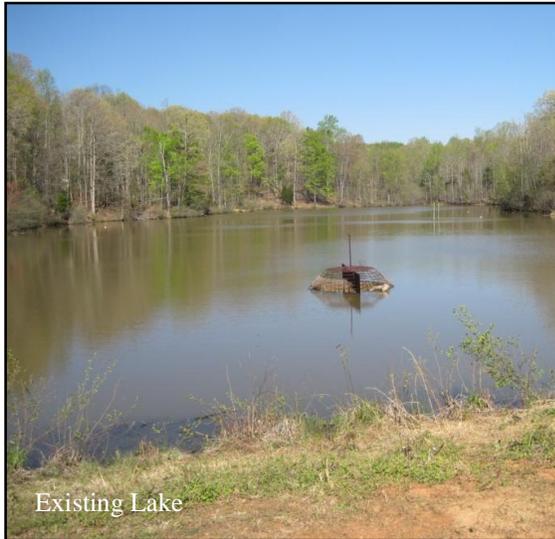


# Feasibility Study Report

## Reedy Creek Watershed Enhancement

Contract Number: 1100719

Charlotte, North Carolina



Existing Lake



Reach 1

04/07/2011

05/10/2011



Reach 4

05/13/2011



Reach 7

04/17/2012

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## 1.0 Introduction

The purpose of this report is to summarize the data collection, analysis, and professional opinion concerning the feasibility of restoring, enhancing, and/or preserving the headwater systems/tributaries to Reedy Creek. The study reaches are mostly contained on public land inside the Reedy Creek Park and Nature Preserve with the exception of the headwaters of two tributaries that start on adjacent privately owned parcels. The study area (area or site) is the top of the Reedy Creek Watershed. The site is located in eastern Mecklenburg County in the Yadkin River Watershed (USGS HUC 03040105010050 and DWQ 03-07-11) and is bordered by Grier Road to the north and Plaza Road Extension to the south (Figure 1).

The total study area contains approximately 44,060 feet of jurisdictional stream, three in-line lakes/ponds, and seven wetlands totaling approximately 3.3 acres. Of the above approximately 22,000 feet of stream and 1.9 acres of wetland are on property owned by Mecklenburg County. The site was identified as a potential mitigation site in the Stream Restoration Ranking Protocol (SSRP) Ranking Document prepared by Collins and Baker for Charlotte-Mecklenburg Storm Water Services (CMSWS).

The purpose of this report is to present a summary of:

- Information obtained during data collection
- Field assessment and constraints
- Existing conditions and unique features
- Alternative conceptual designs
  - Location and type of stream restoration
  - Location of storm water BMP or other improvements
  - Pros and cons of alternative
  - Preliminary opinion of cost of alternatives
  - Preliminary opinion of compensatory mitigation credits for each alternative

## 2.0 Data Collection

The following background data was collected for the project site:

- Mecklenburg County GIS mapping
  - Topography
  - Storm Drainage
  - Aerials
  - FEMA Zones
  - Water Quality Buffers
  - Parcel data
- Federal and State GIS Data Sources
  - Soils Mapping
  - National Wetland Inventory (NWI)
- Ordinances and Guidelines
  - Charlotte Post Construction Controls Ordinance (PCCO)
  - CMSWS Mitigation Monitoring Guidelines
  - USACE-Wilmington District and NC-DWQ Stream Mitigation Guidelines (2003)

- County Floodplain Policy
- NC DWQ's Interim, Internal Technical Guide – Benthic Macroinvertebrate Monitoring Protocols for Compensatory Stream Restoration Projects
- Environmental Data Resources (EDR) report
- Parks and Recreation's website on Reedy Creek  
<http://www.charmeck.org/mecklenburg/county/ParkandRec/InsideTheDepartment/Divisions/StewardshipServices/NaturePreserves/Pages/Reedy.aspx> )

The following data was collected in the field:

- Qualitative field assessment
- Quantitative field assessment
  - Geomorphic survey and stability
    - Rosgen classification of each Reach 1-11
      - Cross-section and profile locations shown on Figure 3
    - Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS)
  - Geotechnical and soils
    - Soil strata and classification
      - Collection locations shown on Figure 3
  - Constraints Analysis
    - Utilities and other infrastructure (roads, paths, bridges, and ponds)
    - Mature trees and unique vegetation
    - Construction footprint and access
    - Topography and unique features
  - Jurisdictional determinations
    - DWQ stream origins classification for the watershed
    - 1987 routine wetland determination data for 7 wetlands
    - Rapanos forms
    - Stream data points and wetland data points shown on Figure 2
  - Biological
    - Benthic Macroinvertebrate per NC DWQ guidelines
      - Modified Qual-4 collection method
    - Monitoring locations shown on Figure 3
  - Physiochemical
    - Same monitoring location as biological
    - Physical conditions measured using a calibrated handheld water quality sonde
      - Measurements include temperature, pH, dissolved oxygen, turbidity, and conductivity
    - Grab samples taken to measure: fecal coliform, total phosphate, nitrate, biological oxygen demand, and total dissolved solids.

### 3.0 Assessment Summary and Constraints Analysis

Overview:

The project site is the top of the watershed. As a result, there are varieties of hydrologic and jurisdictional features. These features include ephemeral channels, seasonal and perennial streams, linear wetlands, and

open water (in-line lakes/ponds) in Figure 2. There are eleven (11) distinct stream segments and seven (7) unique wetlands.

Approximately 40-50% of the studied streams and corresponding watersheds are contained in the Reedy Creek Park and Nature Preserve (Figure 2). Overall, the site is generally wooded (hardwood and pine forests) with the exception of some open space around the largest in-line lake and the upstream reaches of Reach 4, and 8, which are contained on private property. The Reedy Creek Nature Preserve is 727 acres of the 1630-acre watershed and provides active and passive recreation. The areas around the streams and wetlands are mostly undisturbed forested corridors with the exception of some hiking trail footbridge crossings in the upper reaches and a maintained sewer easement along some of the lower reaches.

#### Streams:

Being a headwater system, the hydrologic features start at the top of the watershed/site as ephemeral draws or linear wetlands. These ephemeral channels transition into seasonal, relatively permanent waters (RPW) and then change to perennial RPWs (Figure 2). The streams' relative stability is most stable in the top of the watershed. The bed scour is severe in the middle reaches. The lower reaches in the site all are highly entrenched (bank height ratios over 4). The lower reaches of all project streams classify as Rosgen Type G and/or F channels. The combined linear footage of these unstable reaches is 24,000+ feet. These unstable channel reaches have abandoned their active floodplains. The effective rooting depth of the adjacent trees and buffer (Photos 1-9 and 11-12 in Appendix 2) no longer provides bank protection. Both the bed and banks of these reaches are unstable as indicated by the many headcuts, and vertical exposed banks. These systems mostly are in the G->F channel evolution phase. These reaches lack the riffle pool sequences typically found in stable systems. Reaches 1, 9, 10, and 11 lack almost any pavement or sub-pavement variation. Reach 1 has down-cut into weathered rock and reaches 9-11 has filled in with 2-3 feet of sands and fines. Along the banks of reach 1, 9, 10, 11 and lower reach 2, 3, 4 and 5 there is visual evidence of historical dredging and/or straightening in the remnant casting piles along the top of the stream banks. However, it is evident by the mature trees (some over 30 years old) that this was done pre 1980.

On Reaches 2 and 6, the dam/embankment of Dragonfly Pond and a relic pond has prevented the headcut from migrating upstream respectively, and on reach 5 and 7 a large bedrock outcrop and dense root mass has done the same. Above these points, reaches are visually stable. Much of the upstream areas of reach 5 and 7 are in a reference condition (Photo 10 and 15, Appendix 2).

Table 1 summarizes the geomorphic survey and Rosgen stream classifications.

