENDICES:

A. LSA Risk Classification & Land Use Form
B. Standard Field Procedures
C. Photographs
D. Laboratory Report for Soil Samples
E. UST-61 (24-Hour Release & UST Leak Reporting Form)
F. Email from Guilford County Dept. of Environmental Health
G. Laboratory Report for Groundwater Samples (TW-1)

PHASE I LIMITED SITE ASSESSMENT REPORT

OAK HOLLOW TIRE
2410 EASTCHESTER DRIVE
HIGH POINT, NC

1.0 Introduction

On behalf of the Bank of Oak Ridge and Oak Hollow Tire, Pyramid Environmental & Engineering P.C. (Pyramid) has completed the Phase I Limited Site Assessment (LSA I) for the Oak Hollow Tire facility. The subject property is located at 2410 Eastchester Drive in High Point, North Carolina. The location of the site is shown on **Figure 1**, an excerpt of the 2018 Guilford, NC, USGS topographic map. The existing building and the property boundaries are shown on the 2018 Guilford County aerial photograph presented as **Figure 2**.

In April 2020, Pyramid performed a Phase I Environmental Site Assessment (ESA) for the subject property. The Phase I ESA identified eight in-ground hydraulic vehicle lifts inside the maintenance shop; four are single-post lifts and four are double-post lifts. Based on the findings of the Phase I ESA, Pyramid recommended the following Limited Phase II investigation.

- Soils borings to investigate existing in-ground hydraulic vehicle lifts inside the automotive maintenance shop.

A building sketch showing the approximate locations of the in-ground hydraulic lifts is presented as **Figure 3**. The goal of this assessment was to address environmental concerns associated with the current property use and provide information to the prospective buyer prior to taking possession of the property.

2.0 Site History

Historical information reviewed as part of this Phase I ESA indicates that the subject property was used for agricultural purposes from at least 1938, as shown on the earliest aerial photograph, until the early to mid-1980s. From the late 1980s through the late 1990s, the subject property was no longer being used for agricultural purposes and appeared to be undeveloped and wooded. The existing building was constructed in 2000 and has been used as the Oak Hollow Tire Car Care Center since that time. The surrounding area includes a mixture of retail, residential, commercial, and institutional land use. At the time of the site investigation, the building was occupied and was operating as Oak Hollow Tire - Car Care Center.

As previously indicated, there are eight in-ground hydraulic vehicle lifts inside the maintenance shop; four are single-post lifts and four are double-post lifts; therefore, there are 12 in-ground hydraulic lift cylinders inside the building. Each hydraulic lift contains approximately 40 gallons of hydraulic fluid. Each lift also includes a small in-ground reservoir where hydraulic fluid can be added to the system. The volume of the reservoirs are unknown.

3.0 Risk Characterization

The LSA Risk Classification and Land Use Form was completed by Pyramid. A copy of the completed form is presented as **Appendix A**. The form indicates that the risk classification of the incident should be "low" since there are no active supply wells located within 500 feet of the source area and the nearest surface water is located more approximately 900 feet south of the subject site.

4.0 Receptor Information

In January 2020, a receptor survey was completed for the adjacent property to the south (The Pop Shoppe) as part of a LSA. The Pop Shoppe is an active retail filling station and convenience store. The NC Department of Environmental Quality (NC DEQ) agreed to allow Pyramid to use the receptor survey findings for the Pop Shoppe and confirm/update the information as part of the LSA I investigation for Oak Hollow Tire.

The site is located in an area of High Point, where most of the developed properties within 1,000 feet are connected to municipal water. The owner information for the adjacent and adjoining properties is in included in **Table 1**. A map showing all properties within 1,000 feet of the subject property is presented as **Figure 4**.

4.1 Water Supply Wells:

Five residential water supply wells were identified within 1,000 feet of the subject property. Three of the wells are currently used as the sole source of potable water for the residence and two of the wells were taken out of service when the residences were connected to municipal water. All of these wells are south of the Pop Shoppe gas station, which is the adjacent property to the south. The supply well information is included in **Table 2** and the locations of the wells are shown on **Figure 4**.

4.2 Public Water Supplies:

The subject site and all developed properties within 500 feet of the site are connected to the municipal water system.

4.3 Surface Water:

The nearest surface water is unnamed tributary to West Fork Deep River, which is located approximately 900 feet to the east-southeast. The unnamed tributary flows south approximately 1.7 miles before joining West Fork Deep River.

4.4 Wellhead Protection Areas:

There are no designated wellhead protection areas within a 1,500-foot radius of the site.

4.5 Deep Aquifers in the Coastal Plain Physiographic Region:

This section is not applicable to this site.

4.6 Subsurface Structures:

No shallow subsurface structures were identified in the source area that would affect contaminant migration.

4.7 Land Use:

The surrounding land use includes a mix of commercial, single-family residential and multi-family residential (See **Figure 4**).

5.0 Site Geology and Hydrogeology

Pyramid's review of the 1985 Geologic Map of North Carolina yielded information concerning local geology and hydrogeology. Based on this review, the site is located in the Carolina Slate Belt of North Carolina. The surface geology consists of regional soils created by the weathering of underlying bedrock. The surface geology in the Carolina Slate Belt consists of regional soils created by the weathering of underlying bedrock. The Carolina Slate Belt consists of heated and deformed volcanic and sedimentary rocks. The region included a series of oceanic volcanic islands about 550-650 million years ago and today is known for its numerous abandoned gold mines and prospects.

In general, both surface and groundwater flow directions are controlled by topographic contours of landforms in the Carolina Slate Belt with flow occurring perpendicular to the contours from high to low elevations. Surface water run-off from the subject property generally flows to the east-southeast and is directed by open ditches and surface topography to an unnamed tributary to West Fork Deep River, which is located approximately 900 feet to the east-southeast. The unnamed tributary flows south approximately 1.7 miles before joining West Fork Deep River. The location of the site relative to surface water is shown in **Figure 1**.

6.0 Soil Sampling & Results

Five business days prior to performing the soil borings, Pyramid called NC 811 to have the public utilities located at the site. The day before work was performed Pyramid used utility locating equipment to locate and mark the underground lines associated with the hydraulic lifts.

On May 13, 2020, Pyramid mobilized to the site to collect soil samples at the in-ground hydraulic lifts located inside the auto maintenance shop. Eight (8) soil borings were installed using a Geoprobe® track-mounted direct-push drill rig. The locations of the soil borings are shown on **Figure 5**. Continuous soil samples were collected using a 5-foot Macro-Core™ soil sampler. The completed soil borings were filled with soil and the top 3 inches of each boring was patched with concrete.

Pyramid collected soil samples from each of the borings for geologic description, field screening with a photo-ionization detector (PID), and for preservation and laboratory analyses. A copy of Pyramid's Standard Field Procedures is included in **Appendix B.** The field PID readings for the soil samples are included in **Table 3**. Photographs of the field work performed on 5/13/20 and 6/4/20 are presented in **Appendix C**.

6.1 In-ground Hydraulic Lifts

The April 2020 Phase I ESA inspection identified eight in-ground hydraulic vehicle lifts (HVLs) inside the auto service area of the building. The HVLs are shown on **Figure 5**. Research performed by Pyramid determined that the bottom of a typical in-ground hydraulic lift cylinder is 7 to 8 feet below the existing floor level. Eight soil borings (B1, B2, B3, B4, B5, B6, B7 & B8) were installed adjacent to each in-ground hydraulic lift. Each boring was advanced to depth of 10 feet and soil samples were collected at 3-5 feet and 8-10 feet for geologic description and field screening with the PID. The locations of the soil borings are shown on **Figure 5**.

The soil sample collected from 8-10 feet in each boring was selected for laboratory analysis. A slight petroleum odor was observed in the sample collected from B3 at 8-10 feet. No obvious petroleum odors were recorded or observed in the other soil samples. The soil samples were preserved in laboratory prepared containers for diesel range organics (DRO) analysis and shipped via laboratory courier to Pace Analytical in Huntersville, NC.

The soil samples were analyzed using the EPA 3550/8015C Modified Method which provide results for total DRO. The laboratory analytical result for soil sample B3-8-10' indicated a DRO concentration of 1,050 milligrams per kilogram (mg/kg) which exceeds the North Carolina Department of Environmental Quality (NC DEQ) DRO initial action level of 100 mg/kg. The laboratory results for the other seven soil samples were below 100 mg/kg. The DRO laboratory results for the soil samples collected at the site are summarized in **Table 3**, and a copy of the laboratory report is included in **Appendix D.**

6.2 Risk-Based Laboratory Analysis

On May 13, 2020, additional soil volume for each sample was placed in laboratory prepared containers and sent to the laboratory with the DRO samples. These additional containers were placed on hold for analyses for semi-volatile organic compounds (SVOCs) using EPA Method 8270 and Extractable Petroleum Hydrocarbons (EPH) using the Massachusetts Department of Environmental Protection (MADEP) Method. These risk-based methods are required by the NC DEQ for soil contamination associated with hydraulic oil if the concentrations exceed the DRO initial action level of 100 mg/kg. On May 20, 2020, the DRO results for all the soil samples were received. After reviewing the results, Pyramid authorized Pace Analytical to analyze soil sample B3-8-10' for MADEP EPH and EPA 8270.

On May 28, 2020, the risk-based laboratory results (EPH & 8270) for B3-8-10 were received from Pace Analytical. The laboratory results for the EPA Method 8270 analysis indicate that none of the targeted SVOCs were detected at concentrations that exceed the laboratory detection limits. The laboratory results for the MADEP EPH analysis indicate that C11-C22 Aromatics were detected at a concentration of 223 mg/kg, which exceeds the soil-to-groundwater maximum soil contaminant concentration (MSCC) of 31 mg/kg. The detected concentration is well below the residential MSCC level for C11-C22 Aromatics. None of the other targeted compounds were detected at concentrations that exceeded the soil-to-groundwater or residential MSCCs. Based on risk-based laboratory results for soil sample B3-8-10', further assessment and/or cleanup of the soil contamination should not be required by the NC DEQ. The risk-based lab results for B3-8-10 are summarized in **Table 4**.

On May 28, 2020, Ron Bridges, the current owner of Oak Hollow Tire, authorized Pyramid to report the petroleum release to the NC DEQ. On 5/28/20, the UST-61 (24-hour Release and UST Leak Reporting Form) was completed and emailed to the Guilford

County Department of Environmental Health and the Winston-Salem Regional Office of the NC DEQ. A copy of the UST-61 form is included as **Appendix E**.

After a review of the soil assessment data that was included with the UST-61 Form, the NC DEQ indicated that an LSA I was required at the site. A copy of the email correspondence from Mr. Gene Mao with the Guilford County Department of Environmental Health date 6/01/20 indicating that an LSA was required is included as **Appendix F**.

7.0 Groundwater Investigation

On June 4, 2020, Pyramid personnel supervised the installation of one temporary groundwater monitoring well at the subject site to complete the LSA I. The monitoring well was installed to assess groundwater conditions at the location of soil boring B3.

7.1 Monitoring Well Installation:

The temporary monitoring well (TW-1) was installed to a depth of 12 feet BLS, and the location is shown on **Figure 5**. The well was drilled using a track-mounted Geoprobe drill rig and installed using 6-inch diameter solid-stem augers. Auger refusal was encountered at a depth of 12 feet. The monitoring well was constructed to a depth of 12 feet BLS using 5 feet of 2-inch diameter, schedule-40 PVC 0.010-inch slotted screen, and the remaining portion was constructed of schedule 40 PVC well casing. The well construction details are included in **Table 5.**

7.2 Monitoring Well Sampling:

On June 4, 2020 groundwater samples were collected from TW-1 for laboratory analyses. The depth to groundwater measured 9.25 feet below the top of the well casing. The top of the well casing was approximately 6 inches above the finished floor elevation in the shop. No free-product was detected in the well.

To purge stagnant water and develop the well, approximately three casing volumes (10 gallons) of water was removed from the well using a new disposable polyethlyene bailer. The groundwater samples were collected using a polyethylene bailer and placed in laboratory prepared containers, packed in ice, and prepared for shipment to Pace Analytical Services in Huntersville, NC for analysis. The groundwater samples collected from TW-1 were analyzed for semi-volatile organic compounds (SVOCs) using EPA Method 625, for extractable petroleum compounds (EPH) using the MADEP Method. To prevent cross contamination, disposable nitrile gloves were worn by field personnel during purging and sampling. The temporary monitoring well will be properly abandoned by a NC licensed driller after Pyramid receives confirmation from the NC DEQ that no additional assessment is required at the site.

7.3 Laboratory Analyses:

The laboratory results of the groundwater sample collected from TW-1 on June 4, 2020 indicate that C11 – C22 Aromatics were detected at a concentration of 272 micrograms per liter (µg/L), which is exceeds the NC 2L Groundwater Standard of 200 µg/L. None of the targeted compounds were detected in at concentrations that exceed the NC 2L Groundwater Standards. A copy of the Pace Analytical Report for the groundwater sample is included as **Appendix G**.

8.0 Assessment Summary

As requested by the Oak Hollow Tire, Pyramid has completed the Phase I Limited Site Assessment (LSA I) for the Oak Hollow Tire site in High Point, NC. A summary of the assessment results is presented below.

- The receptors survey showed indicate that there are three active supply wells located within 1000 feet of the source area. The nearest supply well is 790 feet south and topographically downgradient from the source area. All other developed properties within 1,000 feet are all connected to municipal water. The LSA risk evaluation shows that the site is within the city limits of High Point, and the risk classification of the incident should be classified as "Low Risk".

- On May 13, 2020, eight soil borings were installed at the site to collect samples at the in-ground hydraulic lifts. The soil samples were analyzed using the EPA 3550/8015C Modified Method which provide results for total DRO. The laboratory analytical result for soil sample B3-8-10' indicated a DRO concentration of 1,050 mg/kg which exceeds the NC DEQ DRO initial action level of 100 mg/kg.

- The lab results of the risk-based soil analyses of B3-8-10 indicated that the concentrations of C9-C22 aromatics exceed the soil to groundwater MSCC, but do not exceed the residential MSCC.

- As part of the LSA I, one 2-inch diameter temporary monitoring well (TW-1) was installed at the location of soil boring B3. The laboratory results of the groundwater sample collected from TW-1 on June 4, 2020 indicate that C11 – C22 Aromatics were detected at a concentration of 272 micrograms per liter (µg/L), which is exceeds the NC 2L Groundwater Standard of 210 µg/L. None of the targeted compounds were detected in at concentrations that exceed the NC 2L Groundwater Standards.

9.0 Recommendations

Based on the laboratory results of the soil and groundwater samples collected from TW-1/B3, Pyramid recommends regulatory closure of the incident by the NC DEQ using the Notice of Residual Petroleum process.

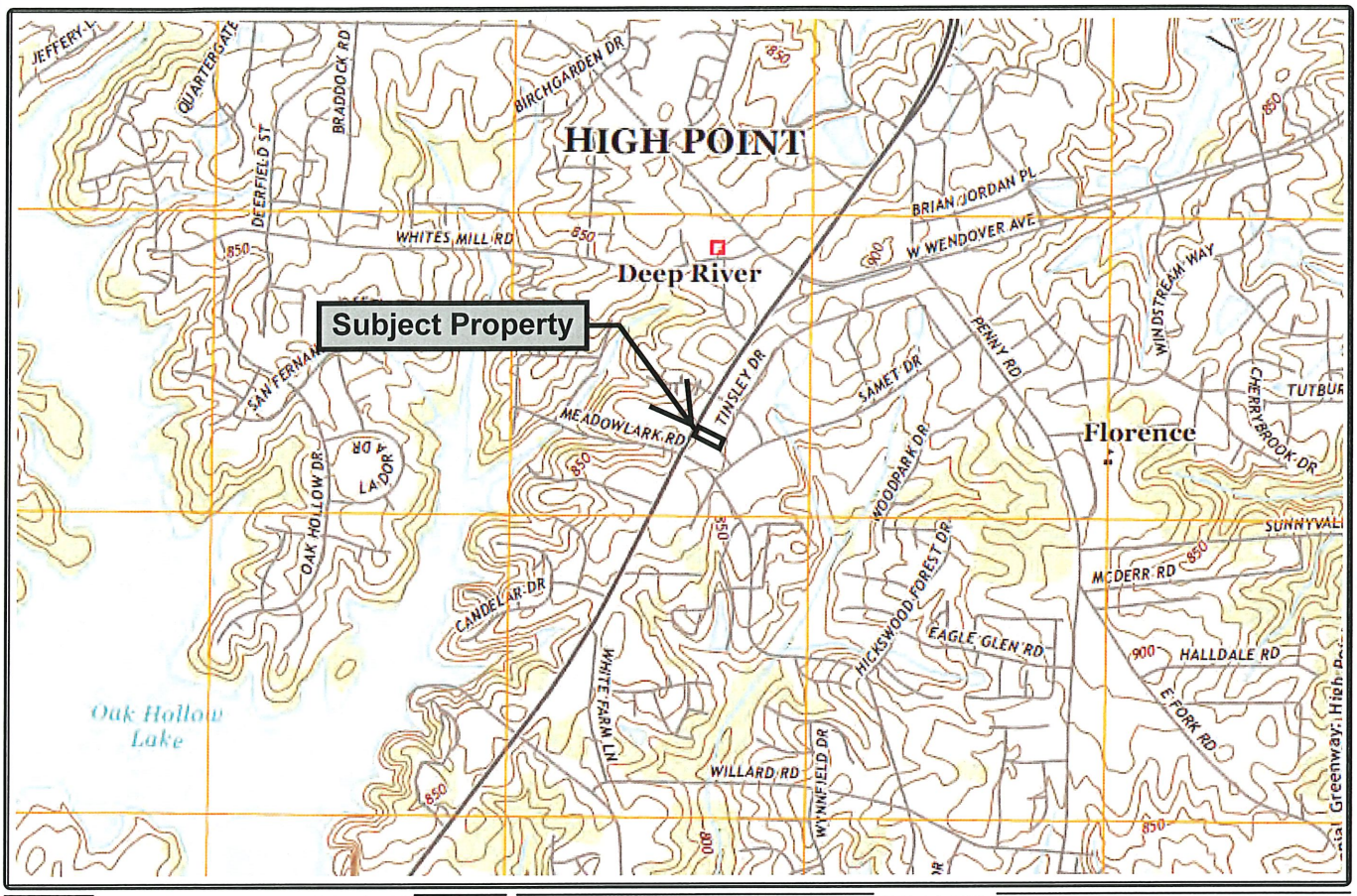
10.0 Closure

This report is prepared for, and made available solely for the use of Bank of Oak Ridge and Oak Hollow Tire. The contents thereof may not be used or relied upon by any other person without the express written consent and authorization of Pyramid Environmental & Engineering, P.C. (Pyramid). The observations, conclusions, and recommendations documented in this report are based on site conditions and information reviewed at the time of Pyramid's investigation. Pyramid appreciates the opportunity to provide this environmental service.

FIGURES

USGS TOPOGRAPHIC MAP

SITE: 2410 Eastchester Drive LOCATION: High Point, North Carolina



USGS IDENTIFICATION

USGS 7.5 MINUTE MAP	Guilford, NC
ORIGINAL DATE:	2019
PHOTOREVISION DATE:	N/A

	PRIMARY HIGHWAY, HARD SURFACE
	SECONDARY HIGHWAY, HARD SURFACE
	LIGHT-DUTY ROAD HARD OR IMPROVED SURFACE
	UNIMPROVED ROAD
	STATE ROAD
	U.S. ROUTE
	INTERSTATE ROUTE

SCALES

MILES: 1/2 0 1

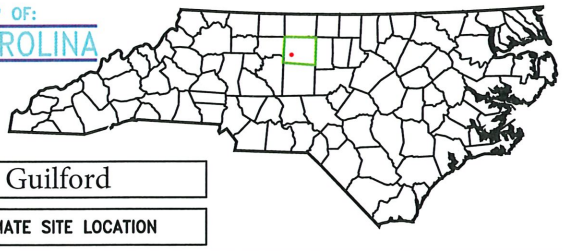
FEET: 1000 0 2000 4000 6000

1" = 2000'

NOTES: ▶ TOPOGRAPHICAL CONTOUR INTERVAL = 10 FEET
▶ PHOTOREVISIONS DENOTED IN PURPLE

MAGNETIC NORTH

COUNTY MAP OF: NORTH CAROLINA



COUNTY: Guilford

APPROXIMATE SITE LOCATION

PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

CLIENT:	Bank of Oak Ridge
PROPERTY NAME:	2410 Eastchester Drive
CITY:	High Point
STATE:	North Carolina
TITLE:	Topographic Map
SCALE:	1" = 2,000'
DATE:	06/05/20
DRAWING NAME:	USGSTOPO
DRAWN BY:	BDM
CHECK BY:	BSH
JOB NO.:	2020-156
TYPE:	PHASE I
FIGURE NUMBER:	1

NOTES

TOPOGRAPHIC MAP USED IN THIS GRAPHIC IS MAPPED, EDITED, AND PUBLISHED BY THE UNITED STATES GEOLOGIC SURVEY, DEPARTMENT OF THE INTERIOR, RESTON VIRGINIA.

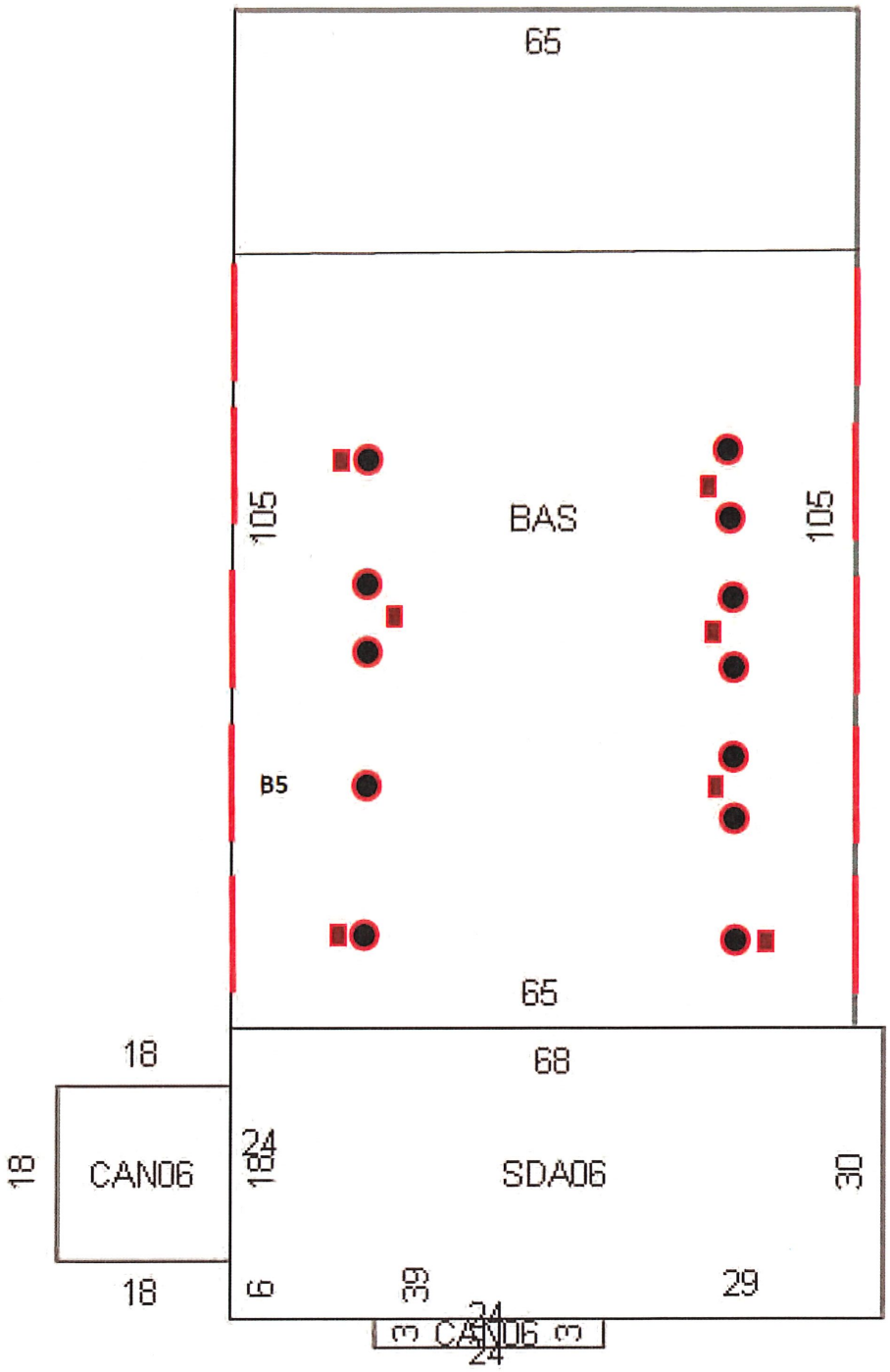
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.



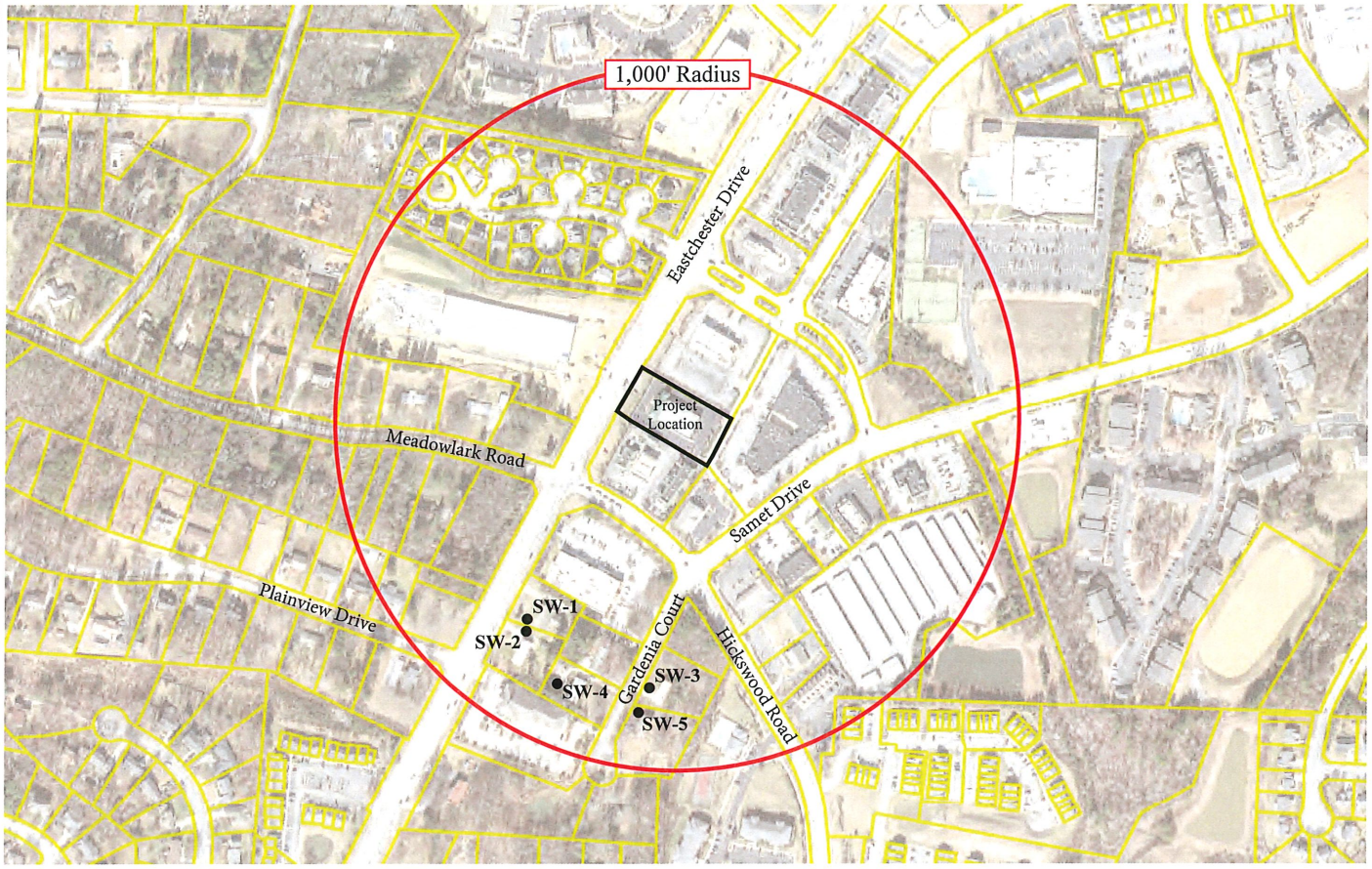
PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

CLIENT	Bank of Oak Ridge			COUNTY	Guilford
SITE	2410 Eastchester Drive			TAX ID	196481
CITY	High Point	STATE	North Carolina	DWG	Tax Map
TITLE	2018 Aerial/Tax Map			J-NO.	2020-156
				PAGE	2

GRAPHIC SCALE IN FEET
0 50' 100'
1 inch = 100 ft.



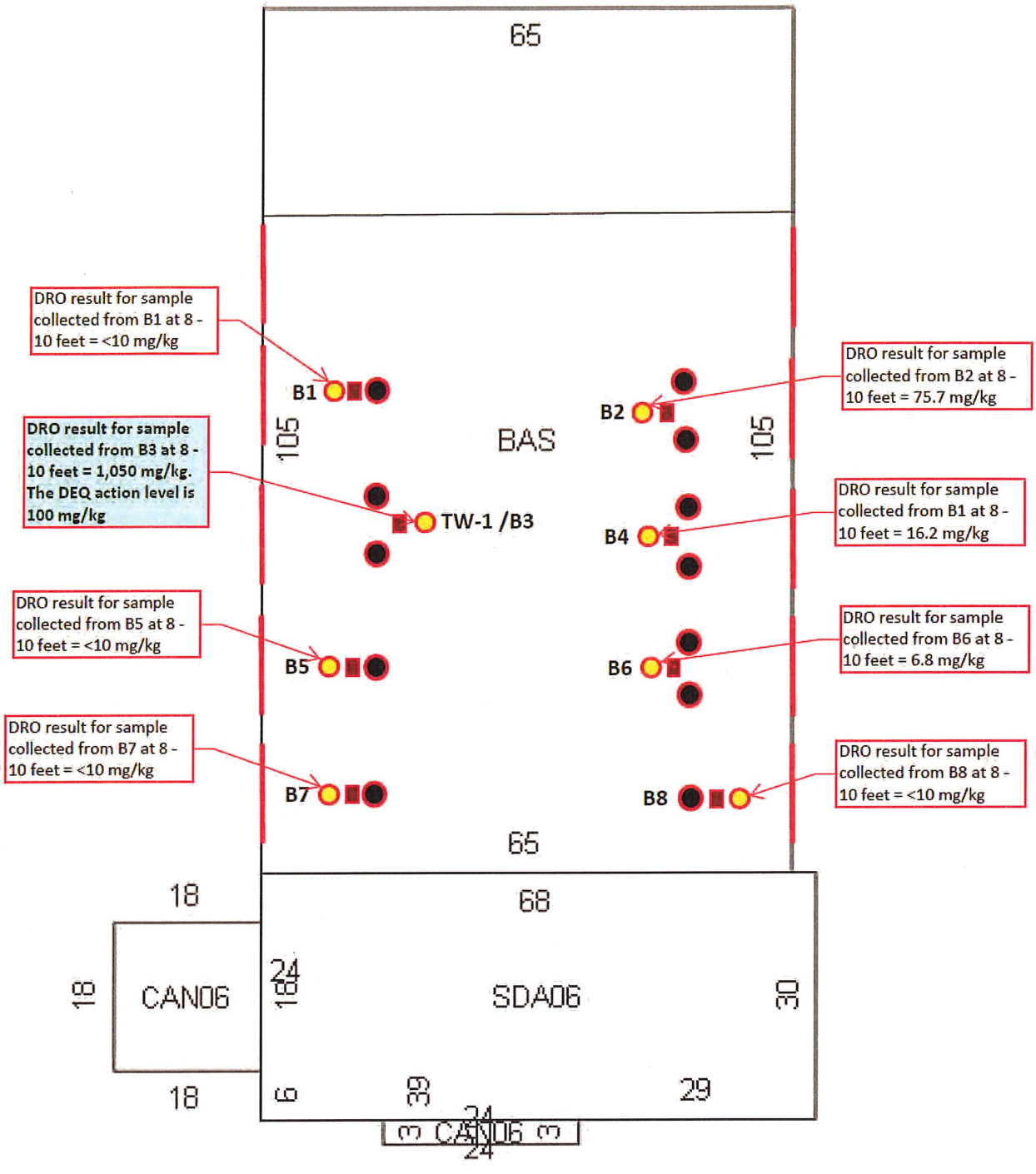
PYRAMID ENVIRONMENTAL & ENGINEERING, P.C.	CLIENT: Bank of Oak Ridge	COUNTY: Guilford	GRAPHIC SCALE IN FEET: 0, 19', 38' ~1 inch = 19 ft.
	SITE: 2410 Eastchester Drive	DATE: 06/05/20	
	CITY: High Point / STATE: North Carolina	J-NO: 2020-156	
	TITLE: Building Sketch with Hydraulic Lifts	FIGURE: Figure 3	



PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

CLIENT	Bank of Oak Ridge	DATE	6/5/20	DRWN	TRC
SITE	2410 Eastchester Drive	LAY	LSA	CKD	BSH
CITY	High Point	STATE	North Carolina	Tnk ID	196481
TITLE	Surrounding Properties Map with Supply Well Locations	J-NO.	2020-156	FIGURE	4

GRAPHIC SCALE IN FEET
0 200' 400'
1" = 400'



PYRAMID
ENVIRONMENTAL & ENGINEERING, P.C.

CLIENT	Bank of Oak Ridge	COUNTY	Guilford
SITE	2410 Eastchester Drive	DATE	06/05/20
CITY	High Point	STATE	North Carolina	J-NO.	2020-156
TITLE	Bldg. Sketch with Soil Borings & TW-1	FIGURE	Figure 5

GRAPHIC SCALE IN FEET
0 19' 38'
~1 inch = 19 ft.

TABLES

TABLE 1

Adjacent/Adjoining Property Owners
Oak Hollow Tire – Car Care Center
2410 Eastchester Drive, High Point NC
Pyramid Project #2020-156

ID# on Figure 2	Guilford County Parcel Number	Property Owner Name	Physical Address	Property Owner Mailing Address
1	196481	Ronald E. Bridges (Subject Property)	2410 Eastchester Drive High Point, NC 27265	2410 Eastchester Drive High Point, NC 27265
2	196480	Nanj Corporation, Inc.	2420 Eastchester Drive High Point, NC 27265	P.O. Box 2246 Jamestown, NC 27282
3	196484	Cana Holding Company, LLC	3793 Samet Drive High Point, NC 27265	P.O. Box 49579 Greensboro, NC 27419
4	196483	David J. Novak	3781 Samet Drive High Point, NC 27265	3781 Samet Drive High Point, NC 27265
5	196471	Triad Holding Co., LLC	2400 Eastchester Drive High Point, NC 27265	2006 Guilford Rd., Jamestown, NC 27282
6	196565	First Generation, LLC	2501 -2503 Eastchester Drive, High Point, NC 27265	172 Fairview Ave. Boonton, NJ 07005
7	196566	AAA Storage Management 24, LLC	2505 Eastchester Drive, High Point, NC 27265	7622 Bentley Rd. Greensboro, NC 27409

TABLE 2

Water Supply Wells Within 1,000 Feet
Oak Hollow Tire – Car Care Center
2410 Eastchester Drive, High Point NC
Pyramid Project #2020-156

ID# on Figure 4	Guilford County Parcel Number	Property Owner Name	Supply Well Physical Address	Property Owner Mailing Address	Use of Well	Depth of Well	Distance & Direction from Source Area (ft.)
SW-1	196471	Nan Soon Jon	2302 Eastchester Drive High Point, NC 27265	P.O. Box 2246 Jamestown, NC 27282	Out of Service House connected to city water	Unknown	790 Southwest
SW-2	196472	Thanh Le & Mong Thu Thi Luu	2300 Eastchester Drive High Point, NC 27265	2300 Eastchester Drive High Point, NC 27265	Out of Service House connected to city water	Unknown	820 Southwest
SW-3	196471	Jerome C. Thompson	2404 Gardenia Court High Point, NC 27265	3819 Briarwood Avenue High Point, NC 27265	Potable Water	Unknown	805 Southwest
SW-4	196471	Buddy Frazier & Steven Watson	2401 Gardenia Court High Point, NC 27265	2102 Carlisle Way High Point, NC 27265	Potable Water	Unknown	860 South
SW-5	196471	Robert E. Eanes	2402 Gardenia Court High Point, NC 27265	2402 Gardenia Court High Point, NC 27265	Potable Water	Unknown	880 South

The location of TW-1 is shown on Figure 4

TABLE 3

Summary of Field Screening and TPH Laboratory Results
Oak Hollow Tire - Soil Samples Collected at In-Ground Hydraulic Lifts
2410 Eastchester Drive, High Point, NC
Pyramid Project #2020-156

Sample Number	Date Collected	Sample Location	Depth (feet)	PID (ppm)	EPA Method 3550-DRO (mg/kg)
B1 - 8-10'	5/13/2020	Single-post lift in NE portion of maintenance shop	8-10'	0.0	ND
B2 - 8-10'	5/13/2020	Double-post lift in SE portion of maintenance shop	8-10'	1.1	75.5
B3 - 8-10'	5/13/2020	Double-post lift in north-central portion of maintenance shop	8-10'	3.7	**1050**
B4 - 8-10'	5/13/2020	Double-post lift in south-central portion of maintenance shop	8-10'	0.0	16.2
B5 - 8-10'	5/13/2020	Single-post lift in north-central portion of maintenance shop	8-10'	0.0	ND
B6 - 8-10'	5/13/2020	Double-post lift in south-central portion of maintenance shop	8-10'	0.1	6.8
B7 - 8-10'	5/13/2020	Single-post lift in NW portion of maintenance shop	8-10'	0.0	ND
B8 - 8-10'	5/13/2020	Single-post lift in SW portion of maintenance shop	8-10'	0.0	ND
NCDEQ Initial Cleanup Level (mg/kg)					**100**

ND = Not Detected

Bold and shaded values exceed the NCDEQ Initial Cleanup Level

TABLE 4

Risk-Based Laboratory Results for Soil Sample B3-8-10'
Oak Hollow Tire, 2410 Eastchester Drive, High Point, NC
Pyramid Project #2020-156

Analytical Parameter	Analytical Method	Sample Number B3 - 8-10'	Soil to Groundwater MSCC (mg/kg)	Residential MSCC (mg/kg)	Commercial / Industrial MSCC (mg/kg)
	Sample Date:	5/13/2020			
	Sample Depth (feet):	8-10 feet			
MADEP EPH					
C9-C18 Aliphatics (b)	EPH	ND	540	1,500	40,000
C19-C36 Aliphatics (y)	EPH	318	CI	31,000	810,000
C11-C22 Aromatics (d)	EPH	**223**	31	469	12,264
EPA Method 8270					
1-Methylnaphthalene	8270	ND	0.004	20	100
2-Methylnaphthalene	8270	ND	3.6	63	1,635
Naphthalene	8270	ND	0.16	313	8,176
Phenanthrene	8270	ND	56	469	12,264
Pyrene	8270	ND	270	469	12,264
All other compounds		ND	ND	ND	ND

NA=Not Analzyed for this parameter
mg/kg = milligrams/kilograms.

BOLD and shaded values exceed the Soil-to-Groundwater MSCCs

TABLE 5

Temporary Monitoring Well Construction Data
Oak Hollow Tire – Car Care Center
2410 Eastchester Drive, High Point NC
Pyramid Project #2020-156

Monitoring Well ID#	Total Well Depth (ft.)	Top of Casing Elevation	Depth to Groundwater (ft.)	Ground-water Elevation	Riser Interval (ft.)	Screen Interval (ft.)	Grout Interval (ft.)	Bentonite Interval (ft.)	Sand Interval (ft.)
TW-1	12	NS	9.75	NS	0-7	7-12	NA	2-5	5-12

The location of TW-1 is shown on Figure 5
Depth to groundwater measured on 06/04/20
NS = Not Surveyed

TABLE 6

Summary of Groundwater Analyses for TW-1
Oak Hollow Tire – Car Care Center
2410 Eastchester Drive, High Point, NC
Pyramid Project #2020-156

Analytical Method Parameters	TW-1 (ug/L) 06/04/20	NCAC 2L Standard (ug/L)	Gross Contaminant Level (GCL) ug/L
EPA Method 625			
Anthracene	ND	2000	2,000
Chrysene	ND	5	5
Fluorene	ND	300	900
Naphthalene	ND	6	6,000
Phenanthrene	ND	200	410
Pyrene	ND	200	200
1,2,4-Trichlorobenzene	ND	600	260,000
2,4,6-Trichlorophenol	ND	4	4,000
All other 625 Parameters	ND	--	--
MADEP Method for EPH			
C9-C18 Aliphatics	110	700	NS
C19-C36 Aliphatics	820	10,000	NS
C11-C22 Aromatics	**272**	200	NS

NS = No Standard
ND = Not Detected Above the Laboratory Detection Limit

APPENDIX A

LSA Risk Classification and Land Use Form

Limited Site Assessment Risk Classification and Land Use Form

Part I – Groundwater/Surface Water/Vapor Impacts

High Risk

1. Has the discharge or release contaminated any water supply well including any used for non-drinking purposes? **YES/NO**
   If yes, explain.
   No supply wells have been impacted.

2. Is a water supply well used for drinking water located within 1000 feet of the source area of the discharge or release? **YES/NO**
   Three active water supply wells are located between 800 – 900 feet south of the source area at the subject site (see Figure 4 & Table 2).

3. Is a water supply well used for any purpose (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the release or discharge? **YES/NO**

4. Does groundwater within 500 feet of the source area of the discharge or release have the potential for future use in that there is no other source of water supply other than the groundwater? **YES/NO**
   Explain.

5. Do vapors from the discharge or release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety, or the environment? **YES/NO**
   If yes, explain.

6. Are there any other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment? **YES/NO**
   If yes, explain.

Intermediate Risk

7. Is a surface water body located within 500 feet of the source area of the discharge or release? **YES/NO**

   If yes, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B .0200 by a factor of 10? **YES/NO**

8. Is the source area of the discharge or release located within a designated wellhead protection area as defined in 42 USC 300h-7(e)? **YES/NO**
   If yes, explain.

9. Is the discharge or release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985? **YES/NO**

   If yes, is the source area of the discharge or release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water? **YES/NO**
   If yes, explain.
   Not applicable.

10. Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established (see Table 7) by the Department. **YES/NO**

Part II - Land Use

Property Containing Source Area of Discharge or Release

The questions below pertain to the property containing the source area of the release.

1. Does the property contain one or more primary or secondary residences (permanent or temporary)? **YES/NO**
   Explain.
   The property is a retail auto tire store and auto maintenance facility.

2. Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly? **YES/NO**
   Explain.
   The property is a retail auto tire store and auto maintenance facility.

3. Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research, and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped? **YES/NO**
   Explain.
   The property is a retail auto tire store and auto maintenance facility.

4. Do children visit the property? **YES/NO**
   Explain.
   The property is unrestricted, and children may visit the property temporarily.

5. Is access to the property reliably restricted consistent with its use (e.g., by fences, security personnel or both)? **YES/NO**
   Explain.
   The property is not surrounded by fences or security personnel.

6. Do pavement, buildings, or other structures cap the contaminated soil? **YES/ NO**
   Explain.
   The soil contamination is under the concrete floor of the maintenance shop inside the building.

   If yes, what mechanisms are in place or can be put into place to ensure that the contaminated soil will remain capped in the foreseeable future?
   The property will likely remain a retail automobile tire store and auto maintenance facility for the next 20 years or more.

7. What is the zoning status of the property?

The property is zoned for commercial land use

8. Is the use of the property likely to change in the next 20 years? **YES/NO**
Explain.

Property Surrounding Source Area of Discharge or Release

The questions below pertain to the area within 1500 feet of the source area of the discharge or release (excludes property containing source area of the release):

11. What is the distance from the source area of the release to the nearest primary or secondary residence (permanent or temporary)?

The nearest residence is located approximately 550 feet west of the source area.

12. What is the distance from the source area of the release to the nearest school, daycare center, hospital, playground, park, recreation area, church, nursing home or other place of public assembly?

A church is located approximately 350 feet east of the site.

13. What is the zoning status of properties in the surrounding area?

Predominantly commercial with some nearby residential

14. Briefly characterize the use and activities of the land in the surrounding area.

The immediate surrounding area is commercial land use including restaurants, retail stores and a retail petroleum filling station on the adjacent property to the south. Residential properties are located greater than 500 feet way to the east, south and west.

APPENDIX B

Standard Field Procedures

Standard Field Procedures
Pyramid Environmental & Engineering, P.C.

1.0 Equipment Decontamination

Equipment decontamination is essential to assure representative environmental samples are collected and to eliminate the potential for cross-contamination between sample points. Pyramid strives to clean all field equipment prior to leaving the office; however, field decontamination is still required on most projects. The procedures for decontamination of water level probes, hand augers, sampling probes, trowels, and other field equipment are listed below.

1.1 EPA Region IV Decontamination Procedures

Drilling and soil sampling equipment is decontaminated prior to each use using a pressure washer or steam cleaner. Reusable sampling equipment (hand augers, sampling probes, trowels, split spoon samplers, water sampling equipment, etc....) are decontaminated using the general procedure described below.

- Wash with non-phosphate detergent, water, & brush to remove particulate matter
- Rinse with tap water
- Rinse with 10 percent nitric acid solution (only if sampling for metals)
- Rinse with de-ionized water
- Rinse with pesticide-grade isopropyl alcohol
- Rinse with de-ionized water
- Air-dry as long as possible

The level of decontamination used is appropriate to the analytical parameters selected and the material of the sampling device being used for sampling. For example, if metals analyses are required, then the 10 % nitric acid solution is used for decontamination of stainless-steel equipment. Pyramid uses de-ionized or distilled water for decontamination. Equipment that is not used immediately after decontamination is wrapped in aluminum foil prior to storage.

2.0 Soil Borings & Sampling

2.1 Soil Borings

Soil borings are used by Pyramid to investigate and characterize the subsurface at sites. Soil borings provide information concerning soil types and density, depth to refusal, depth to bedrock, organic vapors that may be present, and can be used to obtain samples for laboratory analysis.

Pyramid conducts borings in several different ways, using hand augers, direct-push equipment (Geoprobe), sample probes, split-spoon samplers (ASTM D 1586-84), auger drilling, air drilling, and Vibro-Core. The following procedures are used by Pyramid Environmental when performing soil borings:

1. Soil boring locations are chosen, and the ULOCO utility locating service is called to mark all public utilities. Pyramid locates private utilities at many project sites using Pyramid locating equipment, or uses a private utility locating service.

2. Down hole drilling equipment is cleaned prior to use and between borings using pressure washing or steam cleaning. Additional decontamination procedures in Section 1.1 are used for sampling tools such as split spoons or direct-push points.

3. Soil borings are advanced using direct-push, drilling rigs, hand augers, or other appropriate means. Near-surface soil samples may also be collected using stainless steel push probes, shovels, scoops, or other sampling devices.

4. Soil samples are normally collected at a minimum of 5-foot intervals. Each sample is divided into two parts. Soil samples for laboratory analyses are jarred from the initial sample volume. The remaining soil is stored in a sealed container for headspace analysis and geological description.

5. After screening the soil with the field instruments, each soil sample is described by the field geologist and a geologic description is recorded in project documentation.

6. Soils are typically described in the field by the project geologist or soil scientist and are classified according to the Unified Soil Classification System (ASTM D 2488-84).

7. Soil samples selected for laboratory analysis are placed in properly prepared, laboratory supplied containers and immediately packed in a cooler on ice. Sample custody is maintained using standard chain-of-custody (COC) procedures through delivery to the analytical laboratory.

8. Soil borings, which are not completed as monitoring wells, are grouted using a Portland cement, bentonite, or backfilled with soil cuttings.

9. Soil cuttings are generally spread near the soil boring or monitoring well location as directed by State regulatory managers. Drill cuttings are drummed (containerized) where site conditions or regulatory requirements prohibit spreading cuttings, and are disposed off-site (after waste determination is made).

2.2 Soil Headspace Screening

Soil samples are routinely screened for volatile organic compounds (VOCs) which may be an indication of organic or petroleum hydrocarbon contamination. The typical screening procedure includes immediately transferring the soil from the sampling devices to a sealed container (sealed 1-gallon Ziplock plastic bag). The soil container is filled approximately halfway with soil and sealed. This creates headspace above the soil in which VOCs may accumulate. The container is allowed to stand for 5 to 15 minutes for the VOCs to equilibrate in the headspace of the container. The headspace of the container is then screened using a calibrated organic vapor analyzer (PID or FID). The screening is conducted by cracking the seal only enough to allow insertion of the probe into the headspace so as not to dilute the sample. In most cases where the contaminant of concern includes volatile organics, the highest or "Peak" field-screening result is documented for each sample. The soil samples showing the highest reading from each boring are typically selected for laboratory analysis.

2.3 Soil Sample Collection for Laboratory Analysis

After the targeted depth has been reached, soil samples are collected using a variety of sampling devices. Soil sample devices used include split-spoons, stainless-steel hand augers, stainless-steel push-probes and sampling scoops, and directly from the center of the excavator bucket. The sample technician uses disposable nitrile gloves, which are changed between samples to avoid cross-contamination of samples, and each sampling device is decontaminated prior to use.

Only laboratory provided containers are used for sample collection. Samples are collected in accordance with the preservation methods required by the requested analytical method. Samples are handled as little as possible and preserved in the field as specified for the analytical method. The samples are stored and transported to the laboratory in an insulated cooler chilled to approximately 4 degrees centigrade. The samples are labeled with a minimum of the following information: Pyramid, project name or number, sample identification, date collected, sampler name, and analysis requested. Sample custody is maintained using standard chain-of-custody procedures through delivery to the analytical laboratory. Notes of the sampling events are recorded in project documentation.

Incremental sampling methodology (ISM) is a structured composite sampling and processing protocol that reduces data variability and provides a reasonably unbiased estimate of mean contaminant concentrations in a volume of soil targeted for sampling. ISM provides representative samples of specific soil volumes defined as decision units (DUs) by collecting numerous increments of soil (typically 30–100 increments) that are combined, processed, and subsampled according to specific protocols. ISM Sampling will be further explained in a site-specific Work Plan documents.

Pyramid will contract an on-site laboratory for immediate analyses as needed.

2.4 Sediment Sample Collection for Laboratory Analysis

Near surface sediment may be present in a surface water ditch, stream, or dry intermittent stream bed. Sediment samples are typically soil related samples and may be collected with a variety of sampling tools. Pyramid will use stainless-steel samplers which have been decontaminated according to the procedure detailed in section 1.1 of this document. After the sediment samples are collected, the location, depth, conditions, and sample composition are documented in the project records. The samples will be screened in the field to detect volatile organic vapors and visually examined for contamination. Sediment samples will be preserved in laboratory prepared containers in accordance with sample preservation recommendation of the analytical laboratory. Samples are handled as little as possible and preserved in the field as specified for the analytical method. The samples are stored and transported in an insulated cooler chilled to approximately 4 degrees centigrade. The samples are labeled with a minimum of the following information: Pyramid, project name or number, sample identification, date collected, sampler name, and analysis requested. Sample custody is maintained using standard chain-of-custody procedures through delivery to the analytical laboratory. Documentation of the sampling events are recorded in the project documentation.

3.0 Direct-Push Sampling Procedures

Direct-push sampling techniques have been used at many sites to collect soil and groundwater samples rapidly and inexpensively. Track-mounted, direct-push rigs can access hard to reach areas and allow borings and monitoring wells to be installed. For soil sampling, typically, the direct-push steel drive tube is decontaminated using a pressure washer, and a new plastic sample liner is inserted in the steel drive tube to collect soil samples. The soil samples are collected in new polyethylene sample tubes within the steel drive tube. The soil samples are then extracted from the polyethylene liner and preserved as required for laboratory analysis.

For groundwater sampling, a steel probe with a retractable screen section and tubing are driven to depth and the screened section is opened to allow groundwater to enter the tubing. The water samples are withdrawn using new polyethylene and Teflon® tubing with either a decontaminated stainless-steel check ball, or peristaltic pump. The groundwater sample is placed directly into the appropriate laboratory containers and sealed immediately. To prevent cross-contamination of samples, new disposable tubing is used for each groundwater sample point. Disposable nitrile gloves are worn by field personnel during development and groundwater sampling, and gloves are changed between samples. Groundwater sampling procedures are detailed more in Section 5.0, as appropriate for each analytical method.

4.0 Monitoring Well Installation

Groundwater monitoring wells are installed in many subsurface environments; Coastal Plain, sedimentary, Piedmont saprolite, weathered rock formations, and mountain terrains to list a few. Formations encountered include unconsolidated and consolidated sediments, fill material, organic soils, saprolitic soils, weathered rock formations, and bedrock. Groundwater monitoring wells provide a stable sampling point at discrete intervals within the confined or unconfined aquifers. Monitoring wells are installed for a number of reasons, and are typically installed as 1-inch, 2-inch, 4-inch, or 6-inch diameter wells. Construction may be of PVC, stainless-steel, HDPE, or other appropriate materials. The following procedures are used by Pyramid when performing borings and monitoring well installations.

- If required, monitoring well permits are obtained from the State, County, or City.
- Boring and monitoring well locations are chosen, and utilities are marked by the public utility locating company. As needed, the locations may be scanned for utilities by Pyramid using our locating equipment, or a private utility locating company.
- In selecting a drill site, care is taken to avoid overhead power lines, and subsurface utilities whenever possible.
- Down-hole drilling equipment is decontaminated prior to use and between borings.
- Borings are advanced using direct-push, drilling rigs, hand augers, solid-stem augers, hollow-stem augers, air rotary drilling, or air hammer drilling.
- Soil samples are normally collected at a minimum of 5-foot intervals. Each sample is divided into two parts. Soil samples for laboratory analyses are jarred from the initial sample volume. The remaining soil is stored in a sealed container for headspace analysis with an organic vapor analyzer (PID or FID).
- After screening the soil with the field instruments, each soil sample is described by the field geologist and a geologic description is recorded in the project documentation.

Type II monitoring wells are usually installed using 2-inch diameter schedule 40 PVC riser and 2-inch, 0.010-inch machine slotted well screen. The screened interval length varies with the geologic site conditions, expected variations in water level, and the investigation goals for the well. The well construction details are presented on the boring log.

Type III wells are usually installed as double-cased wells to monitor the deeper portions of the aquifer. The first casing is usually a 5 to 6-inch diameter solid PVC well casing drilled to bedrock or an appropriate depth within the surficial zone. The 5 to 6-inch diameter casing is then set and grouted in the borehole. After the cement grout has set for 12 to 24-hours, the borehole is completed to the desired depth using air rotary drilling or air hammer drilling. The inside casing of the Type III monitoring well is usually constructed of 2-inch diameter SCH 40 PVC casing and 2-inch diameter SCH 40 PVC 0.010-inch slotted well screen.

In most applications, a sand filter pack of #2 well sand (or appropriately sized well sand). Sand is typically installed to a level of 2 feet above the top of the screen in each well. A minimum 2-foot thick bentonite seal is usually placed on top of the filter pack and hydrated with de-ionized or distilled water. The remaining annular space of a typical well is backfilled to grade with a Portland cement/bentonite grout. In monitoring wells where the water table is close to surface, the amount of sand above the screen and bentonite will be reduced to allow for a minimum of 2–3 feet of cement grout in the well bore.

At the surface, each well is secured with a locking cap and a steel well protector. Depending on the surface conditions, the well may be protected by a flush-mounted manhole set in the surrounding surface in a concrete pad. In some cases, stick-up well protectors are used to secure the well and allow the well to be more easily located in wooded or open areas.

Each groundwater monitoring well is developed by surging, pumping, or bailing to remove sediment before sampling. Water removed during development is managed according to individual State regulatory guidance.

5.0 Water Sampling Procedures

Pyramid relies on water sampling as a primary method for assessment of subsurface groundwater conditions. Water sampling typically includes sampling groundwater from monitoring wells, water supply wells, surface water bodies, stormwater, waste sumps, etc. The following provides typical sampling procedures for the water samples.

5.1 Monitoring Wells

Prior to sampling each monitoring well, depth to liquid and/or liquids and total well depth are measured using a properly decontaminated electric interface probe. If phase-separated petroleum product is detected in a well, the product measurements are recorded along with the water level in each well. This information is recorded in the field record and the volume of the water in the well casing is calculated. To purge stagnant water from each monitoring well, three to five well casing volumes of water are removed from each well prior to sampling. Alternately, for low-flow sampling, development continues until the field parameters (pH, conductivity, dissolved oxygen, ORP, and temperature) have stabilized.
If the water in the monitoring well is removed until the well is dry, then the well is sampled thereafter. Water removed from wells during purging is managed in accordance with individual State regulatory guidance.

Groundwater samples are typically collected using a new disposable polyethylene bailer and a new length of nylon cord. To prevent cross-contamination of samples between wells, a new disposable bailer is used for each well. The bailer is lowered into the groundwater

slowly and removed slowly. A new pair of disposable gloves is worn by field personnel during purging and sampling, and is changed between wells. In the case of small diameter monitoring wells or direct-push water samples, water samples may be collected using a peristaltic pump and new polyethylene tubing. Another method is to use a segment of new sampling tubing and a stainless-steel check ball to create a "Tube Bailer".

Groundwater samples selected for laboratory analysis are immediately placed in properly prepared, laboratory supplied containers and preserved in a cooler on ice. Samples are maintained under standard chain-of-custody procedures from sample collection through laboratory analysis.

5.2 Water Supply Well Sampling

Prior to sampling each water supply well, the well owner is contacted to provide access to the well. The well owner is interviewed to locate the faucet closest to the well for sampling. If there are no faucets located on the well, then water from an outside faucet at the building is usually sampled. If there are no outside faucets available, then the water samples are collected from an inside faucet. The location of the sample is recorded in the field record.

The owner is interviewed to see if there is a chlorination system on the well, or if the well has been recently chlorinated. Recent chlorination could affect the laboratory detection limits. In most cases, the samples are preserved using sodium thiosulfate or ascorbic acid to remove the interactions of chlorine, which may be present in the samples.

If the well is treated with a Point-of-Entry (POE) treatment system, then the "raw" water sample must be collected before the treatment system. An associated treated water sample is usually collected as well to demonstrate effective treatment.

To purge stagnant water from the water supply well system, the faucet is allowed to run on full stream for a minimum of 15 minutes. The aerator is removed from the tap if one is present. Water removed from wells during purging is managed according to regulatory standards.

Water supply well samples are collected using appropriate laboratory prepared containers for each analysis. The analytical methods selected will vary with the contaminant of interest. To prevent cross-contamination of samples between wells, disposable nitrile gloves are worn by field personnel during purging and sampling and are changed between wells. It is possible that samples may be required at several places within the water supply system. The samples are collected accordingly and labeled to show the source and location sampled.

Supply well samples selected for laboratory analysis are immediately placed in properly prepared, laboratory supplied containers and packed in a cooler on ice, and chilled to approximately 4 degrees Celsius. Samples are maintained under standard chain-of-custody procedures from sample collection through laboratory analysis.

5.3 Surface Water Sampling

Surface water samples are obtained using several techniques including use of sample bailers, discrete depth interval samples, sample scoops, from boats, bridges, or wading into a stream. Caution should always be used when sampling surface water to ensure that the water collected is representative of the site conditions. Since stream or open water sampling is transient, careful documentation of the site conditions, weather, surface conditions, sediment, algal or biological material, etc. is required.

In many studies, additional samples from upstream and downstream of the desired sample point are required. Surface water sampling must be planned to reflect the site-specific conditions during sampling. The general procedures are similar to the supply well sampling procedures detailed above. Appropriate laboratory prepared containers are used for each analysis. The analytical methods selected will vary with the contaminant of interest.

To prevent cross-contamination of samples between samples, disposable nitrile gloves are worn by field personnel during purging and sampling and are changed between samples. It is possible that samples may be required at several places along the stream to check for influences of up-stream facilities. Samples will be collected accordingly and labeled to show the source and location sampled. Sample will always be collected upstream of the area disturbed by the person sampling the stream. Surface water samples selected for laboratory analysis are placed in properly prepared, laboratory supplied containers and immediately packed in a cooler on ice. Samples are maintained under strict control using standard chain-of-custody procedures through laboratory analysis.

6.0 Quality Assurance / Quality Control

The field and laboratory procedures listed above have been implemented on many sites with excellent results. The procedures are often verified by an appropriate use of the following environmental samples.

Trip Blanks (or Travel blanks)

The Trip Blank (or travel blanks) are often used to verify that the environmental samples are not impacted during shipping, and verify that the source of the glassware is not the source of contamination. The trip blanks are preserved de-ionized water, collected in the laboratory, and shipped with the sample containers to Pyramid or the site. The trip blank remains in the sample cooler and is shipped back to the laboratory with the environmental samples. The trip blank is most commonly analyzed for volatile organic compounds (VOCs), and correspond to the target analyses.

Field Blanks

Field Blanks are quality assurance samples which are collected in the field to represent the conditions present at the time the samples are collected. For water samples, the laboratory containers are opened and filled in the field using de-ionized (or distilled) water from a known source. The samples reflect any site conditions such as vapor sources which may affect the water samples. The samples then travel to the laboratory with the other samples for analysis. Comparison of the field blank results with the sample results may indicate a pervasive site constituent detected in the samples.

Equipment Blanks

Equipment Blanks are used to verify whether the decontamination procedures used for the sample equipment (or the new equipment) may have added any contaminants to the sample during collection. If a non-disposable sampling device is used (such as a sampling treir, scoop, hand auger, Teflon bailer, etc....), then the decontamination of the sampling device is usually verified using an equipment blank. The equipment blank is collected using de-ionized (or distilled) water from a known source. The equipment is decontaminated, allowed to air dry, the water is poured over (or through) the equipment, and a sample is collected in the appropriate sample containers. The equipment blank samples are preserved with the other environmental samples, and shipped for analyses for the target parameters.

Duplicate Samples

Duplicate Samples are used to verify the sampling procedures and evaluate laboratory analysis variability. The duplicate samples may be collected from soil, sediment, air, surface water, wastes, or groundwater. These samples are collected and sent to the laboratory as blind samples to have maximum effectiveness. Duplicate samples are generally analyzed for the same analytical methods as the actual environmental sample for direct comparison. Duplicate samples may also be split between two different laboratories to provide verification of laboratory detection limits or quality process verification.

Background Samples

Background Samples are a tool for comparison of general site conditions with source area site conditions. Background samples may be soil, sediment, air, surface water, waste, or groundwater. The goal is to reflect conditions outside the expected area of contamination. These samples are collected outside the expected area of contamination and sent to the laboratory for analyses. Background samples are generally analyzed for the same analytical methods as the source area environmental samples for direct comparison. Background samples for metals comparison are common types of background samples used in environmental investigations.

APPENDIX C

Photographs



1: Front view of existing building.



2: Rear and south views of building.



3: North side of building showing 5 of 10 roll-up doors.



4: In-ground hydraulic lifts on north side of shop.



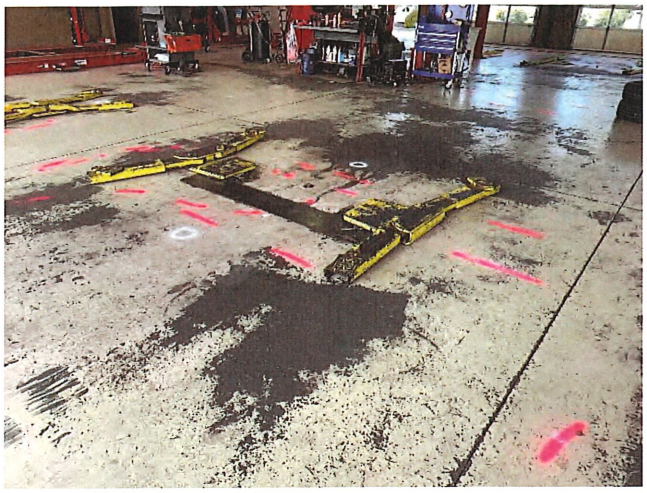
5: Example of single-post hydraulic lift (1 of 4).



6: Example of double-post hydraulic lift (1 of 4).



7: Single-post lift after underground lines were marked.



8: Double-post lift after lines were marked.



9: Soil boring B3 on north side of the shop.



10: Soil boring B4 on south side of shop.



11: Soil boring B7 on north side of the shop.



12: Soil boring B8 on south side of the shop.



13: Preparation for TW-1 installation.



14: Geoprobe drilling for TW-1 installation.



15: Installation of TW-1.



16: Completed temporary well (TW-1).

APPENDIX D

Laboratory Report for Soil Samples

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

May 28, 2020

Mr. Brett Higgins
Pyramid Environmental
P.O. Box 16265
503 Industrial Avenue
Greensboro, NC 27416

RE: Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Dear Mr. Higgins:

Enclosed are the analytical results for sample(s) received by the laboratory on May 14, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:
- Pace Analytical Services - Charlotte

This revision was issued on 5/28/20 to report EPH and 8270 on sample B3-8-10' as per client request.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A. Payne

Amanda Payne
amanda.payne@pacelabs.com
(704)875-9092
Project Manager

Enclosures

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Huntersville, NC 28078
(704)875-9092

CERTIFICATIONS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Pace Analytical Services Charlotte
9800 Kincey Ave. Ste 100, Huntersville, NC 28078
Louisiana/NELAP Certification # LA170028
North Carolina Drinking Water Certification #: 37706
North Carolina Field Services Certification #: 5342
North Carolina Wastewater Certification #: 12
South Carolina Certification #: 99006001
Florida/NELAP Certification #: E87627
Kentucky UST Certification #: 84
Virginia/VELAP Certification #: 460221

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

SAMPLE ANALYTE COUNT

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
92477681001	**B1 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681002	**B2 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681003	**B3 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		MADEP EPH	BAJ	7	PASI-C
		EPA 8270E	BPJ	75	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681004	**B4 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681005	**B5 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681006	**B6 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681007	**B7 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C
92477681008	**B8 - 8-10'**	EPA 8015C Modified	BAJ	2	PASI-C
		ASTM D2974-87	KDF	1	PASI-C

PASI-C = Pace Analytical Services - Charlotte

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Pace Analytical Services, LLC
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Huntersville, NC 28078
(704)875-9092

ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B1 - 8-10' **Lab ID: 92477681001** Collected: 05/13/20 12:00 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	ND	mg/kg	7.3	1	05/14/20 19:53	05/15/20 20:20		
Surrogates								
n-Pentacosane (S)	58	%	33-129	1	05/14/20 19:53	05/15/20 20:20	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**30.1**	%	0.10	1		05/14/20 17:01		

REPORT OF LABORATORY ANALYSIS

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Huntersville, NC 28078
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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B2 - 8-10' **Lab ID: 92477681002** Collected: 05/13/20 12:10 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	**75.7**	mg/kg	6.6	1	05/14/20 19:53	05/15/20 20:44		
Surrogates								
n-Pentacosane (S)	68	%	33-129	1	05/14/20 19:53	05/15/20 20:44	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**23.9**	%	0.10	1		05/14/20 17:01		

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(704)875-9092

ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B3 - 8-10' **Lab ID: 92477681003** Collected: 05/13/20 12:20 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	**1050**	mg/kg	28.3	5	05/14/20 19:53	05/18/20 10:28		
Surrogates								
n-Pentacosane (S)	275	%	33-129	5	05/14/20 19:53	05/18/20 10:28	629-99-2	S5
MADEP EPH NC Soil	Analytical Method: MADEP EPH Preparation Method: MADEP EPH Pace Analytical Services - Charlotte							
Aliphatic (C09-C18)	ND	mg/kg	113	10	05/21/20 15:46	05/26/20 09:27		N2
Aliphatic (C19-C36)	**318**	mg/kg	113	10	05/21/20 15:46	05/26/20 09:27		N2
Aromatic (C11-C22)	**223**	mg/kg	22.6	2	05/21/20 15:46	05/26/20 09:27		N2
Surrogates								
Nonatriacontane (S)	0	%	40-140	10	05/21/20 15:46	05/26/20 09:27	7194-86-7	S4
o-Terphenyl (S)	183	%	40-140	2	05/21/20 15:46	05/26/20 09:27	84-15-1	S5
2-Fluorobiphenyl (S)	156	%	40-140	2	05/21/20 15:46	05/26/20 09:27	321-60-8	S5
2-Bromonaphthalene (S)	188	%	40-140	2	05/21/20 15:46	05/26/20 09:27	580-13-2	S5
8270E MSSV Microwave	Analytical Method: EPA 8270E Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Acenaphthene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	83-32-9	
Acenaphthylene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	208-96-8	
Aniline	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	62-53-3	
Anthracene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	120-12-7	
Benzo(a)anthracene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	56-55-3	
Benzo(a)pyrene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	207-08-9	
Benzoic Acid	ND	ug/kg	1870	1	05/20/20 19:12	05/21/20 12:31	65-85-0	
Benzyl alcohol	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	101-55-3	
Butylbenzylphthalate	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	59-50-7	
4-Chloroaniline	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	111-44-4	
2-Chloronaphthalene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	91-58-7	
2-Chlorophenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	7005-72-3	
Chrysene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	53-70-3	
Dibenzofuran	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	132-64-9	
1,2-Dichlorobenzene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	120-83-2	

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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B3 - 8-10' **Lab ID: 92477681003** Collected: 05/13/20 12:20 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270E MSSV Microwave	Analytical Method: EPA 8270E Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diethylphthalate	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	105-67-9	
Dimethylphthalate	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	131-11-3	
Di-n-butylphthalate	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	534-52-1	v2
2,4-Dinitrophenol	ND	ug/kg	1870	1	05/20/20 19:12	05/21/20 12:31	51-28-5	v2
2,4-Dinitrotoluene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	606-20-2	
Di-n-octylphthalate	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	117-81-7	
Fluoranthene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	206-44-0	
Fluorene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	87-68-3	
Hexachlorobenzene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	77-47-4	v2
Hexachloroethane	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	193-39-5	
Isophorone	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	78-59-1	
1-Methylnaphthalene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	90-12-0	
2-Methylnaphthalene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	91-57-6	
2-Methylphenol(o-Cresol)	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	15831-10-4	
Naphthalene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	91-20-3	
2-Nitroaniline	ND	ug/kg	1870	1	05/20/20 19:12	05/21/20 12:31	88-74-4	
3-Nitroaniline	ND	ug/kg	1870	1	05/20/20 19:12	05/21/20 12:31	99-09-2	
4-Nitroaniline	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	100-01-6	
Nitrobenzene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	98-95-3	
2-Nitrophenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	88-75-5	
4-Nitrophenol	ND	ug/kg	1870	1	05/20/20 19:12	05/21/20 12:31	100-02-7	
N-Nitrosodimethylamine	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	62-75-9	
N-Nitroso-di-n-propylamine	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	86-30-6	
2,2'-Oxybis(1-chloropropane)	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	108-60-1	
Pentachlorophenol	ND	ug/kg	747	1	05/20/20 19:12	05/21/20 12:31	87-86-5	
Phenanthrene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	85-01-8	
Phenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	108-95-2	
Pyrene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	129-00-0	
Pyridine	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	110-86-1	
1,2,4-Trichlorobenzene	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	120-82-1	
2,4,5-Trichlorophenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	373	1	05/20/20 19:12	05/21/20 12:31	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	43	%	23-110	1	05/20/20 19:12	05/21/20 12:31	4165-60-0	
2-Fluorobiphenyl (S)	45	%	30-110	1	05/20/20 19:12	05/21/20 12:31	321-60-8	
Terphenyl-d14 (S)	53	%	28-110	1	05/20/20 19:12	05/21/20 12:31	1718-51-0	

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(704)875-9092

ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B3 - 8-10' **Lab ID: 92477681003** Collected: 05/13/20 12:20 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270E MSSV Microwave	Analytical Method: EPA 8270E Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Surrogates								
Phenol-d6 (S)	44	%	22-110	1	05/20/20 19:12	05/21/20 12:31	13127-88-3	
2-Fluorophenol (S)	43	%	13-110	1	05/20/20 19:12	05/21/20 12:31	367-12-4	
2,4,6-Tribromophenol (S)	47	%	27-110	1	05/20/20 19:12	05/21/20 12:31	118-79-6	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**11.6**	%	0.10	1		05/14/20 17:01		

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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B4 - 8-10' **Lab ID: 92477681004** Collected: 05/13/20 12:30 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	**16.2**	mg/kg	5.8	1	05/14/20 19:53	05/15/20 21:08		
Surrogates								
n-Pentacosane (S)	60	%	33-129	1	05/14/20 19:53	05/15/20 21:08	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**13.7**	%	0.10	1		05/14/20 17:02		

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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B5 - 8-10' **Lab ID: 92477681005** Collected: 05/13/20 12:40 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	ND	mg/kg	7.4	1	05/14/20 19:53	05/15/20 21:32		
Surrogates								
n-Pentacosane (S)	61	%	33-129	1	05/14/20 19:53	05/15/20 21:32	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**32.3**	%	0.10	1		05/14/20 17:02		

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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B6 - 8-10' **Lab ID: 92477681006** Collected: 05/13/20 12:50 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	**6.8**	mg/kg	6.3	1	05/14/20 19:53	05/15/20 21:32		
Surrogates								
n-Pentacosane (S)	51	%	33-129	1	05/14/20 19:53	05/15/20 21:32	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**21.0**	%	0.10	1		05/14/20 17:02		

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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B7 - 8-10' **Lab ID: 92477681007** Collected: 05/13/20 13:00 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	ND	mg/kg	7.6	1	05/14/20 19:53	05/15/20 21:56		
Surrogates								
n-Pentacosane (S)	63	%	33-129	1	05/14/20 19:53	05/15/20 21:56	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**32.9**	%	0.10	1		05/14/20 17:02		

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ANALYTICAL RESULTS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Sample: B8 - 8-10' **Lab ID: 92477681008** Collected: 05/13/20 13:10 Received: 05/14/20 14:14 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8015 GCS THC-Diesel	Analytical Method: EPA 8015C Modified Preparation Method: EPA 3546 Pace Analytical Services - Charlotte							
Diesel Range Organics(C10-C28)	ND	mg/kg	6.4	1	05/14/20 19:53	05/15/20 21:56		
Surrogates								
n-Pentacosane (S)	56	%	33-129	1	05/14/20 19:53	05/15/20 21:56	629-99-2	
Percent Moisture	Analytical Method: ASTM D2974-87 Pace Analytical Services - Charlotte							
Percent Moisture	**20.2**	%	0.10	1		05/14/20 17:02		

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

QC Batch: 541678
QC Batch Method: EPA 3546
Analysis Method: EPA 8015C Modified
Analysis Description: 8015 Solid GCSV
Laboratory: Pace Analytical Services - Charlotte
Associated Lab Samples: 92477681001, 92477681002, 92477681003, 92477681004, 92477681005, 92477681006, 92477681007, 92477681008

METHOD BLANK: 2886580 Matrix: Solid
Associated Lab Samples: 92477681001, 92477681002, 92477681003, 92477681004, 92477681005, 92477681006, 92477681007, 92477681008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Diesel Range Organics(C10-C28)	mg/kg	ND	4.9	05/15/20 09:59	
n-Pentacosane (S)	%	47	33-129	05/15/20 09:59	

LABORATORY CONTROL SAMPLE: 2886581

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diesel Range Organics(C10-C28)	mg/kg	66	38.6	58	43-130	
n-Pentacosane (S)	%			55	33-129	

MATRIX SPIKE SAMPLE: 2886582

Parameter	Units	92477651001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Diesel Range Organics(C10-C28)	mg/kg	95.5	81.5	215	146	10-130	M1
n-Pentacosane (S)	%				54	33-129	

SAMPLE DUPLICATE: 2886583

Parameter	Units	92477681001 Result	Dup Result	RPD	Qualifiers
Diesel Range Organics(C10-C28)	mg/kg	ND	ND		
n-Pentacosane (S)	%	58	56		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

QC Batch: 542741
QC Batch Method: EPA 3546
Analysis Method: EPA 8270E
Analysis Description: 8270E Solid MSSV Microwave
Laboratory: Pace Analytical Services - Charlotte

Associated Lab Samples: 92477681003

METHOD BLANK: 2891438 Matrix: Solid
Associated Lab Samples: 92477681003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	ND	331	05/21/20 11:37	
1,2-Dichlorobenzene	ug/kg	ND	331	05/21/20 11:37	
1,3-Dichlorobenzene	ug/kg	ND	331	05/21/20 11:37	
1,4-Dichlorobenzene	ug/kg	ND	331	05/21/20 11:37	
1-Methylnaphthalene	ug/kg	ND	331	05/21/20 11:37	
2,2'-Oxybis(1-chloropropane)	ug/kg	ND	331	05/21/20 11:37	
2,4,5-Trichlorophenol	ug/kg	ND	331	05/21/20 11:37	
2,4,6-Trichlorophenol	ug/kg	ND	331	05/21/20 11:37	
2,4-Dichlorophenol	ug/kg	ND	331	05/21/20 11:37	
2,4-Dimethylphenol	ug/kg	ND	331	05/21/20 11:37	
2,4-Dinitrophenol	ug/kg	ND	1660	05/21/20 11:37	v2
2,4-Dinitrotoluene	ug/kg	ND	331	05/21/20 11:37	
2,6-Dinitrotoluene	ug/kg	ND	331	05/21/20 11:37	
2-Chloronaphthalene	ug/kg	ND	331	05/21/20 11:37	
2-Chlorophenol	ug/kg	ND	331	05/21/20 11:37	
2-Methylnaphthalene	ug/kg	ND	331	05/21/20 11:37	
2-Methylphenol(o-Cresol)	ug/kg	ND	331	05/21/20 11:37	
2-Nitroaniline	ug/kg	ND	1660	05/21/20 11:37	
2-Nitrophenol	ug/kg	ND	331	05/21/20 11:37	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	331	05/21/20 11:37	
3,3'-Dichlorobenzidine	ug/kg	ND	662	05/21/20 11:37	
3-Nitroaniline	ug/kg	ND	1660	05/21/20 11:37	
4,6-Dinitro-2-methylphenol	ug/kg	ND	662	05/21/20 11:37	v2
4-Bromophenylphenyl ether	ug/kg	ND	331	05/21/20 11:37	
4-Chloro-3-methylphenol	ug/kg	ND	662	05/21/20 11:37	
4-Chloroaniline	ug/kg	ND	662	05/21/20 11:37	
4-Chlorophenylphenyl ether	ug/kg	ND	331	05/21/20 11:37	
4-Nitroaniline	ug/kg	ND	662	05/21/20 11:37	
4-Nitrophenol	ug/kg	ND	1660	05/21/20 11:37	
Acenaphthene	ug/kg	ND	331	05/21/20 11:37	
Acenaphthylene	ug/kg	ND	331	05/21/20 11:37	
Aniline	ug/kg	ND	331	05/21/20 11:37	
Anthracene	ug/kg	ND	331	05/21/20 11:37	
Benzo(a)anthracene	ug/kg	ND	331	05/21/20 11:37	
Benzo(a)pyrene	ug/kg	ND	331	05/21/20 11:37	
Benzo(b)fluoranthene	ug/kg	ND	331	05/21/20 11:37	
Benzo(g,h,i)perylene	ug/kg	ND	331	05/21/20 11:37	
Benzo(k)fluoranthene	ug/kg	ND	331	05/21/20 11:37	
Benzoic Acid	ug/kg	ND	1660	05/21/20 11:37	
Benzyl alcohol	ug/kg	ND	662	05/21/20 11:37	

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(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

METHOD BLANK: 2891438 Matrix: Solid
Associated Lab Samples: 92477681003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
bis(2-Chloroethoxy)methane	ug/kg	ND	331	05/21/20 11:37	
bis(2-Chloroethyl) ether	ug/kg	ND	331	05/21/20 11:37	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	331	05/21/20 11:37	
Butylbenzylphthalate	ug/kg	ND	331	05/21/20 11:37	
Chrysene	ug/kg	ND	331	05/21/20 11:37	
Di-n-butylphthalate	ug/kg	ND	331	05/21/20 11:37	
Di-n-octylphthalate	ug/kg	ND	331	05/21/20 11:37	
Dibenz(a,h)anthracene	ug/kg	ND	331	05/21/20 11:37	
Dibenzofuran	ug/kg	ND	331	05/21/20 11:37	
Diethylphthalate	ug/kg	ND	331	05/21/20 11:37	
Dimethylphthalate	ug/kg	ND	331	05/21/20 11:37	
Fluoranthene	ug/kg	ND	331	05/21/20 11:37	
Fluorene	ug/kg	ND	331	05/21/20 11:37	
Hexachloro-1,3-butadiene	ug/kg	ND	331	05/21/20 11:37	
Hexachlorobenzene	ug/kg	ND	331	05/21/20 11:37	
Hexachlorocyclopentadiene	ug/kg	ND	331	05/21/20 11:37	v2
Hexachloroethane	ug/kg	ND	331	05/21/20 11:37	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	331	05/21/20 11:37	
Isophorone	ug/kg	ND	331	05/21/20 11:37	
N-Nitroso-di-n-propylamine	ug/kg	ND	331	05/21/20 11:37	
N-Nitrosodimethylamine	ug/kg	ND	331	05/21/20 11:37	
N-Nitrosodiphenylamine	ug/kg	ND	331	05/21/20 11:37	
Naphthalene	ug/kg	ND	331	05/21/20 11:37	
Nitrobenzene	ug/kg	ND	331	05/21/20 11:37	
Pentachlorophenol	ug/kg	ND	662	05/21/20 11:37	
Phenanthrene	ug/kg	ND	331	05/21/20 11:37	
Phenol	ug/kg	ND	331	05/21/20 11:37	
Pyrene	ug/kg	ND	331	05/21/20 11:37	
Pyridine	ug/kg	ND	331	05/21/20 11:37	
2,4,6-Tribromophenol (S)	%	75	27-110	05/21/20 11:37	
2-Fluorobiphenyl (S)	%	70	30-110	05/21/20 11:37	
2-Fluorophenol (S)	%	70	13-110	05/21/20 11:37	
Nitrobenzene-d5 (S)	%	75	23-110	05/21/20 11:37	
Phenol-d6 (S)	%	73	22-110	05/21/20 11:37	
Terphenyl-d14 (S)	%	89	28-110	05/21/20 11:37	

LABORATORY CONTROL SAMPLE: 2891439

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	1680	1470	87	52-130	
1,2-Dichlorobenzene	ug/kg	1680	1410	84	51-130	
1,3-Dichlorobenzene	ug/kg	1680	1390	83	50-130	
1,4-Dichlorobenzene	ug/kg	1680	1440	86	49-130	
1-Methylnaphthalene	ug/kg	1680	1480	88	55-130	

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

LABORATORY CONTROL SAMPLE: 2891439

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,2'-Oxybis(1-chloropropane)	ug/kg	1680	1350	81	30-130	
2,4,5-Trichlorophenol	ug/kg	1680	1630	97	55-130	
2,4,6-Trichlorophenol	ug/kg	1680	1650	98	57-130	
2,4-Dichlorophenol	ug/kg	1680	1590	95	56-130	
2,4-Dimethylphenol	ug/kg	1680	1510	90	51-130	
2,4-Dinitrophenol	ug/kg	8390	4840	58	27-133	v3
2,4-Dinitrotoluene	ug/kg	1680	1680	100	61-130	
2,6-Dinitrotoluene	ug/kg	1680	1620	97	60-130	
2-Chloronaphthalene	ug/kg	1680	1520	91	52-130	
2-Chlorophenol	ug/kg	1680	1500	89	54-130	
2-Methylnaphthalene	ug/kg	1680	1530	91	54-130	
2-Methylphenol(o-Cresol)	ug/kg	1680	1540	92	51-130	
2-Nitroaniline	ug/kg	3360	3230	96	51-130	
2-Nitrophenol	ug/kg	1680	1430	86	49-130	
3&4-Methylphenol(m&p Cresol)	ug/kg	1680	1590	95	11-163	
3,3'-Dichlorobenzidine	ug/kg	3360	3180	95	10-132	
3-Nitroaniline	ug/kg	3360	2950	88	55-130	
4,6-Dinitro-2-methylphenol	ug/kg	3360	2200	66	47-142	v3
4-Bromophenylphenyl ether	ug/kg	1680	1680	100	59-130	
4-Chloro-3-methylphenol	ug/kg	3360	3280	98	55-130	
4-Chloroaniline	ug/kg	3360	3050	91	54-130	
4-Chlorophenylphenyl ether	ug/kg	1680	1680	100	58-130	
4-Nitroaniline	ug/kg	3360	3070	91	54-130	
4-Nitrophenol	ug/kg	8390	8520	102	48-130	
Acenaphthene	ug/kg	1680	1540	92	60-130	
Acenaphthylene	ug/kg	1680	1550	93	60-130	
Aniline	ug/kg	1680	1410	84	43-130	
Anthracene	ug/kg	1680	1570	93	63-130	
Benzo(a)anthracene	ug/kg	1680	1620	96	59-130	
Benzo(a)pyrene	ug/kg	1680	1640	98	57-130	
Benzo(b)fluoranthene	ug/kg	1680	1730	103	54-130	
Benzo(g,h,i)perylene	ug/kg	1680	1660	99	59-130	
Benzo(k)fluoranthene	ug/kg	1680	1600	95	54-130	
Benzoic Acid	ug/kg	8390	5830	70	19-130	
Benzyl alcohol	ug/kg	3360	3080	92	50-130	
bis(2-Chloroethoxy)methane	ug/kg	1680	1410	84	54-130	
bis(2-Chloroethyl) ether	ug/kg	1680	1370	81	48-130	
bis(2-Ethylhexyl)phthalate	ug/kg	1680	1570	94	45-134	
Butylbenzylphthalate	ug/kg	1680	1520	91	46-138	
Chrysene	ug/kg	1680	1570	93	58-130	
Di-n-butylphthalate	ug/kg	1680	1640	98	60-130	
Di-n-octylphthalate	ug/kg	1680	1480	88	53-130	
Dibenz(a,h)anthracene	ug/kg	1680	1660	99	59-130	
Dibenzofuran	ug/kg	1680	1580	94	60-130	
Diethylphthalate	ug/kg	1680	1640	98	60-130	
Dimethylphthalate	ug/kg	1680	1640	98	60-130	
Fluoranthene	ug/kg	1680	1630	97	65-130	

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

LABORATORY CONTROL SAMPLE: 2891439

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluorene	ug/kg	1680	1670	100	63-130	
Hexachloro-1,3-butadiene	ug/kg	1680	1470	88	46-130	
Hexachlorobenzene	ug/kg	1680	1640	98	58-130	
Hexachlorocyclopentadiene	ug/kg	1680	582	35	23-130	v3
Hexachloroethane	ug/kg	1680	1310	78	47-130	
Indeno(1,2,3-cd)pyrene	ug/kg	1680	1700	101	60-130	
Isophorone	ug/kg	1680	1470	88	49-130	
N-Nitroso-di-n-propylamine	ug/kg	1680	1500	89	47-130	
N-Nitrosodimethylamine	ug/kg	1680	1330	80	45-130	
N-Nitrosodiphenylamine	ug/kg	1680	1550	93	59-130	
Naphthalene	ug/kg	1680	1460	87	55-130	
Nitrobenzene	ug/kg	1680	1450	87	49-130	
Pentachlorophenol	ug/kg	3360	3700	110	10-132	
Phenanthrene	ug/kg	1680	1600	95	62-130	
Phenol	ug/kg	1680	1540	92	46-130	
Pyrene	ug/kg	1680	1560	93	53-130	
Pyridine	ug/kg	1680	1140	68	37-130	
2,4,6-Tribromophenol (S)	%			97	27-110	
2-Fluorobiphenyl (S)	%			78	30-110	
2-Fluorophenol (S)	%			78	13-110	
Nitrobenzene-d5 (S)	%			76	23-110	
Phenol-d6 (S)	%			81	22-110	
Terphenyl-d14 (S)	%			95	28-110	

MATRIX SPIKE SAMPLE: 2891440

Parameter	Units	92477681003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	ND	1910	991	52	18-130	
1,2-Dichlorobenzene	ug/kg	ND	1910	944	49	14-130	
1,3-Dichlorobenzene	ug/kg	ND	1910	932	49	12-130	
1,4-Dichlorobenzene	ug/kg	ND	1910	972	51	10-130	
1-Methylnaphthalene	ug/kg	ND	1910	937	49	12-130	
2,2'-Oxybis(1-chloropropane)	ug/kg	ND	1910	914	48	10-130	
2,4,5-Trichlorophenol	ug/kg	ND	1910	1070	56	13-130	
2,4,6-Trichlorophenol	ug/kg	ND	1910	1080	57	17-130	
2,4-Dichlorophenol	ug/kg	ND	1910	1080	57	10-130	
2,4-Dimethylphenol	ug/kg	ND	1910	1040	55	10-130	
2,4-Dinitrophenol	ug/kg	ND	9560	2800	29	10-130	v3
2,4-Dinitrotoluene	ug/kg	ND	1910	973	51	24-130	
2,6-Dinitrotoluene	ug/kg	ND	1910	1030	54	23-130	
2-Chloronaphthalene	ug/kg	ND	1910	984	51	19-130	
2-Chlorophenol	ug/kg	ND	1910	1030	54	10-130	
2-Methylnaphthalene	ug/kg	ND	1910	965	50	18-130	
2-Methylphenol(o-Cresol)	ug/kg	ND	1910	1020	54	10-130	
2-Nitroaniline	ug/kg	ND	3820	2150	56	17-130	

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

MATRIX SPIKE SAMPLE: 2891440

Parameter	Units	92477681003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
2-Nitrophenol	ug/kg	ND	1910	1020	53	10-130	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	1910	1050	55	10-130	
3,3'-Dichlorobenzidine	ug/kg	ND	3820	1970	52	10-130	
3-Nitroaniline	ug/kg	ND	3820	1970	52	24-130	
4,6-Dinitro-2-methylphenol	ug/kg	ND	3820	1320	34	10-152	v3
4-Bromophenylphenyl ether	ug/kg	ND	1910	1090	57	29-130	
4-Chloro-3-methylphenol	ug/kg	ND	3820	2130	56	17-130	
4-Chloroaniline	ug/kg	ND	3820	2150	56	14-130	
4-Chlorophenylphenyl ether	ug/kg	ND	1910	990	52	25-130	
4-Nitroaniline	ug/kg	ND	3820	2220	58	22-130	
4-Nitrophenol	ug/kg	ND	9560	5480	57	10-130	
Acenaphthene	ug/kg	ND	1910	991	52	20-130	
Acenaphthylene	ug/kg	ND	1910	989	52	25-130	
Aniline	ug/kg	ND	1910	1030	54	10-130	
Anthracene	ug/kg	ND	1910	993	52	29-130	
Benzo(a)anthracene	ug/kg	ND	1910	1010	53	19-130	
Benzo(a)pyrene	ug/kg	ND	1910	1020	53	12-130	
Benzo(b)fluoranthene	ug/kg	ND	1910	1020	53	14-130	
Benzo(g,h,i)perylene	ug/kg	ND	1910	1030	54	10-130	
Benzo(k)fluoranthene	ug/kg	ND	1910	998	52	14-130	
Benzoic Acid	ug/kg	ND	9560	4270	45	10-130	
Benzyl alcohol	ug/kg	ND	3820	2050	54	13-130	
bis(2-Chloroethoxy)methane	ug/kg	ND	1910	992	52	16-130	
bis(2-Chloroethyl) ether	ug/kg	ND	1910	935	49	11-130	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	1910	876	44	21-130	
Butylbenzylphthalate	ug/kg	ND	1910	723	38	23-130	
Chrysene	ug/kg	ND	1910	983	51	22-130	
Di-n-butylphthalate	ug/kg	ND	1910	955	50	30-130	
Di-n-octylphthalate	ug/kg	ND	1910	855	45	23-142	
Dibenz(a,h)anthracene	ug/kg	ND	1910	998	52	10-130	
Dibenzofuran	ug/kg	ND	1910	969	51	24-130	
Diethylphthalate	ug/kg	ND	1910	954	50	26-130	
Dimethylphthalate	ug/kg	ND	1910	1090	57	22-130	
Fluoranthene	ug/kg	ND	1910	1160	61	33-130	
Fluorene	ug/kg	ND	1910	1020	53	22-130	
Hexachloro-1,3-butadiene	ug/kg	ND	1910	1010	53	13-130	
Hexachlorobenzene	ug/kg	ND	1910	1110	58	29-130	
Hexachlorocyclopentadiene	ug/kg	ND	1910	341J	18	10-130	v3
Hexachloroethane	ug/kg	ND	1910	862	45	10-130	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	1910	1030	54	10-130	
Isophorone	ug/kg	ND	1910	1030	54	13-130	
N-Nitroso-di-n-propylamine	ug/kg	ND	1910	999	52	12-130	
N-Nitrosodimethylamine	ug/kg	ND	1910	967	51	11-130	
N-Nitrosodiphenylamine	ug/kg	ND	1910	990	52	15-130	
Naphthalene	ug/kg	ND	1910	979	51	15-130	
Nitrobenzene	ug/kg	ND	1910	1030	54	12-130	
Pentachlorophenol	ug/kg	ND	3820	2410	63	10-130	

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

MATRIX SPIKE SAMPLE: 2891440

Parameter	Units	92477681003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/kg	ND	1910	1030	54	27-130	
Phenol	ug/kg	ND	1910	1040	54	10-130	
Pyrene	ug/kg	ND	1910	877	46	19-130	
Pyridine	ug/kg	ND	1910	865	45	10-130	
2,4,6-Tribromophenol (S)	%				59	27-110	
2-Fluorobiphenyl (S)	%				50	30-110	
2-Fluorophenol (S)	%				50	13-110	
Nitrobenzene-d5 (S)	%				49	23-110	
Phenol-d6 (S)	%				49	22-110	
Terphenyl-d14 (S)	%				53	28-110	

SAMPLE DUPLICATE: 2891441

Parameter	Units	92477681003 Result	Dup Result	RPD	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	ND	ND		
1,2-Dichlorobenzene	ug/kg	ND	ND		
1,3-Dichlorobenzene	ug/kg	ND	ND		
1,4-Dichlorobenzene	ug/kg	ND	ND		
1-Methylnaphthalene	ug/kg	ND	ND		
2,2'-Oxybis(1-chloropropane)	ug/kg	ND	ND		
2,4,5-Trichlorophenol	ug/kg	ND	ND		
2,4,6-Trichlorophenol	ug/kg	ND	ND		
2,4-Dichlorophenol	ug/kg	ND	ND		
2,4-Dimethylphenol	ug/kg	ND	ND		
2,4-Dinitrophenol	ug/kg	ND	ND		v2
2,4-Dinitrotoluene	ug/kg	ND	ND		
2,6-Dinitrotoluene	ug/kg	ND	ND		
2-Chloronaphthalene	ug/kg	ND	ND		
2-Chlorophenol	ug/kg	ND	ND		
2-Methylnaphthalene	ug/kg	ND	ND		
2-Methylphenol(o-Cresol)	ug/kg	ND	ND		
2-Nitroaniline	ug/kg	ND	ND		
2-Nitrophenol	ug/kg	ND	ND		
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	ND		
3,3'-Dichlorobenzidine	ug/kg	ND	ND		
3-Nitroaniline	ug/kg	ND	ND		
4,6-Dinitro-2-methylphenol	ug/kg	ND	ND		v2
4-Bromophenylphenyl ether	ug/kg	ND	ND		
4-Chloro-3-methylphenol	ug/kg	ND	ND		
4-Chloroaniline	ug/kg	ND	ND		
4-Chlorophenylphenyl ether	ug/kg	ND	ND		
4-Nitroaniline	ug/kg	ND	ND		
4-Nitrophenol	ug/kg	ND	ND		
Acenaphthene	ug/kg	ND	ND		
Acenaphthylene	ug/kg	ND	ND		

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QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

SAMPLE DUPLICATE: 2891441

Parameter	Units	92477681003 Result	Dup Result	RPD	Qualifiers
Aniline	ug/kg	ND	ND		
Anthracene	ug/kg	ND	ND		
Benzo(a)anthracene	ug/kg	ND	ND		
Benzo(a)pyrene	ug/kg	ND	ND		
Benzo(b)fluoranthene	ug/kg	ND	ND		
Benzo(g,h,i)perylene	ug/kg	ND	ND		
Benzo(k)fluoranthene	ug/kg	ND	ND		
Benzoic Acid	ug/kg	ND	ND		
Benzyl alcohol	ug/kg	ND	ND		
bis(2-Chloroethoxy)methane	ug/kg	ND	ND		
bis(2-Chloroethyl) ether	ug/kg	ND	ND		
bis(2-Ethylhexyl)phthalate	ug/kg	ND	ND		
Butylbenzylphthalate	ug/kg	ND	ND		
Chrysene	ug/kg	ND	ND		
Di-n-butylphthalate	ug/kg	ND	ND		
Di-n-octylphthalate	ug/kg	ND	ND		
Dibenz(a,h)anthracene	ug/kg	ND	ND		
Dibenzofuran	ug/kg	ND	ND		
Diethylphthalate	ug/kg	ND	ND		
Dimethylphthalate	ug/kg	ND	ND		
Fluoranthene	ug/kg	ND	ND		
Fluorene	ug/kg	ND	ND		
Hexachloro-1,3-butadiene	ug/kg	ND	ND		
Hexachlorobenzene	ug/kg	ND	ND		
Hexachlorocyclopentadiene	ug/kg	ND	ND		v2
Hexachloroethane	ug/kg	ND	ND		
Indeno(1,2,3-cd)pyrene	ug/kg	ND	ND		
Isophorone	ug/kg	ND	ND		
N-Nitroso-di-n-propylamine	ug/kg	ND	ND		
N-Nitrosodimethylamine	ug/kg	ND	ND		
N-Nitrosodiphenylamine	ug/kg	ND	ND		
Naphthalene	ug/kg	ND	ND		
Nitrobenzene	ug/kg	ND	ND		
Pentachlorophenol	ug/kg	ND	ND		
Phenanthrene	ug/kg	ND	ND		
Phenol	ug/kg	ND	ND		
Pyrene	ug/kg	ND	ND		
Pyridine	ug/kg	ND	ND		
2,4,6-Tribromophenol (S)	%	47	48		
2-Fluorobiphenyl (S)	%	45	32		
2-Fluorophenol (S)	%	43	44		
Nitrobenzene-d5 (S)	%	43	43		
Phenol-d6 (S)	%	44	43		
Terphenyl-d14 (S)	%	53	57		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

QC Batch: 542932
QC Batch Method: MADEP EPH
Analysis Method: MADEP EPH
Analysis Description: MADEP EPH NC Soil
Laboratory: Pace Analytical Services - Charlotte

Associated Lab Samples: 92477681003

METHOD BLANK: 2892280 Matrix: Solid
Associated Lab Samples: 92477681003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aliphatic (C09-C18)	mg/kg	ND	10.1	05/22/20 15:39	N2
Aliphatic (C19-C36)	mg/kg	ND	10.1	05/22/20 15:39	N2
Aromatic (C11-C22)	mg/kg	ND	10.1	05/22/20 15:39	N2
2-Bromonaphthalene (S)	%	97	40-140	05/22/20 15:39	
2-Fluorobiphenyl (S)	%	97	40-140	05/22/20 15:39	
Nonatriacontane (S)	%	65	40-140	05/22/20 15:39	
o-Terphenyl (S)	%	80	40-140	05/22/20 15:39	

LABORATORY CONTROL SAMPLE & LCSD: 2892281 2892282

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Aliphatic (C09-C18)	mg/kg	10	ND	ND	47	45	40-140		50	N2
Aliphatic (C19-C36)	mg/kg	13.3	ND	ND	60	48	40-140		50	N2
Aromatic (C11-C22)	mg/kg	28.3	20.7	15.0	73	53	40-140	32	50	N2
2-Bromonaphthalene (S)	%				106	88	40-140			
2-Fluorobiphenyl (S)	%				104	85	40-140			
Nonatriacontane (S)	%				45	42	40-140			
o-Terphenyl (S)	%				83	55	40-140			

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

QC Batch: 541656
QC Batch Method: ASTM D2974-87
Analysis Method: ASTM D2974-87
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Charlotte
Associated Lab Samples: 92477681001, 92477681002, 92477681003, 92477681004, 92477681005, 92477681006, 92477681007, 92477681008

SAMPLE DUPLICATE: 2886494

Parameter	Units	92477458003 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	26.9	27.0	1	

SAMPLE DUPLICATE: 2886495

Parameter	Units	92477681008 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	20.2	21.1	4	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALIFIERS

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.
S5	Surrogate recovery outside control limits due to matrix interferences (not confirmed by re-analysis).
v2	The continuing calibration verification was below the method acceptance limit. The analyte was not detected in the associated samples and the sensitivity of the instrument was verified with a reporting limit check standard.
v3	The continuing calibration verification was below the method acceptance limit. Any detection for the analyte in the associated samples may have low bias.

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Oak Hollow Tire 2020-119
Pace Project No.: 92477681

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92477681001	**B1 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681002	**B2 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681003	**B3 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681004	**B4 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681005	**B5 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681006	**B6 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681007	**B7 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681008	**B8 - 8-10'**	EPA 3546	541678	EPA 8015C Modified	541755
92477681003	**B3 - 8-10'**	MADEP EPH	542932	MADEP EPH	543183
92477681003	**B3 - 8-10'**	EPA 3546	542741	EPA 8270E	542822
92477681001	**B1 - 8-10'**	ASTM D2974-87	541656		
92477681002	**B2 - 8-10'**	ASTM D2974-87	541656		
92477681003	**B3 - 8-10'**	ASTM D2974-87	541656		
92477681004	**B4 - 8-10'**	ASTM D2974-87	541656		
92477681005	**B5 - 8-10'**	ASTM D2974-87	541656		
92477681006	**B6 - 8-10'**	ASTM D2974-87	541656		
92477681007	**B7 - 8-10'**	ASTM D2974-87	541656		
92477681008	**B8 - 8-10'**	ASTM D2974-87	541656		

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Pace Analytical®	Document Name: Sample Condition Upon Receipt(SCUR)	Document Revised: February 7, 2018 Page 1 of 2
	Document No.: F-CAR-CS-033-Rev.06	Issuing Authority: Pace Carolinas Quality Office

Laboratory receiving samples:
Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☑ Raleigh ☐ Mechanicsville ☐

Sample Condition Upon Receipt

Client Name: PyraMid Environmental Project

WO# : 92477681

92477681

Courier: ☐ Commercial ☑ Fed Ex ☐ UPS ☐ USPS ☑ Pace ☐ Client ☐ Other:____

Custody Seal Present? ☐ Yes ☑ No Seals Intact? ☐ Yes ☑ No

Date/Initials Person Examining Contents: EM 5-19-20

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Thermometer: ☑ IR Gun ID: 92T061 Type of Ice: ☑ Wet ☐ Blue ☐ None

Cooler Temp (°C): 0.9 Correction Factor: Add/Subtract (°C) +0.1

Cooler Temp Corrected (°C): 3.0

Temp should be above freezing to 6°C
☐ Samples out of temp criteria. Samples on ice, cooling process has begun

USDA Regulated Soil (☑ N/A, water sample)
Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☐ Yes	☐ No	☑ N/A	8.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	9.
-Includes Date/Time/ID/Analysis Matrix: SL				
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY

Field Data Required? ☐ Yes ☐ No

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ Date: _____

Project Manager SRF Review: _____ Date: _____

***Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.**

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

****Bottom half of box is to list number of bottle**

Project: WO#: 92477681

PM: AP Due Date: 05/29/20

CLIENT: 92-Pyramid

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4C-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	AG3A(DG3A)-250 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unp (N/A)	DG9P-40 mL VOA H3PO4 (N/A)	VOAK (6 vials per kit)-5035 kit (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3A-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved vials (N/A)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
1									3																				
2									3																				
3									3																				
4									3																				
5									3																				
6									3																				
7									3																				
8									3																				
9																													
10																													
11																													
12																													

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Pyramid Environmental	Report To:	Brett Higgins	Attention:	
Address:	503 Industrial Avenue	Copy To:		Company Name:	Pyramid Environmental
	Greensboro, NC 27406			Address:	SAME
Email To:	brett@pyramidenvironmental.com	Purchase Order #:	2020-119	Pace Quote:	
Phone:	336-335-3174 Fax: 336-691-0648	Project Name:	Oak Hollow Tire	Pace Project Manager:	Amanda Payne
Requested Due Date:	6-9 business days	Project Number:	2020-119	Pace Profile #:	

Regulatory Agency

State / Location

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Requested Analysis Filtered (Y/N): EPA 3550 - DRO	EPH - HOLD	8270 - HOLD	Residual Chlorine (Y/N)	92477681
1	B1 - 8-10'	SL	G			5/13/2020	12:00		3	X									X	X	X		001
2	B2 - 8-10'	SL	G			5/13/2020	12:10		3	X									X	X	X		002
3	B3 - 8-10'	SL	G			5/13/2020	12:20		3	X									X	X	X		003
4	B4 - 8-10'	SL	G			5/13/2020	12:30		3	X									X	X	X		004
5	B5 - 8-10'	SL	G			5/13/2020	12:40		3	X									X	X	X		005
6	B6 - 8-10'	SL	G			5/13/2020	12:50		3	X									X	X	X		006
7	B7 - 8-10'	SL	G			5/13/2020	13:00		3	X									X	X	X		007
8	B8 - 8-10'	SL	G			5/13/2020	13:10		3	X									X	X	X		008
9																							
10																							
11																							
12																							

MATRIX CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
NC Trust Fund Rates	Brett Higgins / Pyramid PM	5/13/2020	3:30 PM		5/14/20	941				
Analyze all samples for EPA 3550 - DRO and place EPH & 8270		5/14/20	1414	Estuck Dawsey/Pace	5/14/20	1414	2.9	Y	N	Y
analyses on hold. If DRO concentrations are detected, analyze										
the sample with the highest concentration if > or = to 50 mg/kg										

SAMPLER NAME AND SIGNATURE		TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:	Brett S. Higgins				
SIGNATURE of SAMPLER:	DATE Signed: 5/13/2020				

APPENDIX E

UST-61 Form (24-Hour Release Notification)

UST-61 — 24-Hour Release and UST Leak Reporting Form.

For Releases in NC

This form should be completed and submitted to the UST Section's regional office following a known or suspected release from an underground storage tank (UST) system. This form is required to be submitted within 24 hours of discovery of a known or suspected release

(DWM USE ONLY)
Incident # _____ Risk (H,I,L,U)_____
Received On _____ Received By _____
Reported by (*circle one*): Phone, Fax or Report
Region _____

Suspected Contamination? (Y/N) _____
Confirmed GW Contamination? (Y/N) N
Confirmed Soil Contamination ?(Y/N) Y
Samples Taken?(Y/N) Y
Free Product? (Y/N) N If Yes, State Greatest Thickness NA

Facility ID Number NA
Date Leak Discovered 5/20/20
Comm/Non-Commercial? Non-Comm
Reg/Non-regulated? Non-Reg.

INCIDENT DESCRIPTION

Incident Name: Oak Hollow Tire

Address: 2410 Eastchester Drive | County: Guilford

City/Town: High Point | Zip Code: 27265 | Regional Office (*circle one*): Asheville, Mooresville, Fayetteville, Raleigh, Washington, Wilmington, (Winston-Salem)

Latitude (decimal degrees): 36.025470 Longitude (decimal degrees) : -79.971374

Obtained by:
- ☐ GPS
- ☐ Topographic map
- ☐ GIS Address matching
- ☐ Other
- ☐ Unknown

Describe location: Google Earth

Briefly describe suspected or confirmed release: *(including but not limited to: nature of release, date of release, amount of release, amount of free product present and recovery efforts, initial responses conducted, impacts to receptors)*

On May 13, 2020 Pyramid supervised the installation of 8 soil borings at the subject property to investigate 8 in-ground hydraulic vehicle lifts in the auto maintenance shop. Eight soil samples were collected and analyzed for Diesel Range Organics (DRO) using the EPA 3550/8015C. The lab results received on 5/20/20 indicated 1,050 mg/kg DRO for B3-8-10'. The risk-based lab results for B3-8-10' indicated 223 mg/kg for C11-C22 aromatics which exceeds the soil-to-gw MSCCs. No other concentrations were detected that exceed the soil-to-gw or residential MSCCs.

HOW RELEASE WAS DISCOVERED (Release Code)

(Check one)

- ☐ Release Detection Equipment or Methods
- ☐ During UST Closure/Removal
- ☒ Property Transfer
- ☐ Visual/Odor
- ☐ Water in Tank
- ☐ Water Supply Well Contamination
- ☐ Groundwater Contamination
- ☐ Surface Water Contamination
- ☐ Other (specify) _____

SOURCE OF CONTAMINATION

Source of Release *(Check one to indicate primary source)*
- ☐ Tank
- ☐ Piping
- ☐ Dispenser
- ☐ Submersible Turbine Pump
- ☐ Delivery Problem
- ☒ Other
- ☐ Unknown

Definitions presented on reverse

Cause of Release *(Check one to indicate primary cause)*
- ☐ Spill
- ☐ Overfill
- ☐ Corrosion
- ☐ Physical or Mechanical Damage
- ☐ Install Problem
- ☐ Other
- ☒ Unknown

Definitions presented on reverse

Type of Release *(Check one)*
- ☒ Petroleum
- ☐ Non-Petroleum
- ☐ Both

Location *(Check one)*
- ☒ Facility
- ☐ Residence
- ☐ Other

Product Type Released *(Check one to indicate primary product type released)*
- ☐ Gasoline/ Diesel/ Kerosene
- ☐ Heating Oil
- ☒ Other Petroleum Products
- ☐ Metals
- ☐ Other Inorganics
- ☐ Other Organics
- ☐ Diesel/Veg. Oil Blend
- ☐ Vegetable Oil 100%
- ☐ E10 – E20
- ☐ E21 – E84
- ☐ E85 – E99
- ☐ Ethanol 100%
- ☐ E01 – E09

Ownership
1. Municipal 2. Military 3. Unknown (4. Private) 5. Federal 6. County 7. State

Operation Type
1. Public Service 2. Agricultural 3. Residential 4. Education/Relig. 5. Industrial (6. Commercial) 7. Mining

IMPACT ON DRINKING WATER SUPPLIES

Water Supply Wells Affected? 1. Yes (2. No) 3. Unknown

Number of Water Supply Wells Affected None

Water Supply Wells Contaminated: (*Include Users Names, Addresses and Phone Numbers. Attach additional sheet if necessary*)

1.
2.
3.

UST SYSTEM OWNER

UST Owner/Company			
Ronald Eugene Bridges / Oak Hollow Tire			
Point of Contact: Ronald Eugene Bridges		Address: 2410 Eastchester Drive	
City: 2410 Eastchester Drive	State: NC	Zip Code: 27265	Telephone Number: 336-707-1084

UST SYSTEM OPERATOR

UST Operator/Company: Ronald Eugene Bridges / Oak Hollow Tire		Address: 2410 Eastchester Drive	
City: High Point	State: NC	Zip Code: 27265	Telephone Number: 336-707-1084

LANDOWNER AT LOCATION OF UST INCIDENT

Landowner: Ronald Eugene Bridges		Address: 2410 Eastchester Drive	
City: High Point	State: NC	Zip Code: 27265	Telephone Number: 336-707-1084

Draw Sketch of Area (showing two major road intersections) or Attach Map

See attached maps, table and lab report

Person Reporting Incident: Brett Higgins	Company: Pyramid Environmental & Engineering, P.C.	Telephone Number: 336-335-3174
Title: Sr. Project Manager	Address: 503 Industrial Ave., Greensboro, NC 27406	Date: 05/28/20

Definitions of Sources

Tank: means the tank that stores the product and is part of the underground storage tank system

Piping: means the piping and connectors running from the tank or submersible turbine pump to the dispenser or other end-use equipment (Vent, vapor recovery, or fill lines are excluded.)

Dispenser: includes the dispenser and the equipment used to connect the dispenser to the piping (e.g., a release from a suction pump or from components located above the shear valve)

Submersible Turbine Pump (STP) Area includes the submersible turbine pump head (typically located in the tank sump), the line leak detector, and the piping that connects the submersible turbine pump to the tank

Delivery Problem: identifies releases that occurred during product delivery to the tank. (Typical causes associated with this source are spills and overfills.)

Other: serves as the option to use when the release source is known but does not fit into one of the preceding categories (e.g., for releases from vent lines, vapor recovery lines, and fill lines)

Unknown: identifies releases for which the source has not been determined

Definitions of Causes

Spill: use this cause when a spill occurs (e.g., when the delivery hose is disconnected from the tank fill pipe or when the nozzle is removed from the dispenser)

Overfill: use when an overfill occurs (e.g., overfills may occur from the fill pipe at the tank or when the nozzle fails to shut off at the dispenser)

Physical or Mechanical Damage: use for all types of physical or mechanical damage, except corrosion (e.g., puncture of tank or piping, loose fittings, broken components, and components that have changed dimension)

Corrosion: use when a metal tank, piping, or other component has a release due to corrosion (e.g., for steel, corrosion takes the form of rust)

Installation Problem: use when the problem is determined to have occurred specifically because the UST system was not installed properly

Other: use this option when the cause is known but does not fit into one of the preceding categories (e.g., putting regulated substances into monitoring wells)

Unknown: use when the cause has not been determined

APPENDIX F

Email from Guilford County Department of Environmental Health

Brett Higgins

From: Gene Mao <GMAO@guilfordcountync.gov>
Sent: Monday, June 01, 2020 1:12 PM
To: Brett Higgins; Kromm, Carin
Subject: RE: Oak Hollow Tire

Brett,

We cannot rank the risk of a site using info from other site because natures of release and subsurface vary from site to site. As I said yesterday, you need to get a GW sample at B-3 where soil contamination was detected and then complete an LSA report for a regulated, commercial incident. You can obtain a GW sample using geoprobe boring or from a temporary well.

Thanks.

Gene Mao
Hydrogeologist
Environmental Health Division
Guilford County Dept. of Health and Human Services
400 W. Market Street, Suite 300
Greensboro, NC 27401
(336) 641-3589 (Office)
(336) 451-7638 (cell)
gmao@guilfordcountync.gov

****DUE TO THE CORONAVIRUS PANDEMIC, FILE REVIEWS AND SITE MEETINGS ARE BY APPOINTMENT ONLY****

ALL UST ARCHIVED FILES CAN BE FOUND ON THE FOLLOWING LINK:
https://deq.nc.gov/about/divisions/waste-management/laserfiche
DWM LOCATOR TOOL: USE MAP FOR LOCATING UST SITES ACROSS THE STATE:
https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebfa49fc383f688
UST FACILITY DATABASE (Facility Permitting and Inspection Documents):
https://xapps.ncdenr.org/wm/docs/WMDocs_Search.jsp

APPENDIX G

Laboratory Report for Groundwater Samples (TW-1)

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

June 11, 2020

Mr. Brett Higgins
Pyramid Environmental
P.O. Box 16265
503 Industrial Avenue
Greensboro, NC 27416

RE: Project: Oak Hollow Tire
Pace Project No.: 92480643

Dear Mr. Higgins:

Enclosed are the analytical results for sample(s) received by the laboratory on June 05, 2020. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Charlotte

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A. Payne

Amanda Payne
amanda.payne@pacelabs.com
(704)875-9092
Project Manager

Enclosures

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Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

CERTIFICATIONS

Project: Oak Hollow Tire
Pace Project No.: 92480643

Pace Analytical Services Charlotte
9800 Kincey Ave. Ste 100, Huntersville, NC 28078
Louisiana/NELAP Certification # LA170028
North Carolina Drinking Water Certification #: 37706
North Carolina Field Services Certification #: 5342
North Carolina Wastewater Certification #: 12
South Carolina Certification #: 99006001
Florida/NELAP Certification #: E87627
Kentucky UST Certification #: 84
Virginia/VELAP Certification #: 460221

REPORT OF LABORATORY ANALYSIS

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(704)875-9092

SAMPLE ANALYTE COUNT

Project: Oak Hollow Tire
Pace Project No.: 92480643

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
92480643001	**TW-1/B3**	MADEP EPH	BAJ	7	PASI-C
		EPA 625.1	PKS	58	PASI-C

PASI-C = Pace Analytical Services - Charlotte

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ANALYTICAL RESULTS

Project: Oak Hollow Tire
Pace Project No.: 92480643

Sample: TW-1/B3 **Lab ID: 92480643001** Collected: 06/04/20 16:30 Received: 06/05/20 10:23 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
MADEP EPH NC Water	Analytical Method: MADEP EPH Preparation Method: MADEP EPH Pace Analytical Services - Charlotte							
Aliphatic (C09-C18)	**110**	ug/L	96.2	1	06/10/20 11:43	06/11/20 13:59		N2
Aliphatic (C19-C36)	**820**	ug/L	96.2	1	06/10/20 11:43	06/11/20 13:59		N2
Aromatic (C11-C22)	**272**	ug/L	96.2	1	06/10/20 11:43	06/11/20 13:59		N2
Surrogates								
Nonatriacontane (S)	64	%	40-140	1	06/10/20 11:43	06/11/20 13:59	7194-86-7	
o-Terphenyl (S)	79	%	40-140	1	06/10/20 11:43	06/11/20 13:59	84-15-1	
2-Fluorobiphenyl (S)	101	%	40-140	1	06/10/20 11:43	06/11/20 13:59	321-60-8	
2-Bromonaphthalene (S)	104	%	40-140	1	06/10/20 11:43	06/11/20 13:59	580-13-2	
625 RVE	Analytical Method: EPA 625.1 Preparation Method: EPA 625.1 Pace Analytical Services - Charlotte							
Acenaphthene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	83-32-9	
Acenaphthylene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	208-96-8	
Anthracene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	120-12-7	
Benzo(a)anthracene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	56-55-3	
Benzo(a)pyrene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	50-32-8	
Benzo(b)fluoranthene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	205-99-2	
Benzo(g,h,i)perylene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	191-24-2	
Benzo(k)fluoranthene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	207-08-9	
4-Bromophenylphenyl ether	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	101-55-3	
Butylbenzylphthalate	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	85-68-7	
4-Chloro-3-methylphenol	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	59-50-7	
bis(2-Chloroethoxy)methane	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	111-44-4	
2-Chloronaphthalene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	91-58-7	
2-Chlorophenol	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	7005-72-3	
Chrysene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	218-01-9	
Dibenz(a,h)anthracene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	53-70-3	
3,3'-Dichlorobenzidine	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	91-94-1	
2,4-Dichlorophenol	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	120-83-2	
Diethylphthalate	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	84-66-2	
2,4-Dimethylphenol	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	105-67-9	
Dimethylphthalate	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	131-11-3	
Di-n-butylphthalate	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	534-52-1	
2,4-Dinitrophenol	ND	ug/L	50.0	1	06/08/20 12:48	06/09/20 17:39	51-28-5	
2,4-Dinitrotoluene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	121-14-2	
2,6-Dinitrotoluene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	606-20-2	
Di-n-octylphthalate	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	117-81-7	
Fluoranthene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	206-44-0	
Fluorene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	87-68-3	
Hexachlorobenzene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	118-74-1	
Hexachlorocyclopentadiene	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	77-47-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Oak Hollow Tire
Pace Project No.: 92480643

Sample: TW-1/B3 **Lab ID: 92480643001** Collected: 06/04/20 16:30 Received: 06/05/20 10:23 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
625 RVE	Analytical Method: EPA 625.1 Preparation Method: EPA 625.1 Pace Analytical Services - Charlotte							
Hexachloroethane	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	193-39-5	
Isophorone	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	78-59-1	
Naphthalene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	91-20-3	
Nitrobenzene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	98-95-3	
2-Nitrophenol	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	88-75-5	
4-Nitrophenol	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	100-02-7	
N-Nitrosodimethylamine	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	62-75-9	
N-Nitroso-di-n-propylamine	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	621-64-7	
N-Nitrosodiphenylamine	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	86-30-6	
2,2'-Oxybis(1-chloropropane)	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	108-60-1	
Pentachlorophenol	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	87-86-5	
Phenanthrene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	85-01-8	
Phenol	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	108-95-2	
Pyrene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/L	5.0	1	06/08/20 12:48	06/09/20 17:39	120-82-1	
2,4,6-Trichlorophenol	ND	ug/L	10.0	1	06/08/20 12:48	06/09/20 17:39	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	67	%	10-120	1	06/08/20 12:48	06/09/20 17:39	4165-60-0	
2-Fluorobiphenyl (S)	64	%	15-120	1	06/08/20 12:48	06/09/20 17:39	321-60-8	
Terphenyl-d14 (S)	112	%	11-131	1	06/08/20 12:48	06/09/20 17:39	1718-51-0	
Phenol-d6 (S)	37	%	10-120	1	06/08/20 12:48	06/09/20 17:39	13127-88-3	
2-Fluorophenol (S)	46	%	10-120	1	06/08/20 12:48	06/09/20 17:39	367-12-4	
2,4,6-Tribromophenol (S)	86	%	10-137	1	06/08/20 12:48	06/09/20 17:39	118-79-6	

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QUALITY CONTROL DATA

Project: Oak Hollow Tire
Pace Project No.: 92480643

QC Batch: 545759
QC Batch Method: EPA 625.1
Analysis Method: EPA 625.1
Analysis Description: 625 MSS
Laboratory: Pace Analytical Services - Charlotte

Associated Lab Samples: 92480643001

METHOD BLANK: 2905706 Matrix: Water

Associated Lab Samples: 92480643001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trichlorobenzene	ug/L	ND	5.0	06/09/20 11:39	
2,2'-Oxybis(1-chloropropane)	ug/L	ND	5.0	06/09/20 11:39	
2,4,6-Trichlorophenol	ug/L	ND	10.0	06/09/20 11:39	
2,4-Dichlorophenol	ug/L	ND	5.0	06/09/20 11:39	
2,4-Dimethylphenol	ug/L	ND	10.0	06/09/20 11:39	
2,4-Dinitrophenol	ug/L	ND	50.0	06/09/20 11:39	
2,4-Dinitrotoluene	ug/L	ND	5.0	06/09/20 11:39	
2,6-Dinitrotoluene	ug/L	ND	5.0	06/09/20 11:39	
2-Chloronaphthalene	ug/L	ND	5.0	06/09/20 11:39	
2-Chlorophenol	ug/L	ND	5.0	06/09/20 11:39	
2-Nitrophenol	ug/L	ND	5.0	06/09/20 11:39	
3,3'-Dichlorobenzidine	ug/L	ND	10.0	06/09/20 11:39	
4,6-Dinitro-2-methylphenol	ug/L	ND	10.0	06/09/20 11:39	
4-Bromophenylphenyl ether	ug/L	ND	5.0	06/09/20 11:39	
4-Chloro-3-methylphenol	ug/L	ND	5.0	06/09/20 11:39	
4-Chlorophenylphenyl ether	ug/L	ND	5.0	06/09/20 11:39	
4-Nitrophenol	ug/L	ND	10.0	06/09/20 11:39	
Acenaphthene	ug/L	ND	5.0	06/09/20 11:39	
Acenaphthylene	ug/L	ND	5.0	06/09/20 11:39	
Anthracene	ug/L	ND	5.0	06/09/20 11:39	
Benzo(a)anthracene	ug/L	ND	5.0	06/09/20 11:39	
Benzo(a)pyrene	ug/L	ND	5.0	06/09/20 11:39	
Benzo(b)fluoranthene	ug/L	ND	5.0	06/09/20 11:39	
Benzo(g,h,i)perylene	ug/L	ND	5.0	06/09/20 11:39	
Benzo(k)fluoranthene	ug/L	ND	5.0	06/09/20 11:39	
bis(2-Chloroethoxy)methane	ug/L	ND	10.0	06/09/20 11:39	
bis(2-Chloroethyl) ether	ug/L	ND	5.0	06/09/20 11:39	
bis(2-Ethylhexyl)phthalate	ug/L	ND	5.0	06/09/20 11:39	
Butylbenzylphthalate	ug/L	ND	5.0	06/09/20 11:39	
Chrysene	ug/L	ND	5.0	06/09/20 11:39	
Di-n-butylphthalate	ug/L	ND	5.0	06/09/20 11:39	
Di-n-octylphthalate	ug/L	ND	5.0	06/09/20 11:39	
Dibenz(a,h)anthracene	ug/L	ND	5.0	06/09/20 11:39	
Diethylphthalate	ug/L	ND	5.0	06/09/20 11:39	
Dimethylphthalate	ug/L	ND	5.0	06/09/20 11:39	
Fluoranthene	ug/L	ND	5.0	06/09/20 11:39	
Fluorene	ug/L	ND	5.0	06/09/20 11:39	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	06/09/20 11:39	
Hexachlorobenzene	ug/L	ND	5.0	06/09/20 11:39	
Hexachlorocyclopentadiene	ug/L	ND	10.0	06/09/20 11:39	

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QUALITY CONTROL DATA

Project: Oak Hollow Tire
Pace Project No.: 92480643

METHOD BLANK: 2905706 Matrix: Water
Associated Lab Samples: 92480643001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Hexachloroethane	ug/L	ND	5.0	06/09/20 11:39	
Indeno(1,2,3-cd)pyrene	ug/L	ND	5.0	06/09/20 11:39	
Isophorone	ug/L	ND	10.0	06/09/20 11:39	
N-Nitroso-di-n-propylamine	ug/L	ND	5.0	06/09/20 11:39	
N-Nitrosodimethylamine	ug/L	ND	5.0	06/09/20 11:39	
N-Nitrosodiphenylamine	ug/L	ND	10.0	06/09/20 11:39	
Naphthalene	ug/L	ND	5.0	06/09/20 11:39	
Nitrobenzene	ug/L	ND	5.0	06/09/20 11:39	
Pentachlorophenol	ug/L	ND	10.0	06/09/20 11:39	
Phenanthrene	ug/L	ND	5.0	06/09/20 11:39	
Phenol	ug/L	ND	5.0	06/09/20 11:39	
Pyrene	ug/L	ND	5.0	06/09/20 11:39	
2,4,6-Tribromophenol (S)	%	65	10-137	06/09/20 11:39	
2-Fluorobiphenyl (S)	%	72	15-120	06/09/20 11:39	
2-Fluorophenol (S)	%	56	10-120	06/09/20 11:39	
Nitrobenzene-d5 (S)	%	69	10-120	06/09/20 11:39	
Phenol-d6 (S)	%	42	10-120	06/09/20 11:39	
Terphenyl-d14 (S)	%	98	11-131	06/09/20 11:39	

LABORATORY CONTROL SAMPLE: 2905707

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trichlorobenzene	ug/L	50	39.1	78	44-142	
2,2'-Oxybis(1-chloropropane)	ug/L	50	63.3	127	36-166	
2,4,6-Trichlorophenol	ug/L	50	49.9	100	37-144	
2,4-Dichlorophenol	ug/L	50	48.9	98	1-191	
2,4-Dimethylphenol	ug/L	50	43.9	88	32-119	
2,4-Dinitrophenol	ug/L	250	341	136	1-181	
2,4-Dinitrotoluene	ug/L	50	59.3	119	39-139	
2,6-Dinitrotoluene	ug/L	50	54.4	109	50-158	
2-Chloronaphthalene	ug/L	50	44.1	88	60-118	
2-Chlorophenol	ug/L	50	48.8	98	23-134	
2-Nitrophenol	ug/L	50	57.2	114	29-182	
3,3'-Dichlorobenzidine	ug/L	100	89.8	90	1-262	
4,6-Dinitro-2-methylphenol	ug/L	100	138	138	1-181	
4-Bromophenylphenyl ether	ug/L	50	45.1	90	53-127	
4-Chloro-3-methylphenol	ug/L	100	96.6	97	22-147	
4-Chlorophenylphenyl ether	ug/L	50	45.3	91	25-158	
4-Nitrophenol	ug/L	250	173	69	1-132	
Acenaphthene	ug/L	50	46.9	94	47-145	
Acenaphthylene	ug/L	50	48.3	97	33-145	
Anthracene	ug/L	50	49.6	99	1-166	
Benzo(a)anthracene	ug/L	50	50.6	101	33-143	
Benzo(a)pyrene	ug/L	50	51.7	103	17-163	

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Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire
Pace Project No.: 92480643

LABORATORY CONTROL SAMPLE: 2905707

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzo(b)fluoranthene	ug/L	50	51.4	103	24-159	
Benzo(g,h,i)perylene	ug/L	50	50.7	101	1-219	
Benzo(k)fluoranthene	ug/L	50	52.2	104	11-162	
bis(2-Chloroethoxy)methane	ug/L	50	42.9	86	33-184	
bis(2-Chloroethyl) ether	ug/L	50	44.0	88	12-158	
bis(2-Ethylhexyl)phthalate	ug/L	50	54.6	109	8-158	
Butylbenzylphthalate	ug/L	50	55.3	111	1-152	
Chrysene	ug/L	50	50.1	100	17-168	
Di-n-butylphthalate	ug/L	50	52.5	105	1-118	
Di-n-octylphthalate	ug/L	50	56.1	112	4-146	
Dibenz(a,h)anthracene	ug/L	50	51.5	103	1-227	
Diethylphthalate	ug/L	50	50.5	101	1-114	
Dimethylphthalate	ug/L	50	48.6	97	1-112	
Fluoranthene	ug/L	50	50.3	101	26-137	
Fluorene	ug/L	50	49.1	98	59-121	
Hexachloro-1,3-butadiene	ug/L	50	35.4	71	24-116	
Hexachlorobenzene	ug/L	50	43.9	88	1-152	
Hexachlorocyclopentadiene	ug/L	50	37.0	74	25-150	
Hexachloroethane	ug/L	50	36.8	74	40-113	
Indeno(1,2,3-cd)pyrene	ug/L	50	51.0	102	1-171	
Isophorone	ug/L	50	44.4	89	21-196	
N-Nitroso-di-n-propylamine	ug/L	50	45.8	92	1-230	
N-Nitrosodimethylamine	ug/L	50	39.5	79	25-150	
N-Nitrosodiphenylamine	ug/L	50	47.8	96	25-150	
Naphthalene	ug/L	50	43.7	87	21-133	
Nitrobenzene	ug/L	50	44.3	89	35-180	
Pentachlorophenol	ug/L	100	107	107	14-176	
Phenanthrene	ug/L	50	49.6	99	54-120	
Phenol	ug/L	50	33.6	67	5-112	
Pyrene	ug/L	50	51.0	102	52-115	
2,4,6-Tribromophenol (S)	%			104	10-137	
2-Fluorobiphenyl (S)	%			92	15-120	
2-Fluorophenol (S)	%			77	10-120	
Nitrobenzene-d5 (S)	%			91	10-120	
Phenol-d6 (S)	%			60	10-120	
Terphenyl-d14 (S)	%			115	11-131	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2905708 2905709

Parameter	Units	92480643001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
1,2,4-Trichlorobenzene	ug/L	ND	50	50	27.9	28.5	56	57	44-142	2	
2,2'-Oxybis(1-chloropropane)	ug/L	ND	50	50	45.9	47.6	92	95	36-166	4	
2,4,6-Trichlorophenol	ug/L	ND	50	50	35.3	36.3	71	73	37-144	3	
2,4-Dichlorophenol	ug/L	ND	50	50	33.9	35.8	68	72	1-191	5	

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REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire
Pace Project No.: 92480643

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2905708 2905709

Parameter	Units	92480643001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
2,4-Dimethylphenol	ug/L	ND	50	50	27.1	27.4	54	55	32-119	1	
2,4-Dinitrophenol	ug/L	ND	250	250	269	266	108	107	1-181	1	
2,4-Dinitrotoluene	ug/L	ND	50	50	48.1	45.5	96	91	39-139	6	
2,6-Dinitrotoluene	ug/L	ND	50	50	41.5	40.8	83	82	50-158	2	
2-Chloronaphthalene	ug/L	ND	50	50	31.5	32.5	63	65	60-118	3	
2-Chlorophenol	ug/L	ND	50	50	34.1	35.8	68	72	23-134	5	
2-Nitrophenol	ug/L	ND	50	50	40.2	43.0	80	86	29-182	7	
3,3'-Dichlorobenzidine	ug/L	ND	100	100	81.9	81.2	82	81	1-262	1	
4,6-Dinitro-2-methylphenol	ug/L	ND	100	100	115	114	115	114	1-181	1	
4-Bromophenylphenyl ether	ug/L	ND	50	50	37.0	33.6	74	67	53-127	10	
4-Chloro-3-methylphenol	ug/L	ND	100	100	70.9	70.3	71	70	22-147	1	
4-Chlorophenylphenyl ether	ug/L	ND	50	50	33.8	32.8	68	66	25-158	3	
4-Nitrophenol	ug/L	ND	250	250	168	161	67	65	1-132	4	
Acenaphthene	ug/L	ND	50	50	33.3	34.2	67	68	47-145	3	
Acenaphthylene	ug/L	ND	50	50	34.4	35.3	69	71	33-145	3	
Anthracene	ug/L	ND	50	50	42.3	40.6	85	81	1-166	4	
Benzo(a)anthracene	ug/L	ND	50	50	46.7	46.2	93	92	33-143	1	
Benzo(a)pyrene	ug/L	ND	50	50	46.7	46.0	93	92	17-163	1	
Benzo(b)fluoranthene	ug/L	ND	50	50	46.3	47.0	93	94	24-159	1	
Benzo(g,h,i)perylene	ug/L	ND	50	50	44.5	43.5	89	87	1-219	2	
Benzo(k)fluoranthene	ug/L	ND	50	50	45.7	45.6	91	91	11-162	0	
bis(2-Chloroethoxy)methane	ug/L	ND	50	50	30.1	31.3	60	63	33-184	4	
bis(2-Chloroethyl) ether	ug/L	ND	50	50	32.3	34.1	65	68	12-158	5	
bis(2-Ethylhexyl)phthalate	ug/L	ND	50	50	55.4	53.9	111	108	8-158	3	
Butylbenzylphthalate	ug/L	ND	50	50	55.1	55.0	110	110	1-152	0	
Chrysene	ug/L	ND	50	50	45.3	45.2	91	90	17-168	0	
Di-n-butylphthalate	ug/L	ND	50	50	48.2	48.6	96	97	1-118	1	
Di-n-octylphthalate	ug/L	ND	50	50	56.7	55.4	113	111	4-146	2	
Dibenz(a,h)anthracene	ug/L	ND	50	50	45.1	44.3	90	89	1-227	2	
Diethylphthalate	ug/L	ND	50	50	41.3	39.2	83	78	1-114	5	
Dimethylphthalate	ug/L	ND	50	50	36.6	35.2	73	70	1-112	4	
Fluoranthene	ug/L	ND	50	50	45.1	44.9	90	90	26-137	1	
Fluorene	ug/L	ND	50	50	36.5	35.4	73	71	59-121	3	
Hexachloro-1,3-butadiene	ug/L	ND	50	50	25.0	25.5	50	51	24-116	2	
Hexachlorobenzene	ug/L	ND	50	50	36.1	33.7	72	67	1-152	7	
Hexachlorocyclopentadiene	ug/L	ND	50	50	26.6	26.7	53	53	25-150	1	
Hexachloroethane	ug/L	ND	50	50	26.2	26.7	52	53	40-113	2	
Indeno(1,2,3-cd)pyrene	ug/L	ND	50	50	44.5	43.6	89	87	1-171	2	
Isophorone	ug/L	ND	50	50	31.4	32.8	63	66	21-196	4	
N-Nitroso-di-n-propylamine	ug/L	ND	50	50	33.7	35.6	67	71	1-230	6	
N-Nitrosodimethylamine	ug/L	ND	50	50	29.8	30.7	60	61	25-150	3	
N-Nitrosodiphenylamine	ug/L	ND	50	50	40.6	38.6	81	77	25-150	5	
Naphthalene	ug/L	ND	50	50	31.4	32.1	63	64	21-133	2	
Nitrobenzene	ug/L	ND	50	50	31.7	33.1	63	66	35-180	4	
Pentachlorophenol	ug/L	ND	100	100	100	100	100	100	14-176	0	
Phenanthrene	ug/L	ND	50	50	42.3	40.1	85	80	54-120	5	

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REPORT OF LABORATORY ANALYSIS

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire
Pace Project No.: 92480643

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2905708 2905709

Parameter	Units	92480643001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Phenol	ug/L	ND	50	50	26.9	27.7	54	55	5-112	3	
Pyrene	ug/L	ND	50	50	48.2	47.7	96	95	52-115	1	
2,4,6-Tribromophenol (S)	%						93	89	10-137		
2-Fluorobiphenyl (S)	%						67	70	15-120		
2-Fluorophenol (S)	%						58	59	10-120		
Nitrobenzene-d5 (S)	%						68	71	10-120		
Phenol-d6 (S)	%						53	53	10-120		
Terphenyl-d14 (S)	%						107	113	11-131		

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: Oak Hollow Tire
Pace Project No.: 92480643

QC Batch: 546094
QC Batch Method: MADEP EPH
Analysis Method: MADEP EPH
Analysis Description: MADEP EPH NC Water
Laboratory: Pace Analytical Services - Charlotte
Associated Lab Samples: 92480643001

METHOD BLANK: 2907065 Matrix: Water
Associated Lab Samples: 92480643001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aliphatic (C09-C18)	ug/L	ND	100	06/10/20 17:15	N2
Aliphatic (C19-C36)	ug/L	ND	100	06/10/20 17:15	N2
Aromatic (C11-C22)	ug/L	ND	100	06/10/20 17:15	N2
2-Bromonaphthalene (S)	%	114	40-140	06/10/20 17:15	
2-Fluorobiphenyl (S)	%	113	40-140	06/10/20 17:15	
Nonatriacontane (S)	%	73	40-140	06/10/20 17:15	
o-Terphenyl (S)	%	86	40-140	06/10/20 17:15	

LABORATORY CONTROL SAMPLE & LCSD: 2907066 2907067

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Aliphatic (C09-C18)	ug/L	300	132	129	44	43	40-140	2	50	N2
Aliphatic (C19-C36)	ug/L	400	255	256	64	64	40-140	0	50	N2
Aromatic (C11-C22)	ug/L	850	663	604	78	71	40-140	9	50	N2
2-Bromonaphthalene (S)	%				125	101	40-140			
2-Fluorobiphenyl (S)	%				126	100	40-140			
Nonatriacontane (S)	%				74	74	40-140			
o-Terphenyl (S)	%				98	84	40-140			

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Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALIFIERS

Project: Oak Hollow Tire
Pace Project No.: 92480643

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

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Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Oak Hollow Tire
Pace Project No.: 92480643

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92480643001	**TW-1/B3**	MADEP EPH	546094	MADEP EPH	546418
92480643001	**TW-1/B3**	EPA 625.1	545759	EPA 625.1	546107

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Laboratory receiving samples:
Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☑ Raleigh ☐ Mechanicsville ☐

Sample Condition Upon Receipt

Client Name: Pyramid

Project #: WO# : 92480643

92480643

Courier: ☐ Commercial ☐ Fed Ex ☑ Pace ☐ UPS ☐ USPS ☐ Other:____ ☐ Client

Custody Seal Present? ☐ Yes ☑ No Seals Intact? ☐ Yes ☑ No

Date/Initials Person Examining Contents: SK Co-5-20

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☑ No ☐ N/A

Thermometer: ☑ IR Gun ID: 92T061

Type of Ice: ☑ Wet ☐ Blue ☐ None

Cooler Temp (°C): 2.5 Correction Factor: Add/Subtract (°C) +0.1

Cooler Temp Corrected (°C): 2.6

Temp should be above freezing to 6°C
☐ Samples out of temp criteria. Samples on ice, cooling process has begun

USDA Regulated Soil (☑ N/A, water sample)
Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☐ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested? SK Co-5-20	☑ Yes	☐ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☐ Yes	☑ No	☐ N/A	8.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	9.
-Includes Date/Time/ID/Analysis Matrix: WT				
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☑ No	☐ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY

Field Data Required? ☐ Yes ☐ No

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ Date: _____

Project Manager SRF Review: _____ Date: _____

***Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.**

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

****Bottom half of box is to list number of bottle**

Project # WO#: 92480643

PM: AP Due Date: 06/10/20

CLIENT: 92-Pyramid

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4C-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	AG3A(DG3A)-250 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unp (N/A)	DG9P-40 mL VOA H3PO4 (N/A)	VOAK (6 vials per kit)-5035 kit (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3A-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved vials (N/A)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
1											2																2		
2																												
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												
11																												
12																												

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Pyramid Environmental	Report To:	Brett Higgins	Attention:	
Address:	503 Industrial Avenue	Copy To:		Company Name:	Pyramid Environmental
	Greensboro, NC 27406			Address:	SAME
Email To:	brett@pyramidenvironmental.com	Purchase Order #:	2020-156	Pace Quote:	
Phone:	336-335-3174 Fax: 336-691-0648	Project Name:	Oak Hollow Tire	Pace Project Manager:	Amanda Payne
Requested Due Date:	3 business days	Project Number:	2020-156	Pace Profile #:	

Regulatory Agency

State / Location

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	MADEP EPH	EPA METHOD 625	Residual Chlorine (Y/N)	97480643
1	TW-1 / B3	WT	G			6/4/2020	1630		4	X			X						X	X		
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

MATRIX CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
NC Trust Fund Rates	Alan McFeeters / Pyramid PM	6/4/2020	1700			1623				
3-DAy Rush TAT			1243	Robert Pace	6/5/20	1243	2.6	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Alan McFeeters

SIGNATURE of SAMPLER: Alan McFeeters DATE Signed: 6/5/2020

End of Email #9 with Attachment(s)

Email #10 with Attachment(s)

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Monday, January 4, 2021 3:01 AM
To: Public Comment
Subject: ZA-20-20 Incident #18930, Circle K#1676
Attachments: WS-5462_18930_M_RP_20051115.pdf; WS-5462_18930_M_RP_20050412.pdf

Case# ZA-20-20

Dear Town Council, Mayor and City Manager,

Incident #18930, Circle K#1676, 1101 Eastchester Dr

There are several events at this location. The tanks were put into use in 1986.