Table 1: Summary of Geomorphology and Rosgen Stream Classification

Assessment Reach	Drainage Area (mi <sup>2</sup> )	Entrenchment Ratio	Width/Depth Ratio	Sinuosity	Slope (ft/ft)	Rosgen Stream Type
1	0.58	1.14	19.4	1.01	0.0049	F5
2	0.52	1.19	12.2	1.01	0.0151	G5/F5
3	0.26	1.39	13.8	1.05	0.0149	F5
4	0.17	1.39	6.6	1.06	0.0112	G5
6	0.24	1.31	8.5	1.05	0.0059	G5
7	0.27	1.39	7.5	1.07	0.0133	G5
8	0.19	1.25	8.1	1.02	0.0059	G5
9	0.78	1.14	9.3	1.01	0.0051	G5
10	1.67	1.10	14.0	1.00	0.0027	F5
11	2.55	1.71	5.0	1.00	0.0026	B5/G5

As part of the Rosgen BANCS model, Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) were determined using guidelines from Watershed Assessment of River Stability and Sediment Supply (WARSSS) to better define level of instability and sediment export from bank erosion. Table 2 summarizes the results of that analysis.

Table 2: Sediment Loading Assessment (BANCS Model)

Reach	Bank Length (ft.)	Total (tons/yr.)	Total (tons/yr./ft.)
1	3,709	2,206	0.59
2	3,435	1,093	0.32
3	2,834	1,332	0.47
4	3,684	986	0.27
5	974	390	0.40
6	9,042	860	0.10
7	4,014	475	0.12
8	7,672	853	0.11
9	3,269	51	0.02
10	9,500	595	0.06
11	1,788	63	0.04
TOTAL	49,921	8,905	0.18

The BANCS model uses BEHI and NBS to predict the annual sediment loss from stream bank erosion in tons per year. Based on the results of the analysis, it is estimated that the stream reaches (identified for restoration only) produce 8,905 tons of sediment from stream bank erosion per year, which is an approximate average of 0.18 tons per year per foot of bank for the reaches identified as restoration candidates on this site.

Environmental Data Resources:

An Environmental Data Resources (EDR) report (Appendix 1) was reviewed to determine the presence of documented hazardous materials in the project vicinity. A records search revealed two noted sites in the search

that fell inside the project site watershed. One site is a historic auto station and the other is a leaking above ground storage tank (LAST) at Fire Station #34 on Rocky River Road. This LAST is reported in the EDR as a "spill from emergency generator." There were other known sites of concern that appear in the EDR search area, however, all other sites were outside the watershed(s) of the study streams.

Biological Assessment:

Benthics

Ephemeroptera+Plecoptera+Trichoptera (EPT) species are used to determine the biotic integrity and water quality rating. Total EPT is the number of EPT species that occur in the sample. The weighted EPT score is determined by a weighted average of the number of EPT species, the number of individuals of that species, and their pollution tolerance. The biotic index is similar to the weighted EPT score except it is measured by using a weighted average of all species (not just EPT). The weighted biotic index score is a correlation between the biotic index and a range of values for various qualities (fair, poor, etc).

Benthic macroinvertebrate samples were collected at two locations in May of 2011 and six additional locations in April and May of 2012. The Qual-4 collection method (intended for perennial streams having catchment sizes of less than 640 acres) was utilized where appropriate. The Qual-4 collection method involves four samples taken at each bio-monitoring site: a kick net sample, a sweep net sample, a leafpack, and a "visual." In this method, organisms collected are "picked" and preserved in the field. The collected samples were sent to Lenat Consulting Services (Lenat) in Raleigh, NC. Lenat identified specimens to the lowest possible taxonomic level, providing relative abundance (rare, common, and abundant) for each taxon. The calculation of metrics from a Qual-4 method includes total and EPT taxa richness, EPT abundance and biotic index values.

The laboratory results are summarized in Table 3 below.

Table 3: Summary of Benthic Macroinvertebrate

Parameter	Monitoring Site								
	Reach 1	Reach 2	Reach 4	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11
Total Taxa Richness	16	17	22	33	25	35	38	31	18
Total Abundance	66	55	82	175	105	170	143	102	49
EPT Taxa Richness	4	2	9	13	5	9	13	9	4
EPT Abundance	34	8	48	117	11	58	61	30	15
NCBI (Biotic Index)	6.5	7.1	4.9	4.82	6.43	5	5.67	5.87	6.23
Bioclassification	Fair	Poor	Good	Good	Fair	Good	Good-Fair	Fair	Fair

Based on the sampling results above, reaches 1, 2, 7, 10, and 11 lack the species count and/or diversity typically associated with a stream capable of supporting a healthy community. Reach 4, 6, 8, and 9 showed indications of a healthier macroinvertebrate community and had several intolerant species present. The EPT Taxa richness of 13 observed at Reach 6 and 9 are notably high for small streams in urban areas.