- 7/22/1998 routine inspection found contaminated soil
- 2/7/2000 a leak occurred during an upgrade of the three 10,000gl tanks
- 11/14/2001 gasoline was lost when a gasoline probe hit product line
- 2/20/2002 monitoring well levels were not horizontal, indicating release
- 3/2005 groundwater contamination was found in several of the required monitoring wells
- 11/6/2005 Notice of Residual Petroleum was attached to the deed of this property which limits use of groundwater and soil

This site is important to include as it shows that the USTs were only 14 years old when first leak was detected, the many different ways in which contamination occurs, the reports on the many monitoring wells that were required indicate that groundwater started at only a 14ft depth and that it traveled in a northeast direction(which is towards Oak Hollow Lake).

I have sent documentation from the EPA showing that North Carolina is one of many states that still use guidelines set in 1988. NC is working towards adopting new state regulations based on the federal 2015 guidelines, but has not yet done so. A side note: state regulations tend to be stricter than federal guidelines. Also, please review the 2016 EPA study regarding components INSIDE the USTs corroding within ten years due to the newer gas blends and the unregulation of cross contamination between tanks.

Thank you for your hard work and dedication!
Vesta Kennedy

ATC ASSOCIATES OF NORTH CAROLINA, P.C.

2725 E. Millbrook Road, Suite 121
Raleigh, NC 27604
www.atc-enviro.com
919.871.0999
Fax 919.871.0335

RECEIVED
N.C. Dept. of ENR
NOV 17 2005
Winston-Salem
Regional Office

November 15, 2005

Ms.Cindy H. Rintoul
North Carolina Department of Environment and Natural Resources
Winston-Salem Regional Office
Division of Waste Management - UST Section
585 Waughtown Street
Winston-Salem, North Carolina 27107-2241

Re: Notice of Residual Petroleum
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina
ATC Project No. 45.75000.1676
NCDENR Incident No. 18930
NCDENR Risk Classification: Low

Dear Ms. Rintoul:

ATC Associates of North Carolina, P.C. (ATC), on behalf of ConocoPhillips, has notified by certified mail the adjacent property owners, Guilford County Health Director, and Mayor of High Point, of the Notice of No Further Action for the above referenced site. Copies of the certified mail return receipts are included as ***Attachment 1***. ATC is also submitting the attached certified Notice of Residual Petroleum for Circle K Store #1676 as ***Attachment 2***.

If you have any questions or require additional information, please contact our office at (919) 871-0999.

Sincerely,

ATC Associates of North Carolina, P.C.

Dorothy M. Wamback
Project Scientist

Gabriel Araos, P.E.
Senior Project Manager

cc: Ms. Kim Alderman – ConocoPhillips

Attachments

ATTACHMENT 1

CERTIFIED MAIL RETURN RECEIPTS

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mayor Rebecca R. Smothers
1843 Country Club Dr
High Point NC 27262

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery
6/3/05

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1350 0001 4545 6827

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Ronald & Linda Preston
916 Tower Road
Thomasville, NC
27360-7350

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Linda Preston ☐ Agent ☒ Addressee

B. Received by (Printed Name) | C. Date of Delivery
Linda Preston | 6-3-05

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1350 0001 4545 6773

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Adams Investments Inc
2334 English Road
High Point NC
27262-8056

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X L. Cureton ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery
L. Cureton | 6-3-05

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service l) 7004 1350 0001 4545 6810

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Meng Wang Realty Inc.
1804 Kendrick Road
Gastonia, NC 28056

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery 6-6-05

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1350 0001 4545 6797

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mabe R. Wayne
1224 Eastchester Dr
High Point, NC
27265-3114

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1350 0001 4545 6780

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Reid + Son
307 Studor Valley Rd
High Point, NC 27262

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1350 0001 4545 6766

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

ATTACHMENT 2

CERTIFIED NOTICE OF RESIDUAL PETROLEUM

2181

RECORDED - 020016
JEFF L. THIGPEN
REGISTER OF DEEDS
GUILFORD COUNTY, NC
BOOK: 6426
PAGE(S):2181 TO 2184
10/31/2005 15:10:51

10/31/2005	GUILFORD CO. NC		
1 MISC DOCUMENTS		20016	$12.00
3 MISC DOC ADDN PGS			$9.00
1 PROBATE FEE			$2.00

HC

NOTICE OF RESIDUAL PETROLEUM

Mail: ATC
2725 Milbrook Rd
Suite 121
Raleigh, NC 27604

NOTICE OF RESIDUAL PETROLEUM

Circle K #1676, Guilford County, North Carolina
(Site name)

The property that is the subject of this Notice (hereinafter referred to as the "Site") contains residual petroleum and is an Underground Storage Tank (UST) incident under North Carolina's Statutes and Regulations, which consist of N.C.G.S. 143-215.94 and regulations adopted thereunder. This Notice is part of a remedial action for the Site that has been approved by the Secretary (or his/her delegate) of the North Carolina Department of Environment and Natural Resources (or its successor in function), as authorized by N.C.G.S. Section 143B-279.9 and 143B-279.11. The North Carolina Department of Environment and Natural Resources shall hereinafter be referred to as "DENR".

NOTICE

Petroleum product was released and/or discharged at the Site. **Petroleum constituents remain on the site, but are not a danger to public health and the environment, provided that the restrictions described herein, and any other measures required by DENR pursuant to N.C.G.S. Sections 143B-279.9 and 143B-279.11, are strictly complied with.** This "Notice of Residual Petroleum" is composed of a description of the property, the location of the residual petroleum and the land use restrictions on the Site. The Notice has been approved and notarized by DENR pursuant to N.C.G.S. Sections 143B-279.9 and 143B-279.11 and has/shall be recorded at the Guilford Register of Deeds' office Book ___, Page ____.

Source Property

Greatstone Equities Inc., C/O Circle K Company DC17 of PO Box 52085, Phoenix, AZ 85072 2085 is the owner in fee simple of all or a portion of the Site, which is located in the County of Guilford County, State of North Carolina, and is known and legally described as:

> Beginning at an existing concrete monument in the Northwestern right-of-way of Eastchester Drive, said point being also at the Northeast corner of the intersection of said Eastchester Drive and North Centennial Street; thence on a line running through said intersection a chord distance of North 70 degrees 46 minutes 12 seconds West 54.49 feet to an existing concrete monument in the Eastern right-of-way line of North Centennial Street; thence with the Eastern right-of-way line of North Centennial Street North 05 degrees 14 minutes 55 seconds East 156.41 feet to an iron pipe in said right-of-way; thence South 84 degrees 32 minutes 05 seconds East 98.03 feet to an existing iron pipe; thence North 43 degrees 19 minutes 09 seconds East 15.92 feet to an existing pipe; thence South 47 degrees 12 minutes 51 seconds East 20.53 feet to an existing iron pipe; thence South 84 degrees 44 minutes 10 seconds East 57.68 feet to an iron pipe in the Northwestern right-of-way line of Eastchester Drive; thence along said Northwestern right-of-way line of Eastchester Drive South 42 degrees 33 minutes West 212.75 feet to the point and place of BEGINNING.

For protection of public health and the environment, the following land use restrictions required by N.C.G.S. Section 143B-279.9(b) shall apply to all of the above-described real property. These restrictions shall continue in effect as long as residual petroleum remains on the site in excess of unrestricted use standards and cannot be amended or cancelled unless and until the Guilford County Register of Deed receives and records the written concurrence of the Secretary (or his/her delegate) of DENR (or its successor in function).

2183

PERPETUAL LAND USE RESTRICTIONS

Groundwater: Groundwater from the site is prohibited from use as a water supply. Water supply wells of any kind shall not be installed or operated on the site.

ENFORCEMENT

The above land use restriction(s) shall be enforced by any owner, operator, or other party responsible for the Site. The above land use restriction(s) may also be enforced by DENR through any of the remedies provided by law or by means of a civil action, and may also be enforced by any unit of local government having jurisdiction over any part of the Site. Any attempt to cancel this Notice without the approval of DENR (or its successor in function) shall be subject to enforcement by DENR to the full extent of the law. Failure by any party required or authorized to enforce any of the above restriction(s) shall in no event be deemed a waiver of the right to do so thereafter as to the same violation or as to one occurring prior or subsequent thereto.

IN WITNESS WHEREOF, Mr. Peter Barclay has caused this Notice to be executed pursuant to N.C.G.S. Sections 143B-279.9 and 143B-279.11, this 4 day of August, 2005

Circle K Stores Inc.
(name of responsible party if agent is signing)

By: Peter Barclay
(signature of RP, attorney or other agent if there is one)

Environmental Compliance and Remediation Manager
(Title of agent for responsible party if there is one)

Signatory's name typed or printed: Peter Barclay

Mecklenburg COUNTY

I, Teresa Drakeford, a Notary Public for said County and State, do hereby certify that Peter Barclay, Environmental Compliance and Remediation Manager, personally appeared before me this day and acknowledged that he is the Environmental Compliance and Remediation Manager, Circle K Stores Inc., and that by the authority duly given and as the act of the agency, the foregoing instrument was signed in its name by him as Environmental Compliance and Remediation Manager on behalf of the agency.

WITNESS my hand and official seal, this the 4 day of August, 2005.

(Official Seal)

TERESA DRAKEFORD NOTARY PUBLIC MECKLENBURG COUNTY, NC

Teresa Drakeford
Notary Public (signature)

My commission expires July 11th, 2009."

2184

Approved for the purpose of N.C.G.S. 143B-279.11

Cynthia Rintoul
(signature of Regional Supervisor)
Cynthia Rintoul, Regional Supervisor

Winston-Salem Regional Office
UST Section
Division of Waste Management
Department of Environment and Natural Resources

NORTH CAROLINA
Forsyth COUNTY

I, Alice H. Lunsford, a Notary Public for said County and State, do hereby certify that Cynthia Rintoul, Regional Supervisor appeared before me this day and acknowledged that she is the Regional Supervisor, Winston-Salem Regional Office, UST Section, Division of Waste Management, Department of Environment and Natural Resources, and that by authority duly given and as the act of the agency, the foregoing instrument was signed in its name by her as Regional Supervisor on behalf of the agency.

Witness my hand and official seal, this the 13th day of Sept., 2005

OFFICIAL SEAL
Notary Public, North Carolina
County of Forsyth
ALICE H. LUNSFORD
My Commission Expires: 2/11/08

Alice H. Lunsford
Notary Public (signature)

(Official Seal)

My commission expires February 11, 2008.

Revised June 18, 2004

ATC
ASSOCIATES
OF NORTH CAROLINA, P.C.

2725 E. Millbrook Road, Suite 121
Raleigh, NC 27604
www.atc-enviro.com
919.871.0999
Fax 919.871.0335

April 12, 2005

Mr. Gene Mao
Guilford County Department of Public Health
1203 Maple Street
Greensboro, North Carolina 27405

APR 14 2005

Re: Groundwater Sampling Report
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina 28580
Groundwater Incident No. 18930
Facility ID No. 0-017601
ATC Project No. 45.75118.1676

Dear Mr. Mao:

ATC Associates of North Carolina, P.C. (ATC), on behalf of ConocoPhillips, is submitting the attached Groundwater Sampling Report for the above referenced site. Included in this report are the laboratory analytical results, and a summary of assessment activities.

If you have any questions or require additional information, please contact our office at (919) 871-0999.

Sincerely,

ATC Associates of North Carolina, P.C.

Caroline E. Davenport
Project Scientist

Gabriel Araos, P.E.
Project Manager

cc: Ms. Kim Alderman - ConocoPhillips

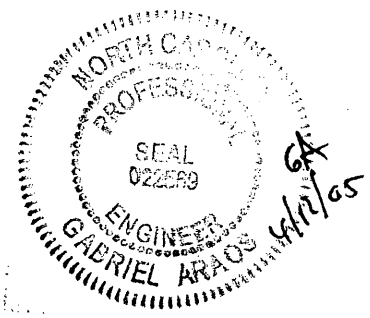
Groundwater Sampling Report
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina 28580
Groundwater Incident No. 18930
Facility ID No. 0-017601
ATC Project No. 45.75118.1676

Sampling Report
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina 28580
Groundwater Incident No. 18930
Facility ID No. 0-017601
ATC Project No. 45.75118.1676

Prepared By:

Caroline E. Davenport
Project Scientist

Gabriel Araos, P.E.
Project Manager
NC Registered Engineer #022569



Submitted To:

North Carolina Department of Environment and Natural Resources
Winston-Salem Regional Office
Division of Waste Management - UST Section
585 Waughtown Street
Winston-Salem, North Carolina 27107

On Behalf Of:

ConocoPhillips
10150 Highland Manor, Suite 200
Tampa, Florida 33610

Prepared By:

ATC Associates of North Carolina, P.C.
2725 East Millbrook Road, Suite 121
Raleigh, North Carolina 27604
Phone: (919) 871-0999
Fax: (919) 871-0335

April 12, 2005

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Figure 4 Dissolved Benzene Isoconcentration Contour Map
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Appendix A Standard Operating Procedures
Appendix B Laboratory Analytical Data Sheets

1.0 SITE HISTORY

The site is identified as Circle K Store #1676 (Facility ID No. 0-017601), and operates as a convenience store and retail gasoline sales facility, located at 1101 Eastchester Drive, High Point, Guilford County, North Carolina (80°00'00", 35°59'00"). A site topographic map is attached as ***Figure 1***.

The site property was acquired by Circle K in March 1985 and sold to Woodcliff Equities in November 1985 as a sale/leaseback. Three 10,000-gallon underground storage tanks (USTs) were installed in January 1986 and the site facility began operating as a Circle K retail gasoline station/convenience store. The locations of USTs and fuel dispensers are shown in ***Figure 2***. No UST systems are known to have operated on-site prior to 1986.

The site consists of a single-story brick building, paved parking lot and gasoline dispensing system associated with retail fuel sales. On June 17, 1998, during modifications of the UST system, limited quantities of soil and stone with elevated organic vapor analyzer (OVA) readings were detected in soil above the USTs near the fill ports. Approximately 15 tons of contaminated soil were excavated and stockpiled on-site for disposal. Inspection of the UST system did not reveal evidence of leaks or damage. Soil samples were obtained on June 16, 1998, and laboratory analyzed by EPA Method 8260 and for total petroleum hydrocarbons (TPH) by modified EPA Method 8015 (preparation methods 5030 and 3550). Laboratory results indicated 8260 parameters above the laboratory detection limits. The Winston-Salem Regional Office of the North Carolina Department of Environment and Natural Resources (NCDENR) was notified on July 23, 1998, of a suspected release from the UST system.

In accordance with 15A NCAC 2N.0703, ATC submitted an Initial Abatement/Site Check report to the Winston-Salem Regional Office on August 7, 1998. A Notice of Regulatory Requirements (NORR) was issued to Circle K, by the NCDENR, on August 25, 1998.

ATC submitted a Limited Site Assessment (LSA) Report to the NCDENR on December 18, 1998, for the site. The LSA included the advancement of five soil borings and the installation of one monitoring well in each of the borings (GW01 through GW05). Sampling and analyses of soil samples indicated that TPH-DRO was detected above the NCDENR Standard from the boring for MW03. The groundwater analytical results indicated concentrations of benzene and tetrachloroethene in excess of the 2L Standards in the sample from GW01. Chloroform was detected above the 2L Standard in GW02; benzene was detected above the 2L Standard in GW03; MTBE was detected above the 2L Standard in GW04; and benzene, ethylbenzene, 1,2-dichlorobenzene and C5-C8 Aliphatics were detected above the 2L Standards in GW05. ATC attributed the concentrations of chlorinated solvents detected in groundwater to a dry cleaning facility located on an adjoining property. The site's expected risk classification was found to be "Low".

ATC contacted Mr. Gene Mao with Guilford County in March 2001 regarding the current status of the site. According to Mr. Mao, the installation of one additional groundwater monitoring well in the source area and a groundwater sampling event would be necessary for further review of closure petition.

One additional groundwater monitoring well (GW06) was installed on April 10, 2001, under the supervision of ATC personnel. The drilling was performed via hollow stem auger techniques without the use of drilling fluids. Split spoon samples were obtained at five foot intervals, classified, and field-screened with an organic vapor analyzer (OVA).

2.0 GROUNDWATER QUALITY

2.1. Groundwater Levels

On March 2, 2005, ATC measured depth to groundwater in monitoring wells GW01 through GW06. Based on groundwater level measurements, the depth to groundwater in the site vicinity ranges from 14.40 feet below land surface (bls) in monitoring well GW01 to 18.80 feet bls in monitoring well GW04. Depth to water was measured from the top of each well casing and then converted into previously established well elevations. The well casing elevations are referenced to an arbitrary on-site benchmark with an assigned datum of 100.00 feet. Well construction details, depth to water measurements and groundwater elevations are summarized on ***Table 1***. A groundwater elevation contour map, based on the March 2, 2005, depth to water measurements, is included as ***Figure 3***. Based upon the water table elevations, groundwater flow direction within the surficial aquifer at the site is to the northeast. Standard Operating Procedures are presented in ***Appendix A***.

2.2 Groundwater Sampling and Analytical Results

Groundwater samples were collected from monitoring wells GW01 through GW06 on March 2, 2005. The samples were placed in appropriate containers and sent to Lancaster Laboratories in Lancaster, Pennsylvania. The groundwater samples were analyzed for volatile organic compounds (VOCs) via EPA Method 8260; lead by EPA Method 3030C; and Volatile Petroleum Hydrocarbons (VPH) by Massachusetts Department of Environmental Protection (MADEP) method.

Groundwater analytical results are summarized in ***Table 2***. As shown in ***Table 2***, constituent levels were compared to the NCDENR Groundwater Quality 2L Standard and the Gross Contaminant Levels (GCLs) as established in 15A NCAC 2L.005(d)(2)(D). The laboratory results indicate that benzene was detected at levels exceeding the 2L

Standard in the groundwater samples collected from GW01, GW02, GW03, GW04 and GW05; MTBE was detected above 2L Standards in GW01, GW04, and GW06; 1,2-dichloroethane was detected above 2L Standards in GW05; Tetrachloroethene was detected in GW02 and GW03 above the 2L Standard; Lead was detected above 2L Standards in GW01 and GW05; C5-C8 Aliphatics were detected above 2L Standards in GW05; and C9-C10 Aromatics were also detected above 2L Standards in GW03 and GW05. According to the laboratory report the groundwater samples did not exceed the Gross Contaminant Levels (GCLs).

The presence of tetrachloroethene in the groundwater samples indicate potential off-site sources as these compounds are not associated with petroleum hydrocarbons. The Cleaner World dry cleaner and Photo Lab, located topographically upgradient from the site, are potential sources of the chlorinated solvents. Laboratory analytical data sheets are attached as ***Appendix B***.

3.0 CONCLUSIONS AND RECOMMENDATIONS

ATC has performed a groundwater sampling event at Circle K Store #1676 (Facility ID No. 0-017601) in High Point, North Carolina. Based on field activities, observations, and groundwater analytical results, ATC concludes the following:

- The site meets the criteria for low risk classification. Based on the low risk classification, the appropriate groundwater cleanup standards will be the GCLs.

- Benzene exceeded 2L Standards in the groundwater samples collected from GW01 through GW-05. MTBE was detected above 2L Standards in GW01, GW04, and GW06; 1,2-dichloroethane was detected above 2L Standards in GW05; Tetrachloroethene was detected in GW02 and GW03 above the 2L Standard; Lead

was detected above 2L Standards in GW01 and GW05. C5-C8 Aliphatics were detected above 2L Standards in GW05, and C9-C10 Aromatics were also detected above 2L Standards in GW03 and GW05. None of the samples exceeded the GCLs.

- The presence of tetrachloroethene in the groundwater samples may be attributed to off-site sources (A Cleaner World dry cleaner and Photo Lab). These compounds are not associated with petroleum hydrocarbons.

Based on the groundwater results, the site does not appear to be impacted above the appropriate risk based cleanup levels. Therefore, ATC requests that the NCDENR issue a No Further Action (NFA) in accordance with 15A NCAC 2L. 0115 (h)

TABLES

TABLE 1
Groundwater Elevation Data
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina 28580
Facility ID No. 0-017601
NCDENR Groundwater Incident No. Pending
ATC Project No. 85445.1676

Well Identification	Top of Casing Elevation (feet)	Depth of Well (feet)	Screened Interval (feet)	Depth to Water (feet)	Ground Water Elevation (feet)
GW01	96.45	25.00	5.0 - 25.0	14.40	82.05
GW02	96.97	35.00	30.0 - 35.0	14.69	82.28
GW03	97.24	25.00	5.0 - 25.0	14.73	82.51
GW04	93.98	25.00	5.0 - 25.0	18.80	75.18
GW05	98.91	25.00	5.0-25.0	17.70	81.21
GW06	98.91	25.00	5.0 - 25.0	16.74	82.17

Notes:
1. All measurements in feet.
2. Groundwater depth measured from top of casing March 2, 2005.
3. Elevations are referenced to an arbitrary site benchmark of 100.00 feet.

TABLE 2
Groundwater Analytical Results
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina
Facility ID No. 0-017601
NCDENR Groundwater Incident No. Pending
ATC Project No. 855446.1676

Sample ID	Sampling Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	1,2-Dichloroethane
GW01	3/2/2005	**35**	<0.7	<0.8	<0.8	35	**190**	<1
GW02	3/2/2005	**6**	<0.7	<0.8	<0.8	6	8	<1
GW03	3/2/2005	**140**	<0.7	8.00	0.8	148.80	160	<1
GW04	3/2/2005	**1**	<0.7	<0.8	<0.8	1	**77**	<1
GW05	3/2/2005	**4**	<0.7	9.0	<0.8	13	<0.5	**44**
GW06	3/2/2005	<3	<4	<4	<4	ND	**5,200**	<5
2L Standard	-----	**1**	**1,000**	**29**	**530**	**NE**	**200**	**0.38**
GCL	-----	**5,000**	**257,500**	**29,000**	**87,500**	**NE**	**200,000**	**380**

Notes:
1. "<" or ND = Not Detected at or above the laboratory detection limit.
2. Concentrations are reported in micrograms per liter (µg/l) = parts per billion (ppb).
3. Concentrations in **bold** print equal or exceed the corresponding NCDENR Groundwater Quality 2L Standard.
4. 2L = Groundwater quality standards for North Carolina.
5. GCL = Gross Contaminant Level.
6. NE = Not Established.
7. NA = Not Analyzed.
8. BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes.
9. EDB = Ethylene Dibromide.
10. IPE = Isopropyl Ether.
11. MTBE = Methyl Tert-Butyl Ether.
12. VPH = Volatile Petroleum Hydrocarbons.

TABLE 2 (Continued)
Groundwater Analytical Results
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina
Facility ID No. 0-017601
NCDENR Groundwater Incident No. Pending
ATC Project No. 855446.1676

Sample ID	Sampling Date	IPE	Trichloro-ethene	Tetrachloro-ethene	Lead	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
GW01	3/2/2005	8	<1	<0.8	**16.7**	95.4	<50	<50
GW02	3/2/2005	<0.8	<1	**2**	NA	<50	<50	<50
GW03	3/2/2005	4	1	**6**	<10	254	133	**337**
GW04	3/2/2005	5	<1	<0.8	11.5	<50	<50	<50
GW05	3/2/2005	17	<1	<0.8	**17.2**	**459**	329	**420**
GW06	3/2/2005	60	<5	<4	NA	<50	<50	<50
2L Standard	-----	**70**	**NE**	**0.7**	**15**	**420**	**4,200**	**210**
GCL	-----	**70,000**	**NE**	**700**	**15,000**	**NE**	**NE**	**NE**

Notes:
1. "<" or ND = Not Detected at or above the laboratory detection limit.
2. Concentrations are reported in micrograms per liter (µg/l) = parts per billion (ppb).
3. Concentrations in **bold** print equal or exceed the corresponding NCDENR Groundwater Quality 2L Standard.
4. 2L = Groundwater quality standards for North Carolina.
5. GCL = Gross Contaminant Level.
6. NE = Not Established.
7. NA = Not Analyzed.
8. BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes.
9. EDB = Ethylene Dibromide.
10. IPE = Isopropyl Ether.
11. MTBE = Methyl Tert-Butyl Ether.
12. VPH = Volatile Petroleum Hydrocarbons.

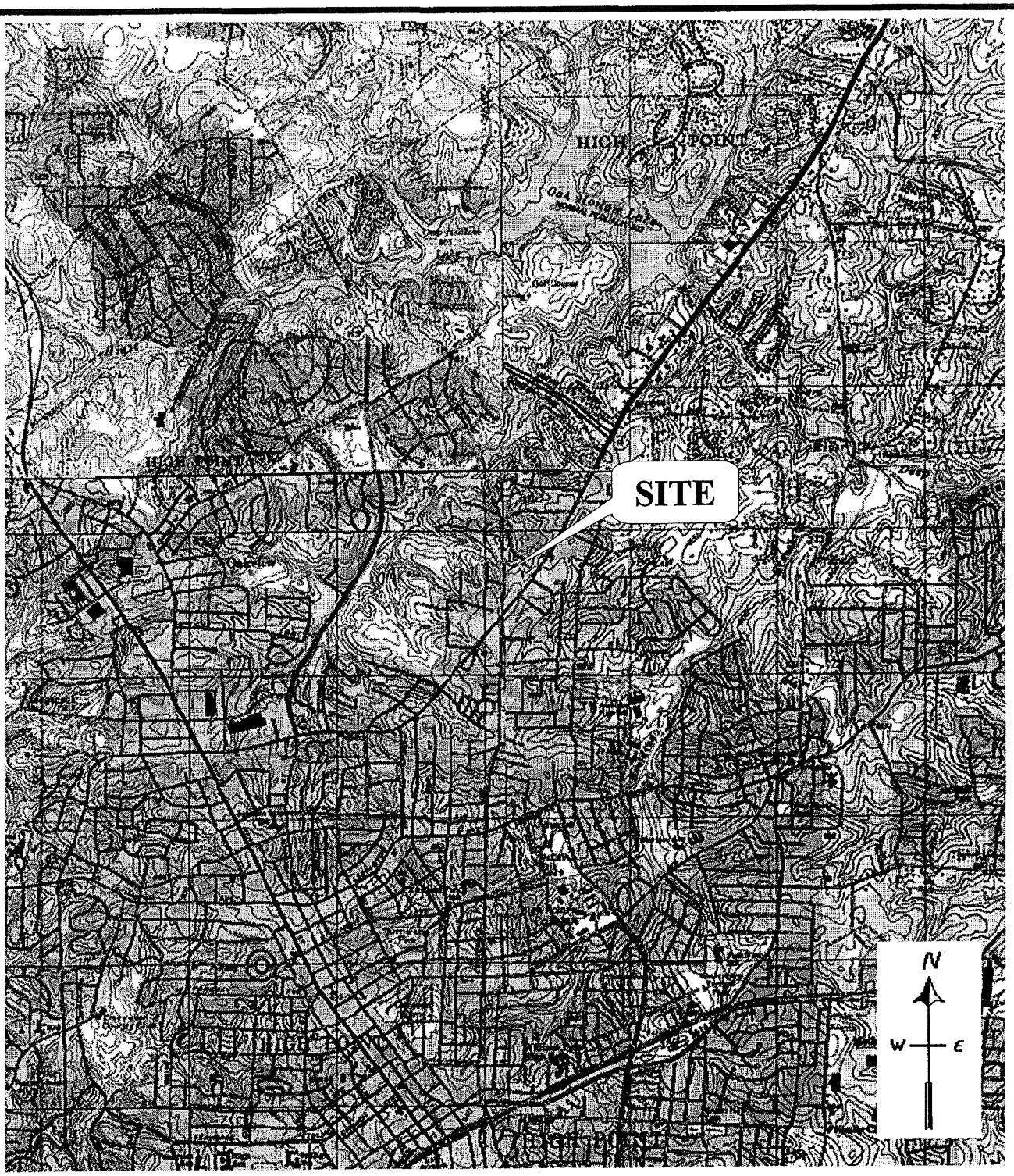
TABLE 3
Historical Groundwater Analytical Results
Circle K Store #1676
1101 Eastchester Drive
High Point, North Carolina
Facility ID No. 0-017601
NCDENR Groundwater Incident No. Pending
ATC Project No. 855446.1676

Sample ID	Sampling Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	IPE	Lead
GW01	9/21/1998	**17**	1	<1	3	21	<5	<5	<3
	5/8/2001	**66.4**	<1	<1	<1	66.4	46	<5	12
	1/2/2003	**179**	6	<5	<5	185	**365**	**89**	<10
	3/2/2005	**35**	<0.7	<0.8	<0.8	35	**190**	8	**16.7**
GW02	9/21/1998	<1	<1	<1	<1	ND	<5	<5	10
	5/8/2001	**1.2**	<1	<1	<1	1.2	<5	<5	<10
	1/2/2003	**1.7**	<1	<1	<1	1.7	9	<5	<10
	3/2/2005	**6**	<0.7	<0.8	<0.8	6	8	<0.8	NA
GW03	9/21/1998	**2**	<1	<1	<1	2	47	<5	4
	5/8/2001	**53**	<1	<1	<1	53	42	<5	<10
	1/2/2003	**92.3**	1	2	<1	95	76	<5	<10
	3/2/2005	**140**	<0.7	8.00	0.8	148.80	160	4	<10
GW04	9/21/1998	<1	<1	<1	<1	ND	**322**	<1	8
	5/8/2001	<0.5	<1	<1	<1	ND	**327**	<5	<10
	1/2/2003	**1.1**	<1	<1	<1	1.1	**246**	<5	<10
	3/2/2005	**1**	<0.7	<0.8	<0.8	1	**77**	5	11.5
GW05	9/21/1998	**36**	<5	**84**	<5	120	<5	<5	<3
	5/8/2001	**5.4**	2	<1	<1	7.4	<5	11	**16**
	1/2/2003	NS	NS	NS	NS	NS	NS	NS	NS
	3/2/2005	**4**	<0.7	9.0	<0.8	13	<0.5	17	**17.2**
GW06	5/8/2001	<5	<10	<10	<10	ND	**6,870**	<50	<10
	1/2/2003	**13**	<25	<25	<25	13	**9,000**	**172**	<10
	3/2/2005	<3	<4	<4	<4	ND	**5,200**	60	NA
2L Standard	-----	**1**	**1,000**	**29**	**530**	**NE**	**200**	**70**	**15**
GCL	-----	**5,000**	**257,500**	**29,000**	**87,500**	**NE**	**200,000**	**70,000**	**15,000**

Notes:

1. "<" or ND = Not Detected at or above the laboratory detection limit.
2. Concentrations are reported in micrograms per liter (µg/l) = parts per billion (ppb).
3. Concentrations in **bold** print equal or exceed the corresponding NCDENR Groundwater Quality 2L Standard.
4. 2L = Groundwater quality standards for North Carolina.
5. GCL = Gross Contaminant Level.
6. NE = Not Established.
7. NA = Not Analyzed.
8. BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes.
9. EDB = Ethylene Dibromide.
10. IPE = Isopropyl Ether.
11. MTBE = Methyl Tert-Butyl Ether.
12. VPH = Volatile Petroleum Hydrocarbons.
13. NS = Not Sampled

FIGURES



SOURCE: 1993 USGS HIGH POINT QUADRANGLE, NORTH CAROLINA – GUILFORD COUNTY, 7.5 MINUTE SERIES TOPOGRAPHIC MAP, SCALE 1:100,000. OBTAINED FROM TOPOZONE.COM

ATC ASSOCIATES INC.
2725 E. Millbrook Road, Ste 121
Raleigh, NC 27604
(919) 871-0999

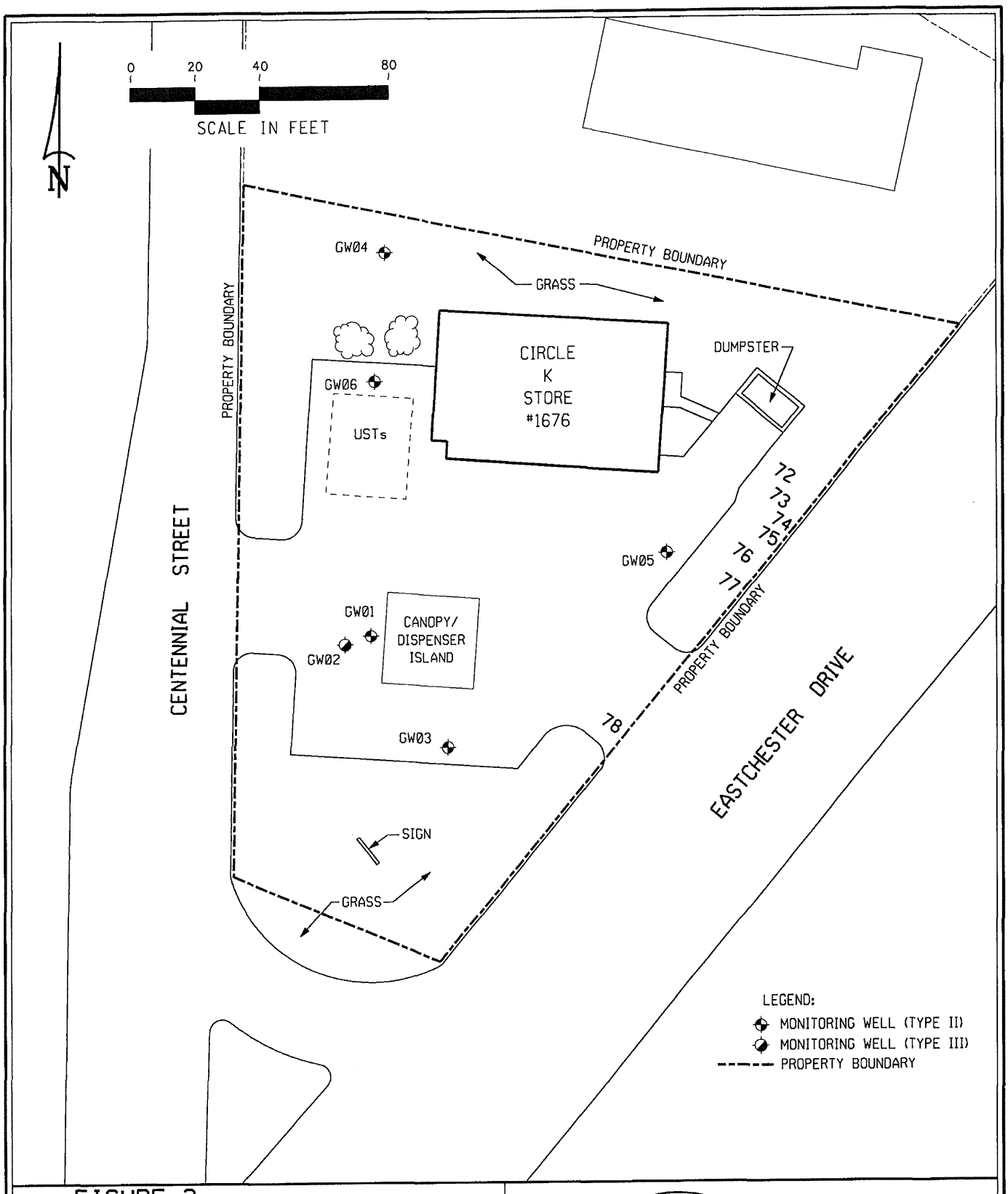
PROJECT NO: 45.75118.1676

DATE: 03/2005 | | REVIEWED BY: DW

FIGURE 1

SITE TOPOGRAPHIC MAP

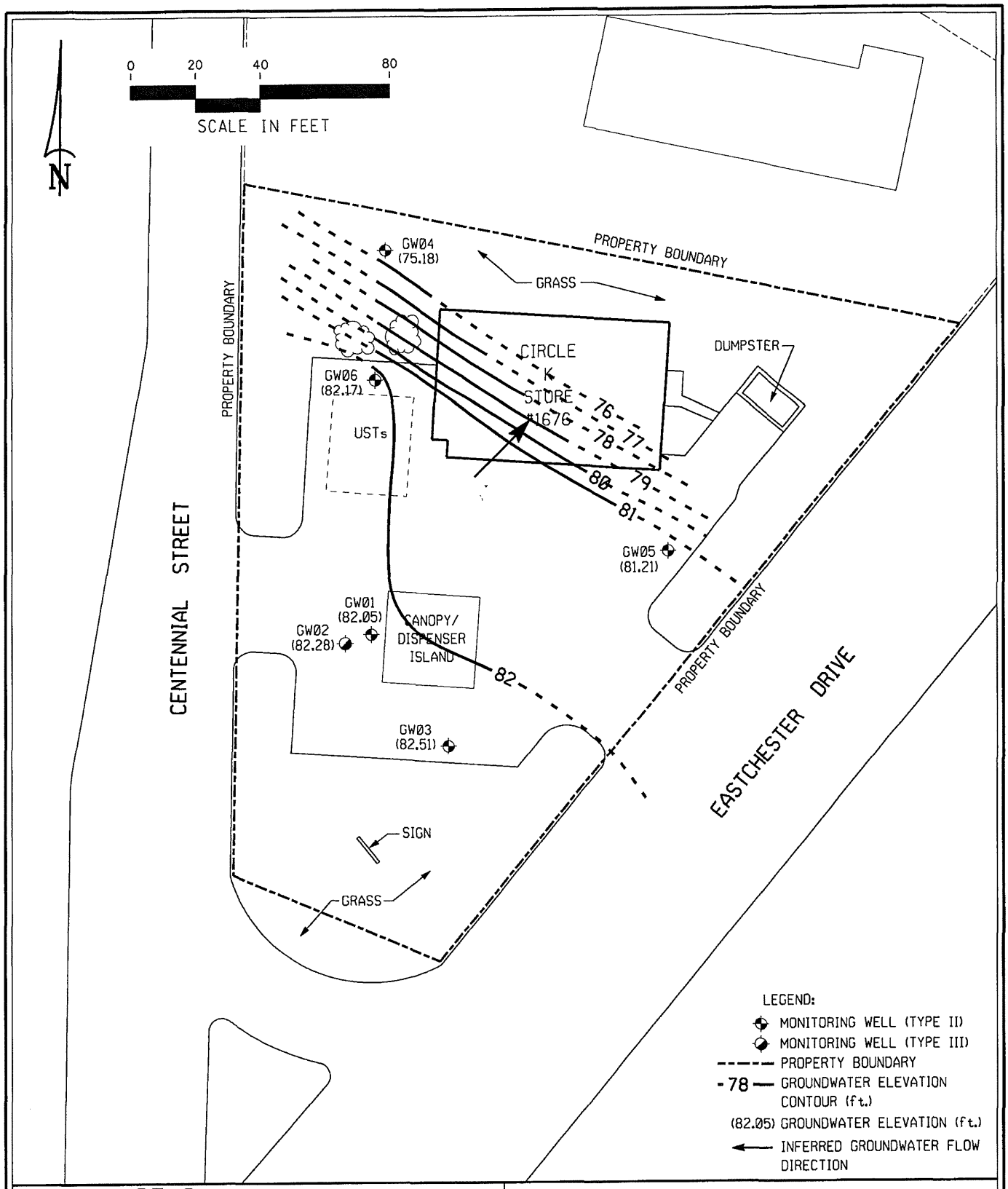
CIRCLE K 1676
1101 EASTCHESTER DRIVE
HIGH POINT, NORTH CAROLINA



TITLE **FIGURE 2**
SITE MAP
CIRCLE K STORE #1676
1101 EASTCHESTER DRIVE
HIGH POINT, NORTH CAROLINA

ATC ASSOCIATES INC.
Raleigh, North Carolina 27604 (919)871-0999 FAX (919)871-0335

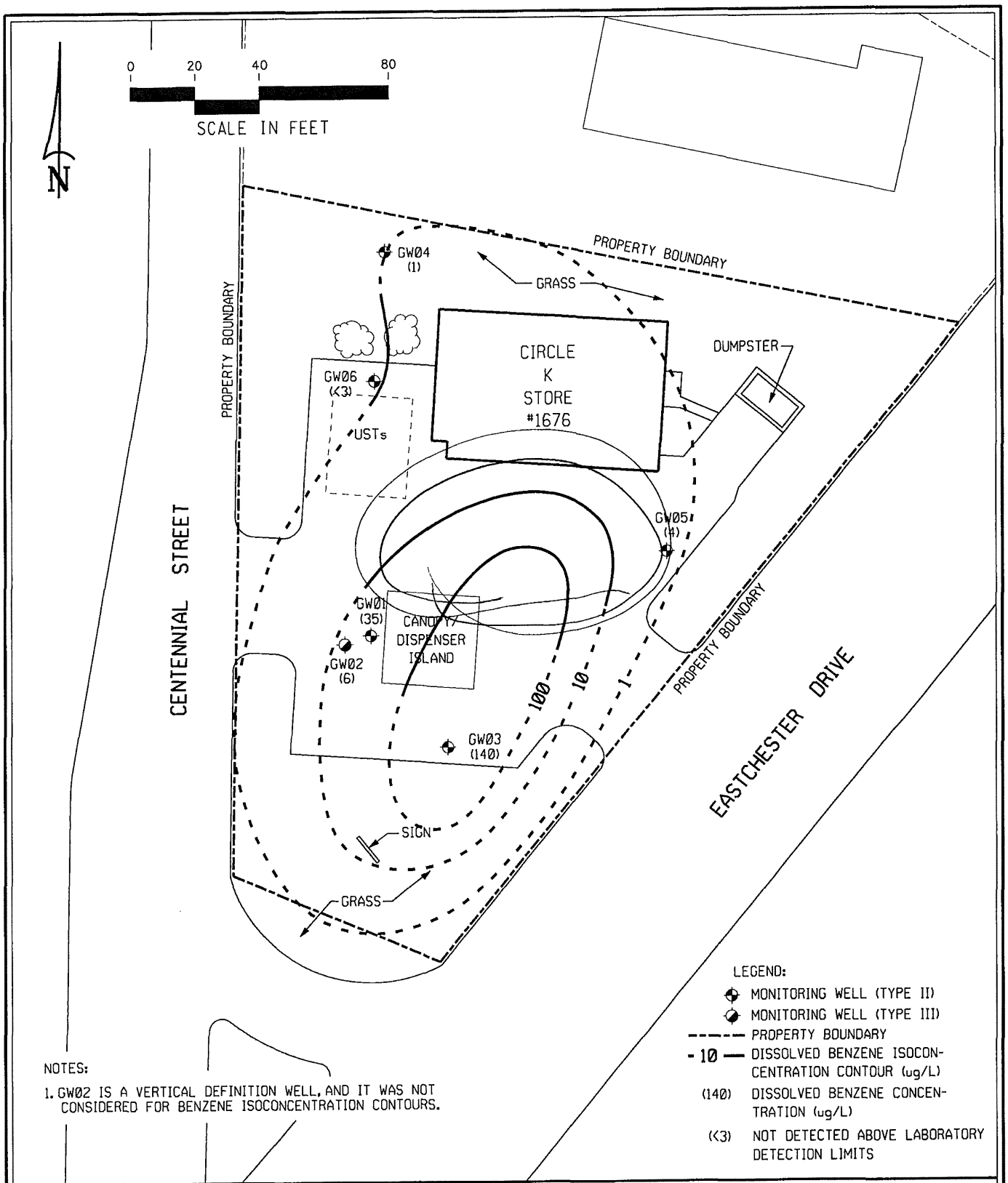
CAD FILE	TYPE CODE	PREP. BY	REV. BY	SCALE	DATE	PROJECT NO.
125810.DGN				AS SHOWN	04-12-2005	45.75118.1676



TITLE **FIGURE 3**
GROUNDWATER ELEVATION CONTOUR MAP
CIRCLE K STORE #1676
1101 EASTCHESTER DRIVE
HIGH POINT, NORTH CAROLINA

ATC ASSOCIATES INC.
Raleigh, North Carolina 27604 (919)871-0999 FAX (919)871-0335

CAD FILE	TYPE CODE	PREP. BY	REV. BY	SCALE	DATE	PROJECT NO.
125810.DGN				AS SHOWN	04-12-2005	45.75118.1676

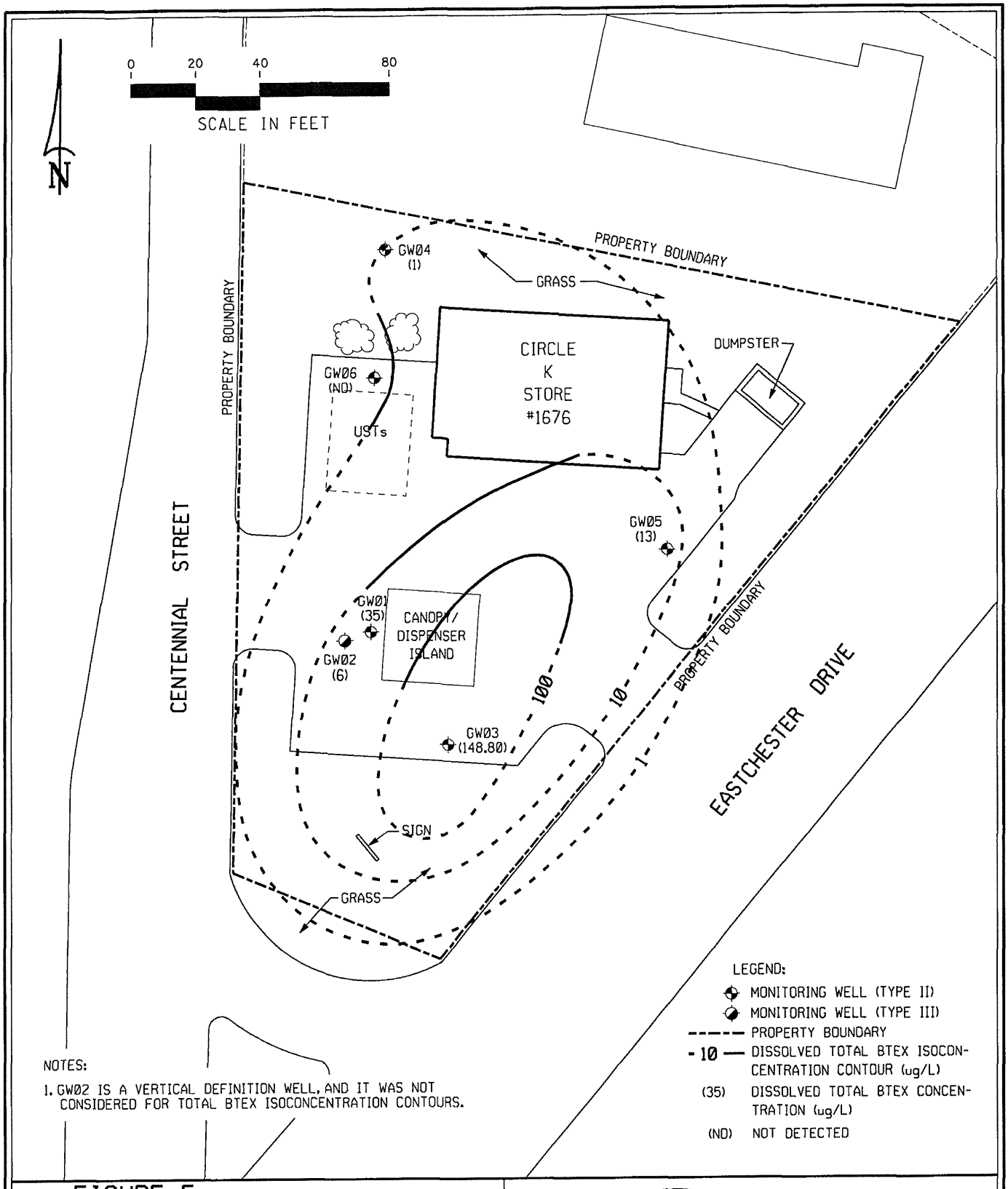


TITLE **FIGURE 4**

DISSOLVED BENZENE ISOCONCENTRATION CONTOUR MAP
CIRCLE K STORE #1676
1101 EASTCHESTER DRIVE
HIGH POINT, NORTH CAROLINA

VATC ASSOCIATES INC.
Raleigh, North Carolina 27604 (919)871-0999 FAX (919)871-0335

CAD FILE	TYPE CODE	PREP. BY	REV. BY	SCALE	DATE	PROJECT NO.
125810.DGN				AS SHOWN	04-12-2005	45.75118.1676

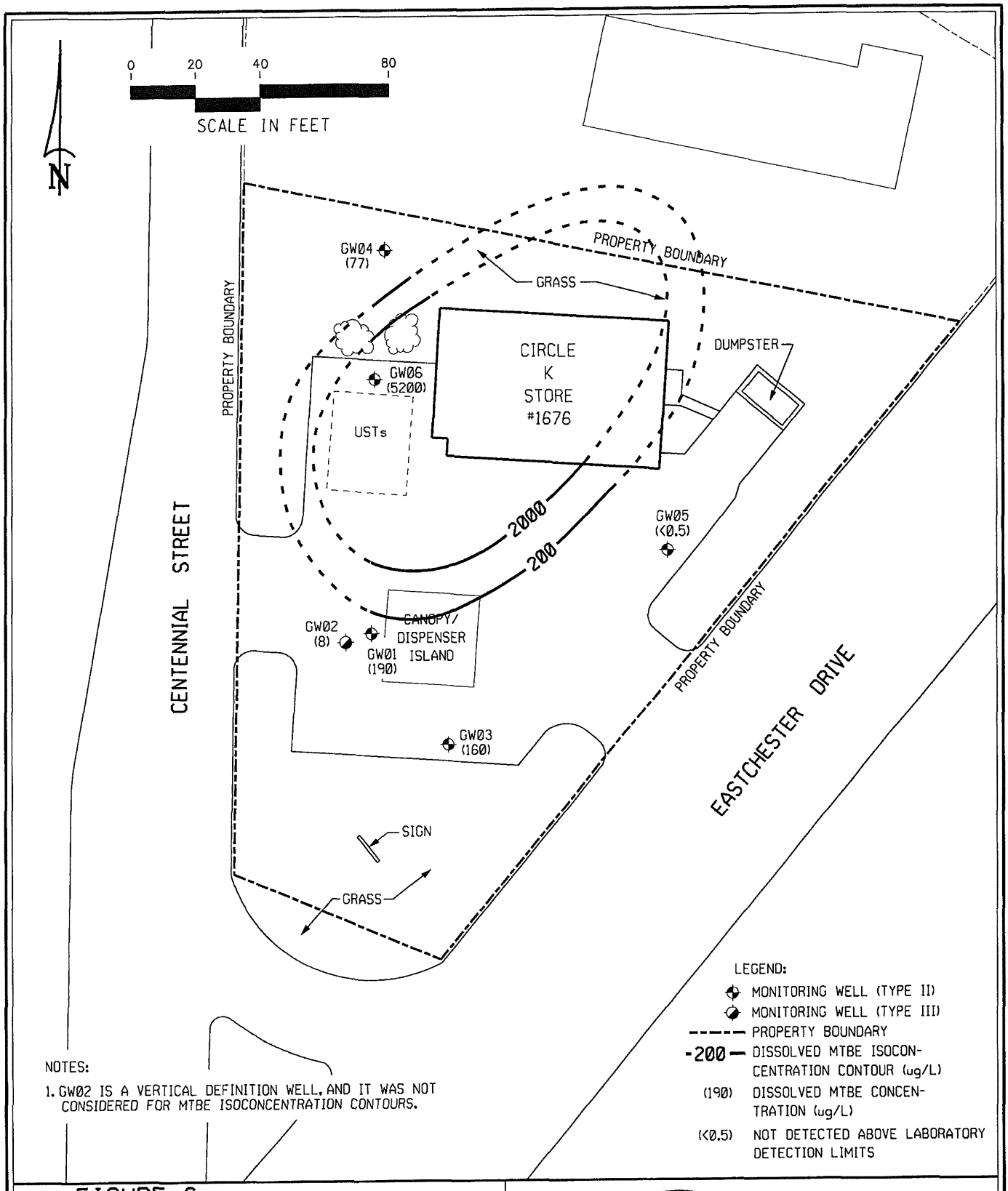


TITLE **FIGURE 5**

DISSOLVED TOTAL BTEX ISOCONCENTRATION CONTOUR MAP
CIRCLE K STORE #1676
1101 EASTCHESTER DRIVE
HIGH POINT, NORTH CAROLINA

ATC ASSOCIATES INC.
Raleigh, North Carolina 27604 (919)871-0999 FAX (919)871-0335

CAD FILE	TYPE CODE	PREP. BY	REV. BY	SCALE	DATE	PROJECT NO.
125810.DGN				AS SHOWN	04-12-2005	45.75118.1676



NOTES:

1. GW02 IS A VERTICAL DEFINITION WELL, AND IT WAS NOT CONSIDERED FOR MTBE ISOCONCENTRATION CONTOURS.

TITLE **FIGURE 6**

DISSOLVED MTBE ISOCONCENTRATION CONTOUR MAP
CIRCLE K STORE #1676
1101 EASTCHESTER DRIVE
HIGH POINT, NORTH CAROLINA

ATC ASSOCIATES INC.
Raleigh, North Carolina 27604 (919)871-0999 FAX (919)871-0335

CAD FILE	TYPE CODE	PREP. BY	REV. BY	SCALE	DATE	PROJECT NO.
125810.DGN				AS SHOWN	04-12-2005	45.75118.1676

APPENDIX A

LABORATORY ANALYTICAL DATA SHEETS

Lancaster Laboratories
2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared for:

ConocoPhillips
PO Box 2197
Houston TX 77079

832-379-6441

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

SAMPLE GROUP

The sample group for this submittal is 933890. Samples arrived at the laboratory on Thursday, March 03, 2005. The PO# for this group is 2075ATC003 and the release number is KIM ALDERMAN.

Client Description	Lancaster Labs Number
GW01 Grab Water Sample	4474627
GW02D Grab Water Sample	4474628
GW03 Grab Water Sample	4474629
GW04 Grab Water Sample	4474630
GW05 Grab Water Sample	4474631
GW06 Grab Water Sample	4474632
Trip Blank Water Sample	4474633

1 COPY TO ATC Assoc of North Carolina Attn: Gabriel Araos

Lancaster Laboratories

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Analysis Report

Questions? Contact your Client Services Representative
Sandra L Patton at (717) 656-2300.

Respectfully Submitted,

Dana M Kauffman

Dana M. Kauffman
Group Leader

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Lancaster Laboratories Sample No. WW 4474627

GW01 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 13:55 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW01-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
07055	Lead	7439-92-1	0.0167	0.0100	mg/l	1
08754	MA - VPH waters					
08755	Benzene	71-43-2	30.0	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	N.D.	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	N.D.	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	161.	2.00	ug/l	1
08761	Naphthalene	91-20-3	N.D.	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	95.4	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	286.	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.
Sample preservation met requirements (pH </= 2).
Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	2.	ug/l	1
05385	Chloromethane	74-87-3	N.D.	1.	ug/l	1
05386	Vinyl Chloride	75-01-4	N.D.	1.	ug/l	1
05387	Bromomethane	74-83-9	N.D.	1.	ug/l	1
05388	Chloroethane	75-00-3	N.D.	1.	ug/l	1
05389	Trichlorofluoromethane	75-69-4	N.D.	2.	ug/l	1

Lancaster Laboratories

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Analysis Report

Lancaster Laboratories Sample No. WW 4474627

GW01 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 13:55 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW01-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05390	1,1-Dichloroethene	75-35-4	N.D.	0.8	ug/l	1
05391	Methylene Chloride	75-09-2	N.D.	2.	ug/l	1
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	0.8	ug/l	1
05393	1,1-Dichloroethane	75-34-3	N.D.	1.	ug/l	1
05396	Chloroform	67-66-3	N.D.	0.8	ug/l	1
05398	1,1,1-Trichloroethane	71-55-6	N.D.	0.8	ug/l	1
05399	Carbon Tetrachloride	56-23-5	N.D.	1.	ug/l	1
05401	Benzene	71-43-2	35.	0.5	ug/l	1
05402	1,2-Dichloroethane	107-06-2	N.D.	1.	ug/l	1
05403	Trichloroethene	79-01-6	N.D.	1.	ug/l	1
05404	1,2-Dichloropropane	78-87-5	N.D.	1.	ug/l	1
05406	Bromodichloromethane	75-27-4	N.D.	1.	ug/l	1
05407	Toluene	108-88-3	N.D.	0.7	ug/l	1
05408	1,1,2-Trichloroethane	79-00-5	N.D.	0.8	ug/l	1
05409	Tetrachloroethene	127-18-4	N.D.	0.8	ug/l	1
05411	Dibromochloromethane	124-48-1	N.D.	1.	ug/l	1
05412	1,2-Dibromoethane	106-93-4	N.D.	1.	ug/l	1
05413	Chlorobenzene	108-90-7	N.D.	0.8	ug/l	1
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	N.D.	0.8	ug/l	1
05416	m+p-Xylene	1330-20-7	N.D.	0.8	ug/l	1
05417	o-Xylene	95-47-6	N.D.	0.8	ug/l	1
05419	Bromoform	75-25-2	N.D.	1.	ug/l	1
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	1.	ug/l	1
05432	1,3-Dichlorobenzene	541-73-1	N.D.	1.	ug/l	1
05433	1,4-Dichlorobenzene	106-46-7	N.D.	1.	ug/l	1
05435	1,2-Dichlorobenzene	95-50-1	N.D.	1.	ug/l	1
05439	Naphthalene	91-20-3	N.D.	1.	ug/l	1
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	190.	0.5	ug/l	1
02011	di-Isopropyl ether	108-20-3	8.	0.8	ug/l	1
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	1.	ug/l	1
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	1.	ug/l	1

State of North Carolina Lab Certification No. 521

Lancaster Laboratories

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Analysis Report

Lancaster Laboratories Sample No. WW 4474627

GW01 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected:03/02/2005 13:55 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW01-

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
07055	Lead	SW-846 6010B	1	03/04/2005 21:06	Donna R Sackett	1
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 17:46	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 18:38	Emiley A King	1
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 18:38	Emiley A King	1
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 18:38	Emiley A King	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 18:38	Emiley A King	n.a.
02812	3030C Acid-Extractable Metals	SM 3030C	1	03/04/2005 09:28	Denise K Conners	1

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Analysis Report

Lancaster Laboratories Sample No. WW 4474628

GW02D Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:15 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW02D

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
08754	MA - VPH waters					
08755	Benzene	71-43-2	5.31	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	N.D.	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	N.D.	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	8.22	2.00	ug/l	1
08761	Naphthalene	91-20-3	N.D.	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.

Sample preservation met requirements (pH </= 2).

Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	2.	ug/l	1
05385	Chloromethane	74-87-3	N.D.	1.	ug/l	1
05386	Vinyl Chloride	75-01-4	N.D.	1.	ug/l	1
05387	Bromomethane	74-83-9	N.D.	1.	ug/l	1
05388	Chloroethane	75-00-3	N.D.	1.	ug/l	1
05389	Trichlorofluoromethane	75-69-4	N.D.	2.	ug/l	1
05390	1,1-Dichloroethene	75-35-4	N.D.	0.8	ug/l	1

Lancaster Laboratories Sample No. WW 4474628

GW02D Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:15 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW02D

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05391	Methylene Chloride	75-09-2	N.D.	2.	ug/l	1
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	0.8	ug/l	1
05393	1,1-Dichloroethane	75-34-3	N.D.	1.	ug/l	1
05396	Chloroform	67-66-3	N.D.	0.8	ug/l	1
05398	1,1,1-Trichloroethane	71-55-6	N.D.	0.8	ug/l	1
05399	Carbon Tetrachloride	56-23-5	N.D.	1.	ug/l	1
05401	Benzene	71-43-2	6.	0.5	ug/l	1
05402	1,2-Dichloroethane	107-06-2	N.D.	1.	ug/l	1
05403	Trichloroethene	79-01-6	N.D.	1.	ug/l	1
05404	1,2-Dichloropropane	78-87-5	N.D.	1.	ug/l	1
05406	Bromodichloromethane	75-27-4	N.D.	1.	ug/l	1
05407	Toluene	108-88-3	N.D.	0.7	ug/l	1
05408	1,1,2-Trichloroethane	79-00-5	N.D.	0.8	ug/l	1
05409	Tetrachloroethene	127-18-4	2.	0.8	ug/l	1
05411	Dibromochloromethane	124-48-1	N.D.	1.	ug/l	1
05412	1,2-Dibromoethane	106-93-4	N.D.	1.	ug/l	1
05413	Chlorobenzene	108-90-7	N.D.	0.8	ug/l	1
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	N.D.	0.8	ug/l	1
05416	m+p-Xylene	1330-20-7	N.D.	0.8	ug/l	1
05417	o-Xylene	95-47-6	N.D.	0.8	ug/l	1
05419	Bromoform	75-25-2	N.D.	1.	ug/l	1
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	1.	ug/l	1
05432	1,3-Dichlorobenzene	541-73-1	N.D.	1.	ug/l	1
05433	1,4-Dichlorobenzene	106-46-7	N.D.	1.	ug/l	1
05435	1,2-Dichlorobenzene	95-50-1	N.D.	1.	ug/l	1
05439	Naphthalene	91-20-3	N.D.	1.	ug/l	1
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	8.	0.5	ug/l	1
02011	di-Isopropyl ether	108-20-3	N.D.	0.8	ug/l	1
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	1.	ug/l	1
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	1.	ug/l	1

State of North Carolina Lab Certification No. 521

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Analysis Report

Lancaster Laboratories Sample No. WW 4474628

GW02D Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:15 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW02D

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 18:29	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 19:01	Emiley A King	1
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 19:01	Emiley A King	1
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 19:01	Emiley A King	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 19:01	Emiley A King	n.a.

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Analysis Report

Lancaster Laboratories Sample No. WW 4474629

GW03 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected:03/02/2005 13:35 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW03-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
07055	Lead	7439-92-1	N.D.	0.0100	mg/l	1
08754	MA - VPH waters					
08755	Benzene	71-43-2	114.	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	8.99	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	N.D.	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	135.	2.00	ug/l	1
08761	Naphthalene	91-20-3	88.2	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	254.	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	133.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	337.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	504.	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	480.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.
Sample preservation met requirements (pH </= 2).
Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	2.	ug/l	1
05385	Chloromethane	74-87-3	N.D.	1.	ug/l	1
05386	Vinyl Chloride	75-01-4	N.D.	1.	ug/l	1
05387	Bromomethane	74-83-9	N.D.	1.	ug/l	1
05388	Chloroethane	75-00-3	N.D.	1.	ug/l	1
05389	Trichlorofluoromethane	75-69-4	N.D.	2.	ug/l	1

Lancaster Laboratories Sample No. WW 4474629

GW03 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 13:35 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW03-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05390	1,1-Dichloroethene	75-35-4	N.D.	0.8	ug/l	1
05391	Methylene Chloride	75-09-2	N.D.	2.	ug/l	1
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	0.8	ug/l	1
05393	1,1-Dichloroethane	75-34-3	N.D.	1.	ug/l	1
05396	Chloroform	67-66-3	N.D.	0.8	ug/l	1
05398	1,1,1-Trichloroethane	71-55-6	N.D.	0.8	ug/l	1
05399	Carbon Tetrachloride	56-23-5	N.D.	1.	ug/l	1
05401	Benzene	71-43-2	140.	0.5	ug/l	1
05402	1,2-Dichloroethane	107-06-2	N.D.	1.	ug/l	1
05403	Trichloroethene	79-01-6	1.	1.	ug/l	1
05404	1,2-Dichloropropane	78-87-5	N.D.	1.	ug/l	1
05406	Bromodichloromethane	75-27-4	N.D.	1.	ug/l	1
05407	Toluene	108-88-3	N.D.	0.7	ug/l	1
05408	1,1,2-Trichloroethane	79-00-5	N.D.	0.8	ug/l	1
05409	Tetrachloroethene	127-18-4	6.	0.8	ug/l	1
05411	Dibromochloromethane	124-48-1	N.D.	1.	ug/l	1
05412	1,2-Dibromoethane	106-93-4	N.D.	1.	ug/l	1
05413	Chlorobenzene	108-90-7	N.D.	0.8	ug/l	1
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	8.	0.8	ug/l	1
05416	m+p-Xylene	1330-20-7	0.8	0.8	ug/l	1
05417	o-Xylene	95-47-6	N.D.	0.8	ug/l	1
05419	Bromoform	75-25-2	N.D.	1.	ug/l	1
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	1.	ug/l	1
05432	1,3-Dichlorobenzene	541-73-1	N.D.	1.	ug/l	1
05433	1,4-Dichlorobenzene	106-46-7	N.D.	1.	ug/l	1
05435	1,2-Dichlorobenzene	95-50-1	N.D.	1.	ug/l	1
05439	Naphthalene	91-20-3	100.	1.	ug/l	1
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	160.	0.5	ug/l	1
02011	di-Isopropyl ether	108-20-3	4.	0.8	ug/l	1
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	1.	ug/l	1
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	1.	ug/l	1

State of North Carolina Lab Certification No. 521

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Analysis Report

Lancaster Laboratories Sample No. WW 4474629

GW03 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected:03/02/2005 13:35 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW03-

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
07055	Lead	SW-846 6010B	1	03/04/2005 21:09	Donna R Sackett	1
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 19:11	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 20:11	Emiley A King	1
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 20:11	Emiley A King	1
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 20:11	Emiley A King	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 20:11	Emiley A King	n.a.
02812	3030C Acid-Extractable Metals	SM 3030C	1	03/04/2005 09:28	Denise K Conners	1

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Analysis Report

Lancaster Laboratories Sample No. WW 4474630

GW04 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:50 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW04-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
07055	Lead	7439-92-1	0.0115	0.0100	mg/l	1
08754	MA - VPH waters					
08755	Benzene	71-43-2	1.	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	N.D.	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	N.D.	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	74.7	2.00	ug/l	1
08761	Naphthalene	91-20-3	N.D.	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	63.3	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.
Sample preservation met requirements (pH </= 2).
Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	2.	ug/l	1
05385	Chloromethane	74-87-3	N.D.	1.	ug/l	1
05386	Vinyl Chloride	75-01-4	N.D.	1.	ug/l	1
05387	Bromomethane	74-83-9	N.D.	1.	ug/l	1
05388	Chloroethane	75-00-3	N.D.	1.	ug/l	1
05389	Trichlorofluoromethane	75-69-4	N.D.	2.	ug/l	1

Lancaster Laboratories Sample No. WW 4474630

GW04 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:50 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW04-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05390	1,1-Dichloroethene	75-35-4	N.D.	0.8	ug/l	1
05391	Methylene Chloride	75-09-2	N.D.	2.	ug/l	1
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	0.8	ug/l	1
05393	1,1-Dichloroethane	75-34-3	N.D.	1.	ug/l	1
05396	Chloroform	67-66-3	N.D.	0.8	ug/l	1
05398	1,1,1-Trichloroethane	71-55-6	N.D.	0.8	ug/l	1
05399	Carbon Tetrachloride	56-23-5	N.D.	1.	ug/l	1
05401	Benzene	71-43-2	1.	0.5	ug/l	1
05402	1,2-Dichloroethane	107-06-2	N.D.	1.	ug/l	1
05403	Trichloroethene	79-01-6	N.D.	1.	ug/l	1
05404	1,2-Dichloropropane	78-87-5	N.D.	1.	ug/l	1
05406	Bromodichloromethane	75-27-4	N.D.	1.	ug/l	1
05407	Toluene	108-88-3	N.D.	0.7	ug/l	1
05408	1,1,2-Trichloroethane	79-00-5	N.D.	0.8	ug/l	1
05409	Tetrachloroethene	127-18-4	N.D.	0.8	ug/l	1
05411	Dibromochloromethane	124-48-1	N.D.	1.	ug/l	1
05412	1,2-Dibromoethane	106-93-4	N.D.	1.	ug/l	1
05413	Chlorobenzene	108-90-7	N.D.	0.8	ug/l	1
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	N.D.	0.8	ug/l	1
05416	m+p-Xylene	1330-20-7	N.D.	0.8	ug/l	1
05417	o-Xylene	95-47-6	N.D.	0.8	ug/l	1
05419	Bromoform	75-25-2	N.D.	1.	ug/l	1
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	1.	ug/l	1
05432	1,3-Dichlorobenzene	541-73-1	N.D.	1.	ug/l	1
05433	1,4-Dichlorobenzene	106-46-7	N.D.	1.	ug/l	1
05435	1,2-Dichlorobenzene	95-50-1	N.D.	1.	ug/l	1
05439	Naphthalene	91-20-3	N.D.	1.	ug/l	1
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	77.	0.5	ug/l	1
02011	di-Isopropyl ether	108-20-3	5.	0.8	ug/l	1
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	1.	ug/l	1
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	1.	ug/l	1

State of North Carolina Lab Certification No. 521

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Analysis Report

Lancaster Laboratories Sample No. WW 4474630

GW04 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:50 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW04-

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
07055	Lead	SW-846 6010B	1	03/04/2005 21:20	Donna R Sackett	1
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 19:53	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 20:35	Emiley A King	1
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 20:35	Emiley A King	1
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 20:35	Emiley A King	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 20:35	Emiley A King	n.a.
02812	3030C Acid-Extractable Metals	SM 3030C	1	03/04/2005 09:28	Denise K Conners	1

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Analysis Report

Lancaster Laboratories Sample No. WW 4474631

GW05 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected:03/02/2005 13:20 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW05-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
07055	Lead	7439-92-1	0.0172	0.0100	mg/l	1
08754	MA - VPH waters					
08755	Benzene	71-43-2	3.59	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	10.6	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	5.43	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	N.D.	2.00	ug/l	1
08761	Naphthalene	91-20-3	6.12	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	459.	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	329.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	420.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	464.	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	765.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.
Sample preservation met requirements (pH </= 2).
Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	2.	ug/l	1
05385	Chloromethane	74-87-3	N.D.	1.	ug/l	1
05386	Vinyl Chloride	75-01-4	N.D.	1.	ug/l	1
05387	Bromomethane	74-83-9	N.D.	1.	ug/l	1
05388	Chloroethane	75-00-3	N.D.	1.	ug/l	1
05389	Trichlorofluoromethane	75-69-4	N.D.	2.	ug/l	1

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Analysis Report

Lancaster Laboratories Sample No. WW 4474631

GW05 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 13:20 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW05-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05390	1,1-Dichloroethene	75-35-4	N.D.	0.8	ug/l	1
05391	Methylene Chloride	75-09-2	N.D.	2.	ug/l	1
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	0.8	ug/l	1
05393	1,1-Dichloroethane	75-34-3	N.D.	1.	ug/l	1
05396	Chloroform	67-66-3	N.D.	0.8	ug/l	1
05398	1,1,1-Trichloroethane	71-55-6	N.D.	0.8	ug/l	1
05399	Carbon Tetrachloride	56-23-5	N.D.	1.	ug/l	1
05401	Benzene	71-43-2	4.	0.5	ug/l	1
05402	1,2-Dichloroethane	107-06-2	44.	1.	ug/l	1
05403	Trichloroethene	79-01-6	N.D.	1.	ug/l	1
05404	1,2-Dichloropropane	78-87-5	N.D.	1.	ug/l	1
05406	Bromodichloromethane	75-27-4	N.D.	1.	ug/l	1
05407	Toluene	108-88-3	N.D.	0.7	ug/l	1
05408	1,1,2-Trichloroethane	79-00-5	N.D.	0.8	ug/l	1
05409	Tetrachloroethene	127-18-4	N.D.	0.8	ug/l	1
05411	Dibromochloromethane	124-48-1	N.D.	1.	ug/l	1
05412	1,2-Dibromoethane	106-93-4	N.D.	1.	ug/l	1
05413	Chlorobenzene	108-90-7	N.D.	0.8	ug/l	1
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	9.	0.8	ug/l	1
05416	m+p-Xylene	1330-20-7	N.D.	0.8	ug/l	1
05417	o-Xylene	95-47-6	N.D.	0.8	ug/l	1
05419	Bromoform	75-25-2	N.D.	1.	ug/l	1
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	1.	ug/l	1
05432	1,3-Dichlorobenzene	541-73-1	N.D.	1.	ug/l	1
05433	1,4-Dichlorobenzene	106-46-7	N.D.	1.	ug/l	1
05435	1,2-Dichlorobenzene	95-50-1	N.D.	1.	ug/l	1
05439	Naphthalene	91-20-3	3.	1.	ug/l	1
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	ug/l	1
02011	di-Isopropyl ether	108-20-3	17.	0.8	ug/l	1
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	1.	ug/l	1
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	1.	ug/l	1

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Analysis Report

Lancaster Laboratories Sample No. WW 4474631

GW05 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 13:20 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW05-

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
07055	Lead	SW-846 6010B	1	03/04/2005 20:44	Donna R Sackett	1
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 20:35	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 20:58	Emiley A King	1
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 20:58	Emiley A King	1
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 20:58	Emiley A King	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 20:58	Emiley A King	n.a.
02812	3030C Acid-Extractable Metals	SM 3030C	1	03/04/2005 09:28	Denise K Conners	1

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Analysis Report

Lancaster Laboratories Sample No. WW 4474632

GW06 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:30 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW06-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
08754	MA - VPH waters					
08755	Benzene	71-43-2	0.8	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	N.D.	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	N.D.	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	4,610.	20.0	ug/l	10
08761	Naphthalene	91-20-3	N.D.	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	3,570.	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.
Sample preservation met requirements (pH </= 2).
Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	10.	ug/l	5
05385	Chloromethane	74-87-3	N.D.	5.	ug/l	5
05386	Vinyl Chloride	75-01-4	N.D.	5.	ug/l	5
05387	Bromomethane	74-83-9	N.D.	5.	ug/l	5
05388	Chloroethane	75-00-3	N.D.	5.	ug/l	5
05389	Trichlorofluoromethane	75-69-4	N.D.	10.	ug/l	5
05390	1,1-Dichloroethene	75-35-4	N.D.	4.	ug/l	5

Lancaster Laboratories Sample No. WW 4474632

GW06 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: 03/02/2005 14:30 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW06-

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05391	Methylene Chloride	75-09-2	N.D.	10.	ug/l	5
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	4.	ug/l	5
05393	1,1-Dichloroethane	75-34-3	N.D.	5.	ug/l	5
05396	Chloroform	67-66-3	N.D.	4.	ug/l	5
05398	1,1,1-Trichloroethane	71-55-6	N.D.	4.	ug/l	5
05399	Carbon Tetrachloride	56-23-5	N.D.	5.	ug/l	5
05401	Benzene	71-43-2	N.D.	3.	ug/l	5
05402	1,2-Dichloroethane	107-06-2	N.D.	5.	ug/l	5
05403	Trichloroethene	79-01-6	N.D.	5.	ug/l	5
05404	1,2-Dichloropropane	78-87-5	N.D.	5.	ug/l	5
05406	Bromodichloromethane	75-27-4	N.D.	5.	ug/l	5
05407	Toluene	108-88-3	N.D.	4.	ug/l	5
05408	1,1,2-Trichloroethane	79-00-5	N.D.	4.	ug/l	5
05409	Tetrachloroethene	127-18-4	N.D.	4.	ug/l	5
05411	Dibromochloromethane	124-48-1	N.D.	5.	ug/l	5
05412	1,2-Dibromoethane	106-93-4	N.D.	5.	ug/l	5
05413	Chlorobenzene	108-90-7	N.D.	4.	ug/l	5
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	N.D.	4.	ug/l	5
05416	m+p-Xylene	1330-20-7	N.D.	4.	ug/l	5
05417	o-Xylene	95-47-6	N.D.	4.	ug/l	5
05419	Bromoform	75-25-2	N.D.	5.	ug/l	5
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	5.	ug/l	5
05432	1,3-Dichlorobenzene	541-73-1	N.D.	5.	ug/l	5
05433	1,4-Dichlorobenzene	106-46-7	N.D.	5.	ug/l	5
05435	1,2-Dichlorobenzene	95-50-1	N.D.	5.	ug/l	5
05439	Naphthalene	91-20-3	N.D.	5.	ug/l	5
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	5,200.	13.	ug/l	25
02011	di-Isopropyl ether	108-20-3	60.	4.	ug/l	5
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	5.	ug/l	5
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	5.	ug/l	5

Due to the level of methyl tertiary butyl ether, the reporting limits for all GC/MS volatile compounds were raised.

State of North Carolina Lab Certification No. 521

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Analysis Report

Lancaster Laboratories Sample No. WW 4474632

GW06 Grab Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected:03/02/2005 14:30 by DW

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:35
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW06-

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 21:18	K. Robert Caulfeild-James	10
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 22:00	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 21:21	Emiley A King	5
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 21:21	Emiley A King	5
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 21:21	Emiley A King	5
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 21:44	Emiley A King	25
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 21:21	Emiley A King	n.a.
01163	GC/MS VOA Water Prep	SW-846 5030B	2	03/08/2005 21:44	Emiley A King	n.a.

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Analysis Report

Lancaster Laboratories Sample No. WW 4474633

Trip Blank Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: n.a.

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:36
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW0TB

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
08754	MA - VPH waters					
08755	Benzene	71-43-2	N.D.	0.5	ug/l	1
08756	Toluene	108-88-3	N.D.	2.00	ug/l	1
08757	Ethylbenzene	100-41-4	N.D.	2.00	ug/l	1
08758	m,p-Xylenes	1330-20-7	N.D.	5.00	ug/l	1
08759	o-Xylene	95-47-6	N.D.	2.00	ug/l	1
08760	Methyl t-butyl ether	1634-04-4	N.D.	2.00	ug/l	1
08761	Naphthalene	91-20-3	N.D.	2.00	ug/l	1
08762	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08763	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08764	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	50.0	ug/l	1
08838	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	ug/l	1
08839	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	ug/l	1

The concentrations of individual target analytes and the surrogate standard have been subtracted from the concentrations of the appropriate hydrocarbon ranges as specified by the method.
Elution ranges for the target analytes are listed below:
benzene, toluene, methyl t-butyl ether - C5-C8 aliphatics
ethyl benzene, m,p-xylenes, o-xylene - C9-C12 aliphatics

Significant modifications to the method are listed below:
The surrogate standard for the VPH analysis is a,a,a-trifluorotoluene for both the PID and FID. This compound elutes in the C5-C8 range. 1-Chloro-3-fluorobenzene is also used as an internal standard for the PID and elutes in the C5-C8 range. The use of the internal standard, surrogate standard that elute in the specified aliphatic or aromatic ranges is a significant modification. The peak areas for these standards are subtracted from the area for the specific ranges before the concentrations are calculated. This process has been validated in our laboratory and has produced acceptable data in the MA Round Robin study.
Sample containers were received in satisfactory condition.
Sample preservation met requirements (pH </= 2).
Samples were received on ice at a temperature of 4 +/- 2C.

05382	EPA SW846/8260 (water)					
05384	Dichlorodifluoromethane	75-71-8	N.D.	2.	ug/l	1
05385	Chloromethane	74-87-3	N.D.	1.	ug/l	1
05386	Vinyl Chloride	75-01-4	N.D.	1.	ug/l	1
05387	Bromomethane	74-83-9	N.D.	1.	ug/l	1
05388	Chloroethane	75-00-3	N.D.	1.	ug/l	1
05389	Trichlorofluoromethane	75-69-4	N.D.	2.	ug/l	1
05390	1,1-Dichloroethene	75-35-4	N.D.	0.8	ug/l	1

Lancaster Laboratories Sample No. WW 4474633

Trip Blank Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: n.a.

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:36
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW0TB

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Units	Dilution Factor
05391	Methylene Chloride	75-09-2	N.D.	2.	ug/l	1
05392	trans-1,2-Dichloroethene	156-60-5	N.D.	0.8	ug/l	1
05393	1,1-Dichloroethane	75-34-3	N.D.	1.	ug/l	1
05396	Chloroform	67-66-3	N.D.	0.8	ug/l	1
05398	1,1,1-Trichloroethane	71-55-6	N.D.	0.8	ug/l	1
05399	Carbon Tetrachloride	56-23-5	N.D.	1.	ug/l	1
05401	Benzene	71-43-2	N.D.	0.5	ug/l	1
05402	1,2-Dichloroethane	107-06-2	N.D.	1.	ug/l	1
05403	Trichloroethene	79-01-6	N.D.	1.	ug/l	1
05404	1,2-Dichloropropane	78-87-5	N.D.	1.	ug/l	1
05406	Bromodichloromethane	75-27-4	N.D.	1.	ug/l	1
05407	Toluene	108-88-3	N.D.	0.7	ug/l	1
05408	1,1,2-Trichloroethane	79-00-5	N.D.	0.8	ug/l	1
05409	Tetrachloroethene	127-18-4	N.D.	0.8	ug/l	1
05411	Dibromochloromethane	124-48-1	N.D.	1.	ug/l	1
05412	1,2-Dibromoethane	106-93-4	N.D.	1.	ug/l	1
05413	Chlorobenzene	108-90-7	N.D.	0.8	ug/l	1
05383	EPA SW846/8260 (water) cont					
05415	Ethylbenzene	100-41-4	N.D.	0.8	ug/l	1
05416	m+p-Xylene	1330-20-7	N.D.	0.8	ug/l	1
05417	o-Xylene	95-47-6	N.D.	0.8	ug/l	1
05419	Bromoform	75-25-2	N.D.	1.	ug/l	1
05421	1,1,2,2-Tetrachloroethane	79-34-5	N.D.	1.	ug/l	1
05432	1,3-Dichlorobenzene	541-73-1	N.D.	1.	ug/l	1
05433	1,4-Dichlorobenzene	106-46-7	N.D.	1.	ug/l	1
05435	1,2-Dichlorobenzene	95-50-1	N.D.	1.	ug/l	1
05439	Naphthalene	91-20-3	N.D.	1.	ug/l	1
08202	EPA SW 846/8260 - Water					
02010	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	0.5	ug/l	1
02011	di-Isopropyl ether	108-20-3	N.D.	0.8	ug/l	1
06306	trans-1,3-Dichloropropene	10061-02-6	N.D.	1.	ug/l	1
06307	cis-1,3-Dichloropropene	10061-01-5	N.D.	1.	ug/l	1

State of North Carolina Lab Certification No. 521

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Analysis Report

Lancaster Laboratories Sample No. WW 4474633

Trip Blank Water Sample
Site# 2075 Circle K 1619 Prj# 45.75000.1676
1101 Eastchester Dr - High Point, NC
Collected: n.a.

Account Number: 11417

Submitted: 03/03/2005 09:00
Reported: 03/14/2005 at 07:36
Discard: 04/14/2005

ConocoPhillips
PO Box 2197
Houston TX 77079

GW0TB

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
08754	MA - VPH waters	MADEP-VPH,modified/8021B	1	03/04/2005 17:04	K. Robert Caulfeild-James	1
05382	EPA SW846/8260 (water)	SW-846 8260B	1	03/08/2005 22:08	Emiley A King	1
05383	EPA SW846/8260 (water) cont	SW-846 8260B	1	03/08/2005 22:08	Emiley A King	1
08202	EPA SW 846/8260 - Water	SW-846 8260B	1	03/08/2005 22:08	Emiley A King	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	03/08/2005 22:08	Emiley A King	n.a.

Lancaster Laboratories

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Analysis Report

Quality Control Summary

Client Name: ConocoPhillips
Reported: 03/14/05 at 07:36 AM

Group Number: 933890

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 050632812001	Sample number(s): 4474627,4474629-4474631							
Lead	N.D.	0.0100	mg/l	103		80-120		
Batch number: 05063A01A	Sample number(s): 4474627-4474633							
Benzene	N.D.	0.5	ug/l	91	93	70-130	1	50
Toluene	N.D.	2.00	ug/l	98	99	70-130	0	50
Ethylbenzene	N.D.	2.00	ug/l	96	96	70-130	0	50
m,p-Xylenes	N.D.	5.00	ug/l	99	99	70-130	1	50
o-Xylene	N.D.	2.00	ug/l	97	98	70-130	0	50
Methyl t-butyl ether	N.D.	2.00	ug/l	96	97	70-130	1	50
Naphthalene	N.D.	2.00	ug/l	88	91	70-130	3	50
C5-C8 Aliphatic Hydrocarbons	N.D.	50.0	ug/l	103	104	70-130	0	50
C9-C12 Aliphatic Hydrocarbons	N.D.	50.0	ug/l	86	86	70-130	0	50
C9-C10 Aromatic Hydrocarbons	N.D.	50.0	ug/l	99	99	70-130	0	50
Unadjusted C5-C8 Aliphatics	N.D.	50.0	ug/l	99	100	70-130	1	50
Unadjusted C9-C12 Aliphatics	N.D.	50.0	ug/l	96	96	70-130	0	50
Batch number: W050671AA	Sample number(s): 4474627-4474633							
Methyl Tertiary Butyl Ether	N.D.	0.5	ug/l	106		77-127		
di-Isopropyl ether	N.D.	0.8	ug/l	97		67-130		
Dichlorodifluoromethane	N.D.	2.	ug/l	100		59-177		
Chloromethane	N.D.	1.	ug/l	91		59-177		
Vinyl Chloride	N.D.	1.	ug/l	89		71-134		
Bromomethane	N.D.	1.	ug/l	97		62-131		
Chloroethane	N.D.	1.	ug/l	85		67-127		
Trichlorofluoromethane	N.D.	2.	ug/l	100		70-148		
1,1-Dichloroethene	N.D.	0.8	ug/l	121		79-130		
Methylene Chloride	N.D.	2.	ug/l	108		80-128		
trans-1,2-Dichloroethene	N.D.	0.8	ug/l	108		81-124		
1,1-Dichloroethane	N.D.	1.	ug/l	105		83-127		
Chloroform	N.D.	0.8	ug/l	107		86-124		
1,1,1-Trichloroethane	N.D.	0.8	ug/l	109		83-127		
Carbon Tetrachloride	N.D.	1.	ug/l	108		77-130		
Benzene	N.D.	0.5	ug/l	102		85-117		
1,2-Dichloroethane	N.D.	1.	ug/l	111		77-132		
Trichloroethene	N.D.	1.	ug/l	101		87-117		
1,2-Dichloropropane	N.D.	1.	ug/l	98		80-117		
Bromodichloromethane	N.D.	1.	ug/l	97		83-121		
Toluene	N.D.	0.7	ug/l	95		85-115		
1,1,2-Trichloroethane	N.D.	0.8	ug/l	95		86-113		
Tetrachloroethene	N.D.	0.8	ug/l	101		74-125		
Dibromochloromethane	N.D.	1.	ug/l	97		78-119		
1,2-Dibromoethane	N.D.	1.	ug/l	96		81-114		
Chlorobenzene	N.D.	0.8	ug/l	96		85-115		

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The background result was more than four times the spike added.

Quality Control Summary

Client Name: ConocoPhillips
Reported: 03/14/05 at 07:36 AM

Group Number: 933890

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Ethylbenzene	N.D.	0.8	ug/l	97		82-119		
m+p-Xylene	N.D.	0.8	ug/l	99		84-120		
o-Xylene	N.D.	0.8	ug/l	100		82-113		
Bromoform	N.D.	1.	ug/l	91		69-118		
1,1,2,2-Tetrachloroethane	N.D.	1.	ug/l	88		72-119		
1,3-Dichlorobenzene	N.D.	1.	ug/l	96		81-114		
1,4-Dichlorobenzene	N.D.	1.	ug/l	95		84-116		
1,2-Dichlorobenzene	N.D.	1.	ug/l	94		81-112		
Naphthalene	N.D.	1.	ug/l	93		61-116		
trans-1,3-Dichloropropene	N.D.	1.	ug/l	92		79-114		
cis-1,3-Dichloropropene	N.D.	1.	ug/l	100		78-114		

Sample Matrix Quality Control

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 050632812001	Sample number(s): 4474627,4474629-4474631								
Lead	103	100	87-118	2	20	0.0172	0.0171	1 (1)	20
Batch number: W050671AA	Sample number(s): 4474627-4474633								
Methyl Tertiary Butyl Ether	107	107	69-134	0	30				
di-Isopropyl ether	104	105	75-130	0	30				
Dichlorodifluoromethane	129	129	72-208	0	30				
Chloromethane	100	103	72-208	3	30				
Vinyl Chloride	104	107	81-150	4	30				
Bromomethane	103	103	59-143	0	30				
Chloroethane	99	96	63-142	4	30				
Trichlorofluoromethane	120	119	77-177	1	30				
1,1-Dichloroethene	134	133	87-145	1	30				
Methylene Chloride	111	112	79-133	1	30				
trans-1,2-Dichloroethene	118	115	82-133	2	30				
1,1-Dichloroethane	111	115	85-135	3	30				
Chloroform	109	105	82-131	3	30				
1,1,1-Trichloroethane	120	117	81-142	2	30				
Carbon Tetrachloride	121	119	79-155	1	30				
Benzene	109	108	83-128	1	30				
1,2-Dichloroethane	109	107	73-136	2	30				
Trichloroethene	108	109	83-136	1	30				
1,2-Dichloropropane	104	105	83-129	1	30				
Bromodichloromethane	97	97	80-129	0	30				
Toluene	101	102	83-127	1	30				
1,1,2-Trichloroethane	95	97	77-125	2	30				
Tetrachloroethene	106	106	78-133	1	30				
Dibromochloromethane	94	96	73-119	2	30				
1,2-Dibromoethane	95	97	78-120	2	30				
Chlorobenzene	100	100	83-120	0	30				
Ethylbenzene	102	103	82-129	1	30				
m+p-Xylene	104	106	82-130	2	30				
o-Xylene	104	105	82-130	1	30				
Bromoform	89	89	64-119	1	30				
1,1,2,2-Tetrachloroethane	90	91	69-121	1	30				
1,3-Dichlorobenzene	99	97	79-123	1	30				

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The background result was more than four times the spike added.

Quality Control Summary

Client Name: ConocoPhillips
Reported: 03/14/05 at 07:36 AM

Group Number: 933890

Sample Matrix Quality Control

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
1,4-Dichlorobenzene	97	97	81-122	0	30				
1,2-Dichlorobenzene	97	97	82-117	0	30				
Naphthalene	94	95	50-124	1	30				
trans-1,3-Dichloropropene	91	91	75-117	0	30				
cis-1,3-Dichloropropene	101	101	76-117	0	30				

Surrogate Quality Control

Analysis Name: MA - VPH waters
Batch number: 05063A01A

	Trifluorotoluene-P	Trifluorotoluene-F
4474627	78	83
4474628	77	81
4474629	83	86
4474630	75	77
4474631	76	92
4474632	75	80
4474633	75	79
Blank	74	77
LCS	76	78
LCSD	76	80
Limits:	70-130	70-130

Analysis Name: EPA SW846/8260 (water)
Batch number: W050671AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
4474627	94	92	94	94
4474628	95	94	93	94
4474629	94	91	93	97
4474630	92	95	92	92
4474631	94	91	92	97
4474632	91	92	92	92
4474633	94	92	92	91
Blank	96	92	93	95
LCS	98	90	94	100
MS	96	94	93	99
MSD	95	94	94	99
Limits:	81-120	82-112	85-112	83-113

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The background result was more than four times the spike added.

ConocoPhillips Analysis Request/Chain of Custody

Lancaster Laboratories

P. 1 of 1

For Lancaster Laboratories use only
Acct. #: 11461 Group #: ~~433885~~ 433890 Sample #: ~~411458~~ 411458 - 62 411927-33

SCR#: 120520

Consultant Office: ATC Associates PM: G Araos
Consultant Phone #: 919-871-0999 Fax #: 919-871-0335
Site #: 2075ATC003 WO #: WNO 2025.E1
Site Address: (1619, ~~E~~ Eastchester Rd, High Point (1619)
WNO#: CO:01
Sampler: D Wambach

Sample Identification	Date Collected	Time Collected	Grab	Composite	Matrix: Soil	Water	Oil	Air	Preservation Codes	Analyses Requested: 8260 NC COP List	MADEP VPH	Lead 3030C
GW01	3/2	13:55	X			X				X	X	X
GW02D	3/2	14:15	X			X				X	X	X
GW03		13:35	X							X	X	X
GW04		14:50	X							X	X	X
GW05		13:20	X							X	X	X
GW06		14:30	X							X	X	X

List total number of containers in the Analyses Requested box under each analysis.

Matrix: ☐ Potable ☐ NPDES

Preservative Codes
H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 O = Other

CO:01
WNO: 2025.E1
2075ATC003
Cost $726

Remarks

Turnaround Time Requested in Business Days (TAT) (please circle):
STD. TAT 5 day 48 hour
24 hour other _____

Reporting Requirements (please circle)
NJ Reduced NY ASP Cat. A Raw Data Diskette
NY ASP Cat. B Full Type I Other _____

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	2-21-05	1030			
[signature]	3/2	5pm			

Relinquished by Commercial Carrier: UPS _____ FedEx ✓ Other _____

Received by: Kathy Binkley Date 3-3-05 Time 0900

Temperature Upon Receipt 3.8° C°

3658.04

Lancaster Laboratories, Inc., 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 (717) 656-2300
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
ug	microgram(s)	**mg**	milligram(s)
ml	milliliter(s)	**l**	liter(s)
m3	cubic meter(s)	**ul**	microliter(s)

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

J estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions of Lancaster Laboratories and we hereby object to any conflicting terms contained in any acceptance or order submitted by client.

APPENDIX B

STANDARD OPERATING PROCEDURES

METHODS

Soil Boring and Monitoring Well Installation

Soil borings were completed with a 6-1/4 inch hollow stem auger in accordance with ASTM D1452. Soil samples were collected at discrete intervals by collecting samples from a split barrel sampler. Sampling was performed in general accordance with ASTM: 1586-84. Monitoring well GW01 was completed in soil boring SB01 and at GW03, GW04 and GW05 using two-inch diameter PVC casing and screened in accordance with North Carolina guidelines. Wells were developed using a hydraulic pump. Soil boring logs and well construction details are presented in Appendices B and C, respectively. The vertical extent well (GW02) was completed to a depth of 50 feet by air-rotary drilling methods.

Groundwater Levels

All groundwater level measurements were obtained by using an electronic sounding/interface detection device which registers when a probe makes contact with petroleum product and/or water. Depth to groundwater measurements were obtained by lowering the device into the well until it indicated that the water surface had been encountered, at which point a measurement was taken at the top of the riser pipe or top of casing (T.O.C.). All measurements were recorded to the nearest 0.01 foot.

Groundwater Sampling

Groundwater samples were collected using new, dedicated plastic bailers at each monitoring well. Before obtaining a sample, a minimum of three well volumes of groundwater were removed to ensure collection of a sample representative of the in-situ groundwater conditions. Samples were collected using dedicated bailers, transferred to containers supplied by the laboratory, and placed in an ice-filled cooler. Chain of custody forms were completed for each sampling event and accompanied the samples to ATC's laboratory in Marietta, Georgia (Hygeia Laboratories).

Soil Sampling

Soil sampling was done in accordance with ASTM: 1586-84. Special precautions were taken during the sampling procedure to protect the chemical integrity of the soil samples. This included discarding of the exterior of the sample which was in contact with the split barrel sampler, collection of the interior soil for screening with the OVA, and steam cleaning and/or rinsing sampling equipment with clean water between sampling intervals. Samples were split into two aliquots. One aliquot was placed in a soil jar supplied by the laboratory and placed in an ice filled cooler. The second aliquot was placed in glass jars, sealed with aluminum foil, and allowed to reach ambient air temperature. The OVA was used to measure total organic vapors (TOV) in the head space in each sample container. After field screening, the cooled sample collected above the water table from each borehole, matching the sample with the highest OVA reading, was sent in an ice filled cooler, with chain-of-custody forms to ATC's laboratory in Marietta, Georgia (Hygeia Laboratories) for analysis.

Chemical Analyses

Chemical analyses were performed on groundwater and soil samples by Hygeia Laboratories in Marietta, Georgia. Extractions and analyses were completed in accordance with standard EPA methods. The chemical analyses performed are outlined below:

PARAMETER	METHOD
Volatile Organic Compounds (soil)	EPA SW846-8260A
Semi-volatile Organic Compounds (soil)	EPA 8270B
TPH - Gasoline Range Organics (soil)	EPA 8015 (TPH-5030)
TPH - Diesel Range Organics (soil)	EPA 8015 (TPH-3550)
Purgeable Halocarbons (water)	EPA 601 (8260A)
Purgeable Aromatics (water)	EPA 602 (8260A)
Volatile Petroleum Hydrocarbons (water)	MADEP VPH (5035)
Lead (water)	EPA 3030C

End of Email #10 and Attachment(s)

Email #11 with Attachment(s)

Lisa Vierling

From: rollovernclover <rollovernclover@aol.com>
Sent: Tuesday, January 5, 2021 4:09 PM
To: Public Comment
Subject: ZA-20-20 EPA UST end of year 9/2020
Attachments: MEMO20200201-CommercialUSTFundingLevel-I_0000.pdf; 20210105_153806.jpg; 20210105_153833.jpg; 20210105_153920.jpg; 20210105_153952.jpg

Dear Town Council, Mayor, and City Manager,

Attached please find the EPA's end of fiscal year report of North Carolina's USTs.

Please note that of the 27,039 confirmed releases, only 24, 726 clean ups have been initiated, leaving a backlog of 2,784.

Please note that 68 % of UST facilities were in Release Detection compliance, but only 50% of facilities were in Technical Compliance overall.

These facts being stated, I want to say the people that work for NCDepartment of Environmental Quality day in and day out, are hardworking and dedicated. This department seems to be grossly underfunded and understaffed.

Given the EPA's 2016 study of emerging fuels and the damage they are causing to USTs, I foresee this issue getting worse, not better.

Thank you for giving continued consideration to this extremely important public safety issue. I encourage each of you to use the NCDEQ tool forwarded to you to look at UST, AST, and Notices of Residual Petroleum (permanent soil and groundwater contamination) in each of your wards, as well as overall for the city. It is quite dismaying.

Thank you,
Vesta Kennedy

Sent from my Galaxy

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

November 19, 2020

MEMORANDUM

TO: **Responsible Parties, Environmental Service Companies, and Consultants**

FROM: Vance Jackson, UST Section Chief

SUBJECT: Commercial UST Funding Prioritization Schedule Expansion – I-0000 and above

Recent efforts to further promote cost-effective assessment and remediation strategies at active incidents have produced sufficient results to allow for an expansion of the Commercial UST Cleanup Fund to capture additional sites.

Effective November 19, 2020, the funding prioritization schedule for the Commercial Cleanup Fund shall be adjusted to include all Intermediate Risk sites. Following this date, the UST Section will begin issuing Notices of Regulatory Requirement (NORRs) to responsible parties (RPs) for those inactive incidents that meet these criteria. The NORR will specifically require that the site risk be reevaluated, and the groundwater sampled before any additional assessment or corrective actions may be approved. Additional tasks may be directed following the completion of this reevaluation if the site remains within the funding prioritization schedule at that time.

The Department requires that all the tasks associated with updating the existing risk classification be preapproved. To comply with these requirements, a completed electronic **Preapproval/Claim Authorization Form**, encompassing the required reevaluation activities, must be received by the appropriate regional office within 14 days of the date of receipt of the NORR. Electronic copies of both the preapproval form and the Reasonable Rate Document (RRD) are available on the UST Section web site at: http//portal.ncdenr.org/web/wm/ust/rrd under the "Policy" section.

If you have any questions regarding trust fund eligibility or reimbursement, please contact the UST Section Trust Fund Branch at (919) 707-8171. If you have any questions about risk reevaluation and incident ranking, please contact the appropriate UST Section regional office.

cc: UST Section Regional Supervisors
Scott Bullock
Ruth Strauss
Wayne Randolph

North Carolina Department of Environmental Quality | Division of Waste Management
217 West Jones Street | 1646 Mail Service Center | Raleigh, North Carolina 27699-1646
919.707.8200

UST Inspections for End-of-Year FY2020
(October 1, 2019 - September 30, 2020)

Region	State	Number of On-Site Inspections Conducted
State Data by Region		
01	CT	610
	MA	301
	ME	990
	NH	260
	RI	183
	VT	231
Region Subtotal		**2,575**
02	NJ	944
	NY	2,120
	PR	193
	VI	0
Region Subtotal		**3,257**
03	DC	77
	DE	118
	MD	671
	PA	2,333
	VA	1,316
	WV	408
Region Subtotal		**4,923**
04	AL	1,840
	FL	3,730
	GA	1,770
	KY	1,862
	MS	913
	NC	2,370
	SC	2,417
	TN	1,386
Region Subtotal		**16,288**
05	IL	4,091
	IN	762
	MI	1,342
	MN	861
	OH	1,710
	WI	2,704
Region Subtotal		**11,470**
06	AR	1,280
	LA	1,296
	NM	243
	OK	1,142
	TX	4,773
Region Subtotal		**8,734**
07	IA	1,127
	KS	983
	MO	1,545
	NE	780
Region Subtotal		**4,435**

Region	State	Number of On-Site Inspections Conducted
08	CO	1,158
	MT	280
	ND	284
	SD	514
	UT	849
	WY	329
Region Subtotal		**3,414**
09	AS	3
	AZ	723
	CA	11,495
	CNMI	13
	GU	2
	HI	143
	NV	891
Region Subtotal		**13,270**
10	AK	117
	ID	325
	OR	240
	WA	896
Region Subtotal		**1,578**
Indian Country Data		
Region 1		0
Region 2		14
Region 4		10
Region 5		19
Region 6		16
Region 7		0
Region 8		22
Region 9		1
Region 10		27
Indian Country Subtotal		**109**
National Data		
National Total		**70,053**

Note: there are no tribal USTs in EPA Region 3.

UST Technical Compliance Rate Measures for End-of-Year FY2020

(October 1, 2019 - September 30, 2020)

Region	State	% in Compliance with 2015 Spill Prevention Requirements	% in Compliance with 2015 Overfill Prevention Requirements	% in Compliance with 2015 Corrosion Protection Requirements	% in Compliance with 2015 Release Detection Requirements	% of UST Facilities meeting the Technical Compliance Rate (in compliance with all TCR categories)
State Date by Region						
01	CT	N/A	N/A	N/A	N/A	N/A
	MA	N/A	N/A	N/A	N/A	N/A
	ME	N/A	N/A	N/A	N/A	N/A
	NH	N/A	N/A	N/A	N/A	N/A
	RI	N/A	N/A	N/A	N/A	N/A
	VT	N/A	N/A	N/A	N/A	N/A
Region 01 Subtotal		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
02	NJ	99%	96%	97%	86%	82%
	NY	N/A	N/A	N/A	N/A	N/A
	PR	61%	65%	69%	65%	60%
	VI	N/A	N/A	N/A	N/A	N/A
Region 02 Subtotal		**89%**	**88%**	**90%**	**81%**	**76%**
03	DC	N/A	N/A	N/A	N/A	N/A
	DE	N/A	N/A	N/A	N/A	N/A
	MD	N/A	N/A	N/A	N/A	N/A
	PA	N/A	N/A	N/A	N/A	N/A
	VA	N/A	N/A	N/A	N/A	N/A
	WV	78%	75%	95%	70%	56%
Region 03 Subtotal		**78%**	**75%**	**95%**	**70%**	**56%**
04	FL[2]	69%	74%	99%	64%	52%
	GA	N/A	N/A	N/A	N/A	N/A
	KY	74%	66%	86%	78%	51%
	MS	N/A	N/A	N/A	N/A	N/A
	NC	71%	74%	88%	68%	50%
	SC	73%	65%	87%	75%	49%
	TN	N/A	N/A	N/A	N/A	N/A
Region 04 Subtotal		**71%**	**71%**	**91%**	**69%**	**51%**
05	IL	78%	75%	92%	48%	28%
	IN	N/A	N/A	N/A	N/A	N/A
	MI	88%	88%	92%	93%	88%
	MN	N/A	N/A	N/A	N/A	N/A
	OH	62%	61%	93%	62%	51%
	WI	97%	93%	96%	77%	67%
Region 05 Subtotal		**79%**	**78%**	**93%**	**69%**	**57%**
06	AR	N/A	N/A	N/A	N/A	N/A
	LA	N/A	N/A	N/A	N/A	N/A
	NM	N/A	N/A	N/A	N/A	N/A
	OK	88%	86%	83%	62%	51%
	TX	N/A	N/A	N/A	N/A	N/A
Region 06 Subtotal		**88%**	**86%**	**83%**	**62%**	**51%**
07	IA	N/A	N/A	N/A	N/A	N/A
	KS	N/A	N/A	N/A	N/A	N/A
	MO	95%	99%	84%	97%	76%
	NE	N/A	N/A	N/A	N/A	N/A
Region 07 Subtotal		**95%**	**99%**	**84%**	**97%**	**76%**

(October 1, 2019 - September 30, 2020)

Region	State	% in Compliance with A and B Operator Training Requirements	% in Compliance with Financial Responsibility Requirements[1]	% in Compliance with 2015 Walk Through Requirements
State Data by Region				
01	CT	99%	99%	99%
	MA	N/A	N/A	N/A
	ME	N/A	N/A	N/A
	NH	N/A	N/A	N/A
	RI	N/A	N/A	N/A
	VT	N/A	N/A	N/A
Region 01 Subtotal		**N/A**	**N/A**	**N/A**
02	NJ	93%	94%	94%
	NY	N/A	N/A	N/A
	PR	71%	74%	71%
	VI	87%	N/A	N/A
Region 02 Subtotal		**87%**	**88%**	**88%**
03	DC	N/A	N/A	N/A
	DE	N/A	N/A	N/A
	MD	N/A	N/A	N/A
	PA	N/A	N/A	N/A
	VA	N/A	N/A	N/A
	WV	94%	89%	80%
Region 03 Subtotal		**94%**	**89%**	**80%**
04	AL	99%	N/A	51%
	FL	86%	92%	90%
	GA	N/A	N/A	N/A
	KY	84%	100%	74%
	MS	N/A	N/A	N/A
	NC	65%	94%	79%
	SC	98%	95%	71%
	TN	89%	100%	N/A
Region 04 Subtotal		**80%**	**94%**	**81%**
05	IL	86%	86%	69%
	IN	N/A	N/A	N/A
	MI	88%	95%	88%
	MN	N/A	N/A	N/A
	OH	90%	88%	69%
	WI[2]	92%	DNA	91%
Region 05 Subtotal		**88%**	**90%**	**75%**
06	AR	N/A	N/A	N/A
	LA	N/A	N/A	N/A
	NM	N/A	N/A	N/A
	OK	95%	100%	74%
	TX	N/A	N/A	N/A
Region 06 Subtotal		**95%**	**100%**	**74%**
07	IA	N/A	N/A	N/A
	KS	N/A	N/A	N/A
	MO	98%	97%	100%
	NE	N/A	N/A	N/A
Region 07 Subtotal		**98%**	**97%**	**100%**

			Cumulative		This Year	Cumulative	
State Data by Region							
01	CT	90	3,651	3,586	71	2,602	1,049
	MA	32	6,696	6,656	78	6,294	402
	ME	76	3,157	3,120	66	3,115	42
	NH	11	2,724	2,721	35	2,173	551
	RI	15	1,486	1,486	21	1,335	151
	VT	7	2,186	2,184	29	1,626	560
Region Subtotal		**231**	**19,900**	**19,753**	**300**	**17,145**	**2,755**
02	NJ	256	18,258	16,087	307	13,190	5,068
	NY	121	30,434	30,385	189	29,670	764
	PR	0	1,084	846	4	537	547
	VI	0	39	38	1	35	4
Region Subtotal		**377**	**49,815**	**47,356**	**501**	**43,432**	**6,383**
03	DC	8	1,011	968	14	901	110
	DE	20	2,963	2,929	24	2,908	55
	MD	92	12,822	12,648	91	12,618	204
	PA	239	18,153	18,098	299	16,531	1,622
	VA	122	12,734	12,556	159	12,428	306
	WV	33	3,792	3,784	56	3,327	465
Region Subtotal		**514**	**51,475**	**50,983**	**643**	**48,713**	**2,762**
04	AL	55	12,235	12,139	80	11,333	902
	FL	176	33,855	32,762	647	24,062	9,793
	GA	204	14,815	14,661	228	14,011	804
	KY	95	17,251	17,241	119	16,663	588
	MS	113	8,341	8,117	145	7,884	457
	NC	240	27,039	24,726	602	24,255	2,784
	SC	112	10,454	10,194	137	8,200	2,254
	TN	134	15,799	15,799	148	15,685	114
Region Subtotal		**1,129**	**139,789**	**135,639**	**2,106**	**122,093**	**17,696**
05	IL	370	26,104	25,210	332	20,861	5,243
	IN	152	10,487	10,225	217	9,362	1,125
	MI	231	23,776	23,153	165	15,564	8,212
	MN	97	12,296	12,149	160	11,908	388
	OH	365	33,059	32,425	378	31,180	1,879
	WI	117	19,803	19,594	247	19,168	635
Region Subtotal		**1,332**	**125,525**	**122,756**	**1,499**	**108,043**	**17,482**
06	AR	22	1,404	1,389	36	1,299	105
	LA	122	5,812	5,812	141	5,203	609
	NM	21	2,687	2,385	14	1,857	830
	OK	81	5,665	5,665	102	5,310	355
	TX	238	28,664	27,928	245	27,426	1,238
Region Subtotal		**484**	**44,232**	**43,179**	**538**	**41,095**	**3,137**

End of Email #11 and Attachment(s)

FINANCE COMMITTEE
(Virtual Meeting)
Chaired by Mayor Pro Tem Moore
Members: Moore, Holmes, Peters, and Jones
December 17, 2020 – 4:00 p.m.
3rd Floor Council Chambers

Present (2): Chairman Britt Moore; Committee Member Victor Jones
Participating

Remotely (2): Committee Member Michael Holmes [joined at 4:04 p.m.]; and Committee Member Monica Peters

Staff Present:

Randy McCaslin, Interim City Manager; Eric Olmedo, Assistant City Manager; Greg Ferguson, Assistant City Manager; Steve Lingerfelt, Director of IT Services; Eric Xavier, Assistant Director of IT Services; Lisa Vierling, City Clerk; and Mary S. Brooks, Deputy City Clerk

Staff Participating
Remotely: JoAnne Carlyle, City Attorney; Sandy Dunbeck, High Point Economic Development Corporation, Executive Vice President; Terry Houk, Public Services Director; Robby Stone, Public Services Assistant Director; Derrick Boone, Public Services Assistant Director; and Bobby Fitzjohn, Director of Financial Services

As part of the city of High Point's COVID-19 mitigation efforts, in-person attendance was not allowed at this meeting. Instead, the meeting was live-streamed, and the public was provided a link to listen to the meeting as it was being live-streamed.

CALL TO ORDER

Chairman Moore called the meeting to order at 4:00 p.m.

DRAFT

PRESENTATION OF ITEMS

Chairman Moore advised the committee that item number 2020-519 would be presented first; then item number 2020-519.

PUBLIC HEARINGS

2020-519 **Public Hearing: Proposed System Development Fee**

Monday, December 21, 2020 at 5:30 p.m. is the date and time established to receive public comments regarding a proposed System Development Fee for High Point's Water/Sewer System. At the conclusion of the public hearing, staff requests that Council adopt a Resolution implementing the System Development Fee with an effective date of October 1, 2021.

Terry Houk, Public Services Director reported that there would be a public hearing on Monday, December 21, 2020 at 5:30 p.m. on the Proposed System Development Fee (SDF) for High Point's water/sewer system for public input; noted Stantec Consulting made a presentation during a Special Meeting of Council on August 3rd and December 7th of 2020 with recommendations; said the SDF would replace the frontage and acreage fees currently used by the Public Services Department; the revenues from the SDF could only be used for expansion-related capital projects; SDF study was posted on city's website; said 45-day comment period was completed on October 27, 2020; in future budget years, the amount of funds raised by the SDF could have a direct impact on the monthly water and sewer rates; and the recommended effective date would be October 1, 2021.

2020-514 **Public Hearing: Hot Shots Distributing, Inc. - Performance Based Incentives**

Monday, December 21, 2020 at 5:30pm is the date and time established to receive public comments regarding a request for City Council to approve performance based incentives up to the amount of $31,758.00 for Hot Shots Distributing, Inc. and authorize the City Manager to execute a performance agreement with Hot Shots Distributing, Inc. containing benchmarks for the company to achieve and a schedule for the payment of incentives

Sandy Dunbeck, Executive Vice President, High Point Economic Development Corporation reported that a request was received from Hot Shots Distributing Inc., to authorize performance-based incentives for a project at 827 West Green Drive in the amount of $31,758.00; the building would be in the Small-Scale Manufacturing and Southwest High Point Opportunity Zone areas; the company proposed 25 new jobs; and informed the committee that more information would be presented at the public hearing on Monday, December 21, 2020 at 5:30 p.m.

DISCUSSION-SYSTEM DEVELOPMENT FEE/PUBLIC HEARING

JoAnne Carlyle, City Attorney advised the committee that the System Development Fee (SDF) required council to adopt a resolution; said it would be presented before council at the public hearing on Monday; and that a vote from the committee would be needed with or without a favorable recommendation to forward to council.

Chairman Moore asked if a vote was required on the resolution before the public hearing. Ms. Carlyle confirmed with Terry Houk, Public Service Director that there would be a resolution for the SDF; and replied that the final vote to adopt the resolution would be on Wednesday, December 23, 2020 at the recessed meeting; and that more facts regarding the SDF would be presented at the public hearing.

Committee Member Peters stated that she was not in favor of recommending forwarding this matter at this time; she wanted to hear the public comments after the public hearing; and spoke to the impacts the SDF could have on future developments.

Ms. Carlyle asked Randy McCaslin, Interim City manager if council received comments from TREBIC; and spoke to questions asked on delaying the implementation of the SDF because if would not go into effect until October 1, 2021; and that would not be decided by legal. Mr. McCaslin replied that TREBIC's responses were shared with council members; and that they were communicating with council members as well.

Committee Member Jones asked whether a motion could be made to move this matter forward to council without a favorable recommendation; and spoke to having more time to further discussion what actions council may want to take regarding the SDF.

Committee Member Peters asked Ms. Carlyle if the SDF implementation could be delayed. Mr. Carlyle replied that she wanted the committee to be aware she received questions from council members and discussed with staff on delaying since the SDF would not go into effect until October 2021; and that she was not in a position to answer that question.

Discussion took place regarding concerns with the SDF; delaying the implementation of the fees; and tabling this matter for further discussion.

Chairman Moore asked staff for clarification on what action could be taken. Mr. McCaslin replied that staff made a recommendation that would be forwarded to council through this committee; said there was a full range of action council could take on Monday; and advised the committee that, per legislation in 2017, development fees had to be backed up by an independent study which the city's current fees did not have; and spoke to the challenges that could occur if the development fees were not backed up by a study.

Committee Member Jones moved to forward this matter to the City Council without a favorable recommendation. Committee Member Peters made a second to the motion. Following a roll call vote by Chairman Moore, the motion carried by the following unanimous 4-0 vote:

Aye (4): Chairman Moore, Committee Member Jones, Committee Member Peters and Committee Member Holmes

DRAFT

REGULAR AGENDA ITEMS

2020-515 **Contract - Sole Source - Mobile Communications America (MCA) – 911 Communications High Point Police Department**

City Council is requested to award a sole source contract to Mobile Communications America (MCA) in the amount of $304,530.95 for a five year lease to purchase a Vesta 9-1-1 Phone System to update the current 911 Communications Center located in City Hall, and outfit its new (primary) 911 Communications Center located at 1730 Westchester Drive and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Eric Xavier, Assistant Director of IT Services reported that the IT Services Department was recommending the lease of a new Vesta 9-1-4 Phone System from Mobile Communications America (MCA) to update the City's current 911 Communications Center located in City Hall, and outfit its new 911 Communications Center located at 1730 Eastchester Drive; the extended cost, financed over five-years, would total $304,530.95; and that funds would be reimbursed by the North Carolina 911 Board.

Chairman Moore moved to forward this matter to the City Council with a favorable recommendation and place it on the December 21, 2020 City Council Finance Committee Consent Agenda for approval. Committee Member Jones made a second to the motion. Following a roll call vote by Chairman Moore, the motion carried by the following unanimous 4-0 vote:

Aye (4): Chairman Moore, Committee Member Jones, Committee Member Peters and Committee Member Holmes

2020-516 **Contract - Sole Source - Mobile Communications America (MCA) - 911 Phone System Supplemental Purchase**

City Council is requested to award a sole source contract to Mobile Communications America (MCA) in the amount of $88,834.42 for the purchase of six (6) supplemental phones from MCA and that the appropriate City official and/or employee be authorized to execute all necessary documents.

Eric Xavier, Assistant Director of IT Services reported that the city needed to purchase supplemental positions for its phone system for its 911 Communications Center; existing funds in the FY 20/21 budget would be used to purchase the six phones; and that staff recommended awarding a sole source contract to Mobile Communication America (MCA) for the purchase of six supplemental phones in the amount of $88,834.42.

Chairman Moore moved to forward this matter to the City Council with a favorable recommendation and place it on the December 21, 2020 City Council Finance Committee Consent Agenda for approval. Committee Member Jones made a second to the motion. Following a roll call vote by Chairman Moore, the motion carried by the following unanimous 4-0 vote:

Aye (4): Chairman Moore, Committee Member Jones, Committee Member Peters and Committee Member Holmes

DRAFT

2020-517 **Contract - Sterling Water Technologies - Corrosion Inhibitor - Ward Water Treatment Plant (WWTP)**

City Council is requested to award a three (3) year contract to Sterling Water Technologies in the amount of $198,987.38 for the purchase of Corrosion Inhibitor for the Ward Water Treatment Plant (WWTP).

Derrick Boone, Public Services Assistant Director reported that the purpose for the Corrosion Inhibitor for the Ward Water Treatment Plant (WWTP) was used to protect the pipes in the distribution system from corrosion and to help keep lead and copper from leaching into the system; Sterling Water Technologies was the only responsive bidder that was $4.00 cheaper; staff recommended awarding a contract to Sterling Water Technologies in the amount of $198,987.38.

Chairman Moore moved to forward this matter to the City Council with a favorable recommendation and place it on the December 21, 2020 City Council Finance Committee Consent Agenda for approval. Committee Member Holmes made a second to the motion. Following a roll call vote by Chairman Moore, the motion carried by the following unanimous 4-0 vote:

Aye (4): Chairman Moore, Committee Member Jones, Committee Member Peters and Committee Member Holmes

ADJOURNMENT

There being nothing further to come before the Finance Committee, the meeting adjourned at 4:22 p.m. upon motion duly made and seconded.

Respectfully Submitted:

_____

Britt Moore, Chairman

Attest:

_____

Mary S. Brooks, Deputy City Clerk

DRAFT

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Donna Kaiser
1011 Ferndale Boulevard
High Point, NC 27262

RE: Appointment- Library Board of Trustees

Dear Donna Kaiser:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Library Board of Trustees. Your appointment will be effective immediately and will expire on October 31,2023.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

Mary S. Brooks, Deputy City Clerk

City of High Point, P.O. 230, 211 South Hamilton Street, High Point, NC 27261 USA
Phone: 336.883.3690 mary.brooks@highpointnc.gov

CITY OF HIGH POINT
AGENDA ITEM

Title: Appointments/Reappointments- Library Board of Trustees

From: City Clerk's Office

Meeting Date: January 19, 2021

Public Hearing: N/A

Advertising Date / Advertised By: N/A

Attachments: Applications/Resumes

PURPOSE:
To make the necessary appointments/reappointments to the Library Board of Trustees for terms that have expired.

BACKGROUND:
The following terms have expired on the Library Board of Trustees:

Rick Cornwell **(Ward 4 appointee)**
Dorotea Evans **(Ward 5 appointee)**
Yvonne Bostick Short **(Ward 1 appointee)** (not eligible for reappointment)
VACANT **(Moore's At Large appointee)**

Council Member Hudson is recommending the reappointment of **Rick Cornwell** to the Library Board of Trustees as his Ward 4 appointee; appointment to be effective immediately and will expire 10/31/2023.

Council Member Jones is recommending the reappointment of **Dorotea Evans** to the Library Board of Trustees as his Ward 5 appointee; appointment to be effective immediately and will expire 10/31/2023.

Council Member Jefferson is recommending the appointment of **Bill Philips** to the Library Board of Trustees as his Ward 1 appointee; appointment to be effective immediately and will expire 10/31/2023.

Mayor Pro Tem Moore is recommending the appointment of **Donna Kaiser** (Historical Society representative) to the Library Board of Trustees as his At Large appointee; appointment to be effective immediately and will expire 10/31/2023.

BUDGET IMPACT:
N/A

RECOMMENDATION / ACTION REQUESTED:
Council is requested to confirm the preceding appointments/reappointments to the Library Board of Trustees.

Profile

William "Bill" — First Name
Philips, Jr. — Last Name

billphillipshighpoint@yahoo.com — Email Address

1303 Forrest Street — Street Address
Suite or Apt

High Point — City
NC — State
27262 — Postal Code

Mobile: (336) 706-2373 — Primary Phone
Alternate Phone

Employer

Which Boards would you like to apply for?

Library Board of Trustees: Submitted

Ward you reside in?

Ward 1

Interests & Experiences

Please list any work, volunteer, and/or educational experience that you would like us to consider in the review of your application.

High Point Historical Society President (former) High Point Preservation Society Board (current)

Upload a Resume

Have you participated in Leadership High Point?

○ Yes ◉ No

If yes, please list the year in which you participated in Leadership High Point:

Gender

☑ Male

Profile

Donna G
First Name

Kaiser
Last Name

ncdesigner@triad.rr.com
Email Address

1011 Ferndale Boulevard
Street Address

Suite or Apt

High Point
City

NC
State

27262
Postal Code

Home: (336) 883-6730
Primary Phone

Alternate Phone

Retired
Employer

Which Boards would you like to apply for?

Library Board of Trustees: Submitted

Ward you reside in?

Ward 4

Interests & Experiences

Please list any work, volunteer, and/or educational experience that you would like us to consider in the review of your application.

Past President of the H.P. Historical Society , 3 terms and Board Member 6 years. Volunteered as Docent for 7 years. Past Regent Alexander Martin Chapter DAR and Current Member working with CAR B.F.A., Interior Design, Professional Member of ASID, founding member IFDA, Carolina's Chapter, Member of the H.P. Study Club, volunteered in Genealogy Room of H.P. Library, Current Member of H.P. Preservation Board.

Resume.doc
Upload a Resume

Have you participated in Leadership High Point?

○ Yes ◉ No

If yes, please list the year in which you participated in Leadership High Point:

Gender

- [x] Female

Donna G. Kaiser

1011 Ferndale Blvd, High Point, NC 27262 (336) 883-6730

Career Summary

1965-66 Williams of Sumter – Sumter, SC, Showroom designer

1970s-1980s Davidson County Community College, taught Design

1966-68 Davis Furniture Industries, Designer

1968 -71 Heritage Furniture Company, Showroom Designer

1969 - 2012 Kaiser Associates, Inc. – Interior Designer & consulting

1973 – involved with starting Councill and Southwood furniture companies

Late 1970s came back to Drexel Heritage, became first woman VP in 1981

1983 – 1989 - Southwood Furniture, Fabric Buyer

1985-96 – Kaiser Kuhn Lighting

1989-92 – Hancock & Moore and Hinkle Harris, Director of Design

1990s - Homestead House, Design Consultant

Habersham, Design Consultant

Other Consulting at various points: Orinoka, Crafttex, Doblin, and more

2012 - Retired

Education

1965 Richmond Professional Institute (now Virginia Commonwealth University)

BFA Interior Design; Minors in English, Education, Pottery

Professional and Community Organizations

Member ASID, founding member of IFDA

Past President of High Point Historical Society

Past Regent of Alexander Martin Chapter DAR

High Point Historic Preservation Society Board

Subject: The Store

What are the proposed changes for 608 and 610 James Road? There appears to be a conflict in these "proposed" changes.

Your notice (10/29) states: "This portion of your property obtained its current zoning approval in 2000 to support a "proposed" townhome development...." We never received a notification of any changes from a "commercial" designation.

"Since the proposed town
home project never developed, the City of High Point is proposing to rezone this property...."

I would very strongly argue that we revisit your 2000 position and guarantee that any Store property be returned to a commerical (LB) status from any residential zoning proposal now or in the future.

Jerry Corns
702 Oakview Road
High Point, NC 27265
Phone: 336-869-0872

City Clerk's Office

Mary Brooks
DEPUTY CITY CLERK

HIGH POINT
NORTH CAROLINA'S INTERNATIONAL CITY™

January 21, 2021

Dorotea Evans
3634 Malibu Drive
High Point, NC 27265

RE: Reappointment- Library Board of Trustees

Dear Dorotea Evans:

This letter is to notify you that official action was taken by High Point City Council on January 19, 2021 to recommend your appointment to the Library Board of Trustees. Your appointment will be effective immediately and will expire on October 31,2023.

Our boards and commissions play an important role in our community, and in order to carry out this role, we need interested volunteers who are willing to give of their time and talent while carrying out the duties and responsibilities they assume as members.

We sincerely appreciate your willingness to serve as a member of this very important commission, and if I may be of assistance to you, please do not hesitate to contact me at 336-883-3690.

Sincerely,

Mary S Brooks

Mary S. Brooks, Deputy City Clerk

Vesta Kennedy Emails #23 - # 29

Email #23

From: Vesta Kennedy
To: Public Comment
Subject: ZA-20-20 residential incidents
Date: Friday, January 15, 2021 4:46:00 PM

Dear Town Council and Mayor,

Below please find residential incidents by number and address pertaining to oil and petroleum releases in close proximity of Oak Hollow Lake. There are several hundred throughout High Point, so this is a very small representation.

ABT (Above Ground Tank)#86205
4229 Brentonshire Ln

UST#44668
1115 Timberlane Dr

UST#45205
1120 Tanglewood Av

UST#44181
3803 Beverly Hills Dr

UST#37602
4202 Gardenia Ct

UST#45040
2103 Gordon Rd

UST#44477
2205 Plainview Dr

ABT#95636
1662 Eastchester Dr

ABT#95030
2067 Deep River Rd

UST#30165
2406 Lake Ridge Rd

UST#37760
910 Fairidge Dr,
Jamestown....
Included because it's right on water's edge

Here are more commercial Incident numbers, in case you would like to have a look:

UST#7874
Oak Hollow Maintanence Complex
1313 Oak Hollow Rd

UST# 22814
Franklin Lumber Sales, Inc

2211 Eastchester Dr

UST#20403, UST#188847
Exxon Company, USA
1100 Eastchester Dr
TOO MANY and a TANGLED WEB of releases

UST#44718, UST#44219
3030 .N. Main ST
related to installation of new spill buckets, found when tanks were removed

UST#44353
Campmart Citgo
3421 N. Main St
closed in 2014; major soil/groundwater contamination

UST#13582
Bizzy BeeII
3802 N. Main St

UST#44024
Deep River Church of Christ
1934 Eastchester Dr

Thank you so much for your time and consideration. These, along with the others I've already sent, really opened my eyes to this growing problem. I've only scratched the surface of what is happening in our city. If you haven't already, I encourage each of you to look around on the NCDEQ tool I sent.

Thank you, Vesta Kennedy

Email #24 w/attachment(s)

From: Vesta Kennedy
To: Public Comment
Subject: ZA-20-20 Images and corrections of UST installment depth
Date: Saturday, January 16, 2021 1:25:00 PM
Attachments: 08000TITAN96 UST drawing.PDF

Dear Mayor and Town Council,

After communicating with an engineer from NCDENR, I received some clarifications on the dimensions of USTs and the depth of their burial. When I read dimensions, I wrongly understood the length to be height. This puts the smallest typically used 8,000 gl UST buried at a 13 foot depth, and the typically largest 20,000 gl UST buried at a depth of 15 foot. The engineer stated that several manufactures make 12 foot diameter USTs and that he has seen a 12 foot in diameter UST being installed, so with the riser and piping clearance, this would be buried at approximately 17 foot down. This led me to ask if larger retail suppliers of gasoline (in this case possibly 7-11 as they recently bought Speedway and their name is on preliminary site plan) get their tanks from a commisary situation or if each of them bought in bulk from a specific manufacturer. He responded he thinks most chain retail suppliers of gasoline tend to buy in bulk from the same manufacturer. I wanted to research any reported manufacturer defects, recalls, etc. This as far as I inquired, as it is all speculation at this point in time. **Important speculation** however, as 108,000 lives depend on it. I have worked hard to educate myself about the scenerio created by BRC Spirit Group's proposed rezoning and their plans for the site. I TRULY appreciate your time and patience as I relay what I've learned onto you.

With the fact Oak Hollow Lake's water table sits approximately 21 foot down this still creates a disastrous situation for our drinking water. The burial of the USTs required for this project would be at approximate depths of 13-17 feet and we all know water flows down. We know from end of year reports from the EPA and NCDEQ the corrosion issues, other causes of release, and the numerous releases that the cause was never discovered. We have learned that UST technology is not keeping up with increasing ethanol standards, bio fuels, and diesel fuels of today.

Below is a photo of a typical underground storage tank waiting to be installed. (from NCDENR engineer)
Attached please find schematic drawing(from NCDENR engineer)

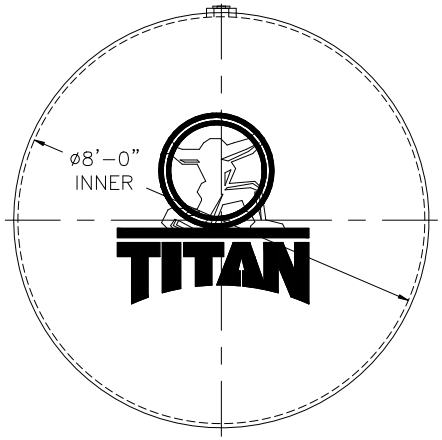


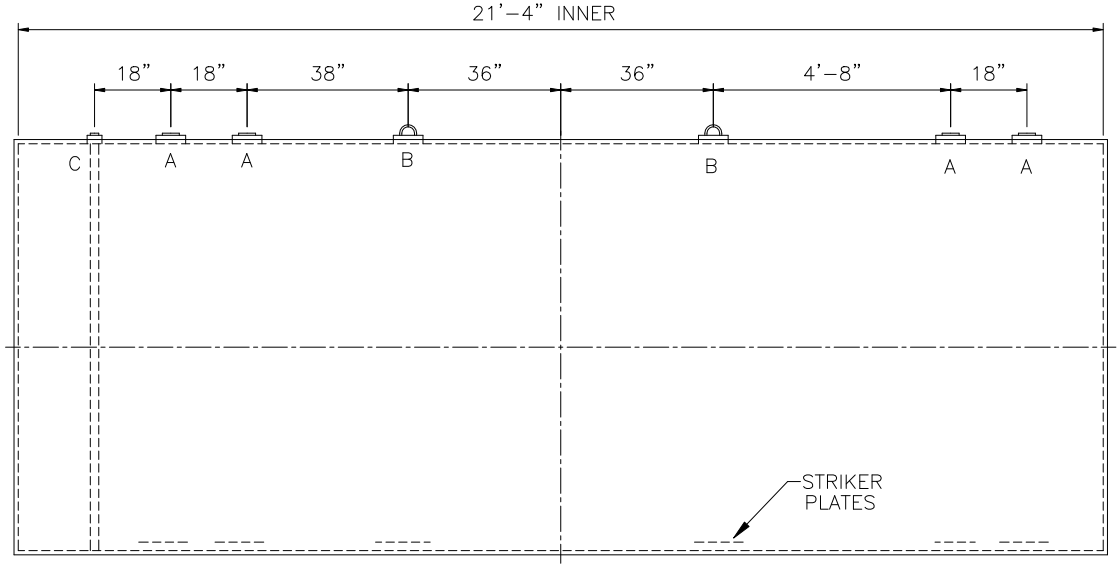
Thanks again,
Vesta Kennedy

-----Original Message-----
From: rollovernclover <rollovernclover@aol.com>
To: rolloverNclover@aol.com
Sent: Sat, Jan 16, 2021 8:59 am

Sent from my Galaxy

NOTE: ALL RIGHTS RESERVED. THIS DRAWING MUST NOT BE REPRODUCED IN ANY FORM WITHOUT THE WRITTEN PERMISSION OF HIGHLAND TANK®. HIGHLAND TANK® SHALL BE RESPONSIBLE ONLY FOR ITEMS INDICATED ON THIS FABRICATION DRAWING UNLESS OTHERWISE NOTED. CUSTOMER IS RESPONSIBLE FOR VERIFYING CORRECTNESS OF SIZE AND LOCATION OF FITTINGS, ACCESSORIES, AND COATINGS SHOWN ON THIS DRAWING.





STRIKER PLATES ROLLED & SEAL WELDED TO THE TANK, 1/4" X 12" x 12" MIN.

DESIGN DATA
CAPACITY – 8,000 GALLONS
TYPE – DOUBLE WALL – 360° TYPE II
NO. REQ. – –
OPERATING PRESSURE – ATMOSPHERIC
TANK MATERIAL – MILD CARBON STEEL
THICKNESS – HEADS– 1/4" THICKNESS – SHELL – 1/4" *GA THK. BASED ON 60" MAX. BURIAL DEPTH
CONSTRUCTION – LAP WELD OUTSIDE ONLY –
TANK TEST – INNER: 5 PSIG OUTER: FULL VACUUM
INT. FINISH – NONE –
EXT. FINISH – GREEN TITAN® WRAP –
LABEL – UL–58/UL–1746 PART III

LEGEND	
A	4" CLOSE OFF FITTING
B	4" CLOSE OFF FITTING WITH REMOVABLE LIFT LUG
C	2" CLOSE OFF FITTING WITH INTERNAL INTERSTICE MONITOR PIPE
D	–
E	–
F	–

△ –

Highland Tank

UNLESS NOTED, TOLERANCES ARE +/– 1"

8,000 GAL 96"ø TITAN®

PATENT: 5,915,586 PATENT: 6,022,435 PATENT: 6,062,977
PATENT: 6,119,887

CUSTOMER:

PROJECT:

QUOTE NO: CHK'D BY:

SCALE:	DATE:	DWG. BY:	DWG. NO.:
3/8"=1'-0"			08000TITAN96

Email #25 w/attachments

From: Vesta Kennedy
To: Public Comment
Subject: ZA-20-20 One of Two Looks- Above Ground
Date: Monday, January 18, 2021 12:18:24 AM
Attachments: RandlemanBufferRule_15a ncac 02b .0250.pdf
City of High Point Best Management Practices Manual %28BMP%29 %28PDF%29.pdf

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Dear Mayor and Town Council,

Attached please find City of High Point's Best Management of Practices Manual. In reviewing the introduction, it mentions a Watershed Enforcement Officer, who would inspect and enforce watershed ordinances. I made some calls looking for this person, as I should have been looking to this person two months ago for clarification of Federal Acts, State Statutes and Local Ordinances. I found out the end of last week that this is actually a quasi-judicial position. Currently it seems that Public Services, Engineering, and Planning all together are responsible to insure that watershed areas are protected.

You have taken the time to review extensive research that I have sent regarding the safety inadequacies of Underground Storage Tanks, and **I thank you**!!!!! **I KNOW IT'S A LOT!**

Two major categories concerning our water safety as it relates to this proposed rezoning and site development, Below ground and Above ground. These two REALLY get intertwined, but for simplicity sake and the volume of material, I have tried to separate. Here goes on the Above Ground:

1. This should not be happening on this site, period. Please refer to either page 18 of the PnZ's staff report report regarding this case, or to attachment provided. This is a picture of the Watershed Map Critical Area Overlay for this site. It is CLEAR that the vast majority of this site lies in Critical Areas Tier 2 and 3, with the tiniest front left (as it faces the road) triangle in the General Watershed Area of High Point City Lake. It looks to be less than 5% of this 3.6 acre site. *Is this portion even still there?* I question it as Eastchester Dr has gone from a 5 twelve foot lane road to a 7 twelve foot lane in recent months. Several businesses along this corridor have been required to install Wet Retention Ponds.

Why does this or ANY developer OR landowner get to say, "Oh, we are going to grade this site to drain towards the storm drains of Eastchester Dr, so therefore, it becomes part of the General Watershed Area....and ALL of the federal, state and local acts, statutes, rules, regulations and ordinances protecting Critical Watershed Areas no longer apply!" ?

Oak Hollow Lake and its water table does not move just because the surface was graded.

2. The Best Practices Manual Sections 1 and 2 give alternatives to the standard and widely-used wet retention pond to manage storm waters. They are 1.2 Extended Retention Ponds, 1.3 Bioretention Area, 1.4 Sand Filtration Area, 2.1 Natural Infiltration Areas, 2.2 Dry Detention Ponds, and 2.3 Infiltration Trenches. In speaking with an experienced engineer about these possibilities, his opinion was that a Bioretention Area would be the most cost way of removing the 85% TSS (total suspended solids) with the first 1 inch of rainfall, per the developed over 24% requirement. This only removes solids from storm water. **This does not remove**

the toxic, volatile substances of oil, gasoline and diesel fuels. They require what is called an Oil/Water Separator, which are only as effective as they are maintained. (see attached examples) So this and other requirements for a development this of size leads a reasonable person to ask:

-What type of Stormwater BMPS measure is being looked at and does it include Oil/Water Separators?
-Has the Sedimentation Pollution Control Plan been done?
-Will the developer be applying for a general or industrial permit to discharge these contaminated waters into the storm drains of Eastchester Dr, down a steep slope into the intermittent and perennial stream which leads to Foxwood Meadows directly across the street from the site? Please see rule 4(a) of 15A NCAC 02B .0216. I question whether or not this site qualifies for a General Permit. This stream has several layers of protection, and below are some of them:

THE RANDLEMAN DAM RIPARIAN BUFFER RULE 15A NCAC 02B.0250
see attachment

6.2.9 PROTECTION OF FRAGILE AREAS
https://library.municode.com/nc/high_point/codes/development_ordinance?nodeId=CH6ENST_6.2WAPR_6.2.9PRFRAR

6.2 ENVIROMENTAL PROTECTIONS
https://library.municode.com/nc/high_point/codes/development_ordinance?nodeId=CH6ENST_6.2WAPR

15A NCAC 02B .0216 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-IV WATERS

The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-IV. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section shall also apply to Class WS-IV waters.