Based on the observed geomorphology and field observations the smaller order streams (Reach 1, 2, 4, 6, 7, 8, 9) are sediment exporters and the higher order downstream reaches (Reach 10 and 11) visually appear to be sediment sinks (i.e. silted in pools and riffles). This high sediment load coming from the upstream reaches may be contributing to the reduced habitat score on these downstream reaches.

**Water Quality:**

The Reedy Creek watershed is classified as Class C surface waters. Reedy Creek is listed on the 2010 North Carolina 303(d) list of impaired waters for ecological/biological integrity benthos.

We collected water quality samples at the same two locations as the benthic samples. A water quality meter was used to measure ambient water quality conditions including dissolved oxygen, pH, and conductivity. Grab test samples were gathered and analyzed in a laboratory to assess contaminants such as fecal coliform, phosphorus, nitrates, and total solids. The parameters were collected during normal flow conditions and will be used to determine a water quality index (WQI).

The laboratory results are summarized in Table 4 below.

Table 4: Summary of Water Quality Data

Testing Parameter		Monitoring Site									Class C Water Quality Standards or Typical Range
	Units	Reach 1	Reach 2	Reach 4	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11	
Nitrate	mg/L	0.49	0.086	1.3	0.52	0.16	1.8	0.68	0.28	0.28	<1mg/L <sup>3</sup>
Phosphorus	mg/L	0.054	0.021	0.025	0.089	0.09	0.12	0.094	0.077	0.08	<0.4 mg/L <sup>3</sup>
BOD5	mg/L	ND	ND	ND	16	2.1	ND	ND	20	13	<5 mg/L <sup>3</sup>
Fecal Coliform	Col/100ml	520	100	690	62	350	200	740	1000	470	< 200/100ml mean <sup>2</sup>
Turbidity (lab)	NTU	ND	4.4	1.2	2.8	11	1.8	4.4	2.6	2.9	< 50 NTU <sup>2</sup>
pH	--	6.95	6.26	7.44	7.75	7.98	8.18	8.18	8.01	8.01	Between 6.0 and 9.0 <sup>2</sup>
DO	mg/L	9.22	6.54	8.93	7.18	8.67	8.91	8.41	8.11	8.11	>5.0 mg/L <sup>2</sup>
Temperature	°C	19.3	18.4	19.2	14.2	13.2	11.6	14.2	16	15.5	<2.8° C above natural water temperature <sup>2</sup>
TS	mg/L	96	100	93	110	100	120	100	90	90	<200 mg/L <sup>3</sup>
WQI <sup>1</sup>	--	83.5	77.4	83.6	71.9	76.7	79.4	75.7	68.4	71.0	-

Mg/L=milligram per liter; col/100ml = colonies per 100 milliliters; NTU=nephelometric turbidity unit, SU=standard units; °C =degrees Celsius; ND=Not detected

<sup>1</sup> WQI Scores: 0-25 = poor; 26-50 = fair; 51-70 = average; 71-90 = good; and 91-100 = excellent

<sup>2</sup> Class C Water Quality Standards

<sup>3</sup> Typical Ranges

Highlighted values are outside of typical range and/or exceed Class C Water Quality Standards

All of the reaches except 10 have a “good” WQI score. Reaches 1, 3, and 7-11 have elevated levels of fecal coliform. Reach 4 and 8 exceed typical nitrate ranges. This elevated nitrate could be linked to agricultural/pasture land-use in the headwaters of these reaches. Based on the water quality results, it appears that the downstream reach benthic community is impaired by the lack of in-stream habitat and not by water quality. There are visual signs of bed and bank scour likely producing episodic stressors. In conclusion, it is likely that the benthic integrity of the reaches could improve if some of the stressors were mitigated and/or in-stream habitat was improved.

#### Geotechnical and Soils:

Based on the hand-auger borings performed by Boyle Consulting Engineers, PLLC there is a consistent silt layer approximately 3-feet-deep, followed by a 1-2 foot sand layer across the site. Detailed boring logs are contained in Appendix 4.