(1) The best usage of waters classified as WS-IV shall be as a source of water supply for drinking, culinary, or food-processing purposes for those users where a more protective WS-I, WS-II or WS-III classification is not feasible as determined by the Commission in accordance with Rules .0212 through .0215 of this Section and any other best usage specified for Class C waters.

(2) The best usage of waters classified as WS-IV shall be maintained as follows:
(a) Water quality standards in a WS-IV watershed shall meet the requirements as specified in Item (3) of this Rule.
(b) Wastewater and stormwater point source discharges in a WS-IV watershed shall meet the requirements as specified in Item (4) of this Rule.
(c) Nonpoint source pollution in a WS-IV watershed shall meet the requirements as specified in Item (5) of this Rule.
(d) Following approved treatment, as defined in Rule .0202 of this Section, the waters shall meet the Maximum Contaminant Level concentrations considered safe for drinking, culinary, or food-processing purposes that are specified in 40 CFR Part 141 National Primary Drinking Water Regulations and in the North Carolina Rules Governing Public Water Supplies, 15A NCAC 18C .1500.
(e) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.
(f) The Class WS-II or WS-III classifications may be used to protect portions of Class WSIV water supplies. For reclassifications of these portions of WS-IV water supplies occurring after the July 1, 1992 statewide reclassification, a WS-IV classification that is requested by local governments shall be considered by the Commission if all local governments having jurisdiction in the affected areas have adopted a resolution and the appropriate ordinances as required by G.S. 143-214.5(d) to protect the

watershed or if the Commission acts to protect a watershed when one or more local governments has failed to adopt protective measures as required by this Sub-Item.

(3) Water quality standards applicable to Class WS-IV Waters shall be as follows:
(a) MBAS (Methylene-Blue Active Substances): not greater than 0.5 mg/l to protect the aesthetic qualities of water supplies and to prevent foaming;
(b) Odor producing substances contained in sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances or waste, as will not cause organoleptic effects in water supplies that cannot be corrected by treatment, impair the palatability of fish, or have an adverse impact, as defined in 15A NCAC 02H .1002, on any best usage established for waters of this class;
(c) Chlorinated phenolic compounds: not greater than 1.0 ug/l to protect water supplies from taste and odor problems due to chlorinated phenols shall be allowed. Specific phenolic compounds may be given a different limit if it is demonstrated not to cause taste and odor problems and not to be detrimental to other best usage;
(d) Total hardness: not greater than 100 mg/l as calcium carbonate (CaCO3 or Ca + Mg);
(e) Solids, total dissolved: not greater than 500 mg/l;
(f) Toxic and other deleterious substances that are non-carcinogens: (i) Barium: 1.0 mg/l; (ii) Chloride: 250 mg/l; (iii) Nickel: 25 ug/l; (iv) Nitrate nitrogen: 10.0 mg/l; (v) 2,4-D: 70 ug/l; (vi) 2,4,5-TP (Silvex): 10 ug/l; and (vii) Sulfates: 250 mg/l;
(g) Toxic and other deleterious substances that are carcinogens: (i) Aldrin: 0.05 ng/1; (ii) Arsenic: 10 ug/l; (iii) ***Benzene:*** 1.19 ug/1; (iv) Carbon tetrachloride: 0.254 ug/l; (v) Chlordane: 0.8 ng/1;
(vi) ***Chlorinated benzenes:*** 488 ug/l; (vii) DDT: 0.2 ng/1; (viii) Dieldrin: 0.05 ng/1; (ix) Dioxin: 0.000005 ng/l; (x) Heptachlor: 0.08 ng/1; (xi) Hexachlorobutadiene: 0.44 ug/l; (xii) ***Polynuclear aromatic hydrocarbons (total of all PAHs):*** 2.8 ng/l; (xiii) Tetrachloroethane (1,1,2,2): 0.17 ug/l; (xiv) Tetrachloroethylene: 0.7 ug/l; (xv) Trichloroethylene: 2.5 ug/l; and (xvi) Vinyl Chloride: 0.025 ug/l.

(4) Wastewater and stormwater point source discharges in a WS-IV watershed shall meet the following requirements:
(a) Discharges that qualify for a General NPDES Permit pursuant to 15A NCAC 02H .0127 shall be allowed in the entire watershed.
(b) Discharges from domestic facilities, industrial facilities and trout farms that are subject to Individual NPDES Permits shall be allowed in the entire watershed.
(c) Stormwater discharges that qualify for an Individual NPDES Permit pursuant to 15A NCAC 02H .0126 shall be allowed in the entire watershed.
(d) No discharge of sewage, industrial wastes, or other wastes shall be allowed in the entire watershed except for those allowed by Sub-Items (a) through (c) of this Item or Rule .0104 of this Subchapter, and none shall be allowed that have an adverse effect on human health or that are not treated in accordance with the permit or other requirements established by the Division pursuant to G.S. 143-215.1. Upon request by the Commission, dischargers or industrial users subject to pretreatment standards shall disclose all chemical constituents present or potentially present in their wastes and chemicals that could be spilled or be present in runoff from their facility which may have an adverse impact on downstream water supplies. These facilities may be required to have spill and treatment failure control plans as well as perform special monitoring for toxic substances.
(e) New industrial discharges of treated wastewater in the critical area shall meet the provisions of Rule .0224(c)(2)(D), (E), and (G) of this Section and Rule .0203 of this Section.
(f) New industrial connections and expansions to existing municipal discharges with a pretreatment program pursuant to 15A NCAC 02H .0904 shall be allowed in the entire watershed.
(g) No new landfills shall be allowed in the Critical Area.
(h) No new permitted sites for land application residuals or petroleum contaminated soils shall be allowed in the Critical Area.

(5) Nonpoint source pollution in a WS-IV watershed shall meet the following requirements:
(a) Nonpoint source pollution shall not have an adverse impact on waters for use as a water supply or any other designated use.
(b) Class WS-IV waters shall be protected as water supplies that are located in watersheds that meet

average watershed development density levels specified for Class WS-IV waters in Rule .0624 of this Subchapter.

History Note: Authority G.S. 143-214.1; 143-215.3(a)(1); Eff. February 1, 1986; Amended Eff. January 1, 2015; May 1, 2007; April 1, 2003; June 1, 1996; October 1, 1995; August 1, 1995; June 1, 1994; Readopted Eff. November 1, 2019.

CLEAN WATER ACT aka Federal Water Pollution Control Act
Section 311 (c)(2)

SAFE DRINKING WATER ACT

SARA TITLE III aka EMERGENCY PLANNING and COMMUNITY RIGHT TO KNOW ACT (EPCRA)

I will address my other Above Ground public safety concerns in separately.
Thank you again for your time and consideration,
Vesta Kennedy

Attachment Email #25

15A NCAC 02B .0250 RANDLEMAN LAKE WATER SUPPLY WATERSHED: PROTECTION AND MAINTENANCE OF EXISTING RIPARIAN BUFFERS

Protection of the pollutant removal and other water quality services provided by riparian buffers throughout the watershed is an important element of the overall Randleman water supply pollutant strategy. The following is the management strategy for maintaining and protecting riparian areas in the Randleman Lake watershed:

(1) PURPOSE. The purposes of this Rule shall be for the local governments listed in this Rule, and in certain cases stated in this Rule the Division, to protect and preserve existing riparian buffers throughout the Randleman Lake watershed as generally described in this Rule, in order to maintain their nutrient removal and stream protection functions. Additionally this Rule will help protect the water supply uses of Randleman Lake and of designated water supplies throughout the Randleman Lake water supply watershed. Local governments with jurisdictions in Randleman Lake watershed shall establish programs to meet or exceed the minimum requirements of this Rule. However, the Division shall assume responsibility for applying the requirements of this Rule to activities listed in Item (3) of this Rule. The requirements of this Rule shall supersede all buffer requirements stated in Rules 15A NCAC 02B .0214 through .0216 as applied to WS-II, WS-III, and WS-IV waters in the Randleman Lake watershed. Parties subject to this Rule may choose to implement more stringent rules, including the one-hundred foot buffer requirement set out in Sub-item (3)(b)(i) of Rules 15A NCAC 02B .0214 through .0216 for high-density developments.

(2) DEFINITIONS. For the purpose of this Rule, these terms shall be defined as follows:

(a) 'Access Trails' means pedestrian trails constructed of pervious or impervious surfaces, and related structures to access a surface water including (but not limited to) boardwalks, steps, rails, signage;

(b) 'Archaeological Activities' means activities conducted by a Registered Professional Archaeologist (RPA);

(c) 'Airport Facilities' means all properties, facilities, buildings, structures, and activities that satisfy or otherwise fall within the scope of one or more of the definition or uses of the words or phrases 'air navigation facility', 'airport', or 'airport protection privileges' under G.S. 63-1; the definition of 'aeronautical facilities' in G.S. 63-79(1); the phrase 'airport facilities' as used in G.S. 159-48(b)(1); the phrase 'aeronautical facilities' as defined in G.S. 159-81 and G.S. 159-97; and the phrase 'airport facilities and improvements' as used in Article V, Section 13, of the North Carolina Constitution. Airport facilities shall include without limitation, any and all of the following: airports, airport maintenance facilities, clear zones, drainage ditches, fields, hangars, landing lighting, airport and airport-related offices, parking facilities, related navigational and signal systems, runways, stormwater outfalls, terminals, terminal shops, and all appurtenant areas used or suitable for airport buildings or other airport facilities, and all appurtenant rights-of-way; restricted landing areas; any structures, mechanisms, lights, beacons, marks, communicating systems, or other instrumentalities or devices used or useful as an aid, or constituting an advantage or convenience to the safe taking off, navigation, and landing of aircraft, or the safe and efficient operation or maintenance of an airport or restricted landing area; easements through, or interests in, air space over land or water, interests in airport hazards outside the boundaries of airports or restricted landing areas, and other protection privileges, the acquisition or control of which is necessary to ensure safe approaches to the landing areas of airports and restricted landing areas, and the safe and efficient operation thereof and any combination of any or all of such facilities. Notwithstanding the foregoing, the following shall not be included in the definition of 'airport facilities':

(i) Satellite parking facilities;

(ii) Retail and commercial development outside of the terminal area, such as rental car facilities; and

(iii) Other secondary development, such as hotels, industrial facilities, free-standing offices and other similar buildings, so long as these facilities are not directly associated with the operation of the airport, and are not operated by a unit of government or special governmental entity such as an airport authority;

(d) 'Channel' means a natural water-carrying trough cut vertically into low areas of the land surface by erosive action of concentrated flowing water or a ditch or canal excavated for the flow of water;

(e) 'DBH' means diameter at breast height of a tree measured at 4.5 feet above ground surface level;

(f) Ditch means a man-made, open drainage way in or into which excess surface water or groundwater from land, stormwater runoff, or floodwaters flow either continuously or intermittently;

(g) 'Ephemeral stream' means a feature that carries stormwater in direct response to precipitation with water flowing only during and shortly after large precipitation events. An ephemeral stream may or may not have a well-defined channel, the aquatic bed is always above the water table, and stormwater runoff is the primary source of water. An ephemeral stream typically lacks the biological, hydrological, and physical characteristics commonly associated with the continuous or intermittent conveyance of water;

(h) 'Forest plantation' means an area of planted trees that may be conifers (pines) or hardwoods. On a plantation, the intended crop trees are planted rather than naturally regenerated from seed on the site, coppice (sprouting), or seed that is blown or carried into the site;

(i) 'Greenway / Hiking Trails' means pedestrian trails constructed of pervious and impervious surfaces and related structures including but not limited to boardwalks, steps, rails, and signage, and that generally run parallel to the surface water;

(j) 'High Value Tree' means a tree that meets or exceeds the following standards: for pine species, 14 inch DBH or greater or 18 inch or greater stump diameter; and, for hardwoods and wetland species, 16 inch DBH or greater or 24 inch or greater stump diameter;

(k) 'Intermittent stream' means a well-defined channel that contains a continuous flow of water for only part of the year, typically during winter and spring when the aquatic bed is below the water table. The flow may be heavily supplemented by stormwater runoff. An intermittent stream often lacks the biological and hydrological characteristics commonly associated with the continuous conveyance of water;

(l) 'Modified natural stream' means an on-site channelization or relocation of a stream channel and subsequent relocation of the intermittent or perennial flow as evidenced by topographic alterations in the immediate watershed. A modified natural stream must have the typical biological, hydrological, and physical characteristics commonly associated with the continuous conveyance of water;

(m) 'Perennial stream' means a well-defined channel that contains water year round during a year of normal rainfall with the aquatic bed located below the water table for most of the year. Groundwater is the primary source of water for a perennial stream, but it also carries stormwater runoff. A perennial stream exhibits the typical biological, hydrological, and physical characteristics commonly associated with the continuous conveyance of water;

(n) 'Perennial waterbody' means a natural or man-made watershed that stores surface water permanently at depths sufficient to preclude growth of rooted plants, including lakes, ponds, sounds, non-stream estuaries and ocean. For the purpose of the State's riparian buffer protection program, the waterbody must be part of a natural drainage way (i.e., connected by surface flow to a stream);

(o) 'Shoreline stabilization' is the in-place stabilization of an eroding shoreline. Stabilization techniques which include "soft" methods or natural materials (such as root wads, or rock vanes) may be considered as part of a restoration design. However, stabilization techniques that consist primarily of "hard" engineering, such as concrete lined channels, rip rap, or gabions, while providing bank stabilization, shall not be considered stream restoration;

(p) 'Stream restoration' is defined as the process of converting an unstable, altered or degraded stream corridor, including adjacent riparian zone and flood-prone areas to its natural or referenced, stable conditions considering recent and future watershed conditions. This process also includes restoring the geomorphic dimension, pattern, and profile as well as biological and chemical integrity, including transport of water and sediment produced by the stream's watershed in order to achieve dynamic equilibrium. 'Referenced' or 'referenced reach' means a stable stream that is in dynamic equilibrium with its valley and contributing

watershed. A reference reach can be used to develop natural channel design criteria for stream restoration projects. 'Stream' means a body of concentrated flowing water in a natural low area or natural channel on the land surface;

(q) 'Stump diameter' means the diameter of a tree measured at six inches above the ground surface level;

(r) 'Surface waters' means all waters of the state as defined in G.S. 143-212 except underground waters and wetlands;

(s) 'Temporary road' means a road constructed temporarily for equipment access to build or replace hydraulic conveyance structures such as bridges, culverts or pipes or water dependent structures, or to maintain public traffic during construction; and

(t) 'Tree' means a woody plant with a DBH equal to or exceeding five inches or a stump diameter exceeding six inches.

(3) APPLICABILITY. This Rule shall apply to all local governments with jurisdictions in the Randleman Lake watershed. Local governments shall develop riparian buffer protection programs for approval by the Division incorporating the minimum standards set out throughout this Rule and shall apply the requirements of this Rule throughout their jurisdictions within the Randleman watershed except where the Division shall exercise jurisdiction. For the following types of buffer activities in the Randleman watershed, wherever local governments are referenced in this Rule, the Division shall implement applicable requirements to the exclusion of local governments:

(a) Activities conducted under authority of the State;

(b) Activities conducted under the authority of the United States;

(c) Activities conducted under the authority of multiple jurisdictions;

(d) Activities conducted under the authority of local units of government;

(e) Forest harvesting activities described in Item 16 of this Rule; and

(f) Agricultural activities.

(4) REQUIREMENTS. The following minimum criteria shall be used for identifying regulated buffers. All local governments subject to this Rule shall develop riparian buffer protection programs and ordinances for approval by the Commission, incorporating the minimum standards contained in Rule. This Rule shall apply to 50 foot wide riparian buffers directly adjacent to surface waters in the Randleman watershed (intermittent and perennial streams, lakes, reservoirs, and ponds) excluding wetlands. Wetlands adjacent to surface waters or within 50 feet of surface waters, shall be considered as part of the riparian buffer but are regulated pursuant to 15A NCAC 02H. 0506.

(a) Surface waters shall be subject to this Rule if the feature is approximately shown on any of the following references, or if there is other site specific evidence that indicates to the Division or local government the presence of waters not shown on any of these maps:

(i) The most recent version of the United States Geological Survey 1:24,000 scale (7.5 minute quadrangle) topographic maps;

(ii) The most recent version of the hardcopy soil survey maps developed by USDA-Natural Resource Conservation Service; or

(iii) A map approved by the Geographic Information Coordinating Council and by the Commission. Prior to approving a map under this sub-division the Commission shall provide a 30-day public notice and opportunity for comment;

(b) Where the specific origination point of an intermittent or perennial stream is in question, parties subject to this Rule shall use the Division publication, *Identification Methods for the Origins of Intermittent and Perennial Streams, v 3.1 February 28, 2005* available at: http://portal.ncdenr.org/web/wq/swp/ws/401/waterresources/streamdeterminations to establish that point;

(c) Local governments may develop stream network maps for the watershed based on maps referenced in Sub-Item (4)(a) of this Rule or criteria identified in Sub-Item (4)(b) and of this Rule. These maps shall be submitted to the Director for review to establish that proper methods were used by any local government wishing to use such maps for implementation of riparian area protection. The local map must be at least as accurate as the map identified in Sub-Items (4)(a)(i) and (4)(a)(ii) and must use the stream identification manual as referenced in Item (4)(b) of this Rule. Riparian areas shall be protected and maintained in accordance

with this Rule on all sides of surface waters in the Randleman Lake watershed as delineated on these approved stream network maps;

(d) Personnel from delegated local governments that are assigned to perform stream determinations, shall successfully complete the Division's Surface Water Identification Training and Certification Class within three years of the effective revision date of this Rule. A delegated local government shall retain personnel on staff who have successfully completed the Division's class at all times with the exception of staff vacancies and class scheduling problems. At any time that a local government does not have a certified individual retained on staff they shall notify the Division and indicate a proposed schedule to secure a certified staff member;

(e) All local governments that have land use authority within the Randleman Lake water supply watershed shall adopt and enforce this Rule through local water supply and other local ordinances. Ordinances shall require that all riparian protection areas are recorded on new or modified plats. No new clearing, grading, or development shall take place and no new building permits shall be issued in violation of this Rule; and

(f) Parties subject to this Rule shall abide by all State rules and laws regarding waters of the state including Rules 15A NCAC 02H .0500, 15A NCAC 02H .1300, and Sections 401 and 404 of the Federal Clean Water Act.

(5) EXEMPTION REQUIREMENTS TO WHEN AN ON-SITE DETERMINATION SHOWS THAT SURFACE WATERS ARE NOT PRESENT. When a landowner or other affected party believes that the maps have inaccurately depicted surface waters, he or she shall consult the delegated local authority. Upon request, the delegated local authority shall make onsite determinations. Local governments may also accept the results of site assessments made by other parties who have successfully completed the Division's Surface Water Identification Training Certification course and are sanctioned by the Division to make such determinations. Any disputes over on-site determinations shall be referred to the local Board of Adjustment or other local appeals process in writing. For projects proposed for state and federal lands, any disputes shall be referred to the Director in writing. A determination of the Director as to the accuracy or application of the maps is subject to review as provided in Articles 3 and 4 of G.S. 150B. Surface waters that appear on the maps shall not be subject to this Rule if an on-site determination shows that they fall into one of the following categories:

(a) Ditches and manmade conveyances, to include manmade stormwater conveyances, other than modified natural streams, unless the ditch or manmade conveyance delivers untreated stormwater runoff from an adjacent source directly to an intermittent or perennial stream;

(b) Areas mapped as intermittent streams, perennial streams, lakes, ponds, or estuaries on the most recent versions of United States Geological Survey 1:24,000 scale (7.5 minute quadrangle) topographic maps, hard-copy soil survey maps or other EMC approved stream maps where no perennial waterbody, intermittent waterbody, lake, pond or estuary actually exists on the ground;

(c) Ephemeral streams; and

(d) Ponds and lakes created for animal watering, irrigation, or other agricultural uses that are not part of a natural drainage way that is classified in accordance with 15A NCAC 02B .0100. Ponds are part of a natural drainage way when they are hydrologically connected (i.e. the pond is fed by an intermittent or perennial stream) or when they have a direct discharge point to an intermittent or perennial stream.

(6) EXEMPTION TO REQUIREMENTS WHEN EXISTING USES ARE PRESENT AND ONGOING. This Rule shall not apply to portions of the riparian buffer where a use is existing and ongoing according to the following:

(a) A use shall be considered existing and ongoing if it was present within the riparian buffer as of the effective date of the local ordinance or local ordinances enforcing this Rule and has continued to exist since that time. For state and federal entities, a use shall be considered existing and ongoing if it was present within the riparian buffer as of the effective date of this Rule and has continued to exist since that time. Existing uses shall include, but not limited to, agriculture, buildings, industrial facilities, commercial areas, transportation facilities, maintained lawns, utility lines and on-site sanitary sewage systems any of which involve either specific, periodic management of vegetation or displacement of vegetation by

structures or regular activity. Only the portion of the riparian buffer that contains the footprint of the existing use is exempt from this Rule. Change of ownership through purchase or inheritance is not a change of use. Activities necessary to maintain uses are allowed provided that the site remains similarly vegetated, no impervious surface is added within 50 feet of the surface water where it did not previously exist as of the effective date of the local ordinance or local ordinances enforcing this Rule, and existing diffuse flow is maintained. Grading and revegetating Zone 2 is allowed provided that the health of the vegetation in Zone 1 is not compromised, the ground is stabilized and existing diffuse flow is maintained;

(b) A use shall be considered existing if projects or proposed development are determined by the local government, or the Director for the cases involving state or federal entities, to meet at least one of the following criteria:

(i) Project requires a 401 Certification/404 permit and these were issued prior to the effective date of the local program enforcing this Rule, and prior to the effective date of this Rule for Division-administered activities listed in Item (3) of this Rule;

(ii) Projects that require a state permit, such as landfills, NPDES wastewater discharges, land application of residuals and road construction activities, have begun construction or are under contract to begin construction and had received all required state permits and certifications prior to the effective date of the local program implementing this Rule, and prior to the effective date of this Rule for Division-administered activities listed in Item (3) of this Rule;

(iii) Projects that are being reviewed through the Clean Water Act Section 404/National Environmental Policy Act Merger 01 Process (published by the US Army Corps of Engineers and Federal Highway Administration, 2003) or its immediate successor and that have reached agreement with DENR on avoidance and minimization by the effective date of the local program enforcing this Rule, and prior to the effective date of this Rule for state and federal entities; or

(iv) Projects that are not required to be reviewed by the Clean Water Act Section 404/National Environmental Policy Act Merger 01 Process (published by the US Army Corps of Engineers and Federal Highway Administration, 2003) or its immediate successor if a Finding of No Significant Impact has been issued for the project and the project has the written approval of the local government prior to the effective date of the local program enforcing this Rule, or the written approval of the Division prior to the effective date of this Rule for state and federal entities: and

(c) This Rule shall apply at the time an existing use is changed to another use. Change of use shall include, but not limited to the initiation of any activity not defined as existing and ongoing in either Sub-Item (6)(a) or (6)(b) of this Rule.

(7) ZONES OF THE RIPARIAN BUFFER. The protected riparian buffer shall have two zones as follows:

(a) Zone 1 shall consist of a vegetated area that is undisturbed except for uses provided for in Item (9) of this Rule. The location of Zone 1 shall be as follows:

(i) For intermittent and perennial streams, Zone 1 shall begin at the most landward limit of the top of the bank or the rooted herbaceous vegetation and extend landward a distance of 30 feet on all sides of the surface water, measured horizontally on a line perpendicular to a vertical line marking the edge of the top of the bank; and

(ii) For ponds, lakes and reservoirs located within a natural drainage way, Zone 1 shall begin at the most landward limit of the normal water level or the rooted herbaceous vegetation and extend landward a distance of 30 feet, measured horizontally on a line perpendicular to a vertical line marking the edge of the surface water or rooted herbaceous vegetation: and

(b) Zone 2 shall consist of a stable, vegetated area that is undisturbed except for uses provided for in Item (9) of this Rule. Grading and revegetating Zone 2 is allowed provided that the health of the vegetation in Zone 1 is not compromised. Zone 2 shall begin at the outer edge of Zone 1 and extend landward 20 feet as measured horizontally on a line perpendicular to

the surface water. The combined width of Zones 1 and 2 shall be 50 feet on all sides of the surface water.

(8) DIFFUSE FLOW REQUIREMENT. Diffuse flow of runoff shall be maintained in the riparian buffer by dispersing concentrated flow and reestablishing vegetation.

(a) Concentrated runoff from new ditches or manmade conveyances shall be converted to diffuse flow at non-erosive velocities before the runoff enters Zone 2 of the riparian buffer;

(b) Periodic corrective action to restore diffuse flow shall be taken if necessary to impede the formation of erosion gullies; and

(c) No new stormwater conveyances are allowed through the buffers except for those specified in Item (9) of this Rule addressing stormwater management ponds drainage ditches, roadside ditches, and stormwater conveyances.

(9) TABLE OF USES. The following chart sets out the uses and their designation under this Rule as exempt, potentially allowable, or potentially allowable with mitigation. All uses not designated as exempt, potentially allowable, or potentially allowable with mitigation are considered prohibited and may not proceed within the riparian buffer unless a variance is granted pursuant to Item (12) of this Rule. The requirements for each category are given in Item (10) of this Rule.

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
Access trails: Pedestrian access trails leading to the surface water, docks, fishing piers, boat ramps and other water dependent activities: • Pedestrian access trails that are restricted to the minimum width practicable and do not exceed 4 feet in width of buffer disturbance, and provided that installation and use does not result in removal of trees as defined in this Rule and no impervious surface is added to the riparian buffer • Pedestrian access trails that exceed 4 feet in width of buffer disturbance, the installation or use results in removal of trees as defined in this Rule or impervious surface is added to the riparian buffer	X	X	
Airport facilities: • Airport facilities that impact equal to or less than 150 linear feet or one-third of an acre of riparian buffer • Airport facilities that impact greater than 150 linear feet or one-third of an acre of riparian buffer • Activities necessary to comply with FAA requirements (e.g. radar uses or landing strips)[1]		X X	X
Archaeological activities: • In Zones 1 and 2 and are designed, constructed and maintained to provide the maximum sediment removal and erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to the maximum extent practical.	X		
Bridges		X	
Canoe access provided that installation and use does not result in removal of trees as defined in the Rule and no impervious surface is added to the buffer.	X		
Dam maintenance activities: • Dam maintenance activities that do not cause	X		

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
additional buffer disturbance beyond the footprint of the existing dam or those covered under a U.S. Army Corps of Engineers Nationwide Permit • Dam maintenance activities that do cause additional buffer disturbance beyond the footprint of the existing dam or those not covered under a U.S. Army Corps of Engineers Nationwide Permit		X	
Drainage ditches, roadside ditches and stormwater conveyances through riparian buffers: • New stormwater flows to existing drainage ditches, roadside ditches, and stormwater conveyances provided flows do not alter or result in the need to alter the conveyance and are managed to minimize the sediment, nutrients and other pollution that convey to waterbodies • Realignment of existing roadside drainage ditches retaining the design dimensions, provided that no additional travel lanes are added and the minimum required roadway typical section is used based on traffic and safety considerations • New or altered drainage ditches, roadside ditches and stormwater outfalls provided that a stormwater management facility is installed to control nitrogen and attenuate flow before the conveyance discharges through the riparian buffer • New drainage ditches, roadside ditches and stormwater conveyances applicable to linear projects that do not provide a stormwater management facility due to topography constraints provided that other practicable BMPs are employed	X	X X	X
Drainage of a pond in a natural drainage way provided that a new riparian buffer that meets the requirements of Items (7) and (8) of this Rule is established adjacent to the new channel.	X		
Driveway crossings of streams and other surface waters subject to this Rule: • Driveway crossings on single family residential lots that disturb equal to or less than 25 linear feet or 2,500 square feet of riparian buffer • Driveway crossings on single family residential lots that disturb greater than 25linear feet or 2,500 square feet of riparian buffer • In a subdivision that cumulatively disturb equal to or less than 150 linear feet or one-third of an acre of riparian buffer • In a subdivision that cumulatively disturb greater than 150 linear feet or one-third of an acre of riparian buffer	X	X X	X
Driveway impacts other than crossing of a stream or other surface waters subject to this Rule			X

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
Fences: • Fences provided that disturbance is minimized and installation does not result in removal of trees as defined in this Rule • Fences provided that disturbance is minimized and installation results in removal of trees as defined in this Rule	X	X	
Forest harvesting - see Item (16) of this Rule			
Fertilizer Application: One-time fertilizer application to establish vegetation	X		
Grading and revegetation in Zone 2 provided that diffuse flow and the health of existing vegetation in Zone 1 is not compromised and disturbed areas are revegetated with native vegetation	X		
Greenway / hiking trails: Designed, constructed and maintained to provide the maximum nutrient removal and erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to the maximum extent practical.		X	
Historic preservation: Designed, constructed and maintained to provide the maximum nutrient removal and erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to the maximum extent practical	X		
Maintenance access of modified natural streams: a grassed travel way on one side of the water body when less impacting alternatives are not practical. The width and specifications of the travel way shall be only that needed for equipment access and operation. The travel way shall be located to maximize stream shading.		X	
Mining activities: • Mining activities that are covered by the Mining Act provided that new riparian buffers that meet the requirements of Items (7) and (8) of this Rule are established adjacent to the relocated channels • Mining activities that are not covered by the Mining Act or where new riparian buffers that meet the requirements or Items (7) and (8) of this Rule are not established adjacent to the relocated channels • Wastewater or mining dewatering wells with approved NPDES permit	X	X	X
Playground equipment: • Playground equipment on single family lots provided that installation and use does not result in removal of vegetation • Playground equipment installed on lands other than	X		

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
single-family lots or that requires removal of vegetation		X	
Ponds in natural drainage ways, excluding dry ponds: • New ponds provided that a riparian buffer that meets the requirements of Items (7) & (8) of this Rule is established adjacent to the pond • New ponds where a riparian buffer that meets the requirements of Items (7) & (8) of this Rule is NOT established adjacent to the pond		X	X
Protection of existing structures, facilities and stream banks when this requires additional disturbance of the riparian buffer or the stream channel		X	
Railroad impacts other than crossings of streams and other surface waters subject to this Rule.			X
Railroad crossings of streams and other surface waters subject to this Rule: • Railroad crossings that impact equal to or less than 40 linear feet of riparian buffer • Railroad crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre of riparian buffer • Railroad crossings that impact greater than 150 linear feet or one-third of an acre of riparian buffer	X	X	X
Recreational and accessory structures: • Total footprint of gazebos and sheds in Zone 2, provided they are not prohibited under local water supply ordinance less than or equal to 150 square feet per lot • Total footprint gazebos and sheds in Zone 2, provided they are not prohibited under local water supply ordinance of more than 150 square feet per lot • Wooden-slatted decks (and associated steps) that are at least 8 feet in height and vegetation is not removed from Zone 1 for the installation and that it meets the requirements of Items (7) and (8) of this Rule • Wooden-slatted decks (and associated steps) that are not at least 8 feet in height or vegetation is removed from Zone 1 for the installation and that it meets the requirements of Items (7) and (8) of this Rule		X X	X X
Removal of previous fill or debris provided that diffuse flow is maintained and vegetation is restored	X		
Road crossings of streams and other surface waters subject to this Rule: • Road crossings that impact equal to or less than 40 linear feet of riparian buffer • Road crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre of riparian buffer • Road crossings that impact greater than 150 linear feet	X	X	X

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
or one-third of an acre of riparian buffer			
Road impacts other than crossings of streams and other surface waters subject to this Rule			X
Road relocation of existing private access roads associated with public road projects where necessary for public safety: • Less than or equal to 2,500 square feet of buffer impact • Greater than 2,500 square feet of buffer impact		X	X
Stormwater BMPs: • Wet detention, bioretention, and constructed wetlands in Zone 2 if diffuse flow of discharge is provided into Zone 1 • Wet detention, bioretention, and constructed wetlands in Zone 1		X	X
Scientific studies and stream gauging: • In Zones 1 and 2 if they are designed, constructed and maintained to protect water quality to the maximum extent practical.	X		
Streambank or shoreline stabilization		X	
Temporary roads provided that the disturbed area is restored to pre-construction topographic and hydrologic conditions immediately after construction is complete and replanted immediately with comparable vegetation, except that the tree planting may occur during the dormant season. A one time application of fertilizer may be utilized to establish vegetation. At the end of five years the restored buffer shall comply with the restoration criteria in Item (9) of Rule 15A NCAC 02B .0252: • Less than or equal to 2,500 square feet of buffer disturbance • Greater than 2,500 square feet of buffer disturbance • Associated with culvert installation, bridge construction or replacement	X	X X	
Temporary sediment and erosion control devices provided that the disturbed area is restored to pre-construction topographic and hydrologic conditions immediately after construction is complete and replanted immediately with comparable vegetation, except that tree planting may occur during the dormant season. A one-time application of fertilizer may be used to establish vegetation. At the end of five years the restored buffer shall comply with the restoration criteria in Item (9) of Rule 15A NCAC 02B .0252: • In Zone 2 only provided ground cover is established within the timeframes required by the Sedimentation and Erosion Control Act and that the vegetation in Zone 1 is not compromised and that discharge is	X		

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
released as diffuse flow in accordance with Item (8) of this Rule • In Zones 1 and 2 to control impacts associated with uses approved by the local government or that have received a variance provided that sediment and erosion control for upland areas is addressed to the maximum extent practical outside the buffer • In-stream temporary erosion and sediment control measures for work within a stream channel that is authorized under Section 401 and 404 of the Federal Water Pollution Control Act • In-stream temporary erosion and sediment control measures for authorized work within a stream channel	X	X X	
Utility- Non-electric utility lines: • Impacts other than perpendicular crossings in Zone 2 only[4, 5] • Impacts other than perpendicular crossings in Zone 1 only[4, 5]		X	X
Utility-Non-electric utility line perpendicular crossings of streams and other surface waters subject to this Rule[4, 5]: • Perpendicular crossings that disturb equal to or less than 40 linear feet of riparian buffer with a maintenance corridor equal to or less than 10 feet in width • Perpendicular crossings that disturb equal to or less than 40 linear feet of riparian buffer with a maintenance corridor greater than 10 feet in width • Perpendicular crossings that disturb greater than 40 linear feet but equal to or less than 150 linear feet of riparian buffer with a maintenance corridor equal to or less than 10 feet in width • Perpendicular crossings that disturb greater than 40 linear feet but equal to or less than 150 linear feet of riparian buffer with a maintenance corridor greater than 10 feet in width • Perpendicular crossings that disturb greater than 150 linear feet of riparian buffer	X	X X	X X
Utility-Overhead electric utility lines: • Impacts other than perpendicular crossings in Zone 2 only[4, 5] • Impacts other than perpendicular crossings in Zone 1 [2,3,4, 5]		X	X
Utility-Overhead electric utility line perpendicular crossings of streams and other surface waters subject to this Rule [2, 3,4, 5]: • Perpendicular crossings that disturb equal to or less than 150 linear feet of riparian buffer • Perpendicular crossings that disturb greater than 150	X	X	

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
linear feet of riparian buffer			
Utility-Underground electric utility lines: • Impacts other than perpendicular crossings in Zone 2 only[2] • Impacts other than perpendicular crossings in Zone 1[1,4]	X X		
Utility-Underground electric utility line perpendicular crossings of streams and other surface waters subject to this Rule: • Perpendicular crossings that disturb less than or equal to 40 linear feet of riparian buffer[3, 4, 5] • Perpendicular crossings that disturb greater than 40 linear feet of riparian buffer[3, 4, 5]	X	X	
Vegetation management: • Emergency fire control measures provided that topography is restored • Periodic mowing and harvesting of plant products in Zone 2 only • Planting vegetation to enhance the riparian buffer • Pruning forest vegetation provided that the health and function of the forest vegetation is not compromised • Removal of individual trees which are in danger of causing damage to dwellings, other structures or human life • Removal of individual trees that are dead, diseased or damaged. • Removal of poison ivy • Removal of understory nuisance vegetation as defined in: Smith, Cherri L. 1998. Exotic Plant Guidelines. Dept. of Environment and Natural Resources. Division of Parks and Recreation. Raleigh, NC. Guideline #30	X X X X X X X X		
Vehicle access to water dependent structures • Vehicular access roads leading to water dependent structures as defined in 15A NCAC 02B .0202, provided they do not cross the surface water and have a minimum practicable width not exceeding ten feet		X	
Water dependent structures as defined in 15A NCAC 02B .0202		X	
Water supply reservoirs: • New reservoirs provided that a riparian buffer that meets the requirements of Items (7) and (8) of this Rule is established adjacent to the reservoir • New reservoirs where a riparian buffer that meets the requirements of Items (7) and (8) of this Rule is not established adjacent to the reservoir		X	X
Water wells • Single family water wells	X		

Use	Exempt	Potentially Allowable	Potentially Allowable with Mitigation
• All water wells other than single family water wells		X	
Wetland stream and buffer restoration • Wetland, stream and buffer restoration that requires DWQ approval for the use of a 401 Water Quality Certification • Wetland, stream and buffer restoration that does NOT require DWQ approval for the use of a 401 Water Quality Certification	X	X	
Wildlife passage structures		X	

[1] Provided that:

- Heavy equipment is not used in Zone 1
- Vegetation is not compromised in the portions of Zone 1 and Zone 2 that are not impacted
- Trees that are cut down are removed by chain
- No permanent felling of trees occurs in the protected buffers or in the streams
- Stump removal is performed only by grinding
- At the completion of the project the disturbed area is stabilized with native vegetation
- Zones 1 & 2 meet the requirements of (7) and (8) of this Rule.

[2] Provided that, in Zone 1, all of the following BMPs for overhead utility lines are used. If all of these BMPs are not used, then the overhead utility lines shall require a no practical alternative evaluation by the local government, or the Director for the cases involving activities listed in Item (3) of this Rule.

- A minimum zone of 10 feet wide immediately adjacent to the water body shall be managed such that only vegetation that poses a hazard or has the potential to grow tall enough to interfere with the line is removed.
- Woody vegetation shall be cleared by hand. No land grubbing or grading is allowed.
- Vegetative root systems shall be left intact to maintain the integrity of the soil. Stumps shall remain where trees are cut.
- Riprap shall not be used unless it is necessary to stabilize a tower.
- No fertilizer shall be used other than a one-time application to re-establish vegetation.
- Construction activities shall minimize the removal of woody vegetation, the extent of the disturbed area, and the time in which areas remain in a disturbed state.
- Active measures shall be taken after construction and during routine maintenance to ensure diffuse flow of stormwater through the buffer.
- In wetlands, mats shall be utilized to minimize soil disturbance.

[3] Provided that poles or towers shall not be installed within 10 feet of a water body unless the local government or the Director for the cases involving activities listed in Item (3) of this Rule completes a no practical alternative evaluation as defined in Item (11) of this Rule.

[4] Provided that, in Zone 1, all of the following BMPs for underground utility lines are used. If all of these BMPs are not used, then the underground utility line shall require a no practical alternative evaluation by the local government or the Director for the cases involving activities listed in Item (3) of this Rule, as defined in Item (11) of this Rule.

- Woody vegetation shall be cleared by hand. No land grubbing or grading is allowed.
- Vegetative root systems shall be left intact to maintain the integrity of the soil. Stumps shall remain, except in the trench, where trees are cut.
- Underground cables shall be installed by vibratory plow or trenching.
- The trench shall be backfilled with the excavated soil material immediately following cable installation.
- No fertilizer shall be used other than a one-time application to re-establish vegetation.
- Construction activities shall minimize the removal of woody vegetation, the extent of the disturbed area, and the time in which areas remain in a disturbed state.
- Active measures shall be taken after construction and during routine maintenance to ensure diffuse flow of stormwater through the buffer.

- In wetlands, mats shall be utilized to minimize soil disturbance.

[5] Perpendicular crossings are those that intersect the surface water at an angle between 75 degrees and 105 degrees.

(10) REQUIREMENTS FOR CATEGORIES OF USES. Uses designated as exempt, potentially allowable, and potentially allowable with mitigation in Item (9) of this Rule shall have the following requirements:

(a) EXEMPT. Uses designated as exempt are allowed within the riparian buffer. Exempt uses shall be designed, constructed and maintained to minimize soil disturbance and to provide the maximum water quality protection practicable, including construction, monitoring, and maintenance activities. In addition, exempt uses shall meet requirements listed in Item (9) of this Rule for the specific use;

(b) POTENTIALLY ALLOWABLE. Uses designated as potentially allowable require a written buffer authorization from the local government, or the Director for the cases involving activities listed in Item (3) of this Rule for impacts within the riparian buffer provided that there are no practical alternatives to the requested use pursuant to Item (11) of this Rule;

(c) POTENTIALLY ALLOWABLE WITH MITIGATION. Uses designated as potentially allowable with mitigation require written authorization from the local government, or the Director for the cases involving activities listed in Item (3) of this Rule for impacts within the riparian buffer provided that there are no practical alternatives to the requested use pursuant to Item (11) of this Rule and an appropriate mitigation strategy has been approved pursuant to Item (15) of this Rule; and

(d) PROHIBITED. Uses that are not designated in Item (9) of this Rule are considered prohibited in the riparian buffers.

(11) DETERMINATION OF "NO PRACTICAL ALTERNATIVES." Persons who wish to undertake uses designated as allowable or allowable with mitigation shall submit a request for a "no practical alternatives" determination to the local government or the Director for the cases involving activities listed in Item (3) of this Rule. The applicant shall certify that the criteria identified in Sub-Item (a) of this Item are met. The local government, or the Director for the cases involving activities listed in Item (3) of this Rule, shall grant an Authorization Certificate upon a "no practical alternatives" determination. The procedure for making an Authorization Certificate shall be as follows:

(a) For any request for an Authorization Certificate, the local government, or the Director for the cases involving activities listed in Item (3) of this Rule, shall review the entire project and make a finding of fact as to whether the following requirements have been met in support of a "no practical alternatives" determination:

(i) The basic project purpose cannot be practically accomplished in a manner that would better minimize disturbance, preserve aquatic life and habitat, and protect water quality;

(ii) The use cannot practically be reduced in size or density, reconfigured or redesigned to better minimize disturbance, preserve aquatic life and habitat, and protect water quality; and

(iii) Best management practices shall be used if required to minimize disturbance, preserve aquatic life and habitat, and protect water quality;

(b) Requests for an Authorization Certificate shall be reviewed and either approved or denied within 60 days of receipt of a complete submission based on the criteria in Sub-Item (a) of this Item and the local ordinance or ordinances enforcing this Rule by the local government, or the Director for the cases involving activities listed in Item (3) of this Rule. Failure to issue an approval or denial within 60 days shall constitute that the applicant has demonstrated "no practical alternatives." An Authorization Certificate shall be issued to the applicant, unless:

(i) The applicant agrees, in writing, to a longer period; and

(ii) Applicant fails to furnish requested information necessary to the local government's decision or the Director's decision for the cases involving activities listed in Item (3) of this Rule;

(c) The local government, or the Director for the cases involving activities listed in Item (3) of this Rule, may attach conditions to the Authorization Certificate that support the purpose,

spirit and intent of the riparian buffer protection program. Complete submissions shall include the following:

(i) The name, address and phone number of the applicant;

(ii) The nature of the activity to be conducted by the applicant;

(iii) The location of the activity, including the jurisdiction;

(iv) A map of sufficient detail to accurately delineate the boundaries of the land to be utilized in carrying out the activity, the location and dimensions of any disturbance in riparian buffers associated with the activity, and the extent of riparian buffers on the land;

(v) An explanation of why this plan for the activity cannot be practically accomplished, reduced or reconfigured to better minimize disturbance to the riparian buffer, preserve aquatic life and habitat and protect water quality; and

(vi) Plans for any best management practices proposed to be used to control the impacts associated with the activity: and

(d) Any disputes over determinations regarding Authorization Certificates shall be referred to the local government's appeals process for a decision, or to the Director for determinations involving lands of activities listed in Item (3) of this Rule. The Director's decision is subject to review as provided in G.S. 150B Articles 3 and 4.

(12) VARIANCES. Persons who wish to undertake prohibited uses may pursue a variance. The local government may grant only minor variances. For major variances, local governments shall prepare preliminary findings and submit them to the Commission for approval. The variance request procedure shall be as follows:

(a) There are practical difficulties or unnecessary hardships that prevent compliance with the riparian buffer protection requirements. Practical difficulties or unnecessary hardships shall be evaluated in accordance with all of the following:

(i) If the applicant complies with the provisions of this Rule, he or she can secure no reasonable return from, nor make reasonable use of, his or her property. Merely proving that the variance would permit a greater profit from the property shall not be considered adequate justification for a variance. Moreover, the local government, or the Director for the cases involving activities listed in Item (3) of this Rule, shall consider whether the variance is the minimum possible deviation from the terms of this Rule that shall make reasonable use of the property possible;

(ii) The hardship results from application of this Rule to the property rather than from other factors such as deed restrictions or other hardship;

(iii) The hardship is due to the physical nature of the applicant's property, such as its size, shape, or topography, and is unique to the applicant's property rather than the result of conditions that are widespread. If other properties are equally subject to the hardship created in the restriction, then granting a variance would be a special privilege denied to others, and would not promote equal justice; and

(iv) The applicant did not cause the hardship by knowingly or unknowingly violating this Rule.

(b) The variance is in harmony with the general purpose and intent of the State's riparian buffer protection requirements and preserves its spirit; and

(c) In granting the variance, the public safety and welfare have been assured, water quality has been protected, and substantial justice has been done.

(13) MINOR VARIANCES. A minor variance request pertains to activities that are proposed to impact only Zone 2 or any portion of Zone 2 of the riparian buffer. Minor variance requests shall be reviewed and approved based on the criteria in Sub-Item (12)(a) of this Rule by the local government pursuant to G.S. 153A-Article 18, or G.S. 160A-Article 19. The local government may attach conditions to the variance approval that support the purpose, spirit and intent of the riparian buffer protection program. Request for appeals to decisions made by the local government shall be made through the local government's appeals process, or to the Director for determinations involving activities listed in Item (3) of this Rule. The Director's decision is subject to review as provided in G.S. 150B Articles 3 and 4.

(14) MAJOR VARIANCES. A major variance request pertains to activities that are proposed to impact any portion of Zone 1 of the riparian buffer. If the local government, or the Director for the cases involving activities listed in Item (3) of this Rule, has determined that a major variance request meets the requirements in Sub-Item (12)(a) of this Rule, then it shall prepare a preliminary finding and submit it to the Commission for approval. Within 90 days after receipt by the local government, or the Director for the cases involving activities listed in Item (3) of this Rule, the Commission shall review preliminary findings on major variance requests. The Commission may choose to approve, approve with conditions, or deny the major variance.

(15) MITIGATION. Persons who wish to undertake uses designated as allowable with mitigation shall meet the following requirements in order to proceed with their proposed use.

(a) Obtain a determination of "no practical alternatives" to the proposed use pursuant to Item (11) of this Rule; and

(b) Obtain approval for a mitigation proposal pursuant to 15A NCAC 02B .0252.

(16) REQUIREMENTS SPECIFIC TO FOREST HARVESTING. The following requirements shall apply for forest harvesting operations and practices:

(a) The following measures shall apply in the entire riparian buffer:

(i) Logging decks and sawmill sites shall not be placed in the riparian buffer;

(ii) Access roads and skid trails shall be prohibited except for temporary and permanent stream crossings established in accordance with 15A NCAC 01I .0203. Temporary stream crossings shall be permanently stabilized after any site disturbing activity is completed;

(iii) Timber felling shall be directed away from the stream or water body;

(iv) Skidding shall be directed away from the stream or water body and shall be done in a manner that minimizes soil disturbance and prevents the creation of channels or ruts;

(v) Individual trees may be treated to maintain or improve their health, form or vigor;

(vi) Harvesting of dead or infected trees or other timber cutting techniques necessary to prevent or control extensive tree pest and disease infestation shall be allowed. These practices must be approved by the Division of Forest Resources for a specific site pursuant to 15A NCAC 01I .0100-.0209. The Division of Forest Resources must notify the local government of all approvals;

(vii) Removal of individual trees that are in danger of causing damage to structures or human life shall be allowed;

(viii) Natural regeneration of forest vegetation and planting of trees, shrubs, or ground cover plants to enhance the riparian buffer shall be allowed provided that soil disturbance is minimized. Plantings shall consist primarily of native species;

(ix) High-intensity prescribed burns shall not be allowed;

(x) Application of fertilizer shall not be allowed except as a one-time use that is necessary for permanent stabilization; and

(xi) Broadcast application of fertilizer or herbicides to the adjacent forest stand shall be conducted so that the chemicals are not applied directly to or allowed to drift into the riparian buffer;

(b) In Zone 1, forest vegetation shall be protected and maintained. Selective harvest as provided for below is allowed on forest lands that have a deferment for use value under forestry in accordance with G.S. 105-277.2 through 277.6 or on forest lands that have a forest management plan prepared or approved by a registered professional forester. Copies of either the approval of the deferment for use value under forestry or the forest management plan shall be produced upon request. For such forest lands, selective harvest is allowed in accordance with the following:

(i) Tracked or wheeled vehicles are permitted for the purpose of selective timber harvesting where there is no other practical alternative for removal of individual trees provided activities comply with forest practices guidelines for water quality as defined in Rule 15A NCAC 01I .0101 through .0209, and provided no equipment shall operate within the first 10 feet immediately adjacent to the stream except at

stream crossings designed, constructed and maintained in accordance with Rule 15A NCAC 01I .0203;

(ii) Soil disturbing site preparation activities are not allowed; and

(iii) Trees shall be removed with the minimum disturbance to the soil and residual vegetation: and

(c) In addition to the requirements of (b) in this Item, the following provisions for selective harvesting shall be met:

(i) The first 10 feet of Zone 1 directly adjacent to the stream or waterbody shall be undisturbed except for the removal of individual high value trees as defined provided that no trees with exposed primary roots visible in the streambank be cut unless listed as an exempt activity under Vegetation Management in the Table of Uses (9) of this Rule.

(ii) In the outer 20 feet of Zone 1, a maximum of 50 percent of the trees greater than five inches DBH may be cut and removed. The reentry time for harvest shall be no more frequent than every 15 years, except on forest plantations where the reentry time shall be no more frequent than every five years. In either case, the trees remaining after harvest shall be as evenly spaced as possible; and

(iii) In Zone 2, harvesting and regeneration of the forest stand shall be allowed in accordance with 15A NCAC 01I .0100 through .0209 as enforced by the Division of Forest Resources.

(17) RULE IMPLEMENTATION. This Rule shall be implemented as follows:

(a) For activities listed in Item (3) of this Rule, the Division shall implement the requirements of this Rule as of its effective date;

(b) Within six months of the effective revision date of this Rule, local governments shall review, revise as necessary, and submit a local program including all necessary ordinances to the Division for review. The local program shall detail local government buffer program implementation including but not limited to such factors as a method for resolution of disputes involving Authorization Certificate or variance determinations, a plan for record keeping, and a plan for enforcement. Local governments shall use the Division's publication, *Identification Methods for the Origins of Intermittent and Perennial Streams, v 3.1 February 28, 2005* available at http://portal.ncdenr.org/web/wq/swp/ws/401/waterresources/streamdeterminations to establish the existence of streams;

(c) Within six months of the Division approval of the revised local ordinance, the local government shall implement their revised buffer program;

(d) Upon implementation, subject local governments shall submit annual reports to the Division summarizing their activities in implementing each of the requirements in Item (4) of this Rule;

(e) The Division shall regularly audit local programs to ensure rule implementation; and

(f) If a local government fails to adopt or adequately implement its program as called for in this Rule, the Division may take appropriate enforcement action as authorized by statute, and may choose to assume responsibility for implementing that program until such time as it determines that the local government is prepared to comply with its responsibilities.

(18) Where the standards and management requirements for riparian areas are in conflict with other laws, regulations, and permits regarding streams, steep slopes, erodible soils, wetlands, floodplains, forest harvesting, surface mining, land disturbance activities, or other environmental protection areas, the more restrictive shall apply.

(19) The existing water supply requirement in Rule .0216(3)(b) of this Section that stipulates a 100 foot vegetated buffer, adjacent to perennial streams, for all new development activities which utilize the high density option, applies to the entire Randleman Lake watershed. The first 50 feet of these riparian areas on either side of these waters must also be protected in accordance with all the requirements of this Rule.

(20) OTHER LAWS, REGULATIONS AND PERMITS. In all cases, compliance with this Rule does not preclude the requirement to comply with all other federal, state and local regulations and laws.

History Note: *Authority G.S. 143-214.1; 143-214.5; 143-215.3(a)(1);*
Eff. April 1, 1999;
Amended Eff. June 1, 2010.

Attachment Email #25

City of High Point



Stormwater Best Management Practices Design Manual

Effective Date:
January 1, 2009

City of High Point
Engineering Services Department
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High Point, North Carolina 27262

Phone: (336) 883-3194
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INTRODUCTION

All local governments that review stormwater management plans under a state stormwater program such as Water Supply Watershed, Nutrient Sensitive Waters, or Phase II NPDES program are to provide a substantially equivalent level of water quality protection as the provisions in the North Carolina Division of Water Resources (NCDWR) Stormwater Best Management Practices (BMP) Manual. Therefore, to comply with the NCDWR, and in an effort to improve consistency in stormwater best management practice, design, and approval, the City of High Point has adopted the NCDWR Stormwater BMP Manual. The NCDWR Stormwater BMP Manual can be accessed at http://portal.ncdenr.org/web/lr/bmp-manual.

National Pollutant Discharge Elimination System (NPDES) Phase II stormwater regulations apply jurisdiction-wide. Therefore, BMP requirements shall apply to all property within the city of High Point and its extraterritorial jurisdiction.

All WS-IV water supply watersheds using the high-density option must control the first 1" of rainfall on any site that exceeds 24% built-upon area. In the lower Randleman watershed, any site that exceeds 12% built-upon area must control the first 1" of rainfall. The NCDWR requires that these control measures not only control the first 1" of rainfall, but also remove 85% of the total suspended solids (TSS).

The sources of High Point's drinking water (Oak Hollow Lake, City Lake, and Randleman Reservoir) are largely urban watersheds. As such, the City of High Point believes that additional measures for controlling stormwater runoff, beyond those required by NCDWR, should be installed. Therefore, additional stormwater controls are required on any proposed low density development that exceeds 6% built-upon area and is less than 24% built-upon area (less than 12% built-upon area if the development is in the Randleman Watershed). Additional BMPs include natural infiltration areas, dry detention ponds, and infiltration trenches. Other BMPs that control the first ½" of rainfall may also be acceptable, and engineers are encouraged to discuss any innovative control devices with the Watershed Enforcement Officer and the City Engineer (see attached Stormwater Best Management Practices, Design Manual, Effective Date, January 1, 2000).

In addition to *North Carolina Division of Water Resources BMP Manual, Chapter 10, Wet Detention Basin*, the City of High Point requires the attached additional wet detention basin design elements (see attached Stormwater Best Management Practices, Design Manual, Effective Date, January 1, 2000).

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City of High Point

Stormwater Best Management Practices

Design Manual

Effective Date:
January 1, 2000

City of High Point
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INTRODUCTION

All WS-IV water supply watersheds using the high-density option must control the first 1" of rainfall on any site that exceeds 24% built-upon area. In the lower Randleman watershed, any site that exceeds 12% built-upon area must control the first 1" of rainfall. The North Carolina Department of Environment and Natural Resources (NCDENR) requires that these control measures not only control the first 1" of rainfall, but also remove 85% of the total suspended solids (TSS).

The first section of the manual outlines performance criteria and design standards for structural water quality stormwater BMPs for use in the City of High Point that meet NCDENR's criteria for controlling the 1" rainfall event and providing adequate TSS removal. They include:

- Wet detention ponds
- Constructed stormwater wetlands
- Bioretention areas
- Sand filter systems

The design criteria described herein are based on the work done in the State of Maryland, Prince George's County, The Center for Watershed Protection, the NCDENR Best Management Practices Manual, and the City of Greensboro. Since 1989, wet detention ponds have been used extensively, and exclusively, to control stormwater runoff within the City of High Point's water supply watersheds, but several other BMPs (bioretention areas, sand filters, constructed stormwater wetlands) have now proven to be acceptable alternatives.

Allowing alternatives to wet detention ponds offers developers and the engineering community flexibility in determining how to best control stormwater runoff from a planned development. Because there has been limited use of engineering BMPs other than wet detention ponds in North Carolina, the design criteria are still being revised and updated. On-going studies continue to examine the effectiveness of these BMPs, and the City of High Point will periodically revise our design criteria to reflect any new information.

Where control of the 1" rainfall event in not required, the City of High Point allows for the use of several additional types of BMPs. The sources of High Point's drinking water (Oak Hollow Lake, City Lake and Randleman Reservoir) are largely urban watersheds. As such, the City of High Point believes that additional measures for controlling stormwater runoff, beyond those required by NCDENR, should be installed. Therefore, stormwater controls may be required on any proposed development that exceeds 6% built-upon area and is less than 24% built-upon area (less than 12% built-upon area if the development is in the Randleman Watershed). In the Watershed Critical Area (WCA), alternative measures are required for any proposed development that exceeds 6% built-upon area, and is less than 24% built-upon area (less than 12% built-upon if the proposed development is in the Randleman Watershed). In the General Watershed Area (GWA), a proposed development must earn 100 points on the Score sheet, and alternative measures may be necessary in order to obtain 100 points. These alternative measures include:

- Natural infiltration areas
- Dry detention ponds
- Infiltration trenches

Natural infiltration areas are designed according to the same criteria used by Guilford County, and have remained unchanged with this revision. The design criteria for dry ponds and infiltration trenches also have remained the unchanged. Other BMPs that control the first ½" of rainfall may also be acceptable, and engineers are encouraged to discuss any innovative control devices with the Watershed Enforcement Officer and City Engineer.

Mandatory performance criteria are distinguished from suggested design criteria (the former is required for all sites in High Point, while the latter are only recommended for most sites and conditions). Thus, in the text, mandatory performance criteria are indicated by *italics*, whereas recommended design criteria are shown in normal typeface.

1.1 Wet Detention Ponds

In High Point, the wet detention pond (Figure 1) is the most commonly used BMP for meeting water supply watershed requirements. Wet detention ponds are sized and configured to provide significant removal of pollutants from the incoming stormwater runoff. They maintain a permanent pool of water that is designed for a targeted 85% removal of TSS (Total Suspended Solids) according to the size and imperviousness of the contributing drainage area. Above the permanent pool is a temporary water quality pool, which is designed to hold the runoff resulting from a 1" rain and release it over a period of two to five days.

The design of wet detention ponds is based on controlling the design runoff volume from the long-term average storm in order to settle out suspended solids and pollutants (such as heavy metals and nutrients). Biological treatment also occurs when aquatic vegetation uses the nutrients found in the water and sediment. The Driscoll model (US EPA, 1986) was used to determine the appropriate size of the permanent pool using a long-term average storm statistically calculated from the historical rainfall record. The permanent pool is sized to detain the runoff long enough to attain the targeted TSS removal.

In addition to the permanent water quality pool, the pond must also have a temporary water quality pool designed to control runoff from a 1" rain. This temporary water quality storage is located above the permanent pool and is necessary for two reasons. First, runoff entering the pond can be significantly warmer than the permanent water quality pool. During these periods, plug flow will occur to a lesser extent, and the temporary water quality volume will allow some of the suspended solids to fall out of suspension before being released. The detrimental effects of this will be decreased because the runoff from the 1" storm is slowly released over a period of two to five days. Secondly, the slow release of this small storm runoff volume also helps to reduce downstream erosion.

1.1.1 General Design Standards

Placement of ponds in jurisdictional waters may require Federal and State Permits. It is suggested that ponds not be placed in perennial streams where possible.

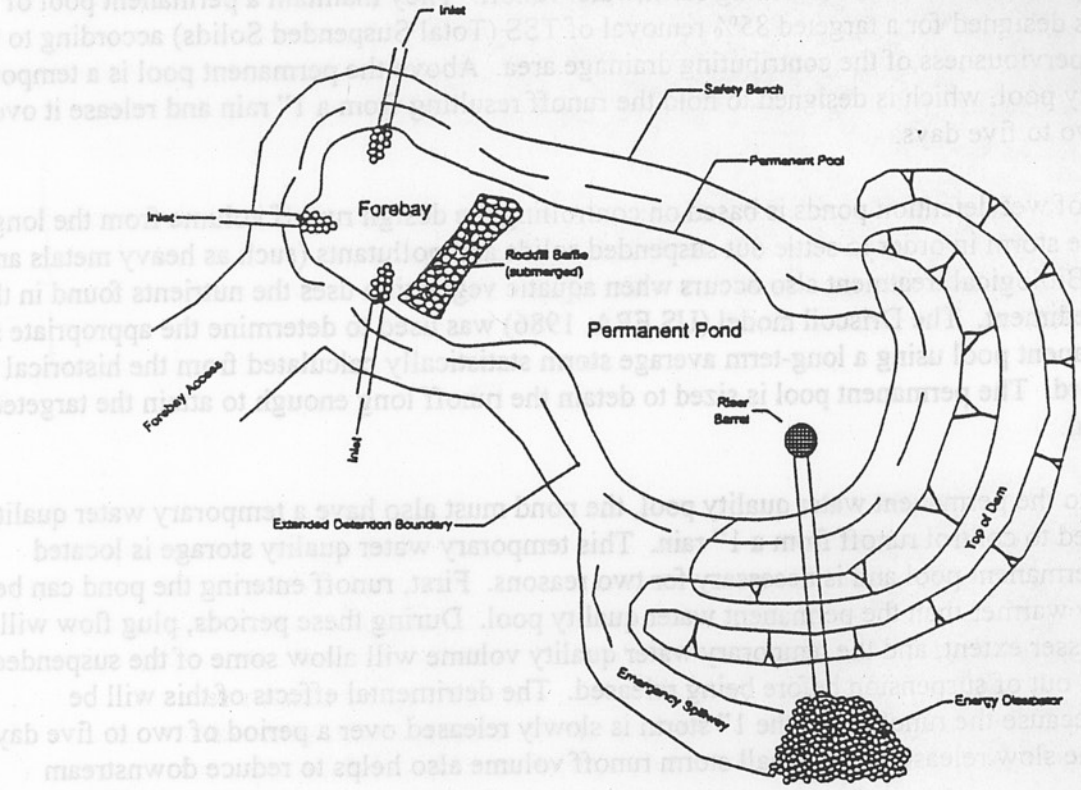
Stormwater ponds are best suited for areas with a minimum contributing drainage area of 5 acres.

Stormwater ponds used to meet the City of High Point watershed protection regulations shall be designed to treat the entire contributing drainage area into the pond.

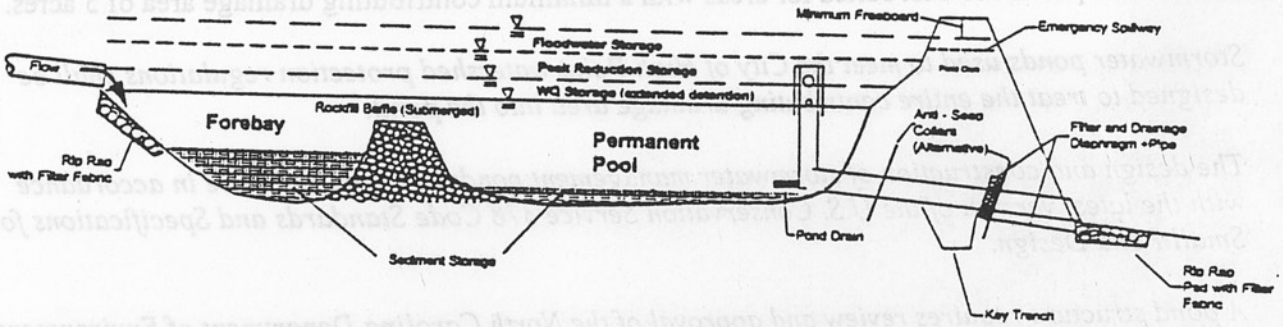
The design and construction of stormwater management ponds are required to be in accordance with the latest version of the U.S. Conservation Service 378 Code Standards and Specifications for Small Pond Design.

A pond structure requires review and approval of the North Carolina Department of Environmental and Natural Resources if the proposed embankment is fifteen feet or greater in height and has an

Figure 1: Example of Wet Detention Pond



PLAN



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impoundment capacity of at least ten acre-feet. If a permit is required, the detention pond must meet the general requirements herein and those contained in the North Carolina Dam Safety Act.

The pond must be easily accessible for maintenance. A 20' wide access easement shall be provided from the public street right-of-way to the pond and shall be continuous around the pond.

At inflow points to the pond, energy dissipaters such as rip-rap shall be used to reduce the velocity of the flow. The outflow shall be designed to protect against erosion and scour from high velocities and turbulence. Rip-rap shall be provided at the points of discharge as necessary.

Pond embankments shall be 4H:1V or flatter in order to reduce erosion potential, promote wetland vegetation, minimize safety hazards, improve aesthetics and facilitate maintenance activities. Pond embankments of 3H:1V are acceptable if a bench is placed near the normal pool surface. In all cases, a 10-15' bench (max. slope 10%) placed around the pond near the normal pool surface, is strongly encouraged. This bench will allow machinery to gain closer access to the pond during cleanouts. This break in the grade will be a safety amenity and can make the pond more aesthetically pleasing. *Dam embankments shall be 3H:1V or flatter.*

The pond surface area should have a minimum 3:1 length to width ratio (or equivalent created by baffles) in order to limit short-circuiting. The distance between the inlets and outlets should be maximized to increase the pollutant removal capability of the pond.

It is encouraged to create a pond that fits the natural contours of the land but care should be taken to prevent "dead storage zones" (areas outside the flow path between the inlet and outlet) within the pond. Generally, the pond should be narrower at the inlet forebay area and become wider at the outlet. Whenever possible one forebay should be created, with all pond inlet pipes discharging to this forebay.

The bottom of the pond should be slightly sloped from the upstream end to the downstream end. This will allow the pond and captured sediments to drain better when cleanouts are necessary.

1.1.2 Sediment Storage

Temporary storage shall be provided for 0.5 acre-inches of sediment per acre disturbed in the watershed during development. Permanent storage shall be provided after the site is stabilized for 0.125 acre-inch per acre of the total watershed.

1.1.3 Permanent Water Quality Pool

Average permanent water quality pool depths shall be between 3 to 6 feet. A minimum of 3 feet is required.

Permanent Pool Surface Area:

Wet Detention Pond Permanent Pool Surface Area to Drainage Area Ratio (Percent)							
Built-Upon (Percent)	Average Permanent Pool Depth (FT)						
	3.0	4.0	5.0	6.0	7.0	8.0	9.0
10	0.59	0.49	0.43	0.35	0.31	0.29	0.26
20	0.97	0.79	0.70	0.59	0.51	0.46	0.44
30	1.34	1.08	0.97	0.85	0.70	0.64	0.62
40	1.73	1.43	1.25	1.03	0.90	0.82	0.77
50	2.00	1.73	1.50	1.33	1.09	1.00	0.92
60	2.39	2.03	1.66	1.51	1.29	1.17	1.10
70	2.75	2.27	1.96	1.79	1.48	1.35	1.29

Interpolation and extrapolation may be necessary to determine the appropriate surface area to drainage ratios.

1.1.4 Temporary Water Quality Pool

The temporary water quality pool is sized to detain the runoff volume from the first inch of rain. This requirement refers to volume and not a particular design storm.

The discharge rate from the outlet device for this temporary water quality pool shall meet the following:

- *The volume shall draw down to the pre-storm design stage in not less than two days, but not more than 5 days.*

1.1.5 Forebay

A forebay shall be provided for all inlets to the pond. The forebay area is located at the upstream area of the pond where the inlet pipes discharge. The forebay is separated from the rest of the pond by a barrier or baffle, serving to trap coarse sediments and minimizing their migration into the main pond. Collecting the sediment in this one area makes it easier to clean out, since machinery will not have to go into the entire pond.

The forebay baffle should extend to one foot below normal pool elevation. The baffle material may be constructed of earth, rip rap, corrugated aluminum or gabions. If earth baffles are used, provisions should be included to allow the forebay to drain out with the rest of the pond to facilitate sediment removal from the forebay. This could include a rip rap check dam in a section of the earth baffle or a perforated riser pipe connecting the forebay to the main pool.

Total volume of the forebay shall approximate 20% of the basin volume.

1.1.6 Dam and Embankment Construction

The dam or embankment shall be constructed of material with sufficient strength to remain stable and with low permeability to prevent seepage of water through the embankment.

For earth dams, a cutoff trench shall be provided with a minimum width of 4'. The cutoff trench shall be backfilled with clay or other highly impermeable material and compacted to at least ninety five percent (95%) of standard proctor density.

The top width of the dam shall be based on the total height of the embankment. *For heights of 10 feet or less, the minimum top width shall be 10 feet. For heights greater than 10 feet, the minimum top width shall be 15 feet.*

Concrete dams and spillway structures shall be designed and built in accordance with the American Concrete Institute's (ACI) latest guidelines. Particular attention shall be paid to design and analysis, water tightness, concrete quality, and construction practices.

No more than 50% of the pond embankments can be concrete.

1.1.7 Principal Spillway

The principal spillway shall be designed for the 10 yr., predevelopment storm.

The minimum difference in elevation between the principal spillway elevation and the emergency spillway elevation shall be one (1) foot.

The minimum diameter of the principal spillway barrel section (horizontal pipe) shall be twelve inches (12"). The minimum cross-sectional area of the riser section (vertical pipe) shall be 1.5 times that of the barrel section.

Anti-seep collars shall be installed on all pipe conduits through earthen dams and embankments

Vertical risers shall be equipped with an anti-vortex device to improve the flow of water, and with a trash rack or hood to prevent floating debris from clogging the principle spillway.

Anti-floatation calculations shall be submitted, with a minimum safety factor of 1.25. The riser/barrel assemblies shall be new and aluminum or concrete pipe, shall have gasketed joints and the barrel shall be pressure tested.

1.1.8 Emergency Spillway

The emergency spillway shall be designed to safely convey the 100 yr. design storm.

A minimum of one (1) foot of freeboard from the top of the pool elevation from the 100 yr. storm to the top of the dam shall be provided. The minimum difference in elevation between the emergency spillway elevation and the settled top of the dam shall be two (2) feet.

Spillways shall be constructed so as to prevent the discharge through the spillway from coming in contact with the fill section of the dam or principle embankment structure.

1.1.9 Pond Drain

An emergency drain (with pipe sized to drain the pond in 48 hours) shall be installed in all ponds to allow for access for riser repairs and sediment removal. The drain is recommended to be a minimum of 3" above the top of the sediment storage area, but may be placed on the bottom of the pond if the drainpipe is protected to prevent the outflow of accumulated sediment and debris when it is opened.

1.1.10 Maintenance Requirements

Regular maintenance is crucial to insure that a wet detention pond is effectively doing what it was designed to do, which is to remove stormwater pollutants. *Maintenance responsibility for a pond and its buffer shall be vested with a responsible party by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval.*

The principal spillway shall be equipped with a trash rack that provides access for maintenance.

Sediment removal in the forebay shall occur when 50% of the total forebay capacity has been lost.

A maintenance plan shall be provided with the design. The plan shall include a plan for sediment removal and disposal, and agreement to regularly maintain the pond. As a minimum, an acceptable maintenance plan shall include the items/frequency shown as follows:

Suggested Maintenance Schedule for Wet Detention Ponds

Description	Frequency
Mow/maintain buffer vegetation	Quarterly
Inspect bank embankment for erosion and repair as needed	Quarterly
Inspect pipe inlet and outlet areas for undercutting/erosion – repair as needed	Quarterly
Inspect trash rack, principal and emergency spillways for trash, blockage	After large storms

Inspect structural integrity of outflow device	annually
Inspect sediment accumulation	annually

1.1.11 Landscaping Plan

Studies of wet detention ponds in this area show that a well-maintained, aesthetically pleasing pond is more effective than a pond that once constructed, is promptly forgotten. Therefore, the city of High Point requires that a *landscaping plan for a stormwater pond and its buffer shall be prepared to indicate how aquatic and terrestrial areas will be stabilized and established.*

Whenever possible, native wetland plants should be encouraged in a pond design, either along the aquatic bench (fringe wetlands), the safety bench and side slopes (ED wetlands) or within shallow areas of the pool itself.

No fertilizers are allowed after stabilization of the pond or the surrounding area. No chemical weed killers will be permitted for invasive plants, and no chemical applications will be allowed within the pond. Mechanical controls are permitted.

The best elevation for establishing wetland plants, either through transplantation or volunteer colonization, are within six inches (plus or minus) of the normal pool.

To sustain the structural integrity of the dam, no trees or woody vegetation should be allowed on the dam embankments or top of dam. Trees and brush, if desired, are acceptable on pond embankments other than the dam.

The soils of a pond buffer are often severely compacted during the construction process to ensure stability. The density of these compacted soils is so great that it effectively prevents root penetration, and therefore, may lead to premature mortality or loss of vigor. Consequently, it is advisable to excavate large and deep holes around the proposed planting sites, and backfill these with uncompacted topsoil.

As a rule of thumb, planting holes should be 3 times deeper and wider than the diameter of the rootball (of balled and burlap stock), and 5 times deeper and wider for container grown stock. This practice should enable the stock to develop unconfined root systems. Avoid species that require full shade, are susceptible to winterkill, or are prone to wind damage. Extra mulching around the base of the tree or shrub is strongly recommended as a means of conserving moisture and suppressing weeds.

1.2 Extended Detention Wetlands

The extended detention wetland is similar in design to that of a wet detention pond. However, an extended detention stormwater wetland is created by varying the treatment volume depths within the system, and establishing several different zones of "microtopography". The extended detention wetland consists of a forebay, a low marsh area, a high marsh area, and a micropool (Figure 2). In extended detention wetlands, extra runoff storage is created above the marsh areas. The basic intent of a stormwater wetland is to create a shallow matrix of sediment, plants, water and detritus that collectively removes multiple pollutants through a series of complementary physical, chemical and biological pathways. Constructed stormwater wetlands are designed to maximize pollutant removal and create "generic" wetland habitats, and are not to be used to mitigate for the loss of natural wetlands under permitting provisions of the wetland protection requirements. Natural wetlands will not be allowed to be converted to stormwater wetlands without the approval of the US Army Corps of Engineers (US ACE) and the NC Division of Water Quality (NC DWQ). The removal of wetland soils and vegetation from natural wetlands to provide a "seedbank" for a stormwater wetland BMP is prohibited, without consultation with the US ACE and NCDWQ. Filling in the stormwater wetlands once they are established may be illegal without a permit.

1.2.1 General Design Guidelines

Placement of wetlands in jurisdictional waters may require Federal and State permits. It is suggested that ponds not be placed in perennial streams where possible.

Stormwater wetlands are best suited for areas with a minimum contributing drainage area of 20 acres.

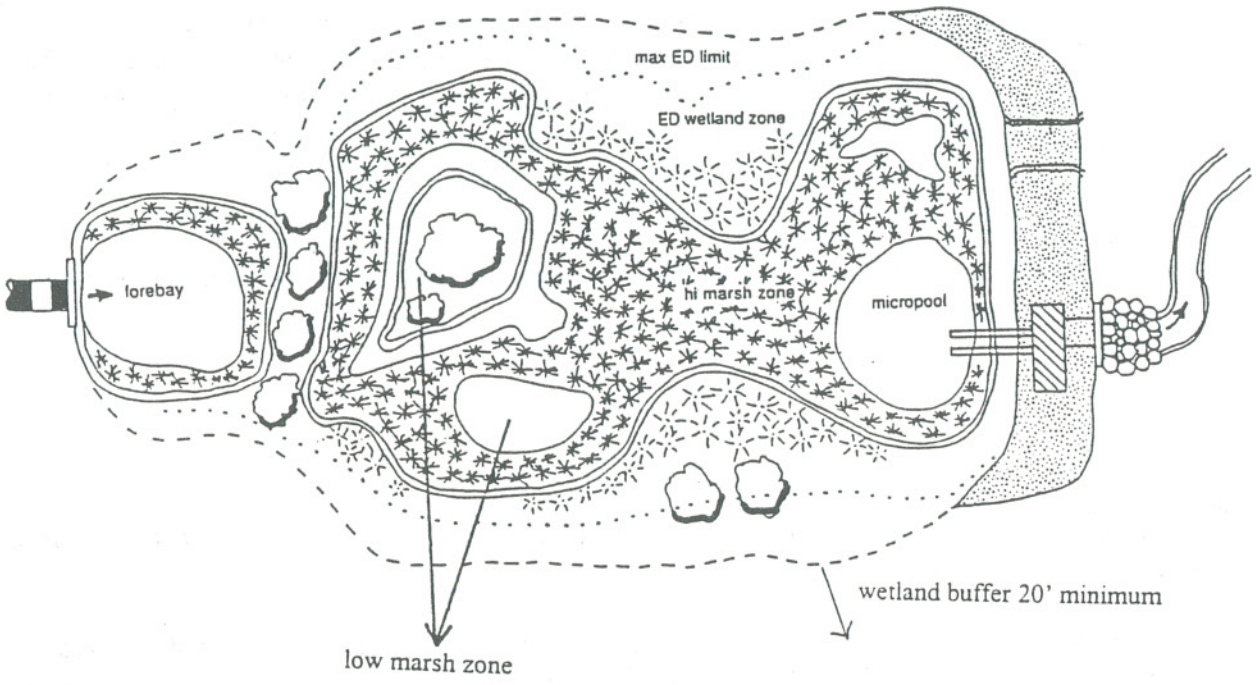
Of primary importance is the availability of water to insure the wetland doesn't go dry. The Metropolitan Washington Council of Governments (Design of Stormwater Wetland Systems) recommends performing a water balance to demonstrate that a stormwater wetland can withstand a thirty-day drought. Researchers at NCSU suggest that the base of wetlands constructed in sandy soils be set to around 6" lower than the seasonally low water table. There may be other methods for determining if the topography and soils are suitable for maintaining wetland plants and aquatic life.

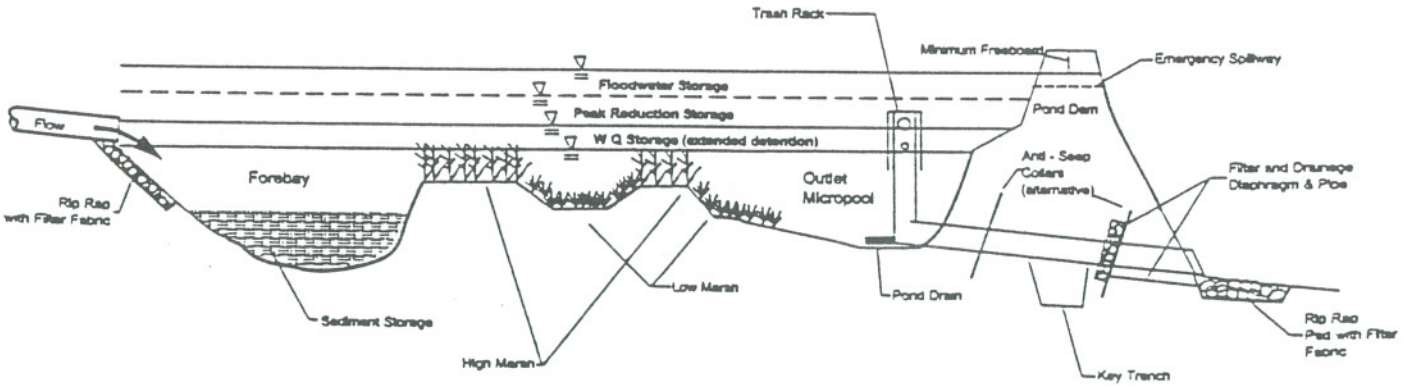
Stormwater wetlands used to meet the City of High Point watershed protection regulations shall be designed to treat the entire contributing drainage area.

The wetland should be easily accessible for maintenance. A 20' wide access easement shall be provided from the public street right-of-way to the wetland, and shall be contiguous around the wetland.

Wetland embankments shall be 4H:1V or flatter in order to reduce the erosion potential, promote wetland vegetation, minimize safety hazards, improve aesthetics and facilitate maintenance activities. A wetland embankment of 3H:1V is acceptable if a bench is placed near the normal pool surface. In any case, a 10-15' bench (max. slope 10%) placed around the pond near the normal pool surface, is strongly encouraged. This bench will allow machinery to gain closer access to the pond

Figure 2: The Extended Detention (ED) Wetland





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during cleanouts. This break in the grade will be a safety amenity and can make the pond more aesthetically pleasing. *Dam embankments shall be 3H:1V or flatter.*

The wetland surface shall have a minimum 3:1 length to width ratio (or equivalent with baffles) in order to limit short-circuiting. The distance between the inlets and outlets should be maximized to increase the pollutant removal capability of the wetland.

It is encouraged to create a wetland that fits the natural contours of the land but care should be taken to prevent "dead storage zones" (areas outside the flow path between the inlet and outlet) within the wetland. Generally, the wetland should be narrower at the inlet forebay area and become wider at the outlet. Whenever possible, one forebay should be created, with all pond inlet pipes discharging to this forebay.

Flowpaths across the stormwater wetland shall be maximized. This path may be achieved by constructing internal berms (e.g., high marsh wedges or rock filter cells). Microtopography is encouraged to enhance wetland diversity.

1.2.2 Permanent Water Quality Pool

The major difference between a stormwater wetland and a wet detention pond is the allocation of surface area to different pond depths.

For the system to function as a wetland, 70% of the surface pool area needs to be designed as a marsh with a depth of 0 to 18". Distribution should be evenly split such that 35% of the area will be designed as a "high marsh" (0 to 9 inches), and 35% designed as a "low marsh" (9 to 18 inches).

The remaining 30% of the surface area are to be divided between the forebay and micropool, with a depth of four (4) to six (6) feet.

According to NCDENR, the permanent water quality pool shall be sized based on the Table shown below:

Wetland Permanent Pool Surface Area to Drainage Area Ratio (Percent)							
Percent Built-Upon	10	20	30	40	50	60	70
SA/DA	0.59	0.97	1.34	1.73	2.00	2.39	2.75

1.2.3. Temporary Water Quality Pool

The temporary water quality pool is sized to detain the runoff volume from the first inch of rain. This requirement refers to volume and not a particular design storm.

The discharge rate from the outlet device for this temporary water quality pool should meet the following:

- *The volume shall draw down to the pre-storm design stage in not less than two days, but not more than five days.*

1.2.4 Forebay

The forebay serves to reduce incoming velocity that promotes initial settling of sediment, minimizing the amount of suspended sediment that enters the wetland area. The forebay serves to spread the flow equally over the width of the wetland. The forebay is to be separated from the remaining wetland by an earthen berm that is no lower than one foot below the normal pool. Sediment cleanout may be needed approximately every 3-5 years (depending on the condition of the drainage area). An access to the forebay should be provided from the top of the embankment and extend to the toe of the embankment slope. This access will allow construction equipment to get down in the forebay and will minimize disturbance to the vegetation.

1.2.5 Outlet Micropool

The outlet micropool is required to allow adequate depth for the extended detention release outlet to function properly and to allow a drain to be installed low enough to drain the wetland. The outlet micropool should be 4 to 6 feet deep. The deep pool areas can be used to stock mosquito fish to help control the mosquito population.

1.2.6 Dam and Embankment

The dam or embankment shall be constructed of material with sufficient strength to remain stable and with low permeability to prevent seepage of water through the embankment.

For earth dams, a cutoff trench shall be provided with a minimum width of 4'. The cutoff trench shall be backfilled with clay or other highly impermeable material and compacted to at least ninety five (95%) of standard proctor density.

The top width of the dam shall be based on the total height of the embankment. *For heights of 10 feet or less, the minimum top width shall be 10 feet. For heights greater than 10 feet, the minimum top width shall be 15 feet.*

Concrete dams and spillway structures shall be designed and built in accordance with the American Concrete Institute's (ACI) latest guidelines. Particular attention shall be paid to design and analysis, water tightness, concrete quality, and construction practices.

1.2.7 Principal Spillway

The principal spillway shall be designed for the 10 yr., predevelopment storm.

The minimum difference in elevation between the principal spillway elevation and the emergency spillway elevation shall be one (1) foot.

The minimum diameter of the principal spillway barrel section (horizontal pipe) shall be twelve (12) inches. The minimum cross-sectional area of the riser section (vertical pipe) shall be 1.5 times that of the barrel section.

Anti-seep collars shall be installed on all pipe conduits through earthen dams and embankments.

Vertical risers shall be equipped with an anti-vortex device to improve the flow of water, and with a trash rack or hood to prevent floating debris from clogging the principal spillway.

Anti-floatation calculations shall be submitted, with a minimum safety factor of 1.25. The riser/barrel assemblies shall be new and aluminum or concrete pipe, shall have gasketed joints and the barrel shall be pressure tested.

1.2.8 Emergency Spillway

The emergency spillway shall be designed to safely convey the 100 yr. design storm.

A minimum of one (1) foot of freeboard from the top of the pool elevation from the 100 yr. storm to the top of the dam shall be provided. The minimum difference in elevation between the emergency spillway elevation and the settled top of the dam shall be two (2) feet.

Spillways shall be constructed so as to prevent the discharge through the spillway from coming in contact with the fill section of the dam or principal embankment structure.

1.2.9 Wetland Drain

An emergency drain (with pipe sized to drain the wetland in 48 hours) shall be installed in all ponds to allow for access for riser repairs and sediment removal. Drain is recommended to be a minimum of three (3) inches above the top of the sediment storage area, but may be placed on the bottom of the wetland if the drainpipe is protected to prevent the outflow of accumulated sediment and debris when it is opened.

1.2.10 Wetland Planting

A *wetland-planting plan is to be developed as part of the wetland design (Figure 3).* Selecting the proper plant species and planting locations is an important part in creating a successful stormwater wetland BMP. A wetland-planting plan should be prepared by a qualified landscape architect and wetlands ecologist as part of the design of the wetland.

The following recommendations are based on the "Design of Stormwater Wetland Systems, by T. Schueler and included in Maryland Performance Criteria for Urban BMPs:

"The transplanting window extends from early April to mid-June. Planting after these dates is not recommended, as the wetland plants need a full growing season to build the root reserves needed to get through the winter. If at all possible, the plants should be ordered at least three months in advance to ensure the availability of the desired species.

The optimal depth requirements for several common species of emergent wetland plants are often six (6) inches of water or less.

To add diversity to the wetland, 5 to 7 species of emergent wetland plants should be used, drawn from the suggested species listed in Table 1. Of these, at least three species should be selected from the "aggressive colonizer" group (e.g. bulrush, pickerelweed, arrow arum, three square and rice cutgrass).

The most common and reliable technique for establishing an emergent wetland community in a stormwater wetland is to transplant nursery stock obtained from local aquatic plant nurseries.

Source of planting information:
Piedmont Environmental Center
1220 Penny Rd.
High Point, NC 27265
(336) 883-8531

Local plant nursery:
Tom's Creek Nursery
6454 Old NC Hwy 49
Denton, NC 27239

The wetland area should be sub-divided into separate planting zones of more or less constant depth. Approximately half of the wetland surface area should be planted. One plant species should be planted within each flagged planting zone, based on their approximate depth requirements. Plants should be installed in clumps with individual plants located an average of 18 inches on center within each clump. Individual plants should be spaced no closer than 12 inches and no further than 24 inches on center.

Figure 3: Sample Pondscaping Plan

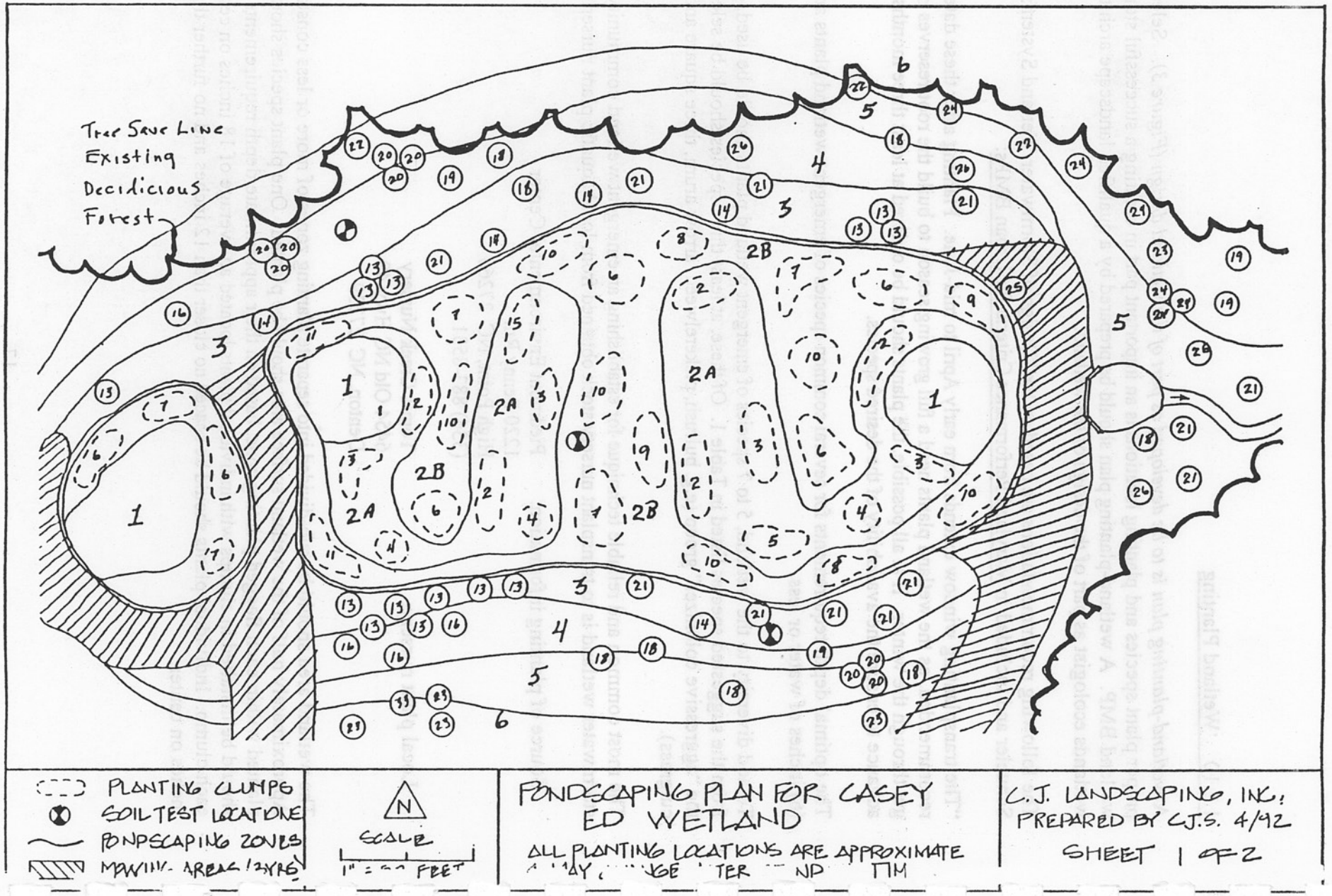


Figure 3 (continued): Sample Pondscaping Plan

PLANT MATERIALS By Pondscaping Zone

KEY	SPECIES	QTY	SIZE
▶ **Zone 1: Deep Pool**			
1	Wild Celery	25	Tubers, cheesecloth sinkers.
▶ **Zone 2A: Low Marsh**			
2	Duck Potato	375	Containers or peat pot 18" o.c.
3	Pickerelweed	300	
4	Arrow Arum	275	
5	Wild Rice	150	
▶ **Zone 2B: High Marsh**			
6	Common 3-Square	500	Container or peat pot 18" o.c.
7	Softstem Bulrush	500	
8	Lizards Tail	150	
9	Sweet Flag	150	
10	Rice Cutgrass	150	
11	Sedge spp.	150	
▶ **Zone 3: Shoreline**			
12	Switchgrass over Red Fescue		
13	Button Bush	8	Container
14	River Birch	6	Container
21	Black Willow	12	1" caliper container.
▶ **Zone 4: Riparian**			
15	Tall Fescue, wildlife mix	100 lbs/ac	Hydroseed
13	Button Bush	4	Container
16	Green Ash	4	2" B & B
17	Arrowood Viburnum	24	Container on embankments.
18	Silky Dogwood	4	2" B & B
19	Sycamore	4	2" B & B

KEY	SPECIES	QTY	SIZE
▶ **Zone 5: Floodplain**			
15	Tall Fescue	100 lbs/ac	Hydroseed
18	Silky Dogwood	4	2" B & B
26	Tulip Poplar	4	2" B & B
20	Elder Berry	9	Container
21	Black Willow	12	1" B & B
22	Shad Bush	4	1" B & B
▶ **Zone 6: Upland**			
23	Willow Oak	6	2" B & B
24	Spice Bush	3	Container
19	Tulip Poplar	4	2" B & B
18	Silky Dogwood	2	2" B & B
▶ **Embankment**			
23	Periwinkle	48	Container

PONDSCAPING SEQUENCE

1. Temporary stabilization of all disturbed areas within 72 hours of final grade.
2. Aquatic planting window 4/1 - 6/15.
3. Reconfirm planting elevations one week prior to planting.
4. Revise plan, stake and flag.
5. De-water wetland 24 hrs before planting.
6. Plant wetland, remaining trees/shrubs.
7. Mulch, water stock, as needed.
8. Inspect pondscape twice/yr.
9. Reinforce planting at end of 1st and 2nd growing season.
10. Restrict mowing to designated areas.
11. Suppress weeds/vines on trees/shrubs during years 2 and 3.

PONDSCAPING NOTES

1. No trees in embankment or along mowed maintenance access area.
2. Tree-save line denotes limit of disturbance during wetland excavation.
3. Pondscaping zones and marsh planting zones to be confined in field after excavation.
4. Existing topsoil to be stockpiled and used to dress pondscaping zones 4,5,6.
5. Reinforcement planting after first growing season based on field inspection of marsh plant survival / colonization rates.
6. Three soil pit tests taken to confirm general soil properties.
7. Switchgrass overseeded on Red Fescue in Pondscaping Zone 3, Tall Fescue and Wildlife grass mix used in Zones 4,5,6 within three days of final grading for erosion control.
8. Six inches of wood mulch around all trees and shrubs, planting holes to be threetimes rootball diameter.

PLANTING CLUMPS
SOIL TEST LOCATIONS
PONDSCAPING ZONES
MOWING AREAS (3 YRS)

N
SCALE
1" = 50 FEET

PONDSCAPING PLAN FOR CASEY ED WETLAND
ALL PLANTING LOCATIONS ARE APPROXIMATE & MAY CHANGE AFTER STANDING TIME

C.J. LANDSCAPING, INC.
PREPARED BY C.J.S. 4/92
SHEET 2 OF 2

Table 1: Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic

Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic, USA

Plant Name	*Zone*	*Form*	*Available*	*Inundation Tolerance*	*Wildlife Value*	*Notes*
Trees and Shrubs						
American Beech *(Fagus grandifolia)*	5,6	Dec. Tree	no	no	High. Mammals and birds.	Prefers shade and rich, well drained soils.
American Holly *(Ilex opaca)*	5,6	Dec. Tree	yes	limited	High. Songbirds-food cover, nesting	Coastal Plain only. Prefers shade and rich soils.
American Hornbeam *(Carpinus caroliniana)*	4,5	Dec. Tree	yes	some	Moderate. Food, browsing.	Most common in floodplains and bottomland of Piedmont and mountains.
Arrowwood Viburnum *(Viburnum dentatum)*	3,4	Dec. Shrub	yes	yes	High. Songbirds and mammals	Grows best in sun to partial shade.
Bald Cypress *(Taxodium distichum)*	3,4	Dec. Tree.	yes	yes	Little food value but good perching site for waterfowl.	Forested Coastal Plain wetlands. North of normal range. Tolerates drought.
Bayberry *(Myrica pensylvanica)*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, food, cover. Berries last into winter.	Coastal Plain only. Roots fix N_2. Tolerates slightly acidic soil.
Bitternut Hickory *(Carya cordiformis)*	4,5,6	Dec. Tree	no	no	High. Food.	Moist soils or wet bottomland areas.
Black Cherry *(Prunus serotina)*	5,6	Dec. Tree	yes	no	High. Fruit is eaten by many birds.	Temporarily flooded forested areas. Possible fungus infestation.
Black Walnut *(Juglans nigra)*	5,6	Dec. Tree	yes	some	High. Food.	Temporarily flooded wetlands along floodplains. Well drained, rich soils.
Blackgum or Sourgum *(Nyssa sylvatica)*	4,5,6	Dec. Tree	yes	yes	High. Songbirds, egrets, herons, raccoons, owls.	Can be difficult to transplant. Prefers sun to partial shade.
Black Willow *(Salix nigra)*	3,4,5	Dec. Tree	yes	yes	High. Browsing and cavity nesters.	Rapid growth, stabilizes streambanks. Full sun.
Buttonbush *(Cephalanthus occidentalis)*	2,3,4,5	Dec. Shrub	yes	yes	High. Ducks and shorebirds. Seeds nectar and nesting.	Full sun to partial shade. Will grow in dry areas.

Table 1 (cont'd.): Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic

Plant Name	*Zone*	*Form*	*Available*	*Inundation Tolerance*	*Wildlife Value*	*Notes*
Chestnut Oak *(Quercus prinus)*	5,6	Dec. Tree	no	no	High. Cover, browse and food.	Gypsy Moth Target. Dry soils.
Common Choke Cherry *(Prunus virginiana)*	5,6	Dec. Tree	no	no	High. Birds, mammals. Fruit and cover.	Prefers drier conditions.
Common Spicebush *(Lindera benzoin)*	3,4,5	Dec. Shrub	yes	yes	Very high. Songbirds.	Shade and rich soils. Tolerates acidic soils. Good understory species.
Eastern Cottonwood *(Populus deltoides)*	4,5	Dec. Tree	yes	yes	Moderate. Cover, food.	Shallow rooted, subject to windthrow. Invasive roots. Rapid growth.
Eastern Hemlock *(Tsuga canadensis)*	5,6	Conif. Tree	yes	yes	Moderate. Mostly cover and some food.	Tolerates all sun/shade conditions. Tolerates acid soil.
Eastern Red Cedar *(Juniperus virginiana)*	4,5,6	Conif. Tree	yes	no	High. Fruit for birds. Some cover.	Full sun to partial shade. Common in wetlands, shrub bogs and edge of streams.
Elderberry *(Sambucus canadensis)*	3,4,5,6	Dec. Shrub	yes	yes	Extremely high for food and cover, for birds and mammals.	Full sun to partial shade.
Flowering Dogwood *(Cornus florida)*	6	Dec. Tree	yes	no	High. Birds, food.	Prefers rich, moist soils. Dogwood anthracnose possible problem.
Fringe Tree *(Chionanthus viginicus)*	3,4,5	Dec. Shrub or small tree	yes	some	Moderate. Food and cover.	Full sun to partial shade. Tolerates acid soil.
Green Ash, Red Ash *(Fraxinus pennsylvanica)*	4,5	Dec. Tree	yes	yes	Moderate. Songbirds.	Rapid growing, streambank stabilizer. Full sun to partial shade.
Hackberry *(Celtis occidentalis)*	5,6	Dec. Tree	yes	some	High. Food and cover.	Full sun to partial shade.
Ironwood/ Hophornbeam *(Ostrya virginiana)*	5,6	Dec. Tree	yes	some	Moderate. Food and browse.	Tolerant of all sunlight conditions.

Table 1 (cont'd.): Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic

Plant Name	*Zone*	*Form*	*Available*	*Inundation Tolerance*	*Wildlife Value*	*Notes*
Larch, Tamarack *(Larix laricina)*	3,4	Conif. Tree	no	yes	Low. Nest tree and seeds.	Rapid initial growth. Full sun, acidic boggy soils.
Loblolly Pine *(Pinus taeda)*	5,6	Conif. Tree	yes	some	Moderate. Food, nesting, squirrels.	Coastal Plain only. Tolerant of extreme soil conditions.
Mountain Laurel *(Kalmia latifolia)*	6	Evergreen	no	no	Low. Cover and nectar. Foliage is toxic to cattle and deer.	Partial shade, acidic soils.
Persimmon *(Diospyros virginiana)*	4,5,6	Dec. Tree	yes	some	Extremely high. Birds, mammals	Not shade tolerant. Well drained soils.
Pin Oak *(Quercus palustris)*	3,4,5,6	Dec. Tree	yes	yes	High. Mast. Tolerates acidic soil.	Gypsy Moth Target. Prefers sun to partial shade.
Red Chokeberry *(Pyrus arbutifolia)*	3,4,5	Dec. Shrub	no	yes	Moderate. Songbirds.	Bank stabilizer. Partial sun.
Red Maple *(Acer rubrum)*	3,4,5,6	Dec. Tree	yes	yes	High seeds and browse. Tolerates acidic soil.	Rapid Growth.
Red Oak *(Quercus rubra)*	5,6	Dec. Tree	yes	no	High. Food and cover	Gypsy Moth Target. Prefers well drained, sandy soils.
River Birch *(Betula nigra)*	3,4,5	Dec. Tree	yes	yes	Low, but good for cavity nesters.	Bank erosion control. Full sun.
Scarlet Oak *(Quercus coccinea)*	5,6	Dec. Tree	yes	no	High. Food and cover.	Gypsy Moth Target. Difficult to transplant.
Shadbush, Serviceberry *(Amelanchier canadensis)*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, cover and food. Birds and mammals.	Prefers partial shade. Common in forested wetlands and upland woods.
Silky Dogwood *(Cornus amomum)*	3,4,5	Dec. Shrub	yes	yes	High. Songbirds, mammals.	Shade and drought tolerant. Good bank stabilizer.

Table 1 (cont'd.): Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic

Plant Name	*Zone*	*Form*	*Available*	*Inundation Tolerance*	*Wildlife Value*	*Notes*
Smooth Alder *(Alnus serrulata)*	3,4,5	Dec. Tree	no	yes	High. Food, cover.	Rapid Growth. Stabilizes streambanks.
Sourwood *(Oxydendrum arboreum)*	5,6	Dec. Tree	yes	no	Moderate. Food.	Ornamental.
Swamp Oak *(Quercus bicolor)*	3,4,5	Dec. Tree	yes	yes	High. Mast.	Full sun to partial shade. Good bottomland tree.
Sweetgum *(Liquidambar styraciflua)*	4,5,6	Dec. Tree	yes	yes	Moderate. Songbirds.	Tolerates acid or clay soils. Sun to partial shade.
Sycamore *(Platanus occidentalis)*	4,5,6	Dec. Tree	yes	yes	Low. Food, cavities for nesting.	Rapid Growth. Common in floodplains and alluvial woodlands.
Tulip Tree *(Liriodendron tulipifera)*	5,6	Dec. Tree	yes	no	Moderate. Seeds and nest sites.	Full sun to partial shade. Well drained soils. Rapid growth.
Tupelo *(Nyssa sylvatica vari biflora)*	3,4,5	Dec. Tree	yes	yes	High. Seeds, cavity nesters.	Ornamental.
White Ash *(Fraxinus americana)*	5,6	Dec. Tree	yes	no	High. Food.	All sunlight conditions. Well drained soils.
White Oak *(Quercus alba)*	5,6	Dec. Tree	yes	some	High. Food and cover.	Gypsy Moth Target. Prefers well drained soils.
Willow Oak *(Quercus phellos)*	4,5,6	Dec. Tree	yes	yes	High. Mast.	Full sun to partial shade. Common in temporarily flooded forested wetlands.
Winterberry *(Ilex verticillata)*	3,4,5	Dec. Shrub	yes	yes	High. Cover and fruit for birds. Holds berries into winter.	Full sun to partial shade. Seasonally flooded areas.
Witch Hazel *(Hamamelis virginiana)*	4,5	Dec. Shrub	yes	no	Low. Food for squirrels, deer and ruffed grouse.	Prefers shade. Ornamental

Table 1 (cont'd.): Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic

Plant Name	*Zone*	*Form*	*Available*	*Inundation Tolerance*	*Wildlife Value*	*Notes*
Wetland Plants						
Arrow arum *(Peltandra virginica)*	2,3	Emergent	yes	up to 1 ft.	High. Berries are eaten by wood ducks.	Full sun to partial shade.
Arrowhead/Duck potato *(Saggitaria latifolia)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Tubers and seeds eaten by ducks.	Aggressive colonizer.
Broomsedge *(Andropogon virginicus)*	2,3	Perimeter.	yes	up to 3 in.	High. Songbirds and browsers. Winter food and cover.	Tolerant of fluctuating water levels & partial shade.
Bushy Beardgrass *(Andropogon glomeratus)*	2,3	Emergent	yes	up to 1 ft.		Requires full sun.
Cattail *(Typha spp.)*	2,3	Emergent	yes	up to 1 ft.	Low. Except as cover.	Aggressive. May eliminate other species. Volunteer. High pollutant treatment.
Coontail *(Ceratophyllum demersum)*	1	Submergent	no	yes	Low food value. Good habitat and shelter for fish and invertebrates.	Free floating SAV. Shade tolerant. Rapid growth.
Common Three-Square *(Scirpus pungens)*	2	Emergent	yes	up to 6 in.	High. Seeds, cover. Waterfowl, songbirds.	Fast colonizer. Can tolerate periods of dryness. Full sun. High metal removal.
Duckweed *(Lemna sp.)*	1,2	Submergent/ emergent	yes	yes	High. Food for waterfowl and fish.	High metal removal.
Lizard's Tail *(Saururus cernuus)*	2	Emergent	yes	up to 1 ft.	Low, except wood ducks.	Rapid growth. Shade tolerant.
Marsh Hibiscus *(Hibiscus moscheutos)*	2,3	Emergent	yes	up to 3 in.	Low. Nectar.	Full sun Can tolerate periodic dryness.
Pickerelweed *(Pontederia cordata)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Ducks. Nectar for butterflies.	Full sun to partial shade.
Pond Weed *(Potamogeton pectinatus)*	1	Submergent	yes	yes	Extremely high. Waterfowl, marsh and shorebirds.	Removes heavy metals.

Table 1 (cont'd.): Native Plant Guide for Stormwater Management Areas in the Mid-Atlantic

Plant Name	*Zone*	*Form*	*Available*	*Inundation Tolerance*	*Wildlife Value*	*Notes*
Rice Cutgrass *(Leersia oryzoides)*	2,3	Emergent	yes	up to 3 in.	High. Food and cover.	Full sun although tolerant of shade. Shoreline stabilization.
Sedges *(Carex spp.)*	2,3,4	Emergent	yes	up to 3 in.	High. Waterfowl, songbirds.	Many wetland and several upland species.
Soft-stem Bulrush *(Scirpus validus)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Good cover and food.	Full sun. Aggressive colonizer. High pollutant removal.
Smartweed *(Polygonum spp.)*	2,3,4	Emergent	yes	up to 1 ft.	High. Waterfowl, songbirds. Seeds and cover.	Fast colonizer. Avoid weedy aliens such as P. perfoliatum.
Soft Rush *(Juncus effusus)*	2,3,4	Emergent	yes	up to 3 in.	Moderate.	Tolerates wet or dry conditiions.
Spatterdock *(Nuphar luteum)*	2	Emergent	yes	up to3 ft	Moderate for food but high for cover.	Fast colonizer. Tolerant of fluctuating water levels.
Switchgrass *(Panicum virgatum)*	2,3,4,5,6	Perimeter	yes	up to 3 in..	High. Seeds, cover for waterfowl, songbirds.	Tolerates wet/dry conditions.
Sweet Flag *(Acorus calamus)*	2,3	Perimeter	yes	up to 3 in.	Low.	Tolerant of dry periods. Not a rapid colonizer. Tolerates acidic conditions.
Waterweed *(Elodea canadensis)*	1	Submergent	yes	yes	Low.	Good water oxygenator. High nutrient, copper, manganese and chromium removal.
Wild Celery *(Valisneria americana)*	1	Submergent	yes	yes	High. Food for waterfowl. Habitat for fish and invertebrates.	Tolerant of murky water and high nutrient loads.
Wild Rice *(Zizania aquatica)*	2	Emergent	yes	up to 1 ft.	High. Food for birds.	Prefers full sun.

Post-nursery care of wetland plants is very important in the interval between delivery of the plants and their subsequent installation, as they are prone to desiccation. Stock should be frequently watered and shaded while on-site.

A wet hydroseed mix should be used to establish permanent vegetative cover in the buffer outside of the permanent pool. For rapid germination, scarify the soil to ½ inch prior to hydroseeding. Alternatively, red fescue or annual rye can be used as a temporary cover for the wet species.

Because most stormwater wetlands are excavated to deep sub-soils, they often lack the nutrients and organic matter needed to support vigorous growth of wetland plants. At these sites, three to six inches of topsoil or wetland mulch should be added to all depth zones in the wetland from one foot below the normal pool to six inches above. Wetland mulch is preferable to topsoil if it is available.

The stormwater wetland should be staked at the onset of the planting season. Depths in the wetland should be measured to the nearest inch to confirm the original planting zones. At this time, it may be necessary to modify the pondscape plan to reflect altered depths or the availability of wetland plant stock. Surveyed planting zones should be marked on an "as-built" or design plan and located in the field using stakes or flags. The wetland drain should be fully opened at least three days prior to the planting date (which should coincide with the delivery date for the wetland plant stock).

Wetland mulch is another technique to establish a plant community that utilizes the seedbank of wetland soils to provide the propagules for marsh development. The majority of the seedbank is contained within the upper six inches of the donor soils. The mulch is best collected at the end of the growing season. Best results are obtained when the mulch is spread 3 to 6 inches deep over the high marsh and semi-wet zones of the wetland (-6 inches to +6 inches relative to the normal pool). *If a minimum coverage of 50% is not achieved in the planted wetland zones after the second growing season, a reinforcement planting will be required.*

1.2.11 Maintenance Requirements

Regular maintenance is important to insure that a constructed wetland is effectively doing what it was designed to do, which is to remove stormwater pollutants. *Maintenance responsibility for the stormwater wetland and its buffer shall be vested with a responsible party by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval.*

The principal spillway shall be equipped with a trash rack that provides access for maintenance.

Sediment removal in the forebay shall occur when 50% of the total forebay capacity has been lost.

A maintenance plan shall be provided with the design, which shall include a plan for sediment removal and disposal, and agreement to regularly maintain the wetland. As a minimum, an acceptable maintenance plan shall include the items/frequency shown as follows:

Suggested Maintenance Schedule for Constructed Stormwater Wetlands

Description	Frequency
Mow/maintain buffer vegetation	Quarterly
Inspect bank embankment for erosion and repair as needed	Quarterly
Inspect pipe inlet and outlet areas for undercutting/erosion – repair as needed	Quarterly
Inspect trash rack, principal and emergency spillway for trash, blockage	After large storms
Inspect structural integrity of outflow device	Annually
Inspect sediment accumulation	Annually
Plant survival and distribution compliant with as-built pondscaping plans?	Twice a year in first 3 years after construction; annually thereafter

1.3 Bioretention Areas

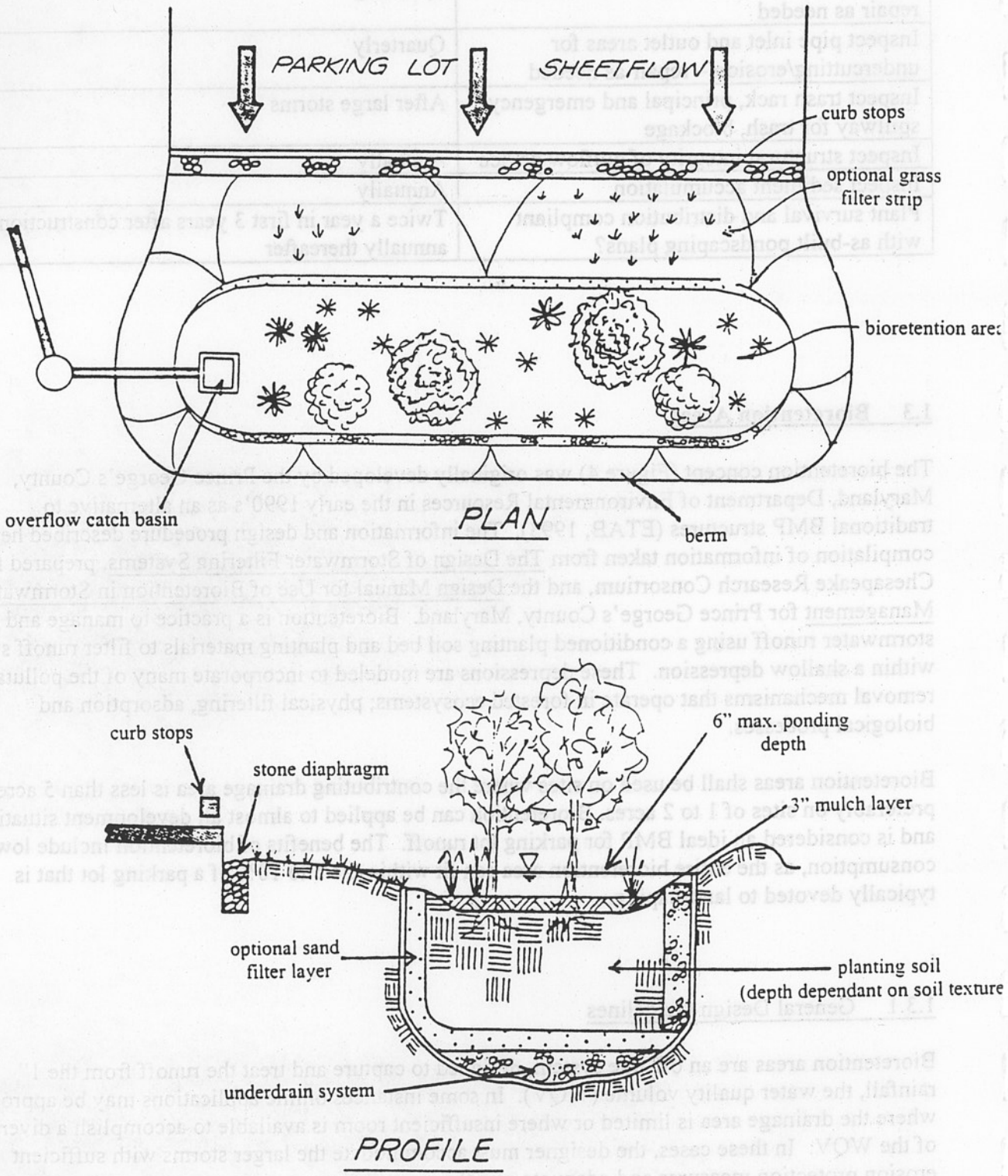
The bioretention concept (Figure 4) was originally developed by the Prince George's County, Maryland, Department of Environmental Resources in the early 1990's as an alternative to traditional BMP structures (ETAB, 1993). The information and design procedure described here is a compilation of information taken from The Design of Stormwater Filtering Systems, prepared for the Chesapeake Research Consortium, and the Design Manual for Use of Bioretention in Stormwater Management for Prince George's County, Maryland. Bioretention is a practice to manage and treat stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression. These depressions are modeled to incorporate many of the pollutant removal mechanisms that operate in forested ecosystems; physical filtering, adsorption and biological processes.

Bioretention areas shall be used on sites where the contributing drainage area is less than 5 acres, preferably on sites of 1 to 2 acres. Bioretention can be applied to almost all development situations, and is considered an ideal BMP for parking lot runoff. The benefits of bioretention include low land consumption, as the entire bioretention area can fit within the 5 to 10% of a parking lot that is typically devoted to landscaping.

1.3.1 General Design Guidelines

Bioretention areas are an off-line system, designed to capture and treat the runoff from the 1" rainfall, the water quality volume (WQV). In some instances online applications may be appropriate where the drainage area is limited or where insufficient room is available to accomplish a diversion of the WQV. In these cases, the designer must accommodate the larger storms with sufficient erosion protection measures and adequate overflow provisions.

Figure 4: Bioretention Area



Bioretention area components have been combined to have complementary roles or functions to improve water quality. The six major components of the bioretention area are:

- Grass buffer strip
- Ponding area
- Planting soil
- Organic or mulch layer
- Plant material
- Underdrain system

1.3.2 Grass Buffer Strip

A grassed buffer strip is recommended to aid in reducing the incoming velocity as well as capturing coarser sediment particles. This will extend the design life and reduce replacement and maintenance of the bioretention system.

1.3.3 Ponding area

This ponding area above the mulch layer and vegetation root zone provides surface storage for a percentage of the WQV. This area also allows for particulate settling during the detention period allowing finer particles to settle on the surface of the mulch layer. A maximum ponding depth of 6" is recommended based on providing surface storage for a period of less than 4 days. NCDENR cautions that a ponding time in excess of four days limits the potential plant species for the bioretention area, and provides an encouraging breeding round for mosquitoes and other undesirable insects.

1.3.4 Planting soil

The planting soil is the region that provides the source of water and nutrients for the plants to sustain growth. The voids in the soil also provide for stormwater storage. NCDENR recommends a planting soil having a composition of at least 10 to 25 percent clay and being of a sandy loam or loamy sand texture. Loamy soils may be utilized for the planting soil but must consist of 35% sand. *If a soil of this texture is used, the soil depth must be 4 feet.* Prince George's County conducted a two-year study of the effectiveness of bioretention areas, and they suggest a soil composition of 50% sand, 20% leaf mulch, and 30% topsoil. The maximum clay content should be less than 10%. *If a soil of this texture is used, the soil depth can be reduced to 3 feet.* Soil shall be of uniform composition, free of stones, stumps, roots or similar objects larger than one inch, brush, or any other material or substance which may be harmful to plant growth, or a hindrance to planting or maintenance operations. Planting soil shall be tested and meet the following criteria:

pH range:	5.5 – 6.5
Organic matter:	1.5 – 3.0%
Magnesium (Mg):	35 lbs/acre
Phosphorus (P2O5):	100 lbs/acre
Potassium (K2O):	85 lbs/acre
Soluble salts:	not to exceed 500ppm

The following testing frequencies shall apply to the above soil constituents:

- pH, organic matter: 1 test per 90 cubic yards, but no less than 1 test per bioretention area
- Magnesium, phosphorus, potassium, soluble salts: 1 test per 500 cubic yards, but no less than 1 test per borrow source.
- One grain size analysis shall be performed per 90 cubic yards of planting soil, but no less than 1 test per bioretention area.

1.3.5 Organic or mulch layer

The organic or mulch layer provides an environment for plant growth by maintaining moisture and allowing for the decomposition of organic matter. The surface layer acts as a filter for finer particles still in suspension and maintains an environment for the microbial community to help breakdown urban runoff pollutants.

Hardwood mulch or chips should be used because they resist floatation better than other landscape covers. Optimum age of the mulch is 12 months. The mulch should be clean free of weeds, soil, roots, plastic, etc.

Mulch should be reapplied wherever is has been displaced through erosion. Mulch layer should be 3 inches thick, and should be replaced once per year or whenever is decays.

1.3.6 Plant material

A bioretention area landscape plan shall be prepared and include the type and number of plantings, plant location, installation guidelines, and post-installation inspection and maintenance guidelines.

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bioretention simulates an ecosystem consisting of an upland oriented community dominated by trees, but having a distinct community, or sub-canopy, of understory trees, shrubs and herbaceous materials. The intent is to establish a diverse, dense plant cover to treat stormwater runoff and withstand urban stresses from insect and disease infestations, drought, temperature, wind and exposure.

The proper selection and installation of plant materials is key to a successful system. There are essentially three zones within a bioretention facility (Figure 5). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports a slightly drier group of plants, but still tolerates fluctuating water levels. The outer edge is the highest elevation and generally supports plants adapted to dryer conditions.

See Table 2 for suggested planting material for bioretention areas. A minimum of 3 species of each tree, shrub, and herbaceous planting should be specified with a minimum planting density of 1000 stems/acre. A higher planting density may be desired for landscaping purposes.

Figure 5: Example Planting Zones for Bioretention Area

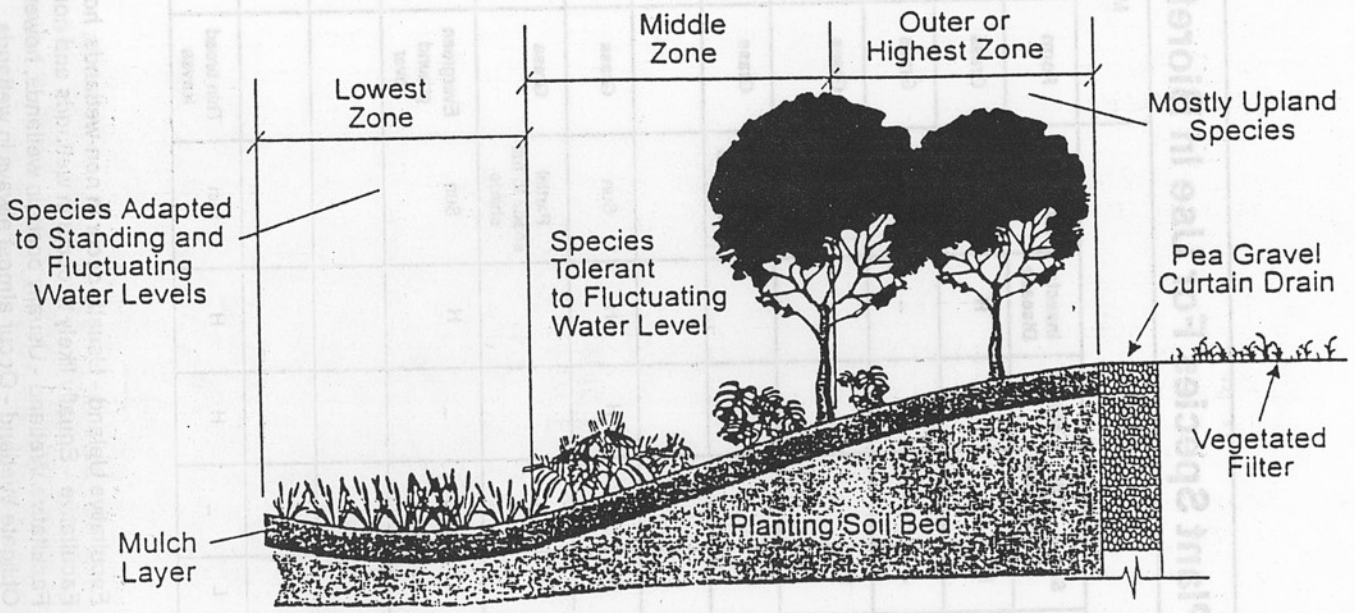


Table 2: Recommended Plant Species For Use In Bioretention - Herbaceous Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Agrostis alba redtop	FAC	Mesic-Xeric	1-2	H	–	H	H	Shade	Grass	2-3'	Fiberous Shallow	Yes	High	–
Andropogon gerardi bluejoint	FAC	Dry Mesic-Mesic	1-2	–	–	–	–	Sun	Grass	2-3'	Fiberous Shallow	Yes	High	–
Andropogon virginicus broomsedge	–	Wet meadow	1-2	L	–			Full sun	Grass	1-3'		Yes	High	Tolerant of fluctuating water levels and drought.
Carex vulpinoidea fox sedge	OBL	Freshwater marsh	2-4	L	–			Sun to partial sun	Grass	2-3.5'	Rhizome	Yes	High	–
Chelone glabra														
Deschampsia caespitosa tufted hairgrass	FACW	Mesic to wet Mesic	2-4	H	–	H	H	Sun	Grass	2-3'	Fiberous Shallow	Yes	High	May become invasive.
Glyceria striata fowl mannagrass, nerved mannagrass	OBL	Freshwater marsh, seeps	1-2	L	–			Partial shade to full shade	Grass	2-4'	Rhizome	Yes	High	–
Hedera helix English Ivy	FACU	Mesic	1-2	–	–	–	H	Sun	Evergreen ground cover	–	Fiberous Shallow	No	Low	–
Hibiscus palustris														
Iris kaempferi														
Iris pseudacorus yellow water iris	OBL	Mesic to wet Mesic	2-4	L	–	H	H	Sun	Thin broad leaves	1-4'	Bulb	Yes	Med	–

H High Tolerance
M Medium Tolerance
L Low Tolerance

FACU Facultative Upland - Usually occur in non-wetlands, however, occasionally found in wetlands.
FAC Facultative - Equally likely to occur in wetlands and non-wetlands.
FACW Facultative Wetland - Usually occur in wetlands, however, occasionally found in non-wetlands.
OBL Obligate Wetland - Occur almost always in wetlands

Adapted from the Prince George's County Design Manual for use of Bioretention in Stormwater Management

Table 2: Recommended Plant Species For Use In Bioretention - Herbaceous Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Lobelia siphilitica														
Lotus Corniculatus birdsfoot-trefoil	FAC	Mesic-Xeric	1-2	H	L	H	H	Sun	Grass	2-3'	Fiberous Shallow	Yes	High	Member of the legume family.
Onoclea sensibilis sensitive fern, beadfern	FACW							Shade		1-3.5'			H	
Pachysandra terminalis Japanese pachysandra	FACU	Mesic	1-2	–	–	–	M	Shade	Evergreen ground cover	–	Fiberous Shallow	No	Low	–
Panicum virgatum switch grass	FAC to FACU	Mesic	2-4	H	–	–	H	Sun or Shade	Grass	4-5'	Fiberous Shallow	Yes	High	Can spread fast and reach height of 6'.
Vinca major large periwinkle	FACU	Mesic	1-2	–	–	–	H	Shade	Evergreen ground cover	–	Fiberous Shallow	No	Low	Sensitive to soil compaction and pH changes.
Vinca minor common periwinkle	FACU	Mesic	1-2	–	–	–	H	Shade	Evergreen ground cover	–	Fiberous Shallow	No	Low	–
Indian grass														
Little bluestem														
Deer tongue														
Green coneflower														

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FAC Facultative - Equally likely to occur in wetlands and non-wetlands.
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OBL Obligate Wetland - Occur almost always in wetlands

Adapted from the Prince George's County Design Manual for use of Bioretention in Stormwater Management

Table 2: Recommended Plant Species For Use In Bioretention - Shrub Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Aronia arbutifolia (Pyrus arbutifolia) red chokeberry	FACW	Mesic	1-2	H	–	H	M	Sun to partial sun	Deciduous shrub	6-12'	–	Yes	High	Good bank stabilizer. Tolerates drought.
Berberis thunbergii Japanese barberry	FAC	Mesic	2-4	H	H	H	M	Sun	Rounded, broad dense shrub	5-7'	Shallow	No	Med	–
Clethra alnifolia sweet pepperbush	FAC	Mesic to wet Mesic	2-4	H	–	–	H	Sun to partial sun	Ovoid shrub	6-12'	Shallow	Yes	Med	Coastal plain species.
Cornus Stolonifera (Cornus sericea) red osier dogwood	FACW	Mesic-Hydric	2-4	H	H	H	M	Sun or shade	Arching, spreading shrub	8-10'	Shallow	Yes	High	Needs more consistent moisture levels.
Cornus amomum silky dogwood	FAC	Mesic	1-2	L	–	–	M	Sun to partial sun	Broad-leaved	6-12'	–	Yes	High	Good bank stabilizer
Euonymous alatus winged euonymous	FAC	Mesic	1-2	H	H	H	M	Sun or shade	Flat, dense horizontal branching shrub	5-7'	Shallow	No	No	–
Euonymous europaeus spindle-tree	FAC	Mesic	1-2	M	M	M	M	Sun to partial sun	Upright dense oval shrub	10-12'	Shallow	No	No	–
Hamamelis virginiana witch hazel	FAC	Mesic	2-4	M	M	M	M	Sun or shade	Vase-like compact shrub	4-6'	Shallow	Yes	Low	–
Hypericum densiflorum common St. John's wort	FAC	Mesic	2-4	H	M	M	H	Sun	Ovoid shrub	3-6'	Shallow	Yes	Med	–
Ilex glabra Inkberry	FACW	Mesic to wet Mesic	2-4	H	H	–	H	Sun to partial sun	Upright dense shrub	6-12'	Shallow	Yes	High	Coastal plain species.
Ilex verticillata winterberry	FACW	Mesic to wet Mesic	2-4	L	M	–	H	Sun to partial sun	Spreading shrub	6-12'	Shallow	Yes	High	–

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Table 2: Recommended Plant Species For Use In Bioretention - Shrub Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Itea virginica tassel-white, Virginia sweetspire	OBL	Mesic	1-2	M	–	–	M	Sun or shade	Broad-leaved, deciduous shrub	6-12'	–	Yes	Low	–
Juniperus communis "compressa" common juniper	FAC	Dry Mesic-Mesic	1-2	M	H	H	M-H	Sun	Mounded shrub	3-6'	Deep taproot	No	High	Evergreen
Juniperus horizontalis "Bar Harbor" creeping juniper	FAC	Dry Mesic-Mesic	1-2	M	H	H	M-H	Sun	Matted shrub	0-3'	Deep taproot	No	High	Evergreen
Lindera benzoin spicebush	FACW	Mesic to wet Mesic	2-4	H	–	–	H	Sun	Upright shrub	6-12'	Deep	Yes	High	–
Myrica pennsylvanica bayberry	FAC	Mesic	2-4	H	M	M	H	Sun to partial sun	Rounded, compact shrub	6-8'	Shallow	Yes	High	Coastal plain species.
Physocarpus opulifolius ninebark	FAC	Dry Mesic to wet Mesic	2-4	M	–	–	H	Sun	Upright shrub	6-12'	Shallow	Yes	Med	May be difficult to locate.
Viburnum cassinoides northern wild raisin	FACW	Mesic	2-4	H	H	H	H	Sun to partial sun	Rounded, compacted shrub	6-8'	Shallow	Yes	High	–
Viburnum dentatum arrow-wood	FAC	Mesic to wet	2-4	H	H	H	H	Sun to partial sun	Upright, multi-stemmed shrub	8-10'	Shallow	Yes	High	–
Viburnum lentago nannyberry	FAC	Mesic	2-4	H	H	H	H	Sun to partial sun	Upright, multi-stemmed shrub	8-10'	Shallow	Yes	High	–

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Table 2: Recommended Plant Species For Use In Bioretention - Tree Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Acer rubrum red maple	FAC	Mesic-Hydric	4-6	H	H	H	H	Partial sun	Single to multi-stem tree	50-70'	Shallow	Yes	High	–
Amelanchier canadensis shadbush	FAC	Mesic	2-4	H	M	–	H	Partial sun	Single to multi-stem tree	35-50'	Shallow	Yes	High	Not recommended for full sun.
Betula nigra river birch	FACW	Mesic-Hydric	4-6	–	M	M	H	Partial sun	Single to multi-stem tree	50-75'	Shallow	Yes	High	Not susceptible to bronze birch borer.
Betula populifolia gray birch	FAC	Xeric-Hydric	4-6	H	H	M	H	Partial sun	Single to multi-stem tree	35-50'	Shallow to deep	No	High	Native to New England area.
Fraxinus americana white ash	FAC	Mesic	2-4	M	H	H	H	Sun	Large tree	50-80'	Deep	Yes	Low	–
Fraxinus Pennsylvanica green ash	FACW	Mesic	4-6	M	H	H	H	Partial sun	Large tree	40-65'	Shallow to deep	Yes	Low	–
Ginko biloba Maidenhair tree	FAC	Mesic	2-4	H	H	H	H	Sun	Large tree	50-80'	Shallow to deep	No	Low	Avoid female species-offensive odor from fruit.
Gleditsia triacanthos honeylocust	FAC	Mesic	2-4	H	M	–	M	Sun	Small caopied large tree	50-75'	Shallow to deep variable taproot	Yes	Low	Select thornless variety.
Juniperus virginiana eastern red cedar	FACU	Mesic-Xeric	2-4	H	H	–	H	Sun	Dense single stem tree	50-75'	Taproot	Yes	Very high	Evergreen
Liquidambar styraciflua sweet gum	FAC	Mesic	4-6	H	H	H	M	Sun	Large tree	50-70'	Deep taproot	Yes	High	Edge and perimeter; fruit is a maintenance problem.
Nyssa sylvatica black gum	FACW	Mesic-Hydric	4-6	H	H	H	H	Sun	Large tree	40-70'	Shallow to deep taproot	Yes	High	–

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Table 2: Recommended Plant Species For Use In Bioretention - Tree Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Platanus acerifolia London plane-tree	FACW	Mesic	2-4	H	–	–	M	Sun	Large tree	70-80'	Shallow	No	Low	Tree roots can heave sidewalks.
Platanus occidentalis sycamore	FACW	Mesic-Hydric	4-6	M	M	M	M	Sun	Large tree	70-80'	Shallow	Yes	Med	Edge and perimeter; fruit is a maintennance problem; tree is also prone to windthrow.
Populus deltoides eastern cottonnwood	FAC	Xeric-Mesic	4-6	H	H	H	L	Sun	Large tree with spreading branches	75-100'	Shallow	Yes	High	Short lived.
Quercus bicolor Swamp white oak	FACW	Mesic to wet Mesic	4-6	H	–	H	H	Sun to partial sun	Large tree	75-100'	Shallow	Yes	High	One of the faster growing oaks.
Quercus coccinea scarlet oak	FAC	Mesic	1-2	H	M	M	M	Sun	Large tree	50-75'	Shallow to deep	Yes	High	–
Quercus macrocarpa bur oak	FAC	Mesic to wet Mesic	2-4	H	H	H	M	Sun	Large spreading tree	75-100"	Taproot	No	High	Native to Midwest.
Quercus palustris pin oak	FACW	Mesic-Hydric	4-6	H	H	H	M	Sun	Large tree	60-80'	Shallow to deep taproot	Yes	High	–
Quercus phellos willow oak	FACW	Mesic to wet Mesic	4-6	H	–	–	H	Sun	Large tree	55-75'	Shallow	Yes	High	Fast growing oak.
Quercus rubra red oak	FAC	Mesic	2-4	M	H	M	M	Sun to partial sun	Large spreading tree	60-80'	Deep taproot	Yes	High	–
Quercus shumardii Shumard's red oak	FAC	Mesic	2-4	H	H	H	M	Sun to partial sun	Large spreading tree	60-80'	Deep taproot	No	High	Native to Southeast.

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Table 2: Recommended Plant Species For Use In Bioretention - Tree Species

Species	Moisture Regime		Tolerance						Morphology			General Characteristics		Comments
Scientific Name Common Name	Indicator Status	Habitat	Ponding (days)	Salt	Oil/ Grease	Metals	Insects/ Disease	Exposure	Form	Height	Root System	Native	Wildlife	
Robinia pseudo-acacia black locust	FAC	Mesic-Xeric	2-4	H	H	H	M	Sun	Typically tall and slender	30-50'	Shallow	Yes	Low	Edge and perimeter; fruit is a maintenance problem; tree is also prone to windthrow.
Sophora japonica Japanese pagoda tree	FAC	Mesic	1-2	M	M	–	M	Sun	Shade tree	40-70'	Shallow	No	Low	Fruit stains sidewalk.
Taxodium distichum bald cypress	FACW	Mesic-Hydric	4-6	–	–	M	H	Sun to partial sun	Typically single stem tree	75-100'	Shallow	Yes	Low	Not well documented for planting in urban areas.
Thuja occidentalis arborvitae	FACW	Mesic to wet Mesic	2-4	M	M	M	H	Sun to partial sun	Dense single stem tree	50-75'	Shallow	No	Low	Evergreen
Zelkova serrata Japanese zelkova	FACU	Mesic	1-2	M	M	–	H	Sun	Dense shade tree	60-70'	Shallow	No	Low	Branches can split easily in storms.

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1.3.7 Underdrain system

Because the native soils in Guilford County do not generally allow for adequate infiltration, all bioretention areas shall have an underdrain system placed beneath the planting soil. The underdrain should consist of perforated piping with a gravel jacket. An optional intermediate layer of geotextile fabric or pea gravel can be placed between the planting soil and gravel jacket to prevent clay from getting into the pipe. Recommended design for underdrain system includes: 6" minimum perforated pipe systems (min. of 4") within an 8" gravel bed (min. of 2" cover over pipe). The pipe should have 3/8" perforations, spaced at 6" centers (for 6" pipe), with a minimum of 4 holes per row. The pipe should be spaced at a maximum of 10' on-center and a minimum grade of 0.5% should be maintained. At least one cleanout per run should be provided. The underdrain system should be connected to the conventional drainage system, or should daylight to a suitable non-erosive outfall (Design of Stormwater Filtering Systems).

1.3.8 Sizing Requirements

Bioretention areas are sized to control the water quality volume (WQV) from a 1" rainfall, which will effectively treat 90% of the annual average rainfall. One method, the **Short Cut Method**, (Schueler, 1987) can be used to obtain a reasonably accurate estimate of the treatment volume

$$WQV = \frac{P * R_v * DA}{12} \text{ where}$$

WQV = Water Quality Volume, in acre-feet
P = rainfall, inches (1.0 since controlling for 1" rainfall)
R_v (volumetric runoff coefficient) = 0.05 + 0.009(I), where
I = % imperviousness
DA = drainage area, acres

The filter area shall be sized based on the principles of Darcy's Law, and the experiences in Maryland and Prince George's County. The required filter bed area is computed using the following equation:

$$A_f = (WQV * d_f)/[k * (h_f + d_f) * t_f] \text{ where}$$

A_f = surface area of filter bed, ft^2
d_f = filter bed depth (minimum of 3' or 4' depending on soil texture)
k = coefficient of permeability of filter media (assume 0.5 ft/day based on Claytor and Schueler, 1996), ft/day
h_f = average height of water above filter bed, ft ($1/2 * h_{max}$)
t_f = design filter bed drain time, days (48 hours is recommended for bioretention areas)
WQV = Water Quality Treatment Vol. (ft^3)

1.3.9 Maintenance Requirements

Suggested Maintenance Schedule for Bioretention Areas:

DESCRIPTION	METHOD	FREQUENCY	TIME OF YEAR
Soil			
Inspect and Repair Erosion	Visual	Monthly	Monthly
Organic Layer			
Remulch any void areas	By hand	Whenever needed	Whenever needed
Remove previous mulch layer before applying new layer (optional)	By hand	Once every two or three years	Spring
Any additional mulch added	By hand	Once a year	Spring
Plants			
Remove and replacement of all dead and diseased vegetation considered beyond treatment	See planting specification		3/15 to 4/30 and 10/1 to 11/30
Treat all diseased trees and shrubs	Mechanical or by hand	N/A	Varies, but will depend on insect or disease infestation
Water of plant material shall take place at end of each day for 14 consecutive days and after planting has been completed	By hand	Immediately after completion of project	N/A
Replacement of support stakes	By hand	Once a year	Only remove stake in the spring
Replace any deficient stakes or wires	By hand	Whenever needed	Whenever needed

1.4 Sand Filtration Facilities

Sand filters are intended for use on small urban sites that would not normally support the hydrology of a wet detention pond and where the soils permit stormwater filtration. The primary mechanism for pollutant removal is through sedimentation, filtration and microbial activity within the sand. As stormwater flows through the filter, the filtration media trap and absorb pollutants present in the stormwater. Sand filtration systems are beneficial when land space is scarce or expensive, because they can be designed to be placed underground or to border the perimeter of a parking lot or other impervious surface.