The *Soil Survey of Mecklenburg County, North Carolina* (USDA, 1980) indicates that the floodplain of the project area contains Monacan loam (MO), Helena sandy loam (HeB), Vance sandy loam (VaD), Wilkes loam (WkE), Pacolet sandy loam (PaE), Enon sandy loam (EnB and EnD), and Cecil sandy clay loam (CeB2 and CeD2) soils. Monacan (MO) and Helena soils, classified as having hydric inclusions, are somewhat poorly drained and nearly level-typical characteristics of soils found on floodplains along streams and drainage ways. Wilkes loam (15-25% slopes) and Pacolet sandy loam (25-45% slopes) are well drained soils on the side slopes adjacent to drainage ways. The organic content for both is low and permeability is moderate. Cecil (CeB2) soils are well drained and typically found on eroded slopes ranging between 2-8%, defined as interfluves or uplands. The soils were classified using the Unified Soil Classification System. There were no observed relic Hydric soils. Soils identified as Hydric per NRCS mapping were inspected for relic indicators but were observed to be uniform alluvial piedmont floodplain soils with no indicators of a relic Hydric condition. A soils map of the project area is shown in Figure 5.

#### Wetlands:

An overall site review was performed using a 4-inch dutch auger to dig soil samples approximately 12 inches deep. Seven small wetlands were found in the project site ranging in size from 0.03 to 1.6 acres. Wetland A, F, G was a linear headwater wetland at the top of reach 2, 6 and 6-A. Wetland B also is a linear wetland located in a small draw that feeds into Slider Pond. The ponds embankment visually appears to maintain the hydrology of Wetland B. Wetland C, D, and E are floodplain wetlands. Wetland D is currently threatened by a stream head cut moving up reach 7 and based on visual evidence is actively moving up valley through the stream wetland system.

Despite the presence of mapped hydric soils (Monacan and Helena Sandy loam) in the floodplain of lower reach 2, 8, 9, 10, and 11, there were no other jurisdictional wetlands identified. The stream reaches in these locations are highly incised/entrenched and the change to the stream channel has altered (lowered) the water table and reduced the frequency of over bank flood events. In addition, the surface layer in this area appeared to be highly disturbed based on hand borings. The combination of the incision/entrenchment and soils alteration would have affected the historic wetlands that may have existed.

The locations of the site's jurisdictional features, including the above wetlands are shown on Figure 2. The United States Army Corp of Engineers (USACE) has approved the Jurisdictional determination (JD) for Reaches 1-5 and Wetland A and B. An amendment to this previously approved JD that adds stream reaches 6-11 and wetlands C-G was submitted to the USACE on May 25, 2012.

#### Open Water (Manmade Ponds):

There are three ponds that exist inside the nature preserve: Slider, Kingfisher, and Dragonfly. All three are in-line ponds on Reach 2. Both Kingfisher and Dragonfly Ponds are used for active recreation (fishing). Kingfisher Pond has an accessible fishing dock. Based on direction from the City and Parks and Recreation, Kingfisher and Dragonfly Ponds will remain, based on their recreation value/uses. The feasibility of removing the embankment and restoring Slider Pond back to a natural stream was investigated. The current pond is a high quality open water habitat with a well-defined littoral shelf and a good native plant diversity of trees, shrubs, and herbaceous species.



Photo. Slider Pond

Removing the pond would not provide a high level of connectivity because there are in-line ponds below and it is near the top of the watershed.

Detailed investigations of any of the outlet structures or earthen embankments (i.e. geotechnical borings) were not performed as part of this study.

#### FEMA:

The Mecklenburg County Digital Flood Insurance Rate Map (DFIRM) panel 4585 (effective March 2, 2009) shows that Reach 10 and 11 inside the Study Area are included in detailed studied streams or mapped within any floodplain or floodway areas. Work within this study area will require a floodplain development permit from Mecklenburg County and a corresponding flood impact study (FIS). The FIS will require detailed (HEC-RAS) modeling and if changes to base flood elevations or floodplain boundaries occur a Conditional Letter of Map Revision (CLOMR) will be required by FEMA/Mecklenburg County prior to construction. A Letter of Map Revision (LOMR) also will be required post construction.