There are two basic components of a sand filter design: the sediment chamber and the sand chamber. The sediment chamber reduces the amount of sediment that reaches the sand chamber, and facilitates sheet flow into the sand chamber. The sand chamber filters out the finer sediments and pollutants bound to these sediments, and provides a media for biological activity.

Drainage areas directed to each sand filter should be kept below 5 acres in size.

The Center for Watershed protection recommends that sand filters be used primarily to treat runoff from impervious or nearly impervious surfaces. The findings from several studies report that most of the particulate load in urban runoff is made up of the coarser fractions, consisting of sand/gravel particle sizes greater than approximately 40 microns. This being the case, the sedimentation chamber can capture the coarser grained material, and the filter chamber will be less prone to clogging. Sand filters designed to treat runoff from purely impervious surfaces will therefore require less sedimentation area and volume than those designed to treat runoff from more pervious surfaces.

In North Carolina, water quality control measures must be designed for 85% removal of Total Suspended Solids. The design requirements included herein are those recommended by the Center for Watershed Protection, in the Design of Stormwater Filtering Systems.

1.4.1 General Design Guidelines

The entire facility should hold 75% of the water quality volume, WQV.

1.4.2 Sedimentation Chamber

In order to prolong the life and effectiveness of the sand filtering system, pretreatment, primarily through the settling of sediments, is needed. The settling efficiency is primarily a function the surface loading (rate of outflow divided by the basin surface area). The following equation is used to size the pretreatment settling basin surface area.

$A_s = -(Q/v) * Ln(1 - E)$ where:

A_s = Sedimentation basin surface area (ft^2)
E = Trap efficiency; which is the target removal efficiency of suspended solids (set equal to 90%)
v = Particle settling velocity; for I < 75% use settling velocity = 0.0004 ft/sec (target ~ 20 micron size particles). For I ≥ 75% use settling velocity = 0.0033 ft/sec (target ~ 40 micron size particles). [I = % impervious surface].
Q = Rate of outflow from the basin, WQV(water quality volume)/t (detention time), use 24 hrs.

Based on the above equation:

$$A_s = 0.066 * WQV \ (ft^2) \qquad \text{for } I < 75\%$$

$$A_s = 0.0081 * WQV\ (ft^2) \qquad \text{for } I \geq 75\%$$

Although the settling efficiency is independent of depth, a minimum basin depth of 2 feet is recommended to minimize particle resuspension.

Length to width ratio should be 2H:1V or greater.

1.4.3 Sand Filter Chamber

The primary design parameter for filtration basins is surface area. The following equation should be used to size the sand filter bed area:

$$A_f = WVQ * (d_f)/[k*(h_f+d_f)(t)] \text{ where,}$$

A_f = sand filter bed area (ft^2)
WQV = water quality volume (ft^3)
d_f = depth of filter material, ft. (1.5 ft minimum)
k = coefficient of permeability for sand bed, ft/day (recommend 3.5 ft/day)
h_f = average height of water above filter bed, ft. ($1/2 * h_{max}$)
t = time required for the water quality volume to filter through the sand bed, days (recommend 40 hours (1.67 days) as minimum)

Flow should be evenly distributed across the filtration chamber.

The *sand bed should be a minimum of 18 inches depth and the top of the bed should be completely level.* The sand should be clean ASTM C-33 medium aggregate concrete sand.

For underground sand filter facilities, a 5 feet minimum height clearance should be provided between the top of the sand bed and the bottom of the slab to provide clearance for future maintenance.

It is recommended to use a dewatering valve placed just above the sand bed layer to drain the facility should the sand bed become clogged.

1.4.4 Underdrain Systems

An underdrain system shall be used to collect water that has percolated through the sand filter. The preferred pipe is 6 inch perforated schedule 40 PVC piping placed in an 8 to 10 inch gravel jacket. Although some designs call for filter fabric between the gravel bed and sand layer, this fabric could present clogging problems and therefore a 3-inch layer of pea gravel is suggested. To ensure adequate drainage, the bottom of the chamber should be sloped toward the underdrain pipes, which should be spaced approximately 10 feet along the filter bed. The underdrain may discharge to a main collector pipe or to an outlet chamber.

1.4.5 Overflow

Sand filtration facilities should be placed off-line (divert runoff from storms greater than the one inch rainfall before entering the facility) whenever possible. A by-pass structure can be used to direct flow away from the filtration facility once the treatment volume has been exceeded.

For on-line facilities, an overflow should be placed in the sediment chamber and be designed to carry the 10 year design storm at a minimum. The overflow needs to be placed as far upstream of the filtration bed as possible to prevent the initial WQV from being flushed out by the subsequent runoff.

1.4.6 Access

Adequate access to underground sand and pretreatment chambers shall be provided for inspection and maintenance. It is preferred that large aluminum or steel doors be placed to access the sand filtration chamber. Steps will need to be provided for the underground facility. Also, observation manholes or doors should be provided for the overflow chamber and the sedimentation chamber. Maintenance to the underground sand filtration facility will involve entering a confined space and the appropriate provisions should be made to comply with OSHA confined space requirements.

Three examples of sand filters are given. Figure 6 and 7 are examples of underground sand filters that might be used in an area where land values are very high, or where there are severe physical limitations is siting a BMP. The District of Columbia (DC) sand filter, is recommended for use on sites draining less than 1 acre, and that are highly urbanized (Figure 6). Another underground sand filtering system, the Delaware Sand Filter (or Perimeter Sand Filter, Figure 7), was originally developed by Mr. Earl Shaver of the Delaware Department of Natural Resources and Environmental Control, and was primarily intended to border the perimeter of parking lots (hence the name Perimeter Sand Filter). The system consists of two concrete chambers; a grated steel inlet to the wet sedimentation chamber and a sand filtration chamber. The WQV flows into the filter bed via distribution slots or multiple orifices, while larger storm volumes bypass the filter chamber through an overflow weir. The filter bed chamber consists of an 18" sand bed over a gravel/perforated pipe underdrain system with several outlets, which discharges into a manifold pipe collection system.

The other type of sand filter, the surface sand filter (SSF), was first developed and used in Austin, Texas (Figure 8). The sand filter can be placed in a concrete or earth basin. A sedimentation basin is needed to pretreat the incoming runoff and to bypass larger storm events. The City of Austin found that it was important to size the sedimentation chamber to remove suspended solids to prevent excessive sediment loading on the sand filtration chamber. Since the SSF is an open basin, it will generally cost less than the other enclosed sand filter types and is usually practical to treat a larger drainage area.

Figure 6: Example of Underground (DC) Sand Filter

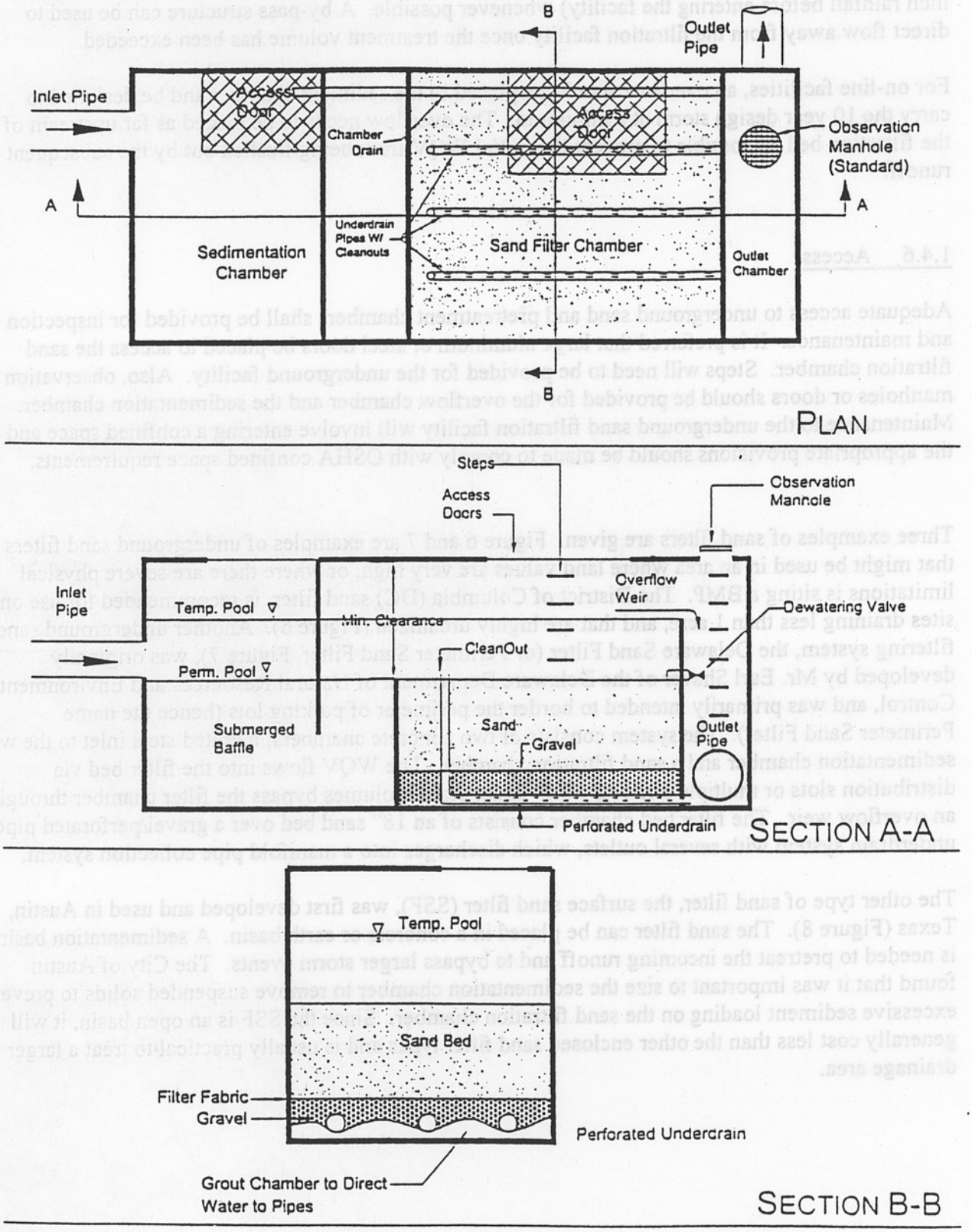


Figure 7: Example of Perimeter Sand Filter
(Delaware Sand Filter)

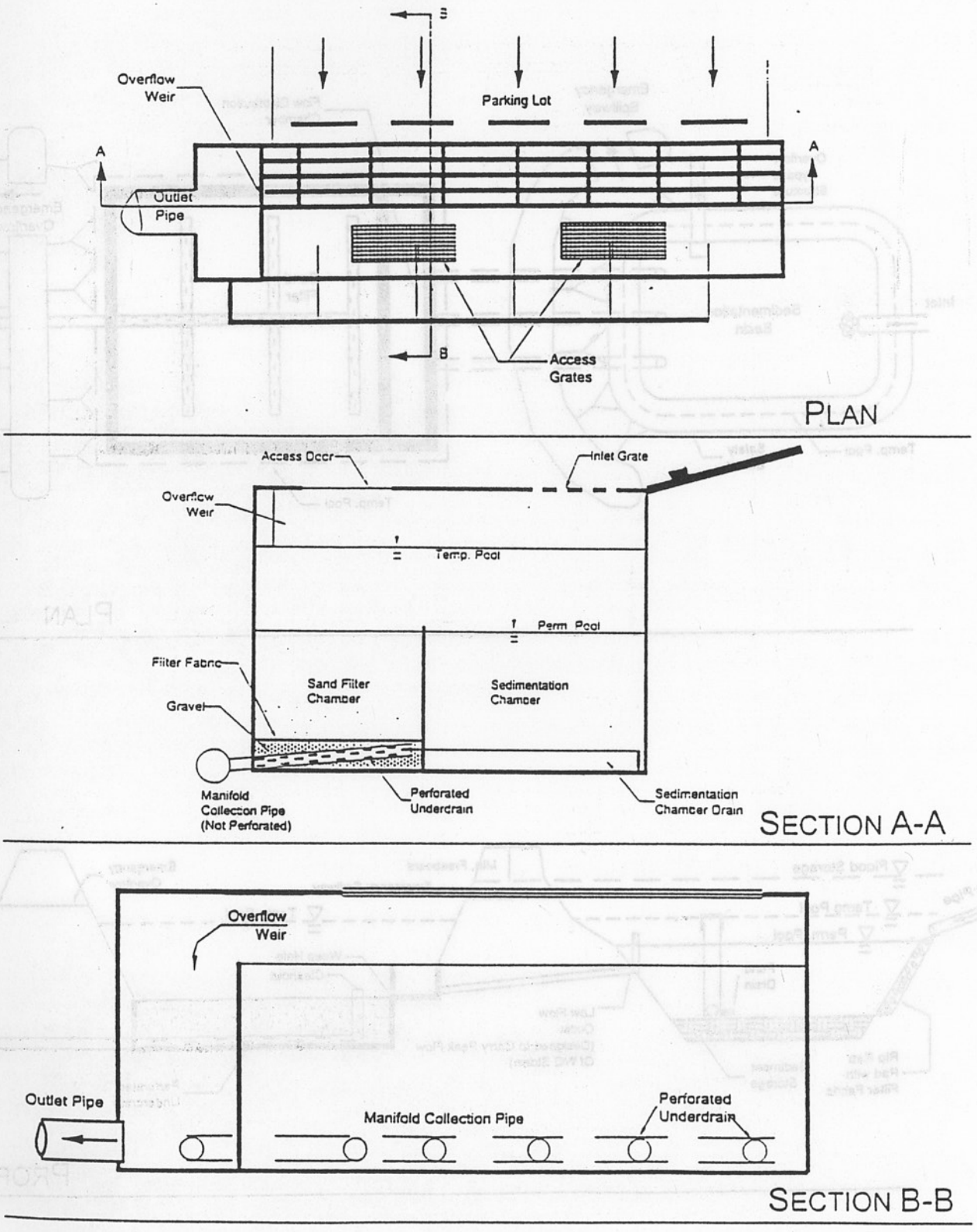
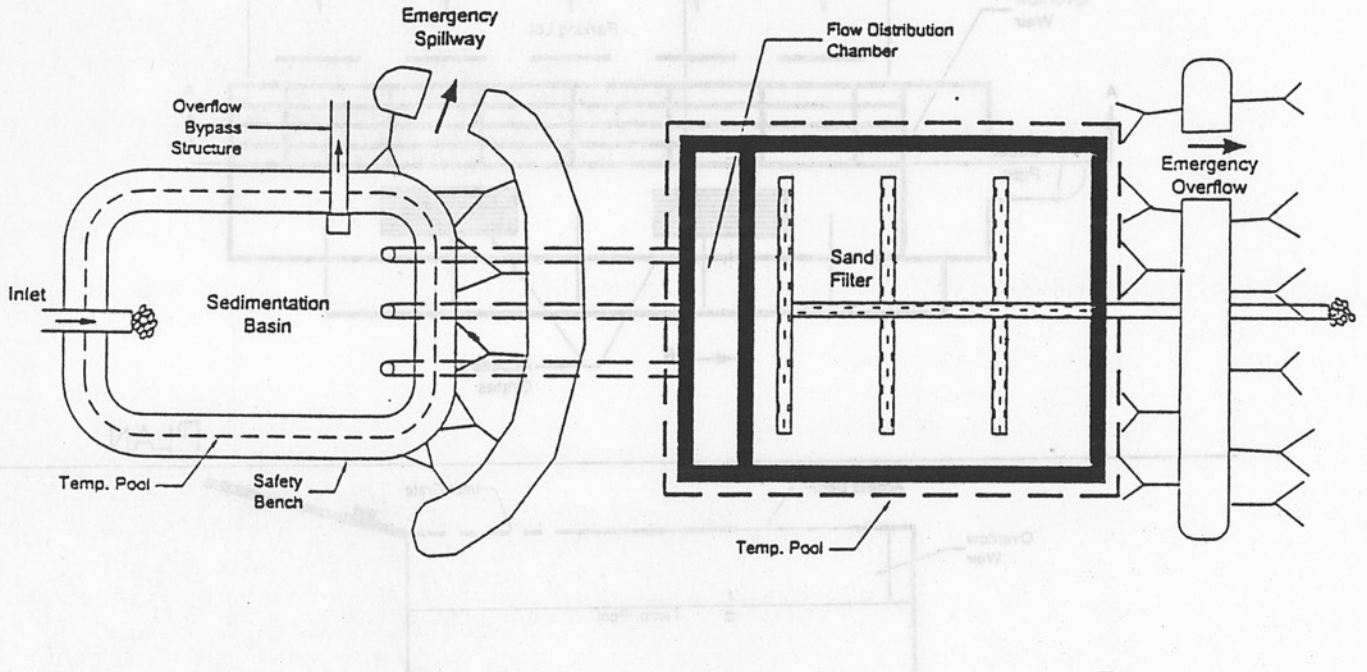
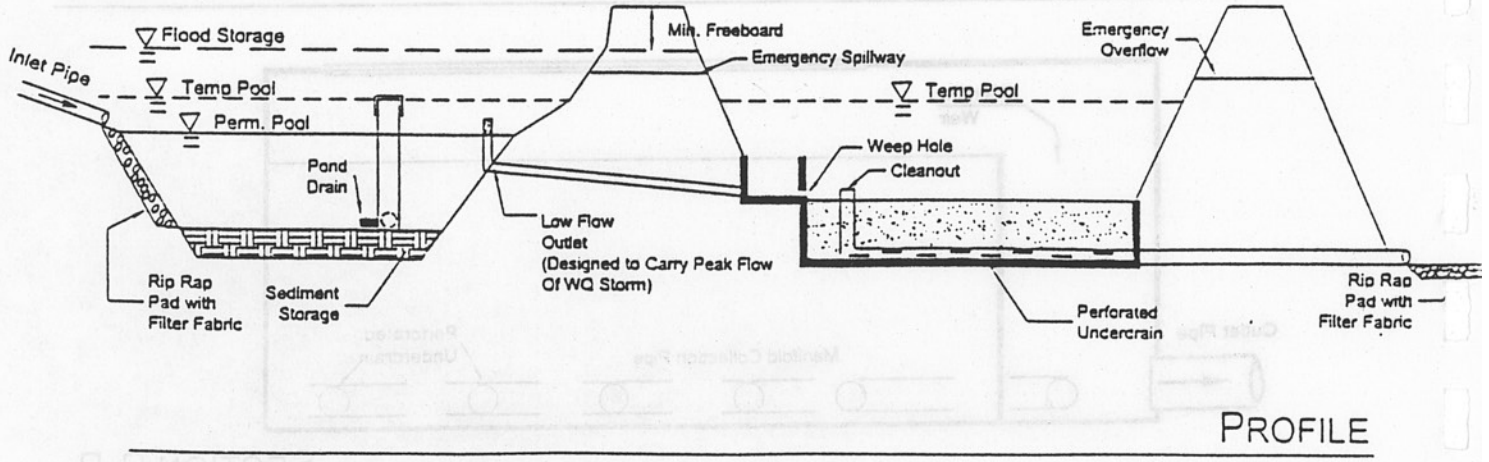


Figure 8: Example of Surface Sand Filter





1.4.7 Other Proprietary Systems

Other proprietary systems may be used to control stormwater runoff, as long as they can be designed to treat the first one-inch of runoff, and achieve 85% removal of TSS. Several proprietary systems have been used successfully elsewhere, and may be applicable in High Point. StormFilter™ by Stormwater Management®, Portland, Oregon (1-800-548-4667 or *www.stormwatermgt.com)*, and StormTreat™ by StormTreat™ Systems, Sandwich, Massachusetts (1-508-833-1033 or *www.stormtreat.com*) are two of several commercially available systems.

1.4.8 Maintenance

A paved area sweeping program is recommended for all properties that utilize a sand filter. Sweeping paved areas on a periodic basis will help to extend the life of the filter by reducing the pollutant load and debris entering the filter. Sweeping should be done in such a manner as to prevent debris from entering inlets leading to the sand filter.

Mowing/landscaping activities on the property should be conducted in such a way to prevent lawn and plant clippings as well as eroded sediment from entering the filter facility. One way to prevent clippings from entering the facility is to use mulching mowers or to bag and remove clippings, especially in areas that drain to the filter.

The following inspection/maintenance activities should be conducted on a quarterly basis (4 times per year), unless noted otherwise.

- Overall Sand Filter Facility
  1. *Accumulated paper, trash, and debris are removed from the filtration facility.*
  2. *Check to verify that there are no signs of cracking or deteriorating concrete (every 6 months at a minimum).*

- Sedimentation Chamber
  1. *Check to verify that the perforated pipe or low flow orifice (if applicable) is clear of debris.*
  2. *Measure the sediment depth at several locations in the sedimentation chamber (every 6 months at a minimum). The sediment chamber should be cleaned out when sediment levels exceed the design level (12" if no level is given). The sludge should be disposed of at an approved site.*

- Filtration Chamber
  1. *Monitor the performance of the filter bed (every 6 months at a minimum). If the drawdown time of the filter bed is greater than twice the initial design drawdown time, corrective maintenance is needed.* Corrective maintenance includes:
     (a) Clean out the underdrain system
     (b) Replace the top layer of the sand filter bed

Accumulated sediment on top of the sand bed and the top layer of discolored sand should be scraped off. The removed sand should be replaced with new sand of the original specifications. The sediment and contaminated sand should be disposed at an approved site.

If a filter fabric/screen is used on top of the sand layer, replace it with a new fabric/screen of the original specifications. If gravel is used on top of the filter fabric/screen, rinse the gravel well and reuse. The sediment rinsed from the gravel should be collected. The used filter/screen and collected sediment is to be disposed at the landfill. Before replacing the fabric/screen, be sure to check to see if the sand layer is contaminated.

(c) If the appropriate drawdown time cannot be restored, the owner will be required to remove and replace the filter bed and underdrain system.
If the filter bed is not draining at all, the stagnated water must be released by the dewatering valve or pumped out before corrective maintenance can be done to the sand bed.

- Outlet Chamber/Outlets
  1. *Check to verify that the outlet is discharging when water is present in the filtration chamber.* When the water level is above the filter bed, check the outlet area to ensure that the sand filter is functioning. If there is no discharge from the outlet, the system is nonfunctional and corrective maintenance is needed immediately to restore drawdown.

  2. *Check to verify that there is no erosion at the outlet areas.*
  The downstream areas from the outlet of the sand filter should be checked to ensure there is no erosion taking place. Eroded areas should be revegetated. A velocity dissipater, if not already in place, may be needed if erosion continues to occur.

2.1 Natural Infiltration Areas

Natural infiltration is defined as a method that allows runoff to infiltrate an undisturbed soil covered with natural vegetation. It is a non-structural practice, and one that does not require maintenance. All that is required is that the area remains natural and undisturbed. Generally, these areas are forested; the soil surface remains covered with leaves, needles, and organic matter. Areas such as these must be protected from use by vehicles, humans and livestock as this will damage the surface mulch and thus lower the infiltration capability.

2.1.1 General Design Standards

The following equation will be used to determine if the first half inch of runoff from an impervious surface can be retained on-site by natural infiltration.

$$U = (KTI)/[(CD) - 0.5]$$

Where:

U = Natural Infiltration area needed for infiltration of runoff from built-upon area, acres
K = .5, a constant representing the first half inch
T = Total acres of land in the tract, or land under consideration.
I = Impervious surface, %/100
C = Effective water capacity, In./in. (water/soil)
D = Depth of soil A horizon, In. (determined from Table 2 or on-site investigation)
0.5 = First half inch of rainfall

Effective water capacity (C) and infiltration rate (f) are functions of the soil texture as presented in the Table below:

Soil Type	C In./In	D In.	F In./Hr	Hydrologic Soil Group
Appling sandy loam	0.25	6	1.02	B
Cecil, Madison Sandy loam	0.25	4	1.02	B
Enon, Vance, Helena Fine sandy loam and sandy loam	0.17	4	0.27	B
Cecil, Enon, Madison, Coronaca and Mecklenburg Sandy clay loam and clay loam	0.14	4	0.17	B or C

Some basic requirements for the undisturbed areas are:

1. Runoff from the built-upon area (I) flows onto the undisturbed area (U) as sheet flow, using structures or diversions if necessary to accomplish sheet flow.

2. Undisturbed area (U) –
   a. has less than 10% slope
   b. has an excellent wood cover, (multiply U by 2 for grass cover)
   c. is not in a floodplain or a wetland
   d. has a stable soil (not highly erodible or subject to landslides), and
   e. will remain undisturbed so as to maintain the infiltration rate

3. If the undisturbed area is between 10% and 15% slope, an additional 10% area is required for each percent of slope over 10%

2.1.2 Maintenance Requirements

Natural infiltration areas shall be protected by silt fence during active construction on the site or when land-disturbing activities may deposit sediment in the infiltration area. Additional protection measures may be required by the Enforcement Officer to prevent the encroachment of vehicles, etc. Encroachments by construction vehicles and or improper construction of drainage facilities can render an infiltration area useless and void the watershed development plan approval.

2.2 Dry Detention Basins

A dry detention basin is an impoundment formed by constructing a dam or embankment or by a combination of excavation and an embankment with an outlet structure to detain surface runoff for periods of generally around 24 hours. There is no permanent water quality pool.

2.2.1 General Design Standards

Avoid placing these structures in environmentally sensitive areas such as streams and wetlands.

Dry detention basins must be easily accessible for maintenance. A 20' wide access easement shall be provided from the public street right-of-way to the basin and shall be continuous around the pond.

At inflow points to the basin, energy dissipaters such as rip-rap shall be used to reduce the velocity of the flow. The outflow shall be designed to protect against erosion and scour from high velocities and turbulence. Rip-rap shall be provided at the points of discharge as necessary.

Basin embankments shall be 4H:1V of flatter in order to reduce erosion potential, promote wetland vegetation minimize safety hazards, improve aesthetics and facilitate maintenance activities.

The minimum length to width ratio shall be 3H:1V (or equivalent created by baffles) in order to limit short-circuiting. The distance between the inlets and outlets should be maximized to increase the pollutant removal capability of the pond.

2.2.2 Storage Requirments

Detention volumes for a 24-hour detention time shall meet the requirements below:

% Impervious	Storage Capacity* (inches)
0 – 6%	NR
7 – 12%	0.1

13 – 25%	0.2
26 – 35%	0.3
36 – 50%	0.4
51 – 70%	0.5

Storage capacity is in units of inches per acre of drainage area

2.2.3 Principal Spillway

The principal spillway shall be designed for the 10 yr. predevelopment storm

The minimum difference in elevation between the principal spillway elevation and the emergency spillway elevation shall be one (1) foot.

Anti-seep collars shall be installed on all pipe conduits through earthen dams and embankments.

Vertical risers shall be equipped with an anti-vortex device to improve the flow of water, and with a trash rack or hood to prevent floating debris from clogging the principal spillway.

Anti-floatation calculations shall be submitted, with a minimum safety factor of 1.25. The riser/barrel assemblies shall be new and aluminum or concrete pipe, shall have gasketed joints and the barrel shall be pressure tested.

2.2.4 Emergency Spillway

The emergency spillway shall be designed to safely convey the 100 yr. design storm.

A minimum of one (1) foot of freeboard from the top of the pool elevation from the 100 yr. storm to the top of the dam shall be provided. The minimum difference in elevation between the emergency spillway elevation and the settled top of the dam shall be two (2) feet.

Spillways shall be constructed so as to prevent the discharge through the spillway from coming in contact with the fill section of the dam or principal embankment structure.

2.2.5 Maintenance Requirements

To sustain the structural integrity of the dam, no trees or woody vegetation should be allowed on the dam embankments or top of dam. Trees and brush, if desired, are acceptable on pond embankments other than the dam.

A maintenance plan shall be provided with the design that shall include a plan for sediment removal and disposal.

Maintenance responsibility for a pond and its buffer shall be vested with a responsible party by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval.

2.3 Infiltration Trenches

An infiltration trench is a gravel-filled trench designed to collect the first one-half inch(1/2") runoff. Gravel shall be clean washed material with a maximum size of 3 inches, and the trench should dewater in less than 7 days.

2.3.1 Storage Requirements

The equation for determining the volume of the trench for one-half (1/2)-inch runoff is:

$$V = I \times (1815/0.4)$$

Where:

V = minimum volume of trench in cubic feet
I = impervious surface area, acres
0.4 = pore space in gravel

Recommended dimensions of the trench are as follows:

	Minimum	Maximum
Width	2 feet	7 feet
Depth	1.5 feet	3 feet

The minimum width between trenches shall be ten feet (10') or the width x depth, whichever is greater. The equation above only determines the minimum volume of the trench. The next step is to select the dimensions of the trench, a site specific consideration and test for the 7-day drawdown or dewatering of the trench. Infiltration rates of selected soil textures are shown below.

Soil Texture	**Infiltration Rate** (CF/Hr/Sq. ft.)
Sandy loam	.085
Fine sandy loam, loam	.043
Silt loam	.023
Sandy clay loam	.014
Clay, 1:1 (kaolinite) and clay loam	.0075
Clay, 2:1 and mixed, saprolite and bottom of trench	.0017

The 7 day drawdown is checked by:

1. Multiply bottom area of trench (sq. ft.) by the appropriate infiltration rate from the Table above by 24 hours
2. Multiply one-half of surface area of trench side walls by appropriate infiltration rate from Table above by 24 hours
3. Multiply square footage of gravel surface by the evaporation rate (approximately .0083 CF/SF/day), assuming that the trench is exposed to the atmosphere.
4. Add Steps 1, 2 and 3 to determine the theoretical drawdown in the trench for 24 hours (D).
5. Divide V by D to determine if the trench will dewater in 7 days or less. If not, trench must be enlarged.

2.3.2 Maintenance Requirements

An infiltration trench depends on infiltration to succeed. If sediment or other trapped pollutants reduce the infiltration rate to the point the trench is no longer effective, the sediment will have to be removed.

REFERENCES

Center for Watershed Protection (Schueler, Thomas R. and Claytor, Richard A.), **Design of Stormwater Filtering Systems**, December 1996.

City of Greensboro, **Stormwater Services, Stormwater Best Management Practices Guidance Manual** (Draft), May 1999.

Department of Environmental Resources, Prince George's County, Maryland, **Design Manual For Use of Bioretention in Stormwater Management,** June 1993.

Department of Environmental Resources, Prince George's County, Maryland, **Low-Impact Development Design Manual**, November, 1997.

Guilford County Planning and Development, Office of Soil Scientist, **Water Quality Protection Manual (Third Edition)**, January 1997.

Maryland Department of the Environment, Water Management Administration, **Maryland Stormwater Design Manual, Chapter 3 (Draft)**, December 1997.

Metropolitan Washington Council of Governments (Schueler, Thomas R.), **Controlling Urban Runoff**, July 1987.

Metropolitan Washington Council of Governments (Schueler, Thomas R.), **Design of Stormwater Wetland Systems**, October 1992.

North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality, **Stormwater Best Management Practices**, July 1998.

North Carolina Cooperative Extensive Service (Hunt, Bill), **Designing Stormwater Wetlands for Small Watersheds (Draft)**, August 1999.

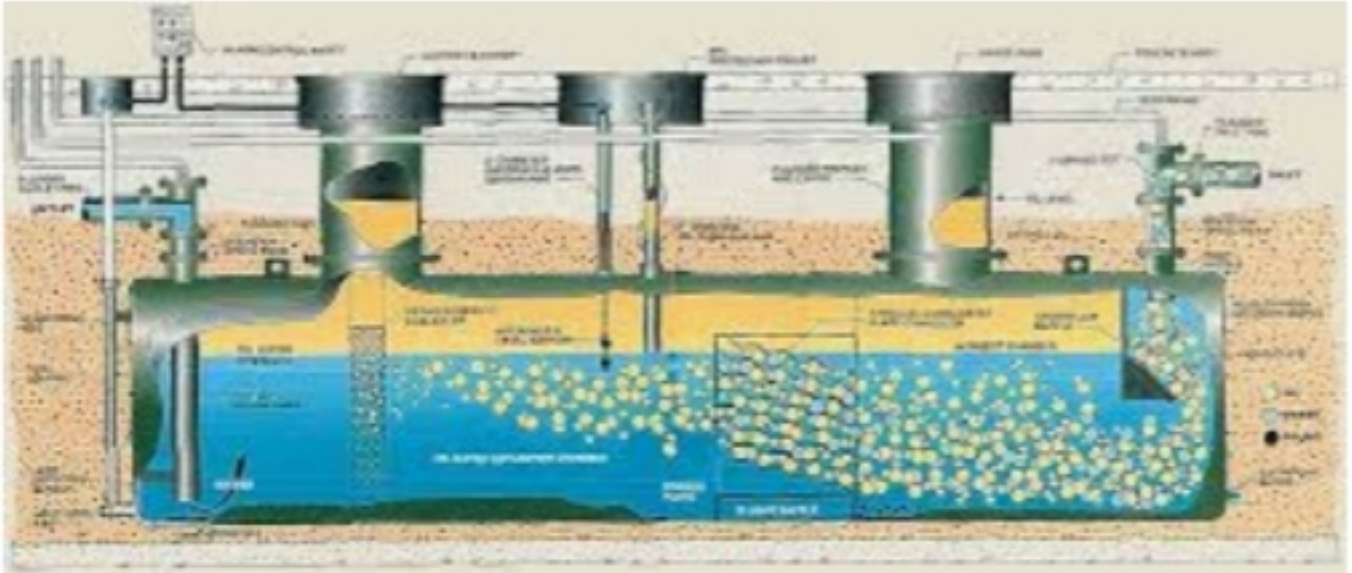
End of Email #25 with Attachment(s)

Email #26 w/ attachments

From: Vesta Kennedy
To: Public Comment
Subject: Za-20-20 Three screenshots to attach to One of Two Looks-Above Ground, sent January 18th, 12:16am
Date: Monday, January 18, 2021 12:18:37 AM

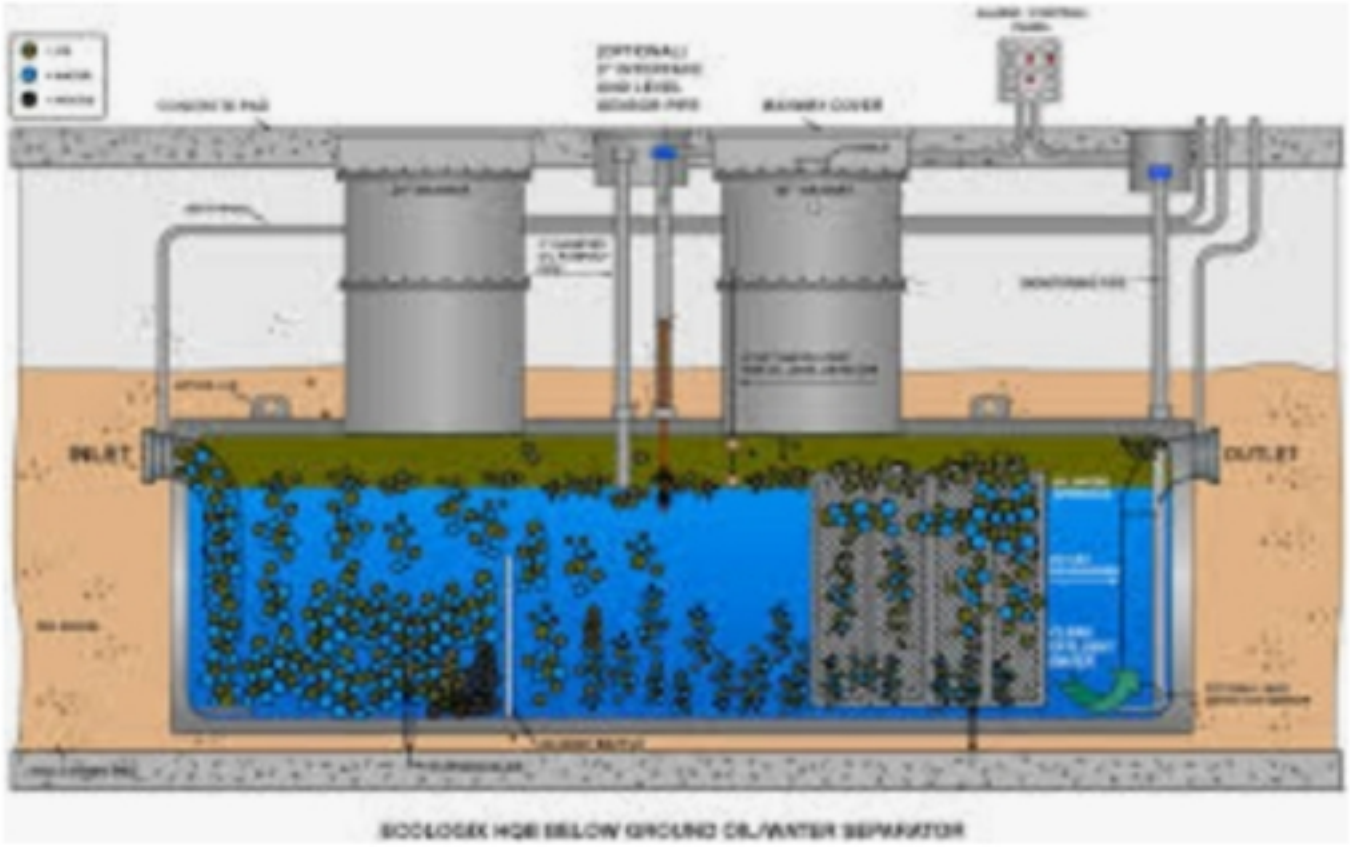
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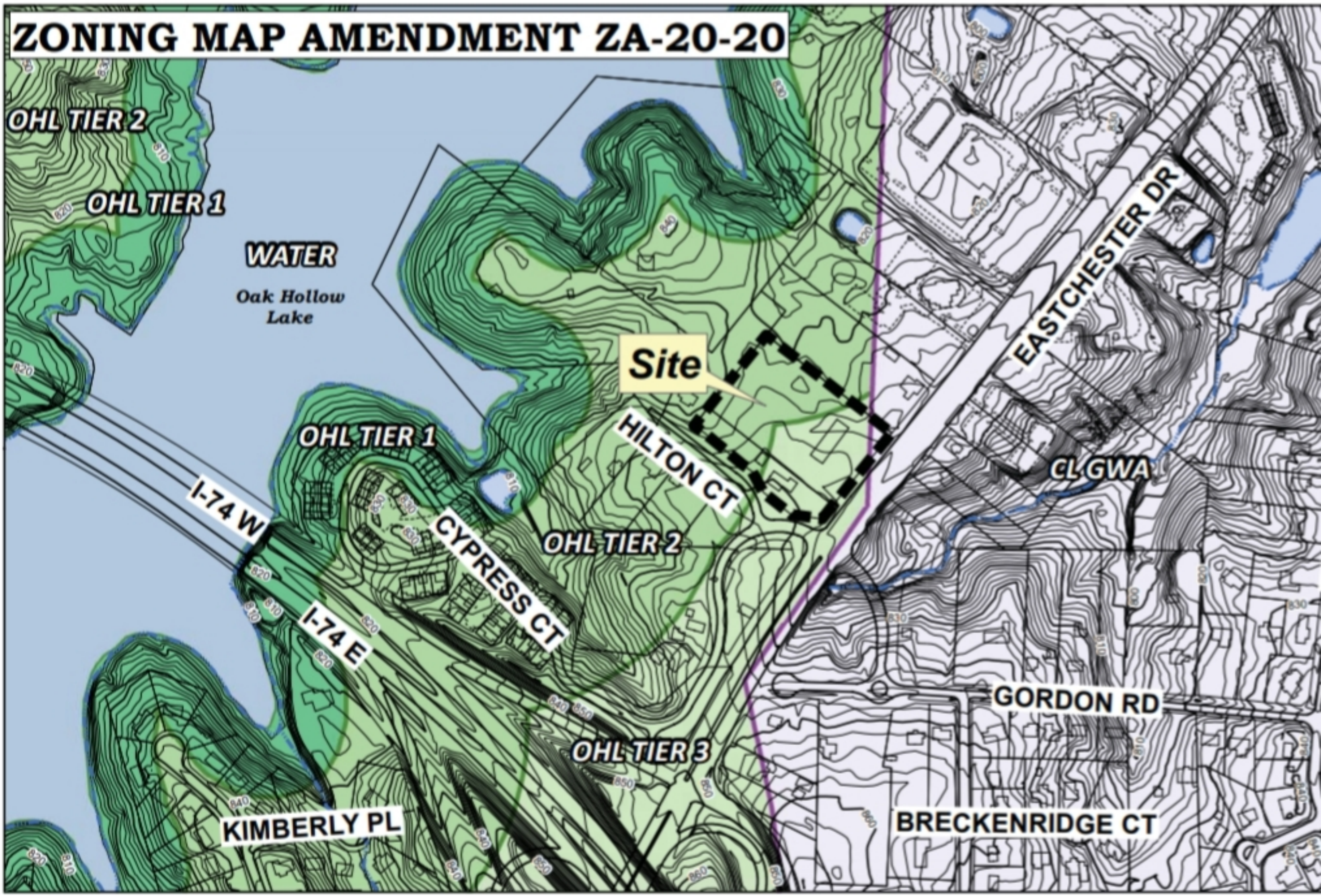
dirtyproperty.com



Below Ground Oil Wat...

ecologixsystems.com

ZONING MAP AMENDMENT ZA-20-20



Email #27

Email #27

From: Vesta Kennedy
To: Public Comment
Subject: part 2 of 2; continuation of Below Ground
Date: Monday, January 18, 2021 4:21:31 AM

I researched the Safe Water Drinking Act and learned of the recently required Source Water Protection Plan, referred to as the Source Water Resiliency and Response Plan. below please find the purpose of of this act, and note that the intent is to protect drinking water from above ground and below ground contaminants.

42 U.S.C. §300f et seq.

The Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designed for drinking use, whether from above ground or underground sources.

Here are a couple excerpts from 15A NCAC 18c .1305 (attached):

(b) The SWRRP shall include a list of potential contaminant sources (PCSs) that have potential to reach surface waters, both provided by the Department and supplemented by the water system if additional PCSs are known to exist by the supplier of water.

This proposed gas station would certainly be high on this Potential Contaminant Source list, above and below ground.

(3) within the critical area and 1,000 feet from perennial streambanks within the protected area for waters classified as WS-IV;

This proposed gas station and development is certainly within 1,000 feet of the West Fork of Deep River's intermittent and perennial stream. Seven lanes x 12 feet = 84 feet; and at an accelerated and easier path when runoff goes down the existing storm drains.
The developer has stated that this site is 1,000 feet from Oak Hollow. I'm not so sure. The interactive map available on The Point has a tool allowing the user to measure distances from one point to another. Attached please find a measurement of 409 feet from the back left corner of the site on a downhill diagonal to Critical Area Tier 1. The middle back edge of the site to the shoreline of Oak Hollow measures 795.5 feet.

by September 30, 2020 for community water systems serving more than 100,000 people;

I would like to have a copy of the SWRRP turned in for our municipality, if it is available for the public under The Freedom of Information Act. I will look into the procedure for this. The past three months have really made me acutely aware of the danger our state's safe drinking water supply is in.

Thank you for your hard work and dedication to the citizens of High Point,

Vesta Kennedy

Email # 28 with Attachment(s)

From: Vesta Kennedy
To: Public Comment
Subject: ZA-20-20 One of Two Looks-Below Ground 1 of 2
Date: Monday, January 18, 2021 5:22:38 AM
Attachments: 15a ncac 18c .1305 (1) SWRRP.pdf
distance map on diagonal from back corner of lot.pdf

Dear Mayor and Town Council,

I have felt compelled to address my concerns for the safety of the water table of Oak Hollow Lake. In looking at statutes, ordinances, rules, regulations and procedures for development on the state and local level, it came to my attention that NC made changes effective 12/31/2020. You, Mr. Wagner and Council members, voted on adopting Text Amendment 20-03 on December 9th reflecting the state's latest changes.

As I read the new procedure for Major Watershed Variances, I had a sense of (FALSE) relief knowing that the Technical Review Committee and the Board Of Adjustment would be reviewing this proposed development, should rezoning be granted. Upon approval by the BOA, this Major Watershed Variance would then pass to the North Carolina Enviromental Management Commission for yet another review before final approval.

I again had a sense of (FALSE) relief when I read High Point's Ordinances 6.2.1 and 6.2.214 . I have highlighted the applicable parts.

6.2.1. - Purpose and Intent

These watershed protection standards are established in accordance with the requirements in the North Carolina General Statutes Sections 143-214.5 through 143-214.7 related to water supply watershed protection. They are intended to regulate residential density and impervious surface cover in water supply watershed drainage areas to control non-point source water pollution and protect drinking water quality.

6.2.14. - Standards Applicable in the WCA

A.

Prohibited Uses In addition to the limitations in Table 4.1.9, Principal Use Table, the following uses are prohibited in a WCA:

1. **Any use that employs, sells, or relates to petroleum, petroleum-based products, or equipment that uses petroleum;**
2. Any use that involves or relates to chemicals, fertilizer, pesticides, explosives, or phosphorous;
3. Any use that involves or relates to the manufacture of paper, rubber, concrete, metals, or textiles;
4. Any use that relates to the collection, processing, or storage of refuse or waste products;
5. Any use that relates to or involves livestock or animal-related products or services; and
6. Any use that involves or relates to commercial, physical, or biological research.

B. **Containment Structures** Storage tanks for fuels and chemicals and associated pumping and piping allowed in the WCA shall have a spill containment system approved by the Planning and Development Director and the Fire Marshal and shall comply with the following:

1. Containment systems shall be of sufficient volume to contain 100 percent of all the tank(s) contents stored in the area and shall have a leak detection system.
2. Tanks and containment structures shall not be placed closer than 1,000 feet to the normal pool elevation of the applicable reservoir.
3. Except when abutting an LI or HI zoning district, a containment system shall be a minimum of 50 feet from the lot line.
4. Provisions shall be made to remove stormwater without removal of the product except for mistable materials.
5. Contaminated water may not be discharged to the sewer system without a permit or to a water body or to a water-course.

C. Underground Storage Tanks Except for <u>the replacement of existing tanks,</u> underground storage tanks for fuels and chemicals <u>are prohibited</u> in the WCA.

D. **Point Source Discharges**

1. No new wastewater treatment plants of any kind or expansion of any existing private wastewater facilities shall be permitted in the WCA.
2. Industrial pre-treatment facilities that prepare wastewater for discharge into a public sewer system shall be permitted in the WCA.

E. **Slopes Greater than 15 Percent and Wetlands**

1. Slopes greater than 15 percent lying adjacent to natural drainageways, intermittent streams, perennial streams, and wetlands shall remain in a natural and undisturbed condition except for road crossings, utilities, erosion control devices, and runoff control devices.
2. Dedication of these areas to the City as drainageway and open space may be required when

authorized by Section 7.1.6 F, Drainage, or any other provision in this Ordinance.

3. Where dedication is not required, a water quality conservation easement shall be recorded over wetlands and slopes greater than 15 percent.

4. Where a water quality conservation easement serves to bring 2 or more lots into compliance with WCA requirements, the TRC may require that the wetlands and slopes covered by such easements be held as common area by an owners' association.

5. The natural ground cover and natural tree canopy within a water quality conservation easement shall be preserved except when removal is authorized by the Public Services Department as part of the following:

(a) Construction or maintenance of a public utility by the City or a designee;

(b) Construction or maintenance of soil erosion and sedimentation control structures by the developer of the land, in accordance with Section 2.5.10, Land Disturbance Permit. After these structures are no longer needed, they shall be removed and the water quality conservation easement restored to a natural state;

(c) Normal maintenance by mechanical means for the removal of dead, diseased, deformed, poisonous, or noxious vegetation and pests harmful to health; and

(d) Mowing of utility areas.

6. Nothing in this subsection shall supersede the surface water buffer requirements of Section 6.2.9 C, Surface Water Buffers.

F. **Drainage**

1. Drainage within the WCA shall be provided by means of open channels, unless it is determined by the TRC that better water quality protection is provided by alternative means.

2. Drainageways shall have protected channels or remain in a natural, undisturbed state, except for road crossings, utilities, erosion control devices, runoff control devices, and desirable artificial stream bank stabilization.

3. No new development shall be allowed in a drainageway except that water dependent structures and public projects such as greenways may be allowed where no practicable alternative exists. Where these activities are allowed, they shall minimize built-upon surface area and maximize the utilization of Best Management Practices (BMP's).

4. Perennial and intermittent streams, lakes and ponds shall be protected as specified in Section 6.2.9 C, Surface Water Buffers.

G. **Density Shifting**

1. The location of development on soils and terrain most suited to protecting the water quality of water supply reservoirs is encouraged in the WCA by density shifting. The

overall density of a development utilizing density shifting shall meet the applicable WCA density and stormwater control requirements, except as modified by this sub-section. Built-upon areas within such developments shall be designed and sited to minimize stormwater runoff impact to the receiving waters, and the remainder of the tract should remain in an undisturbed or natural state.

2. Density shifting is utilized in developments having lot sizes in accordance with the minimum area permitted by the underlying zoning district or in approved conservation subdivisions. Through density shifting, developments may increase the maximum permitted residential densities otherwise established in this Ordinance if the development rights attached to acreage located within a tier are transferred within the same tract to an adjacent tier located farther from the water supply reservoir. Such transfer shall permit an additional number of dwelling units in the receiving tier. This addition is calculated by adding the density or dwelling units transferred from the adjacent tier to the density or dwelling units permitted in the receiving tier. The dwelling units permitted by acreage transfer from an adjacent tier shall be in addition to the number of dwelling units otherwise permitted in the receiving tier, but in no case shall the density allowed by the underlying zoning district be exceeded.

H. **Public Sanitary Sewer Required** Except for development in the Randleman Lake WCA constructed under the low density option, all new development in a WCA shall be served by public sanitary sewer.

THE PROCEDURES IN PLACE FOR MAJOR WATERSHED VARIANCES AND THESE PROTECTIONS OF Oak Hollow Lake's CRITICAL WATERSHED AREAS will NOT apply.

This proposed development will NOT be reviewed by the TRC, the BOA, nor the NCEMC. Landowners should NOT be allowed to grade their land in order to circumvent vital and important public water safety statutes. Regardless of what happens on the surface the water table is still there and so is our primary source of drinking water.

Attachment to Email #28

15A NCAC 18C .1305 SOURCE WATER PROTECTION PLANNING

(a) In compliance with G.S. 130A-320, every supplier of water operating a public water system treating and furnishing water from a surface water source shall create and implement a Source Water Protection Plan. For purposes of this Rule, the Source Water Protection Plan required by G.S. 130A-320 shall be referred to as a Source Water Resiliency and Response Plan (SWRRP).

(b) The SWRRP shall include a list of potential contaminant sources (PCSs) that have potential to reach surface waters, both provided by the Department and supplemented by the water system if additional PCSs are known to exist by the supplier of water. The listed PCSs will be located in the following areas as defined in Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina, 15A NCAC 02B .0200, which is hereby incorporated by reference, including subsequent amendments and editions:

(1) within the entire watershed for waters classified as WS-I;
(2) within the critical area and 1,000 feet from perennial streambanks within the protected area for waters classified as WS-II and WS-III;
(3) within the critical area and 1,000 feet from perennial streambanks within the protected area for waters classified as WS-IV;
(4) within ½ mile from the normal pool elevation in which the intake is located, or to the ridge line of the watershed, whichever comes first, for a reservoir within waters classified as WS-V; and
(5) within ½ mile, measured as a straight line, upstream from and draining to the intake located directly in the stream or river, or to the ridge line of the watershed, whichever comes first, for a direct-stream intake within waters classified as WS-V.

(c) Any community water system subject to this Rule shall certify completion and implementation of a SWRRP by December 31, 2022. The SWRRP shall contain the following elements:

(1) identification and contact information of personnel responsible for emergency management, including water system, local, State, and federal emergency response personnel;
(2) an evaluation of a water system's ability to take the following actions:
    (A) close its water intake(s) in the event of contamination, including a determination of the duration of time the water intake(s) can remain closed while maintaining positive water pressure within the distribution system;
    (B) isolate or divert contaminated water from its surface water intake(s);
    (C) reduce demand by implementing conservation measures during a contamination event. Water Shortage Response Plans may be referenced to fulfill this requirement for water systems required to prepare a Water Shortage Response Plan under 15A NCAC 02E .0607, which is hereby incorporated by reference, including subsequent amendments and editions; and
    (D) meet demand via alternate sources of supply in the event of contamination or loss of its primary water source.
(3) identification of foreseeable natural and human-caused emergency events, including water shortages and outages;
(4) a description of the emergency response strategies for each identified shortage or outage event and each potential contamination event associated with PCSs identified and listed in Paragraph (b) of this Rule;
(5) standard operating procedures to close intakes and switch to an alternate intake during a contamination event, including procedures that outline exercises designed to practice closure and switching of the intake(s);
(6) a description of public notification procedures; and
(7) identification and evaluation of all facilities and equipment that upon failure would result in a water outage or violations of this Subchapter.

(d) For community water systems that are subject to this Rule and also required to complete a Risk and Resilience Assessment and an Emergency Response Plan under Section 2013 of America's Water Infrastructure Act of 2018 (AWIA), the system's Risk and Resilience Assessment and Emergency Response Plan created to comply with AWIA may be referred to as a SWRRP and used to satisfy the requirements of this Rule, if the PCS list was compiled in accordance with Paragraph (b) of this Rule. The schedule for certifying completion and implementation of the SWRRP pursuant to this Paragraph shall be as follows:

(1) by September 30, 2020 for community water systems serving more than 100,000 people;
(2) by June 30, 2021 for community water systems serving 50,000 to 99,999 people; and
(3) by December 30, 2021 for community water systems serving 3,301 to 49,999 people.

(e) Non-transient, non-community water systems subject to this Rule shall certify completion and implementation of a SWRRP by December 31, 2022. The SWRRP shall contain the following elements:

(1) identification and contact information of personnel responsible for emergency management, including water system, local, State, and federal emergency response personnel; and

(2) an evaluation of a water system's ability to take the following actions:

(A) close its water intake(s) in the event of contamination, including a determination of the duration of time the water intake(s) can remain closed while maintaining positive water pressure within the distribution system;

(B) isolate or divert contaminated water from its surface water intake(s);

(C) reduce demand by implementing conservation measures during a contamination event; and

(D) meet demand via alternate sources of supply in the event of contamination or loss of its primary water source.

(f) Any public water system that begins treating and furnishing water from a surface water source on or after December 31, 2022 shall create and implement a SWRRP that satisfies the requirements of this Rule prior to the commencement of its operations.

(g) Any public water system required to create and implement a SWRRP in accordance with this Rule shall review and update its SWRRP at five-year intervals from its creation deadline, as specified in Paragraph (c), (d), (e), or (f) of this Rule.

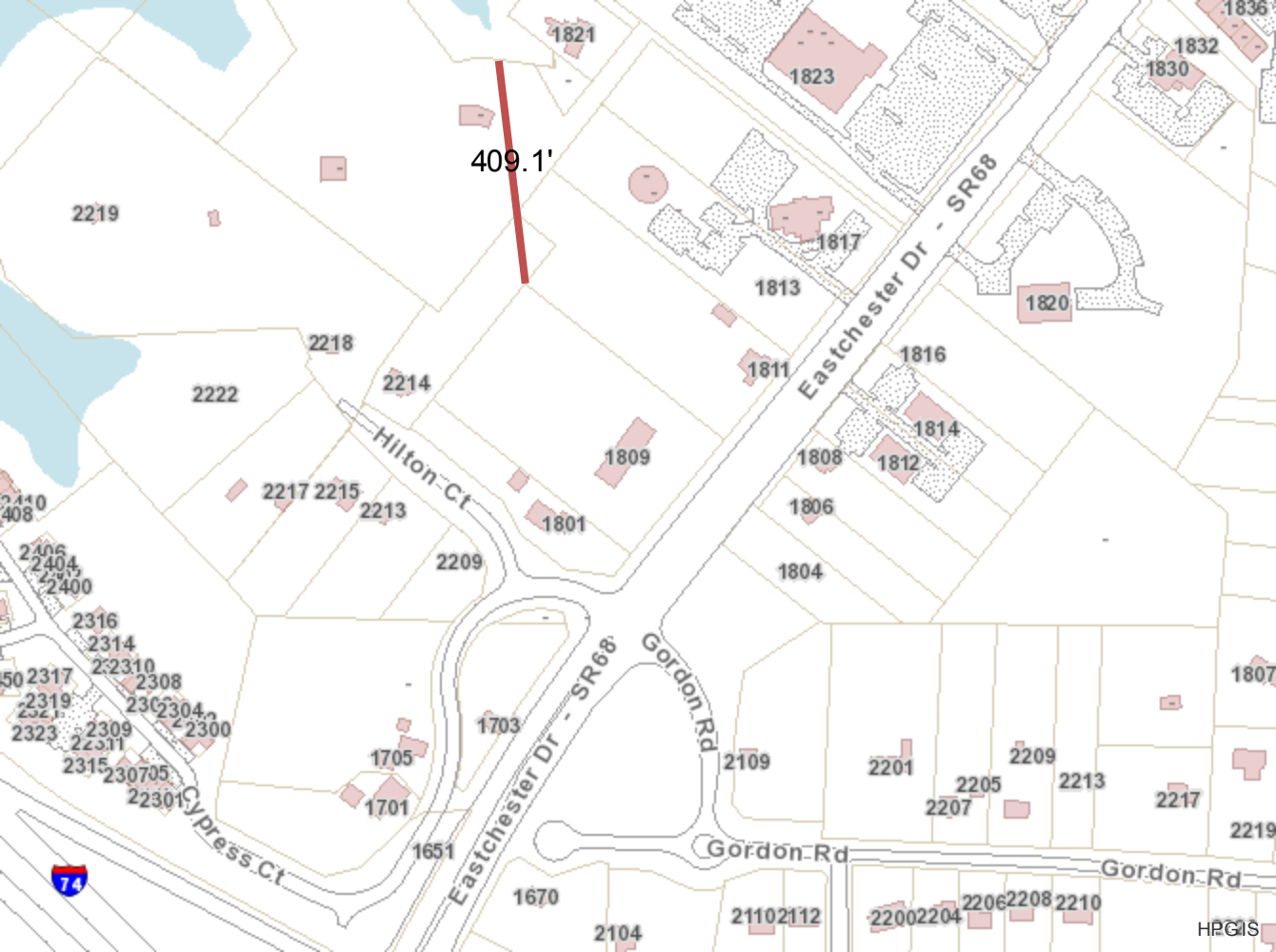
(h) The SWRRP and any associated documentation used in its creation and implementation shall be available for review by Department staff upon request.

(i) The supplier of water shall certify that a SWRRP has been created and implemented, and that the water system's governing body has been advised of the SWRRP creation and implementation. The certification shall be submitted to the Department by the deadline specified in Paragraphs (c), (d), (e), or (f) of this Rule.

(j) The supplier of water shall certify that a SWRRP has been revised and that the water system's governing body has been advised of the revision. The certification shall be submitted to the Department by the revision deadline specified in Paragraph (g) of this Rule.

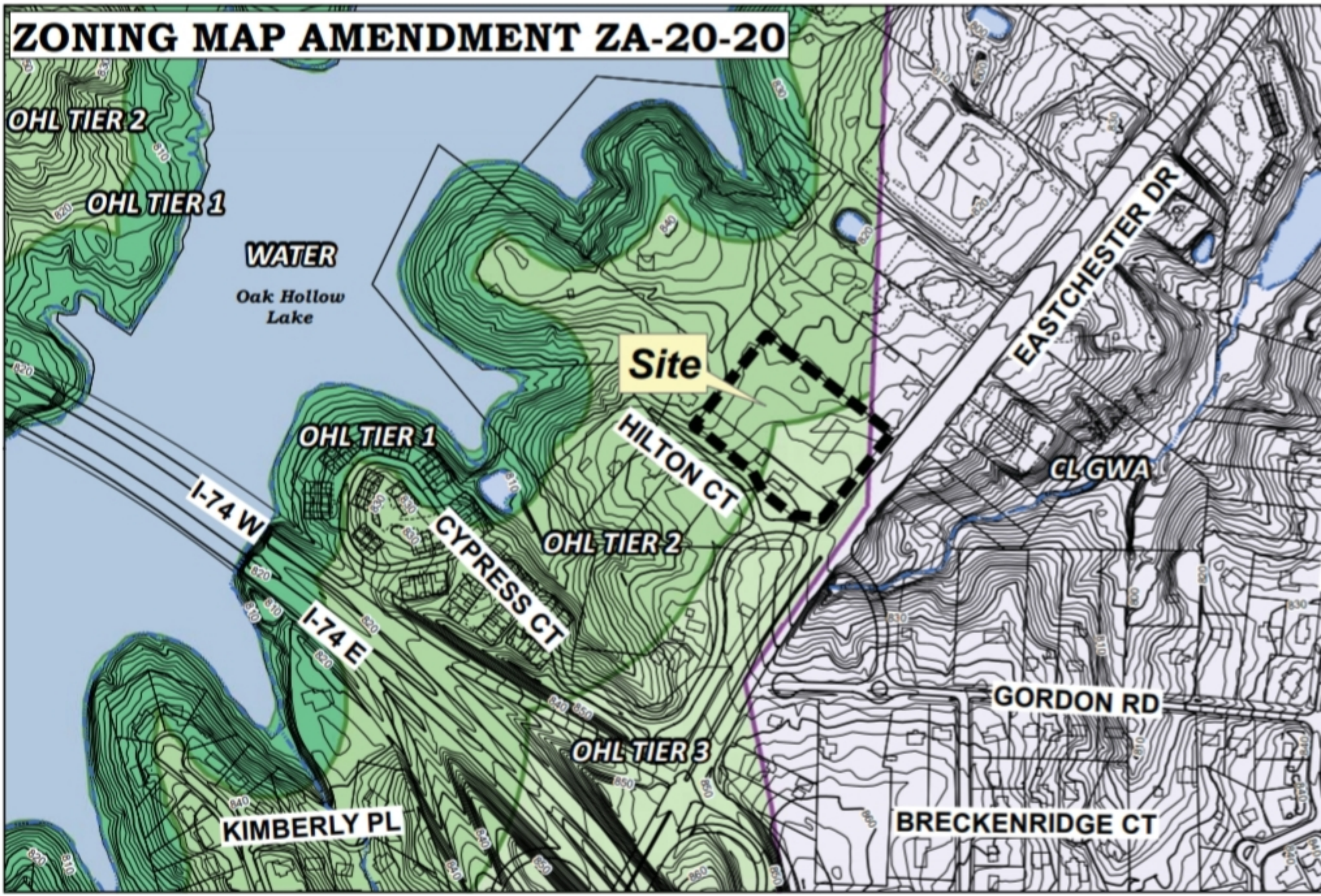
History Note: *Authority G.S. 130A-315; 130A-320(c);*
Eff. January 1, 2019;
Amended Eff. April 1, 2020.

Attachment to Email #28


409.1'
1821
1823
1836
1832
1830
2219
1817
1813
1820
Eastchester Dr - SR68
1816
1811
2218
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2222
1814
1809
1808
1812
Hilton Ct
2217
2215
2213
1806
1801
1804
2209
2316
2314
2310
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Attachment to Email #28

ZONING MAP AMENDMENT ZA-20-20



EMAIL #29 with Attachment(s)

Lisa Vierling

From: Vesta Kennedy <rollovernclover@aol.com>
Sent: Sunday, January 31, 2021 6:44 PM
To: Public Comment
Subject: ZA-20-20 EPA's 8 Tools of Watershed Protection in Developing Areas
Attachments: new_eighttools.pdf

Dear Mayor and Town Council,

Attached please find a distance learning module published by the EPA. It cites 8 tools to be used in Watershed Protection in Developing Areas.

The very first and perhaps the most important is Land Use Planning. Here are a few key points:

1. **Land Use Planning**

Since **impervious cover** has such a strong influence on Watershed quality, a watershed manager must critically analyze the degree and location of future development (and impervious cover) that is expected in a watershed. Consequently, **land use planning ranks as perhaps the single most important watershed protection tool.**

The basic goal of the watershed plan is to apply land use planning techniques to redirect development, preserve sensitive areas, and maintain or reduce the impervious cover within a given watershed.

Streams degraded by high percentages of impervious surface in their watersheds are often prone to larger and more frequent floods (which cause property damage as well as ecological harm) and lower base flows.

Classification of subwatersheds by the amount of impervious cover is one step toward determining land use planning goals. Although presence of vegetated streamside buffer zones or wetlands can help counteract impervious cover impacts, a watershed exceeding 10% impervious cover will generally not be able to support a high quality stream system. In this particular classification system, subwatersheds with impervious cover of less than 10% are classified as sensitive. **A subwatershed with 10 - 25% impervious cover is classified as a degraded or impacted system. Any stream's watershed having greater than 25% impervious is classified as a non-supporting stream with characteristics such as eroding banks, poor biological diversity, and high bacterial levels.**

Watershed protections are becoming increasingly important on a federal, state, and local level. The Zoning and Planning Staff and Commission made this clear when they cited Watershed Protection as one of the reasons they do NOT recommend this request to change zoning. Critical Watershed Areas of Oak Hollow Lake and the General Watershed Area of City Lake will both be adversely effected by this rezoning. Petroleum is clearly banned in CWAs. The perennial stream of the West Fork of Deep River is clearly sensitive and fragile. Maintaining the current zoning along this portion of the Eastchester Corridor will prevent the anticipated domino effect of other landowners requesting their properties be rezoned too. The increased impervious surface area of this site and the sites that will follow would be disastrous for the West Fork of Deep River, making it more prone to larger and more frequent floods.

2. Land Conservation

" Five types of land may need to be conserved in a subwatershed:

- **Critical habitats;**
- **Aquatic corridors;**
- **Hydrologic reserve areas;**

- **Water pollution hazards; and**
- **Cultural areas.**

Critical habitat: Critical habitats can be defined as the essential spaces for plant and animal communities or populations. Examples of critical habitats include tidal wetlands, freshwater wetlands, large forest clumps, springs, spawning areas in streams, habitat for rare or endangered species, potential restoration areas, native vegetation areas, and coves.

Aquatic Corridor : The aquatic corridor is the area where land and water meet. **This can include floodplains, stream channels**, springs and seeps, small estuarine coves, littoral areas, stream crossings, shorelines, riparian forest, caves, and sinkholes.

Hydrologic Reserve: Hydrologic reserves are any undeveloped areas responsible for maintaining the **predevelopment hydrologic response** of a watershed. The three most common land uses are crops, forest, and pasture. From a hydrologic standpoint, forest is the most desirable land use followed by pasture, then crops.

Water Pollution Hazard: This conservation area is defined as any land use or activity that is expected to create a relatively high risk of potential water pollution. Examples of water pollution hazards may include septic systems, landfills, hazardous waste generators, above or below ground tanks, land application sites, impervious cover, stormwater "hotspots", and road and salt storage areas. One way to avoid possible contamination to waterways is to locate such facilities at a designated distance away from the waterbody in order to decrease the chance of contamination.

Cultural Areas: Cultural areas provide a sense of place in the landscape and are important habitats for people. Examples of conservation areas include historic or archeologic sites, trails, parkland, scenic views, water access, bridges, and recreational areas.

This rezoning request clearly is detrimental to the Land Conservation tool for watershed protection, underground and above. Please note the high risk of water pollution, the hydrologic response will not be predevelopment standards, and the aquatic corridor and critical habitats will be negatively impacted. The EPA suggests to "locate such facilities at a designated distance away."

3. Aquatic Buffers

Its (buffer) primary use is to physically protect and separate a stream, lake, or wetland from a wide variety of water pollutants and habitat impacts that can arise from too much land use too close to the water. For streams, a network of buffers act as a right-of-way during floods and sustains the integrity of stream ecosystems and habitats. Technically, buffers are one type of land conservation area, but they are especially important because they:

- regulate light and temperature conditions, improving the habitat for aquatic plants and animals.
- **are effective in removing sediment, nutrients, and bacteria from stormwater and groundwater**
- help to stabilize and protect the streambanks.

A watershed manager faces many tough questions, such as the ones below, when designing a buffer program for a subwatershed.

- How much of the aquatic corridor can be protected by buffers?
- How should buffers be managed and crossed?
- **Is restoration or better stewardship possible along an aquatic corridor that has already been developed?**
- How will the buffer network be managed?
- Long-term maintenance?
- **How much pollutant removal is to be expected by the buffer network?**

The perennial stream of the West Fork of Deep River has layers of protection; has the developer recognized its need for protection? Will volatile petroleum be removed? How about the groundwater surrounding this site, and Oak Hollow's water table sitting helpless directly below petroleum filled Underground Storage Tanks?

4. Better Site Design

Three categories of better site design that have special merit for watershed protection include:

- Residential streets and parking lots;
- Lot development; and,
- Conservation of natural areas.

Residential Street and Parking Lots: Approximately 65% of total impervious cover in the landscape is "habitat for cars," in the form of parking lots, roads, and driveways. Much of this impervious cover is often unnecessary and can be minimized at every stage of parking lot and residential street planning and design.

Lot Development: "Habitat for people"

Conservation of Natural Areas: The goals are to protect all bodies of water and existing vegetation and minimize clearing.

When using the better site design tool, a watershed manager should be realistic about how much impervious cover can be reduced through better site design in a subwatershed. While better site designs can reduce the impacts of individual development projects, the cumulative impact of too much development can still degrade water resources, no matter how well each site is designed.

Will the consideration of a better site design happen on this project? What is the feasibility of lowered impervious surface when the rezoning request purpose is to build a convenience store/gas station, carwash and a fast food restaurant with a drive thru?

5. Erosion and Sediment Control

Perhaps the most destructive stage of the development cycle is the relatively short period when vegetation is cleared and a site is graded to create a buildable landscape. The potential impacts to receiving waters are particularly severe at this stage. Trees and topsoil are removed, soils are exposed to erosion, natural topography and drainage patterns are altered, and sensitive areas are often disturbed.

There are numerous techniques to provide erosion and sediment control (ESC) and the most effective is to minimize clearing. Some examples include regulations that require exposed soil to be stabilized within 7 to 10 days. Other common methods of erosion and sediment control include sedimentation basins and silt fences. Unfortunately, **without proper installation and maintenance, erosion and sediment controls are ineffective.**

- **Is a higher level of ESC practice or more frequent inspection needed to protect my subwatershed?**
- **How well do current ESC programs reinforce other watershed protection tools?**
- What incentives can be used to minimize the amount of clearing at development sites?

What is the plan for Erosion and Sedimentation Control? Who will be contracted to perform this work? How about offsite sedimentation control? Oak Hollow, City Lake and 108,000 citizens deserve to be assured that this phase of development will happen quickly, properly and effectively. What about the next landowner who requests a zoning change?

6.Stormwater Management Practices

A watershed manager needs to make careful choices about what stormwater management practices should be installed in the subwatershed to compensate for the hydrological changes caused by new and existing development. Stormwater management practices are used to delay, capture, store, treat, or infiltrate stormwater runoff.

While specific design objectives for stormwater management practices are often unique to each subwatershed, the general goals for stormwater management practices are often the same, and include:

- **maintain groundwater quality and recharge;**
- **reduce stormwater pollutant loads;**
- **protect stream channels;**
- **prevent increased overbank flooding; and**
- **safely convey extreme floods**

.There are numerous structural stormwater management techniques for controlling stormwater quantity and quality. These five practices can be categorized into five broad groups, including:

-
  - ponds;
  - wetlands;
  - infiltration;
  - filtering systems;
  - grassed channels.

While many advances have been made recently in innovative stormwater management designs, their ability to maintain resource quality in the absence of other watershed protection tools is limited. In fact, stormwater management practices designed or located improperly can sometimes cause more severe secondary environmental impacts than if they were not installed at all.

What is the long range plan to make sure water quality standards are not violated? Already the developer is asking that we turn a blind eye to the clear ban on petroleum in Critical Watershed Areas; will DEMLR permits be standard or industrial? So many questions and so many unknown factors...

7. Non-Stormwater Discharges

This tool is concerned with how wastewater and other non-stormwater flows are treated and discharged in a watershed.
Most non-stormwater discharges are strictly governed under the National Pollutant Discharge Elimination System (NPDES) and require a state or federal permit. The three basic categories of non-stormwater discharges are septic systems, sanitary sewers, and other miscellaneous non-stormwater discharges.

1) Septic Systems, or on-site sewage disposal systems, are used to treat and discharge wastewater from toilets, wash basins, bathtubs, washing machines, **and other water consumptive items that can be sources of high pollutant loads**

2) Sanitary sewers collect wastewater in a central sewer pipe and send it to a municipal treatment plant. Ideally, this permits more efficient collection of wastewater, and often higher levels of pollutant reduction .In addition, **not all sanitary sewer conveyance and treatment systems are capable of achieving high levels of pollutant reduction.** Examples include:

- package treatment plants;
- combined sewer overflows;
- sanitary sewer overflows; and,
- illicit or illegal connections to the storm drain network.

3) Other non-stormwater discharges. Wastewater is not the only non-stormwater discharge possible in a watershed. A planner should also investigate whether other non-stormwater discharges are a factor in the subwatershed. Examples include:

- **industrial NPDES discharges;**
- urban "return flows" (discharges caused by activities such as car washing and watering lawns);
- **water diversions;** and,
- runoff from confined animal feeding lots

One of the first priorities for a watershed manager is to conduct a quick inventory of the nature and extent of non-stormwater discharges in the subwatershed. If non-stormwater discharges appear to be a problem, a watershed manager may need to conduct a subwatershed survey. This usually involves a survey of the largest or most common wastewater discharges within the subwatershed, with a strong emphasis on how wastewater is actually conveyed within the subwatershed.

Again the questions need to be asked, What is the long range plan to make sure water quality standards are not violated? What will be done to protect the West Fork of Deep River, our residents of Foxwood Meadows, and 108,000 citizens that rely on High Point for clean drinking water?

8. Watershed Stewardship Programs

Once a subwatershed is developed, communities still need to invest in ongoing watershed stewardship. The goals of watershed stewardship are to increase public awareness about watershed management efforts and to get local landowners' participation in the process to ensure stewardship on their own property and homes.

There are six basic programs that watershed managers should consider to promote greater watershed stewardship:

- **Watershed advocacy**
- **Watershed education**
- **Watershed maintenance**
- **Pollution prevention**
- **Indicator monitoring**
- **Watershed restoration**

Watershed Advocacy. Advocacy of watershed protection is important because it can lay the foundations for public support and greater watershed stewardship.
Watershed Education: A basic premise of watershed stewardship is that we must learn two things - that we all live in a watershed and that we understand how to live within it.
Watershed Maintenance: Most watershed protection tools require maintenance if they are to properly function over the long run. Some of the most critical watershed "maintenance" functions include management of conservation areas and buffer networks, and maintenance of stormwater practices, septic systems, and sewer networks.
Pollution Prevention: Some businesses may need special training on how to manage their operations to prevent pollution and thereby protect the watershed. In some cases, local or state government may have a regulatory

responsibility to develop pollution prevention programs for certain businesses and industrial categories (e.g., under industrial or municipal NPDES permits).

Watershed Indicator Monitoring: An ongoing stewardship responsibility is to monitor key indicators to track the health of the watershed...

Monitoring water quality can include assessing flow, the quantity and quality of aquatic biota, pollutant levels, and many other characteristics as appropriate to the type of water body and its problems.

Watershed Restoration: The last phase of watershed stewardship is to restore or at least rehabilitate streams that have been degraded by past development. Urban watershed restoration is an emerging art and science that seeks to remove pollutants and enhance habitat to restore urban streams. The urban watershed restoration process should include three main themes: stormwater retrofitting, source control through pollution prevention, and stream enhancement.

The 9-0 recommendation of Zoning and Planning Staff and Commission to not approve this rezoning request is clear, as are their reasons. There is a lot of talent, dedication, education and experience within our city. The topographical restraints of this site are problematic for both Oak Hollow Lake and City Lake. Should you, the Town Council and the Mayor, decide to approve this request, please consider ordering an environmental impact study for Watershed Protection and an impervious surface study to make sure the frequency and intensity of flooding of Foxwood Meadows will not increase. A Traffic Impact Analysis has been required, why not for these other important public safety issues?

Remember, Land Use Plans and Zoning are the NUMBER ONE tool the EPA states that municipalities have for Watershed Protection.

As always,
Thank you for your time and consideration,
Vesta Kennedy

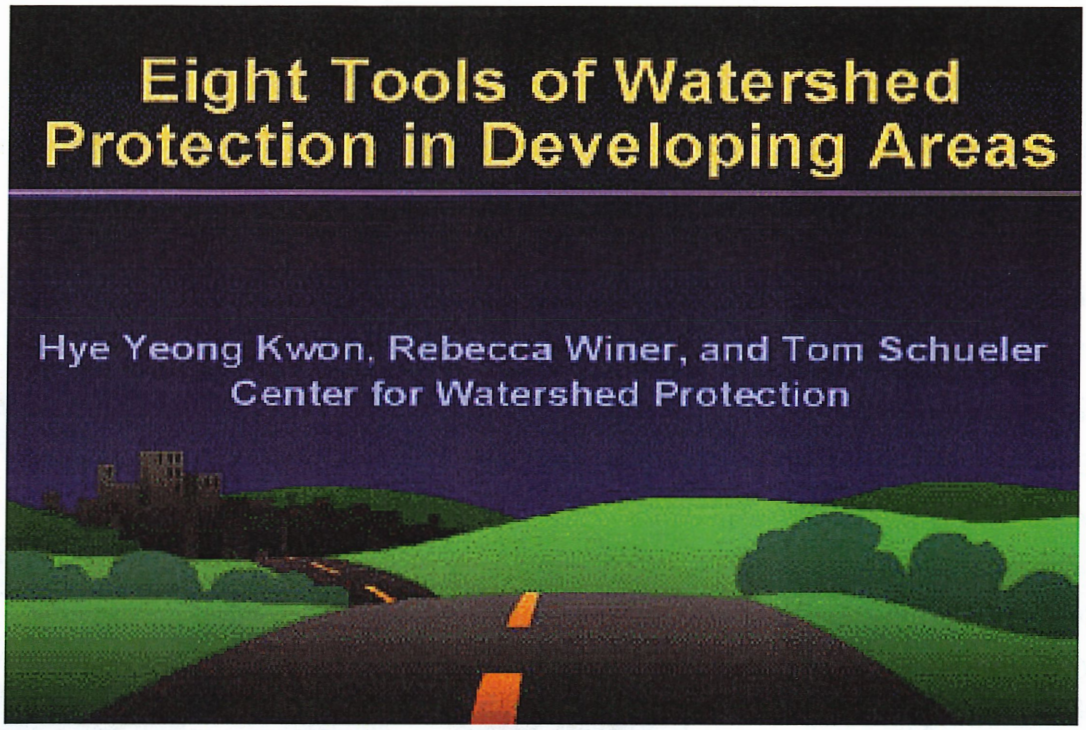
Attachment to Email #29

U.S. Environmental Protection Agency

Watershed Academy Web

Distance Learning Modules on Watershed Management

http://www.epa.gov/watertrain



NOTICE: This PDF file was adapted from an on-line training module of the EPA's ***Watershed Academy Web***, found at http://www.epa.gov/watertrain. To the extent possible, it contains the same material as the on-line version. Some interactive parts of the module had to be reformatted for this noninteractive text presentation. A self-test is included at the end of the file. Underlined terms throughout this module appear in the **glossary** at the end of the file.

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Introduction

This module outlines a watershed protection approach that applies eight tools to protect or restore aquatic resources in an urbanized or developing watershed. It describes the nature and purpose of the eight watershed protection tools, outlines some specific techniques for applying the tools, and highlights some key choices a watershed manager (used here as a catch-all term for any persons, agencies or organizations who contribute to managing watersheds) should consider when applying or adapting the tools within a given watershed. Underlined terms in this narrative are defined in the glossary at the end of this module.

Links to non-EPA sites do not imply any official EPA endorsement of or responsibility for the opinions, ideas, data, or products presented at those locations, or guarantee the validity of the information provided. Links to non-EPA servers are provided solely as a pointer to information on topics related to environmental protection that may be useful to EPA staff and the public.

The eight tools are (Figure 1):

Tool 1. Land Use Planning

Tool 2. Land Conservation

Tool 3. Aquatic Buffers

Tool 4. Better Site Design

Tool 5. Erosion and Sediment Control

Tool 6. Stormwater Best Management Practices (see Glossary on page 24)

Tool 7. Non-Stormwater Discharges

Tool 8. Watershed Stewardship Programs



Figure 1

Watershed protection is about making choices about what tools to apply and in what combination. The eight watershed protection tools roughly correspond to the stages of the development cycle from initial land use planning, site design, and construction through home ownership. As a result, a watershed manager will generally need to apply some form of all eight tools in every watershed to provide comprehensive watershed protection. The tools, however, are applied in different ways depending on what type of water resource is being protected. Each of these tools is an essential element of a comprehensive watershed protection approach and their goal is to provide local communities with a realistic approach for maintaining a quality environment for future generations.

Tool 1: Land Use Planning

Since impervious cover has such a strong influence on watershed quality, a watershed manager must critically analyze the degree and location of future development (and impervious cover) that is expected in a watershed (Figure 2). Consequently, land use planning ranks as perhaps the single most important watershed protection tool. When preparing a watershed plan, a watershed manager needs to:

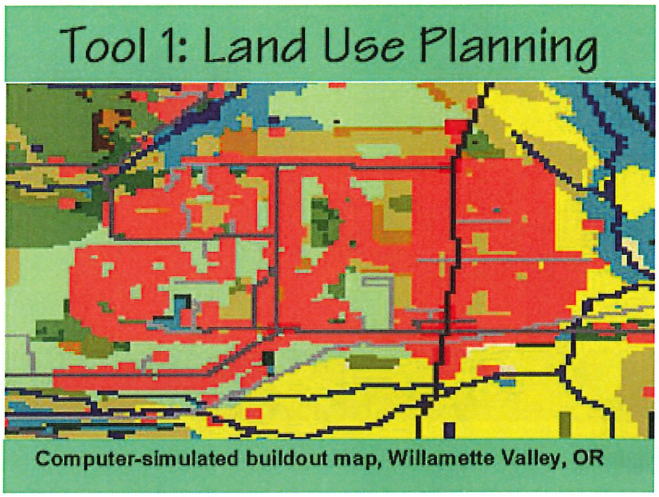
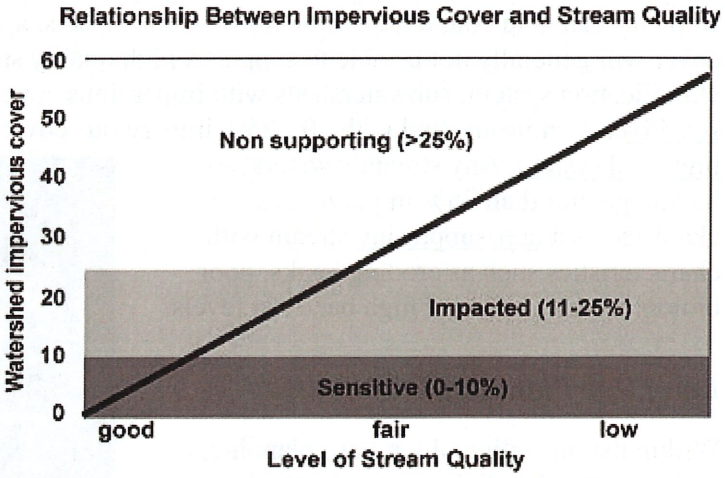


Figure 2

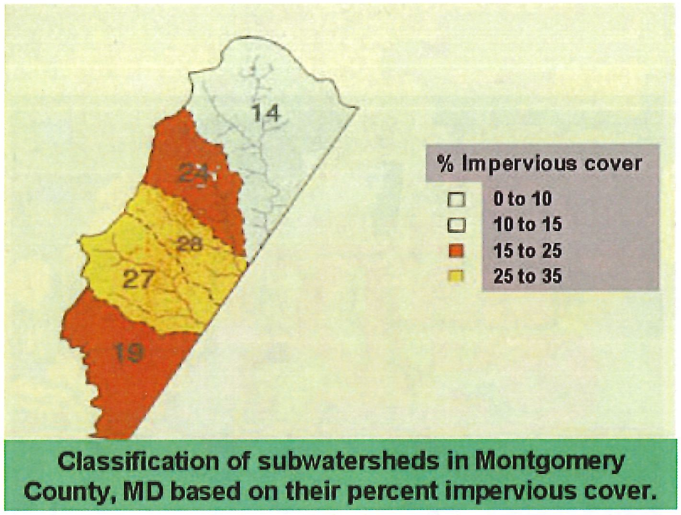
- Predict the impacts of future land use change on water resources.
- Obtain consensus on the most important water resource goals in the watershed.
- Develop a future land use plan that can help meet these goals.
- Select the most acceptable and effective land use planning technique to reduce or shift future impervious cover.
- Select the most appropriate combination of other watershed protection tools to apply to individual subwatersheds.
- Devise an ongoing management structure to adopt and implement the watershed plan.

Land use planning is best conducted at the subwatershed scale, where it is recognized that stream quality is related to land use and consequently impervious cover (Figure 3). One of the goals of land use planning is to shift development toward subwatersheds that can support a particular type of land use and/or density. The basic goal of the watershed plan is to apply land use planning techniques to redirect development, preserve sensitive areas, and maintain or reduce the impervious cover within a given watershed.



Source: Schueler, T. 1994. The Importance of Imperviousness. In: Watershed Protection Techniques 1(3):100-111.

Figure 3



Classification of subwatersheds in Montgomery County, MD based on their percent impervious cover.

Figure 4

Understanding the concept of impervious cover is essential to understanding one of the biggest ways that urbanization impacts our streams. Impervious cover is defined as the sum total of all hard surfaces within a watershed including rooftops, parking lots, streets, sidewalks, driveways, and surfaces that are impermeable to infiltration of rainfall into underlying soils/groundwater. Impervious cover changes the natural landscape and is a major influence on aquatic resources because instead of allowing precipitation to permeate the ground, it runs off. Generally the more impervious surface there is in a watershed, the less the amount of groundwater recharge, plus the more runoff and related erosion in streambeds from greater flow. Further, studies show a direct correlation between the percentage of impervious cover in a watershed and the level of degradation to aquatic organisms. Streams degraded by high percentages of impervious surface in their watersheds are often prone to larger and more frequent floods (which cause property damage as well as ecological harm) and lower base flows (which degrades or eliminates fish and other stream life, as well as reducing the aesthetics of the stream). Impervious surfaces also raise the temperature of runoff, which reduces dissolved oxygen in the stream, harms some gamefish populations, and promotes excess algal growth.

Classification of subwatersheds by the amount of impervious cover (Figure 4) is one step toward determining land use planning goals. Although presence of vegetated streamside buffer zones or wetlands can help counteract impervious cover impacts, a watershed exceeding 10% impervious cover will generally not be able to support a high quality stream system. In this particular classification system, subwatersheds with impervious cover of less than 10% are classified as sensitive. A subwatershed with 10 - 25% impervious cover is classified as a degraded or impacted system. Any stream's watershed having greater than 25% impervious is classified as a non-supporting stream with characteristics such as eroding banks, poor biological diversity, and high bacterial levels.

Land Use Planning Techniques

Within the discipline of land use planning, a wide variety of techniques can be used to manage land use and impervious cover in subwatersheds (Figure 5):



Figure 5

Watershed-based Zoning: This technique is the foundation of a land use planning process using subwatershed boundaries as the basis for future land use decisions. Watershed based zoning involves defining existing watershed conditions, measuring current and potential future impervious cover, classifying subwatersheds based on the amount of future imperviousness, and most importantly modifying master plans and zoning to shift the locations and density of future development to the appropriate subwatershed management categories (Figure 6). A watershed based zoning approach should include the following nine steps:

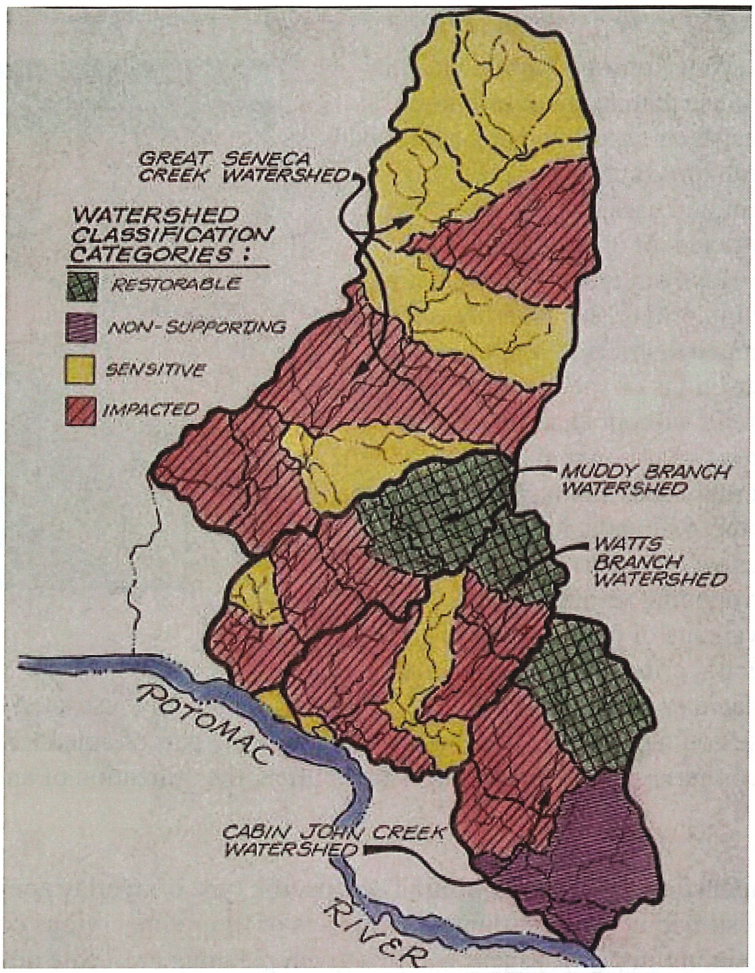


Figure 6

1. Conduct a comprehensive stream inventory.
2. Measure current levels of impervious cover.
3. Verify impervious cover/stream quality relationships.
4. Project future levels of impervious cover.
5. Classify subwatersheds based on stream management "templates" and current impervious cover.
6. Modify master plans/zoning to correspond to subwatershed impervious cover targets and other management strategies identified in Subwatershed Management Templates.
7. Incorporate management priorities from larger watershed management units such as river basins or larger watersheds.
8. Adopt specific watershed protection strategies for each subwatershed.
9. Conduct long term monitoring over a prescribed cycle to assess watershed status.

Overlay Zoning (Figure 7): This land use management technique consists of superimposing additional regulatory standards, specifying permitted uses that are otherwise restricted, or applying specific development criteria onto existing zoning provisions. Overlay zones are mapped districts that place special restrictions or specific development criteria without changing the base zoning. As shown in the maps at left, overlay zones can also be created to protect wetlands, forests, historic sites, or even barrier islands and their surrounding resources. The advantage of overlay zones is that specific criteria can be applied to isolated areas and overlay districts are not necessarily restricted by the limits of the underlying base zoning. An overlay zone may take up only part of an underlying zone or may even encompass several underlying zones. Often, the utilization of an overlay zone is optional.

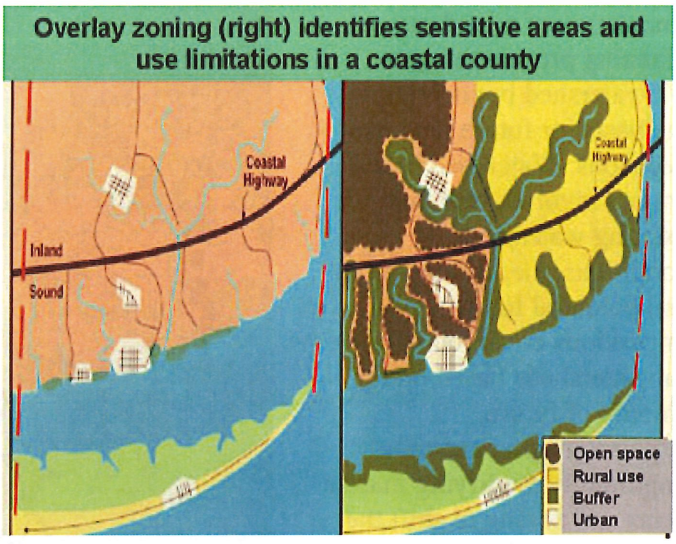


Figure 7

Impervious Overlay Zoning: This specific type of overlay zoning limits future impervious area by estimating the environmental impacts of future impervious cover and setting a limit on the maximum imperviousness within a given planning area. Site development proposals are then reviewed in the context of an imperviousness cap. Subdivision layout options must then conform to the total impervious limit of the planning area.

Performance Zoning: This technique is designed to ensure an acceptable level of performance within a given zoning district such as providing a certain open space ratio, an impervious area target, or a desirable density. Performance zoning is a flexible approach that has been employed in a variety of fashions in several different communities across the country. Some performance factors include: traffic or noise generation limits, lighting requirements, stormwater runoff quality and quantity criteria, protection of wildlife and vegetation, and even architectural style criteria.

Urban Growth Boundaries: This planning technique establishes a dividing line between areas appropriate for urban and suburban development, and areas appropriate for agriculture, rural and resource protection. Boundaries are typically set up for a 10 or 20 year period and should be maintained for the duration of the life of the planning period. Boundaries may be examined at planning period renewal intervals to assess whether conditions have changed between planning cycles to ensure a consistent playing field for both the marketplace and citizens.

Urban growth boundaries are sometimes called development service districts, and include areas where public service is already provided (e.g. sewer, water, roads, police, fire, and schools). The delineation of the boundary is crucial. Listed in Figure 8 are several important issues to consider in establishing an urban growth boundary.

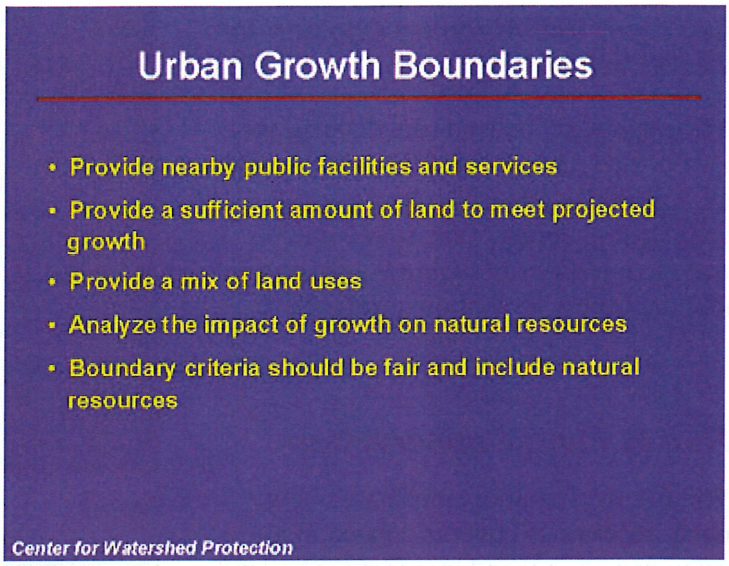


Figure 8

Large Lot Zoning: This land use planning technique is perhaps most widely used to try to mitigate the impacts of development on water quality. The technique involves zoning development at very low densities to disperse impervious cover over very large areas. Densities of 1 lot per 2, 5, or even 10 acres are not uncommon. From the standpoint of watershed protection, large lot zoning is most effective when lots are extremely large (2 to 20 acre lots). While large lot zoning does tend to reduce the impervious cover and therefore the amount of stormwater runoff at a particular location, it also spreads development over vast areas. The road networks required to connect these large lots can actually increase the total amount of imperviousness created for each dwelling unit. In addition, large lot zoning contributes to regional sprawl. Sprawl-like development increases the expense of providing community services such a fire protection, water and sewer systems, and school transportation. Sprawl also increases the amount of land converted from forest or farmland to lawns.

Infill/Community Redevelopment: Infill development encourages new development in unused or underutilized land in existing urban areas. Community redevelopment is a planning initiative to foster revitalization of existing neighborhoods by redeveloping existing buildings and properties that are severely blighted or damaged. Infill and redevelopment can be employed in either large or small projects. Some of the existing impediments to more widespread implementation of these types of projects include: the existing condition of a potential redevelopment site in terms of environmental constraints, the restrictive nature of many land use regulations, and pressing social and economic issues.

Transfer of Development Rights (TDRs): This land use management technique can support local comprehensive planning goals and facilitate Watershed Based Zoning proposals by transferring development potential from sensitive subwatersheds to subwatersheds designated for growth. The principle of TDRs puts to creative use the premise that ownership of land entails certain property rights and therefore individual rights can be bought and sold to accomplish various community planning objectives.

Key Land Use Planning Choices for the Watershed Manager

When applying the land use planning tool, a watershed manager needs to answer some hard questions relating to land use and watershed planning. Take some time to read the questions in Figure 9 and consider how they apply to your own watershed.

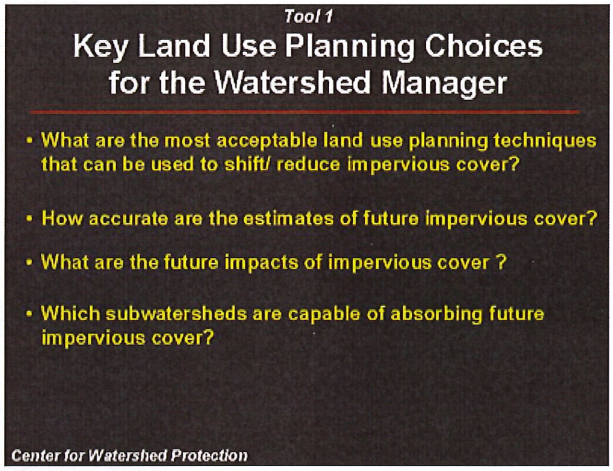


Figure 9

Tool 2: Land Conservation

Whereas the first tool emphasizes how much impervious cover is created in a watershed, the second tool focuses on land conservation (Figure 10). Five types of land may need to be conserved in a subwatershed:

- Critical habitats;
- Aquatic corridors;
- Hydrologic reserve areas;
- Water pollution hazards; and
- Cultural areas.



Figure 10

A watershed manager must choose which of these natural and cultural areas must be conserved in a subwatershed in order to sustain the integrity of its aquatic and terrestrial ecosystems, and to maintain desired human uses from its waters. Four out of five are clearly important because they are key parts of healthy watersheds that should be conserved; water pollution hazards, however, seem out of place on the list. Nevertheless, such areas are intentionally "conserved" at locations carefully selected to minimize their negative impacts on important water resources.

While land conservation is most important in sensitive watersheds, it is also a critical tool for other types of resources. Each subwatershed should have its own land conservation strategy based on its management category, inventory of conservation areas, and land ownership patterns.

The five conservation areas are not always differentiable. Some of the natural areas may overlap among the conservation areas. For example, a freshwater wetland may serve as a critical habitat,

be part of the aquatic corridor, and also comprise part of the hydrologic reserve areas. However, the bulk of the most critical areas are covered in at least one of these five categories.

Critical habitat (Figure 11): Critical habitats can be defined as the essential spaces for plant and animal communities or populations. Examples of critical habitats include tidal wetlands, freshwater wetlands, large forest clumps, springs, spawning areas in streams, habitat for rare or endangered species, potential restoration areas, native vegetation areas, and coves.



Figure 11

Aquatic Corridor (Figure 12): The aquatic corridor is the area where land and water meet. This can include floodplains, stream channels, springs and seeps, small estuarine coves, littoral areas, stream crossings, shorelines, riparian forest, caves, and sinkholes.

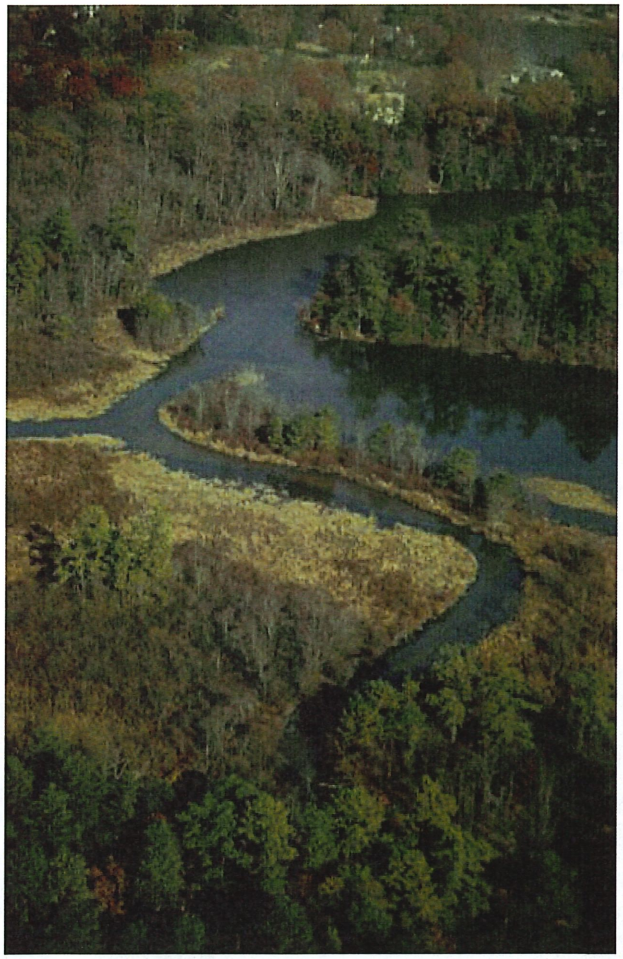


Figure 12

Hydrologic Reserve (Figure 13, next page): Hydrologic reserves are any undeveloped areas responsible for maintaining the predevelopment hydrologic response of a watershed. The three most common land uses are crops, forest, and pasture. From a hydrologic standpoint, forest is the most desirable land use followed by pasture, then crops.

Water Pollution Hazard (Figure 14, next page): This conservation area is defined as any land use or activity that is expected to create a relatively high risk of potential water pollution. Examples of water pollution hazards may include septic systems, landfills, hazardous waste generators, above or below ground tanks,



This airphoto shows several types of land uses, including crops, forests, and pastures, that contribute to the hydrologic reserve function.

Figure 13

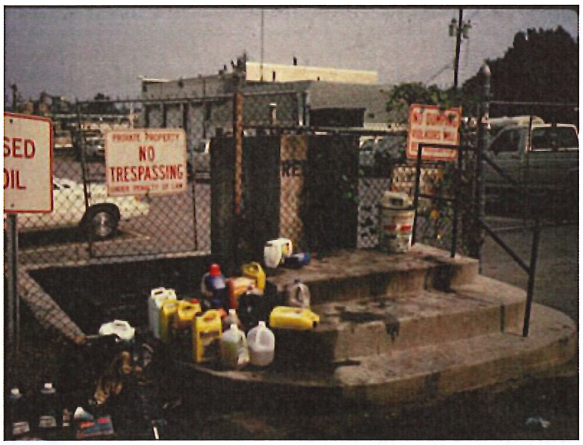


Figure 14

land application sites, impervious cover, stormwater "hotspots", and road and salt storage areas. One way to avoid possible contamination to waterways is to locate such facilities at a designated distance away from the waterbody in order to decrease the chance of contamination.

Cultural Areas (Figure 15): Cultural areas provide a sense of place in the landscape and are important habitats for people. Examples of conservation areas include historic or archeologic sites, trails, parkland, scenic views, water access, bridges, and recreational areas.

Land Conservation Techniques (Figure 16): Numerous techniques can be used to conserve land which provide a continuum ranging from absolute protection to very limited protection. One of these techniques includes buying the land or the use of conservation easements. Conservation easements retain the original owner but pass part of the interest of the property to someone else and prevent the property from being developed.

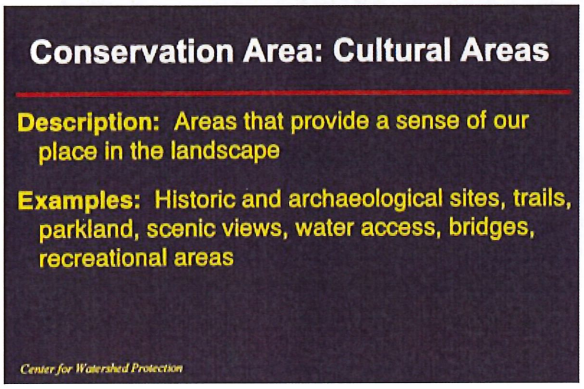


Figure 15



Figure 16

The third technique is to regulate land alteration. A law which restricts development on an area designated as a wetland is a good example of land alteration regulation. Another technique deals with hazard regulations which dictate where potential water pollution hazards can be placed in relation to waterbodies. The fifth technique, open space development, is the use of designs which incorporate open areas into a development site. These areas can be used for either passive or active recreational activity or preserved as naturally vegetated land. Since it is neither practical nor feasible to regulate everyone and everything, landowner and public sector stewardship are both important techniques to the conservation of land.

Key Land Conservation Choices for the Watershed Manager

When applying the land conservation tool, a watershed manager must make some careful choices about the mix of conservation areas to protect and what techniques to employ. Given the large areas that need to be conserved within some subwatersheds, many different conservation techniques need to be applied to cover the patchwork of public and private lands across a subwatershed. Some of the land conservation choices a watershed manager often has to make include the questions in Figure 17; how do these apply to your watershed?

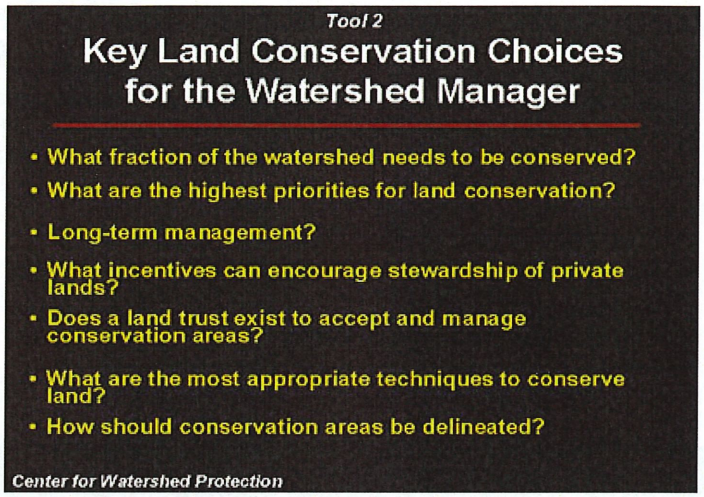


Figure 17

Tool 3: Aquatic Buffers

The aquatic corridor, where land and water meet, deserves special protection in the form of buffers (Figure 18). A buffer can be placed along a stream, shoreline, or around a natural wetland. A buffer has many uses and benefits. Its primary use is to physically protect and separate a stream, lake, or wetland from a wide variety of water pollutants and habitat impacts that can arise from too much land use too close to the water.

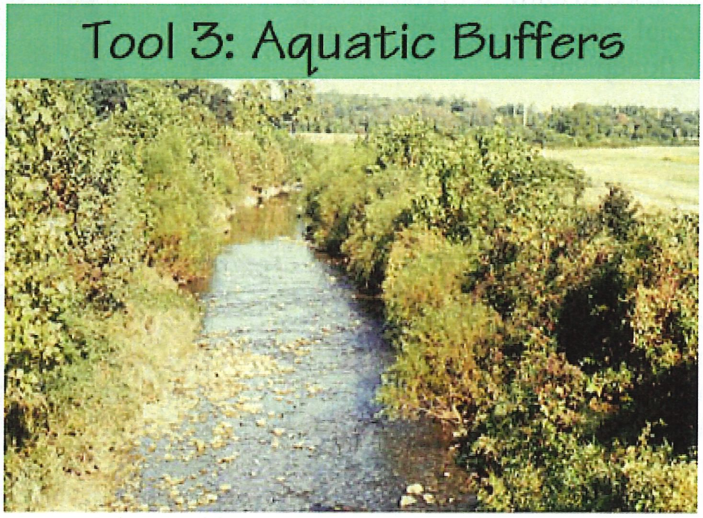
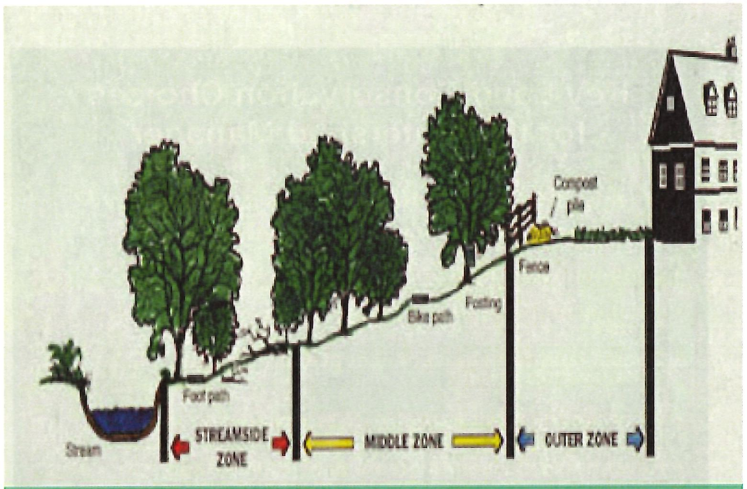


Figure 18

For streams, a network of buffers act as a right-of-way during floods and sustains the integrity of stream ecosystems and habitats. Technically, buffers are one type of land conservation area, but they are especially important because they:

- regulate light and temperature conditions, improving the habitat for aquatic plants and animals.
- are effective in removing sediment, nutrients, and bacteria from stormwater and groundwater
- help to stabilize and protect the streambanks.



The three zone buffer is a general structural approach for establishing basic buffer functions

Figure 19

The basic structure of a stream buffer in an urban setting is broken up into three zones which differ in functions, width, vegetative target, and allowed uses (Figure 19). In the eastern and northwestern US the streamside zone is often maintained as mature forest, with strict limitations on all other uses (in some arid desert or grassland regions of the country a forested buffer may be unachievable). The streamside zone also produces the shade and woody debris that is so important to stream quality and biota. The middle zone is typically a 50 to 100 feet wide forested area that is managed to allow some clearing. The outer zone, usually about 25 feet wide, is ideally forest but also can include turf. The three zone buffer is variable in width and should be increased to allow for protection of special areas such as wetlands and the floodplain.

Once established, the boundaries of buffers need to be clearly marked and enforced (Figure 20). A buffer that is well planned, designed, and maintained can help maximize its many potential benefits. Buffers are important because they make up an integral part of the watershed protection strategy and complement other programs and efforts to protect water quality.



This tree preservation area is clearly marked during the construction stage to prevent any clearing.

Figure 20

Key Buffer Choices for the Watershed Manager

When applying the buffer tool, a watershed manager must make some careful choices about which kinds of buffers are needed and how wide they must be. In many cases, a new buffer ordinance may need to be adopted or an old one revised to establish a more effective buffer network within a subwatershed. A watershed manager faces many tough questions, such as the ones in Figure 21, when designing a buffer program for a subwatershed.

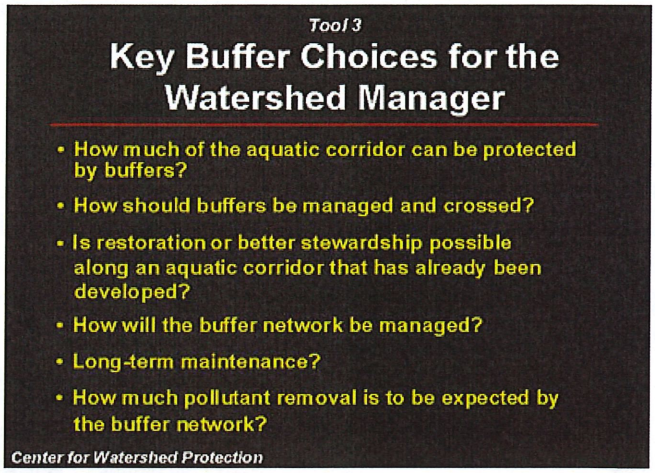


Figure 21

Tool 4: Better Site Design

Urban development (Figure 22) is often characterized by large amounts of impervious cover. Wide streets, huge cul de sacs (Figure 23), long driveways, and sidewalks lining both sides of the street are all features of site design that create impervious cover and consume natural areas. Many innovative site planning techniques have been shown to sharply reduce the impact of new development. Developers, however, are often unable to use these techniques in many communities because of outdated local zoning, parking or subdivision codes.



Figure 22



Figure 23

Three categories of better site design that have special merit for watershed protection include:

- Residential streets and parking lots;
- Lot development; and,
- Conservation of natural areas.

Residential Street and Parking Lots (Figure 24, next page): Approximately 65% of total impervious cover in the landscape is "habitat for cars," in the form of parking lots, roads, and driveways. Much of this impervious cover is often

unnecessary and can be minimized at every stage of parking lot and residential street planning and design.

Lot Development (Figure 25): "Habitat for people" (the area used in house lots) is a necessary part of any community, but many lot development practices result in excessive impervious cover and clearing of natural areas. These impacts can be reduced by changing the shape, orientation, and layout of residential lots. One popular technique, open space design development, minimizes lot sizes within a compact developed portion of a property while leaving the remaining portion open.



Parking lots are often underutilized and can be minimized through better site design techniques.

Figure 24



This open space design utilizes the existing character of the area by minimizing clearing and grading, and preserving natural open space.

Figure 25

Conservation of Natural Areas: The goals are to protect all bodies of water and existing vegetation and minimize clearing. These techniques include the establishment and maintenance of buffers, tree conservation, and providing conservation incentives.

Key Site Design Choices for the Watershed Manager

When using the better site design tool, a watershed manager should be realistic about how much impervious cover can be reduced through better site design in a subwatershed (Figure 26). While better site designs can reduce the impacts of individual development projects, the cumulative impact of too much development can still degrade water resources, no matter how well each site is designed. The value of the site design tool appears to be greatest in those subwatersheds that are approaching their maximum impervious cover limit. Thus, a watershed manager needs to make some careful choices on how to best promote better site designs within a subwatershed. For more information on the principles of better site design, refer to the "Better Site Design" module at this Internet site.

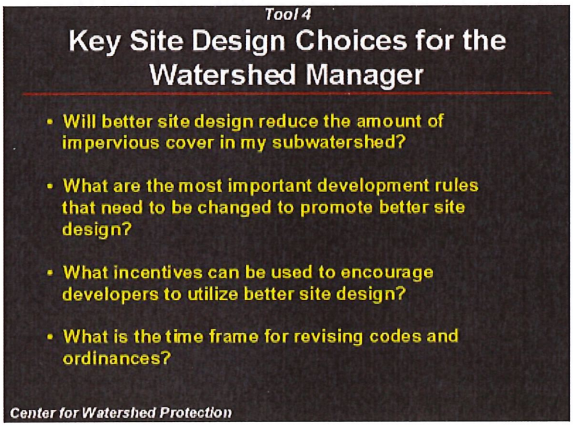


Figure 26

Tool 5: Erosion and Sediment Control

Perhaps the most destructive stage of the development cycle is the relatively short period when vegetation is cleared and a site is graded to create a buildable landscape. The potential impacts to receiving waters are particularly severe at this stage. Trees and topsoil are removed, soils are exposed to erosion, natural topography and drainage patterns are altered, and sensitive areas are often disturbed.



Figure 27

Thus, the fifth watershed protection tool seeks to reduce sediment loss during construction and to ensure that conservation areas, buffers, and forests are not cleared or otherwise disturbed during construction (Figure 27). Every community should have an effective erosion and sediment control program to reduce the potentially severe impacts generated by the construction process. There are numerous techniques to provide erosion and sediment control (ESC) (Figure 28) and the most effective is to minimize clearing. Some examples include regulations that require exposed soil to be stabilized within 7 to 10 days. Other common methods of erosion and sediment control include sedimentation basins and silt fences (Figure 29). Unfortunately, without proper installation and maintenance, erosion and sediment controls are ineffective.

Ten Elements of an Effective Erosion and Sediment Control (ESC) Plan

1. Minimize Needless Clearing and Grading
2. Protect Waterways and Stabilize Drainage Ways
3. Phase Construction to Limit Soil Exposure and Compaction
4. Stabilize Exposed Soils Immediately
5. Protect Steep Slopes and Cuts
6. Install Perimeter Controls to Filter Sediments
7. Employ Advanced Sediment Settling Controls
8. Certify Contractors on ESC Plan Implementation
9. Adjust ESC Plan at Construction Site
10. Assess ESC Practices After Storms

Figure 28



Silt fences are an ESC measure, but without proper installation and maintenance, they are worthless.

Figure 29

Key Erosion and Sediment Control Choices for the Watershed Manager

Every community should have an effective erosion and sediment control program to reduce the potentially severe impacts generated by the construction process. The watershed manager should play a key role in defining which specific ESC practices need to be applied within the subwatershed to best protect sensitive aquatic communities, reduce sediment loads, and maintain the boundaries of conservation areas and buffers. Some of the key decisions that watershed managers often make at the subwatershed level are listed in Figure 30.

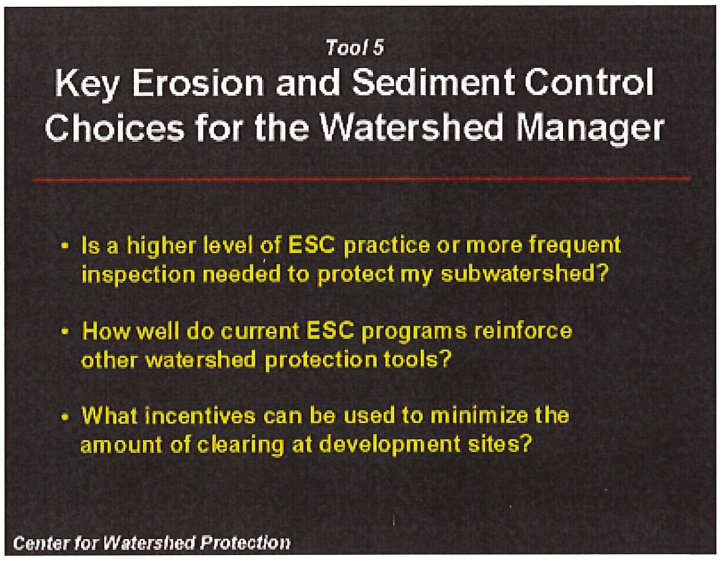


Figure 30

Tool 6: Stormwater Management Practices

A watershed manager needs to make careful choices about what stormwater management practices should be installed in the subwatershed to compensate for the hydrological changes caused by new and existing development. Stormwater management practices are used to delay, capture, store, treat, or infiltrate stormwater runoff (Figure 31). A key choice is to determine the primary stormwater objectives for a subwatershed that will govern the selection, design, and location of stormwater management practices at individual sites. While specific design objectives for stormwater management practices are often unique to each subwatershed, the general goals for stormwater management practices are often the same, and include:



Figure 31

- maintain groundwater quality and recharge;
- reduce stormwater pollutant loads;
- protect stream channels;
- prevent increased overbank flooding; and
- safely convey extreme floods.

There are numerous structural stormwater management techniques for controlling stormwater quantity and quality. These five practices can be categorized into five broad groups, including:

- ponds (Figure 32);
- wetlands (Figure 33);
- infiltration (Figure 34);
- filtering systems (Figure 35); and
- grassed channels (Figure 36, next page).



Stormwater wet ponds are characterized by a permanent pool of water.

Figure 32



Stormwater wetlands treat stormwater for both water quality and quantity.

Figure 33

While many advances have been made recently in innovative stormwater management designs, their ability to maintain resource quality in the absence of other watershed protection tools is limited. In fact, stormwater management practices designed or located improperly can sometimes cause more severe secondary environmental impacts than if they were not installed at all.



Bioretention areas are a filtering system often used in parking lots.

Figure 34



Infiltration trenches allow stormwater to percolate slowly into the soil.

Figure 35



Grassed channels are effectively used along roadways to convey and infiltrate stormwater.

Figure 36

Key Stormwater Management Choices for the Watershed Manager

Selecting the best stormwater management strategy can be a real challenge for the watershed manager. Some of the important issues and questions that watershed managers should address are listed in Figure 37.

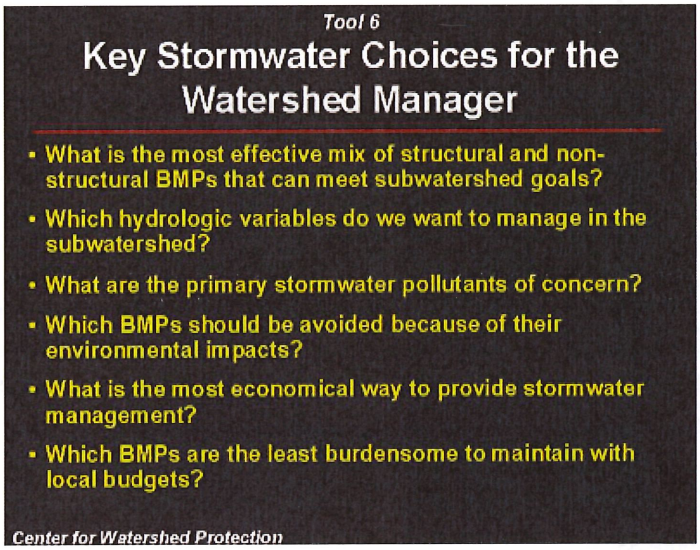


Figure 37

Tool 7: Non-Stormwater Discharges

This tool is concerned with how wastewater and other non-stormwater flows are treated and discharged in a watershed (Figure 38). Key program elements consist of inspecting private septic systems, repairing or replacing failing systems, utilizing more advanced on-site septic controls, identifying and eliminating illicit connections from municipal stormwater systems, and spill prevention.



Figure 38

Most non-stormwater discharges are strictly governed under the National Pollutant Discharge Elimination System (NPDES) and require a state or federal permit. The three basic categories of non-stormwater discharges are septic systems, sanitary sewers, and other miscellaneous non-stormwater discharges.

1) Septic Systems, (Figure 39) or on-site sewage disposal systems, are used to treat and discharge wastewater from toilets, wash basins, bathtubs, washing machines, and other water consumptive items that can be sources of high pollutant loads. One out of four homes in the country uses a septic system, collectively discharging a trillion gallons of wastewater annually (NSFC, 1995). Because of their widespread use and high volume discharges, septic systems have the potential to pollute groundwater, lakes and streams if they are located improperly or if they fail. Even properly functioning septic systems can be a substantial source of nutrient loads in some settings. Unlike other non-stormwater discharges, septic systems are not regulated under NPDES, but are approved by local and state health agencies. It is estimated that as many as 20-25% of septic systems nationwide are not operating as designed, and are failing.

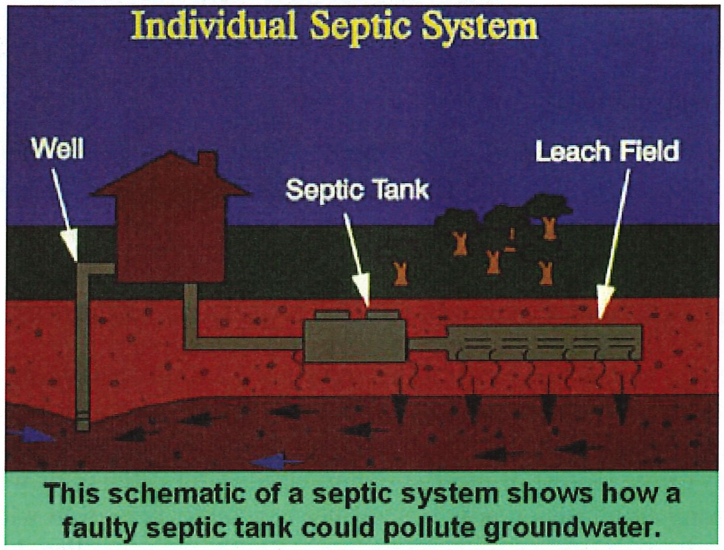


Figure 39

2) Sanitary sewers collect wastewater in a central sewer pipe and send it to a municipal treatment plant. Ideally, this permits more efficient collection of wastewater, and often higher levels of pollutant reduction. The extension of sanitary sewer lines is not without some risk, however, as it has the potential to induce more development than may have been possible in a watershed previously served only by on-site sewage disposal systems (particularly when soils are limiting). Most communities cannot refuse service to new developments within the water and sewer envelope, so the decision to extend lines into undeveloped areas will allow future developers to tap into the line.

In addition, not all sanitary sewer conveyance and treatment systems are capable of achieving high levels of pollutant reduction. Examples include:

- package treatment plants;
- combined sewer overflows;
- sanitary sewer overflows; and,
- illicit or illegal connections to the storm drain network.

3) Other non-stormwater discharges (Figure 40). Wastewater is not the only non-stormwater discharge possible in a watershed. A planner should also investigate whether other non-stormwater discharges are a factor in the subwatershed. Examples include:

- industrial NPDES discharges;
- urban "return flows" (discharges caused by activities such as car washing and watering lawns);
- water diversions; and,
- runoff from confined animal feeding lots.



Runoff from confined animal feedlots can contaminate our streams without proper treatment

Figure 40

Key Non-Stormwater Discharge Choices for the Watershed Manager

One of the first priorities for a watershed manager is to conduct a quick inventory of the nature and extent of non-stormwater discharges in the subwatershed. If non-stormwater discharges appear to be a problem, a watershed manager may need to conduct a subwatershed survey. This usually involves a survey of the largest or most common wastewater discharges within the subwatershed, with a strong emphasis on how wastewater is actually conveyed within the subwatershed (i.e. via sanitary sewer, septic systems, etc.). Some issues are listed in Figure 41.

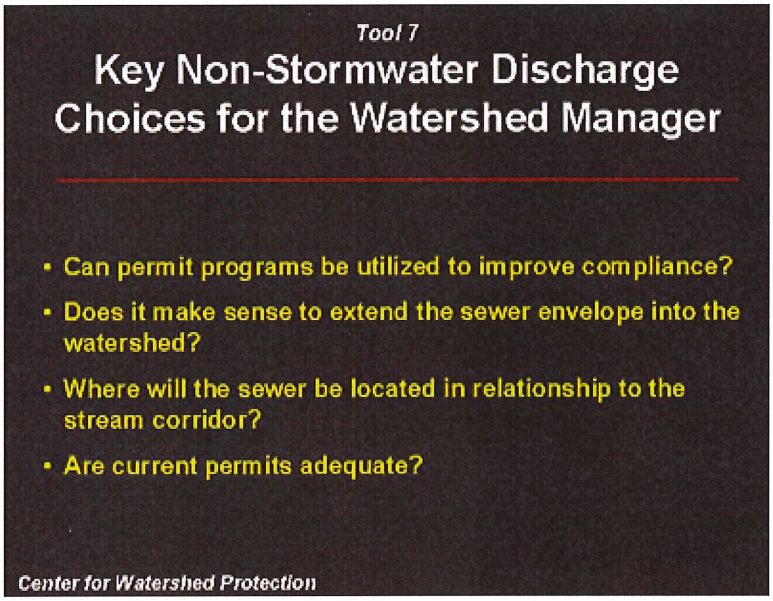


Figure 41

Tool 8: Watershed Stewardship Programs

Once a subwatershed is developed, communities still need to invest in ongoing watershed stewardship. The goals of watershed stewardship are to increase public awareness about watershed management efforts and to get local landowners' participation in the process to ensure stewardship on their own property and homes (Figure 42).



Figure 42

There are six basic programs that watershed managers should consider to promote greater watershed stewardship:

- Watershed advocacy
- Watershed education
- Watershed maintenance
- Pollution prevention
- Indicator monitoring
- Watershed restoration

Watershed Advocacy: Advocacy of watershed protection is important because it can lay the foundations for public support and greater watershed stewardship. One of the most important investments that can be made in a watershed is to seed and support a watershed management structure to carry out the long-term stewardship function. Often, grass roots watershed management organizations are uniquely prepared to handle many critical stewardship programs, given their watershed focus, volunteers, low cost and ability to reach into communities. Watershed organizations can be effective advocates for better land management and can develop broad popular support and involvement for watershed protection. Local governments often have an important role to play in watershed advocacy; in many watersheds, local governments create or direct the watershed management structure.

Watershed Education (Figure 43): A basic premise of watershed stewardship is that we must learn two things - that we all live in a watershed and that we understand how to live within it. The design of watershed education programs that create this awareness is of fundamental importance; some of the most effective programs merge learning, the enjoyment of outdoor recreation, and the development of personal involvement in watershed stewardship. Four types of watershed education programs are:



Interpretive trails, signs, and guided tours along waterways are tools for raising awareness of watershed values and encouraging personal stewardship in the community.

Figure 43

- watershed awareness: raising basic watershed awareness using signs, storm drain stenciling, streamwalks, maps
- personal stewardship: educating residents about the individual role they play in the watershed and communicating specific messages about positive and negative behaviors
- professional training: educating the development community on how to apply the tools of watershed protection
- watershed engagement: providing opportunities for the public to actively engage in watershed protection and restoration.



These citizen volunteers are planting trees in a stream corridor to help create a buffer.

Figure 44

Watershed Maintenance (Figure 44): Most watershed protection tools require maintenance if they are to properly function over the long run. Some of the most critical watershed "maintenance" functions include management of conservation areas and buffer networks, and maintenance of stormwater practices, septic systems, and sewer networks. Maintenance of the quality of watersheds may even require some replanting of natural vegetation cover and can also provide an opportunity for public involvement and education.

Pollution Prevention: Some businesses may need special training on how to manage their operations to prevent pollution and thereby protect the watershed. In some cases, local or state government may have a regulatory responsibility to develop pollution prevention programs for certain businesses and industrial categories (e.g., under industrial or municipal NPDES permits).

Watershed Indicator Monitoring (Figure 45): An ongoing stewardship responsibility is to monitor key indicators to track the health of the watershed. Public agencies, as well as private corporations, citizen groups, and even landowners should seriously consider monitoring to provide appropriate indicator data that will answer their own questions. Monitoring water quality can include assessing flow, the quantity and quality of aquatic biota, pollutant levels, and many other characteristics as appropriate to the type of water body and its problems.



Assessing the quality and quantity of aquatic biota is one way to monitor the health of a watershed.

Figure 45

Watershed Restoration: The last phase of watershed stewardship is to restore or at least rehabilitate streams that have been degraded by past development. Urban watershed restoration is an emerging art and science that seeks to remove pollutants and enhance habitat to restore urban streams. The urban watershed restoration process should include three main themes: stormwater retrofitting, source control through pollution prevention, and stream enhancement.

Key Stewardship Choices for the Watershed Manager

Some of the issues that watershed managers should address when designing watershed stewardship programs are listed in Figure 46. How many are relevant to your watershed, and your community?

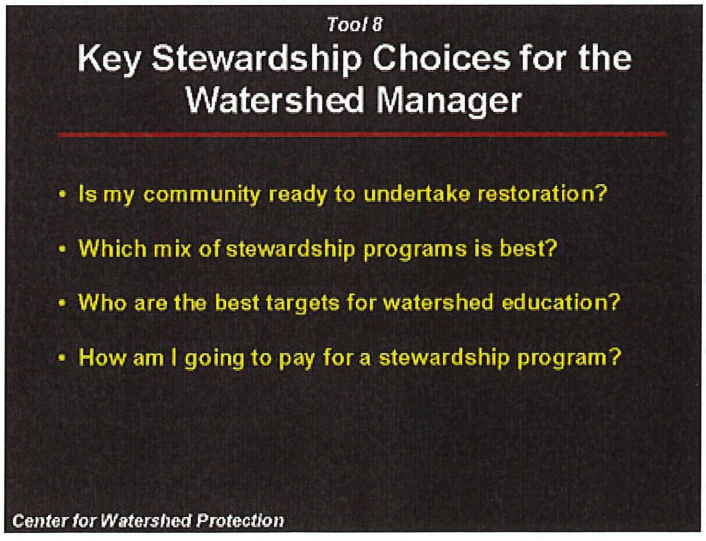


Figure 46

Summary



Figure 47

This module has provided a simple introduction to the eight basic watershed protection tools (Figure 47). These tools are essential to the protection, preservation, and restoration of our lakes, streams, and estuaries, and they also can benefit many terrestrial habitats and human activities in urbanized and developing watersheds. The biggest challenge for watershed managers is to select the right combination of practices to form the most effective plan based on the specific goals of their watershed. For more information on the watershed protection tools, please consult the 1998 *Rapid Watershed Planning Handbook* (www.cwp.org) developed by the Center for Watershed Protection.

A self-test to assess your comprehension is included on page 28 of this module.

Acknowledgments

This module was developed by the Center for Watershed Protection with assistance from the USEPA Office of Wetlands, Oceans and Watersheds/the Watershed Academy. Our thanks also to several technical reviewers: Donald Garofalo, Robert Goo, Charles Gregg, Karen Northup, and Terry Slonecker.

Glossary

Aquatic corridor. An area of land and water which is important to the integrity and quality of a stream, river, lake, wetland, or other body of water. An aquatic corridor usually consists of the actual body of water ("corridor" usually connotes a river or stream), the adjacent buffer, and a fringe of adjacent upland areas.

BMPs (Best Management Practices). Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources, such as pollutants carried by urban runoff.

Buffer. An area adjacent to a lake or estuarine shoreline, wetland edge, or streambank, where a) critically important ecological processes and water pollution control functions take place, and b) development may be restricted or prohibited for these reasons.

Cluster or Open Space Development. The use of designs which incorporate open space into a development site; these areas can be used for either passive or active recreational activity or preserved as naturally vegetated land

Combined Sewer Overflow. Discharge of a mixture of storm water and domestic waste, occurring when the flow capacity of a sewer system is exceeded during rainstorms.

Conservation easements. A practice used to apply and enforce restrictions to preserve natural resources. Typically, a landowner will grant very specific rights concerning a parcel of land to a qualified recipient (e.g. public agency or non profit land conservancy organization). The easement gives the recipient the right to enforce the restrictions. The recipient does not assume ownership but does assume long-term responsibility for enforcement and stewardship of the easement. For example, a wildlife management agency may obtain easements in forested floodplains from private landowners that help them manage wildlife and fish.

Floodplain. A generally flat, low-lying area adjacent to a stream or river that is subjected to inundation during high flows. The relative elevation of different floodplains determines their frequency of flooding, ranging from rare, severe storm events to flows experienced several times a year. For example, a "100-year floodplain" would include the area of inundation that has a frequency of occurring, on average, once every 100 years.

Illicit connections. Illegal and/or improper waste discharges into storm drainage systems and receiving waters.

Impacted stream or subwatershed. A very general, watershed imperviousness-based classification category for a subwatershed with 11 to 25% impervious cover. Urbanization is generally expected to lead to some impacts on stream quality, but the type and magnitude of these effects can vary significantly among different watersheds at similar levels of imperviousness.

Impervious cover. Any surface in the urban landscape that cannot effectively absorb or infiltrate rainfall; for example, sidewalks, rooftops, roads, and parking lots.

Imperviousness. The percentage of impervious cover by area within a development site or watershed, often calculated by identifying impervious surfaces from aerial photographs or maps.

National Pollutant Discharge Elimination System (NPDES). Established by Section 402 of the Clean Water Act, this federally mandated permit system is used for regulating point sources, which include discharges from industrial and municipal facilities and also stormwater discharges from discrete conveyances such as pipes or channels.

Non-stormwater flows. Runoff which occur from sources other than rainwater; for example, personal car washing, lawn watering overspray, street cleaning, or pressure-washing of restaurant waste disposal facilities.

Non-supporting stream or subwatershed. A very general, watershed imperviousness-based classification category for a stream or subwatershed with more than 25% total impervious cover. Urbanization is generally expected to lead to some impacts on stream quality, but the type and magnitude of these effects can vary significantly among different watersheds at similar levels of imperviousness. These non-supporting streams are usually not candidates for restoration of relatively healthy aquatic ecosystems, but often can benefit from some physical rehabilitation designed to reduce additional degradation – for example, excessive erosion and siltation – that affects downstream areas.

Open Space. A portion of a site which is permanently set aside for public or private use and will not be developed. The space may be used for passive or active recreation, or may be reserved to protect or buffer natural areas.

Package Treatment Plant. A small, onsite waste treatment facility designed to handle the specific needs of a specialized, small, or remotely located waste generator; for example, a treatment plant that services a trailer park.

Rooftop runoff. Rainwater which falls on rooftops, does not infiltrate into soil, and runs off the land.

Sensitive stream or subwatershed. A very general, watershed imperviousness-based classification category for a stream or a subwatershed with less than 10% impervious cover, that is potentially still capable of supporting stable channels and good to excellent biodiversity. Urbanization is generally expected to lead to some impacts on stream quality, but the type and magnitude of these effects can vary significantly among different watersheds at similar levels of imperviousness.

Stormwater "hotspots." Land uses or activities that generate highly contaminated runoff. Examples include fueling stations and airport de-icing facilities.

Stormwater best management practice. A structural or non structural technique designed to temporarily store or treat stormwater runoff in order to mitigate flooding, reduce pollution, and provide other amenities

Stormwater runoff. Rainwater which does not infiltrate into the soil and runs off the land

Subwatershed. A smaller geographic section of a larger watershed unit with a drainage area between 2 to 15 square miles and whose boundaries include all the land area draining to a point where two second order streams combine to form a third order stream

Transferable Development Rights (TDRs). A form of incentive for developers in which the developer purchases the rights to an undeveloped piece of property in exchange for the right to increase the number of dwelling units on another site. Often used to concentrate development density in certain land areas.

Watershed. An area of land that drains water, sediment and dissolved materials to a common receiving body or outlet. The term is not restricted to surface water runoff and includes interactions with subsurface water. Watersheds vary from the largest river basins to just acres or less in size. In urban watershed management, a watershed is seen as all the land which contributes runoff to a particular water body.

Zoning. A set of local government regulations and requirements that govern the use, placement, spacing and size of buildings and lots (as well as other types of land uses) within specific areas designated as zones primarily dedicated to certain land use types or patterns.

Self Test for Eight Tools of Watershed Protection Module

After you've completed the quiz, check your answers with the ones provided on page 30 of this document. A passing grade is 7 of 10 correct, or 70%.

1. Land use planning is the single most important tool of watershed protection.

☐ A. True.

☐ B. False.

2. The basic goals of land use planning are to: 1) apply land use planning techniques to redirect development while preserving sensitive areas and 2) to maintain or reduce the impervious cover within a given watershed.

☐ A. True.

☐ B. False.

3. A three zone buffer is a buffer that is in three zone types: an overlay zone, a performance zone and a large lot zone.

☐ A. True.

☐ B. False.

4. The most destructive stage of the development cycle is clearing and grading.

☐ A. True.

☐ B. False.

5. The most effective technique for providing erosion and sediment control is to create aquatic buffers.

☐ A. True.

☐ B. False.

6. Stormwater management practices can help to maintain groundwater recharge and quality, reduce stormwater pollutant loads, protect stream channels, prevent increased overbank flooding and safely convey extreme floods.

☐ A. True.

☐ B. False.

7. Structural stormwater management practices include ponds, wetlands, infiltration, filtering systems and open channels.

☐ A. True.

☐ B. False.

8. Properly functioning septic systems are never a source of nutrient loads.

☐ A. True.

☐ B. False.

9. Non-stormwater discharge flows include septic systems, sanitary sewers, and runoff from confined animal feeding lots.

☐ A. True.

☐ B. False.

10. Urban "return flows" are septic system or sanitary sewer backups.

☐ A. True.

☐ B. False.

Answers for Eight Tools of Watershed Protection Module Self Test

Q1: A Q2: A Q3: B Q4: A Q5: B Q6: A Q7: A Q8: B
Q9: A Q10: B

End of Email #29 with Attachment(s)