#### Endangered Species:

Under the provisions of Section 7 of the Endangered Species Act (ESA) of 1973, as amended, Federal Law requires that any action likely to affect a federally protected species adversely be subject to review by the U.S. Fish and Wildlife Service (USFWS). A search of the USFWS website (<http://www.fws.gov>) indicates that four federally endangered species exist in Mecklenburg County, NC: Carolina heelsplitter (*Lasmigona decorata*), Michaux's sumac (*Rhus michauxii*), smooth coneflower (*Echinacea laevigata*), and Schweinitz's sunflower (*Helianthus schweinitzii*). Each species, its habitat, and its status are described in Table 5. A pedestrian survey did not reveal the presence of any of these species. Further investigation is not needed to meet the requirement of Section 7 consultation.

On August 8, 2011, the North Carolina Natural Heritage Program Office records were reviewed to determine the presence of threatened and endangered species. Records did not show any of the four federally endangered species within the project vicinity.

Carolina heelsplitter

The North Carolina Natural Heritage Program has no records of Carolina heelsplitter in the project vicinity. No species were observed during pedestrian surveys.

**BIOLOGICAL CONCLUSION: NOT LIKELY TO ADVERSELY EFFECT**

Michaux's sumac

The North Carolina Natural Heritage Program has no records of Michaux's sumac in the project vicinity. No species were observed during pedestrian surveys. No appropriate habitat is located in the project vicinity.

**BIOLOGICAL CONCLUSION: NO EFFECT**

Schweinitz's sunflower

The North Carolina Natural Heritage Program has no records of Schweinitz's sunflower in the project vicinity. No species were observed during pedestrian surveys. No appropriate habitat is located in the project vicinity.

**BIOLOGICAL CONCLUSION: NOT LIKELY TO ADVERSELY EFFECT**

Smooth coneflower

The North Carolina Natural Heritage Program has no records of Smooth coneflower in the project vicinity. No species were observed during pedestrian surveys. No appropriate habitat is located in the project vicinity.

**BIOLOGICAL CONCLUSION: NO EFFECT**

Table 5: Endangered Species - Mecklenburg County

Scientific Name	Common Name	Habitat Requirement	State Status	Federal Status	Habitat Present	Likelihood of Presence
Carolina heelsplitter	<i>Lasmigona decorata</i>	Streams, rivers, and ponds	E	E	Yes	Unlikely
Michaux's sumac	<i>Rhus michauxii</i>	Sandy or rocky open woods in association with basic soils	E-SC	E	No	Unlikely
Schweinitz's sunflower	<i>Helianthus schweinitzii</i>	Roadsides, power line clearings, old pastures, woodland openings, and other sunny or semi-sunny situations	E	E	No	Unlikely
Smooth coneflower	<i>Echinacea laevigata</i>	Open woods, barrens, roadsides, clearcuts, dry limestone bluffs on magnesium- and calcium-rich soils	E-SC	E	No	Unlikely

Notes: E=Endangered; SC=Special Concern

The State defines an endangered plant species as "any species or higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy" (GS 19B 106: 202.12).

The State defines an endangered animal species as "any native or once-native species of wild animal whose continued existence as a viable component of the State's fauna is determined by the Wildlife Resources Commission to be in jeopardy or any species of wild

animal determined to be an 'endangered species' pursuant to the Endangered Species Act" (Article 25 of Chapter 113 of the General Statutes; 1987).

The State defines a Special Concern as "any species of plant in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of [the Plant Protection and Conservation Act]" (GS 19B 106.202.12).

#### Cultural Resources:

The State Historic Preservation Office (SHPO) will be consulted during the permitting phase.

#### Vegetation/Buffers:

The buffers in the project corridor have been protected for the last 30 years in the nature preserve. The vegetation communities include Piedmont Bottomland Forest, a Shafely and Weakly classification.



Photo. Less mature emerging buffer lacking understory.



Photo. Mature forested buffer (Reach 8).

The hardwood species range in age from less than 5 to over 30 years old depending on the location in the preserve. Reach 8 has the most mature forested community with many trees over 36" in diameter. The Reaches outside the preserve have less mature vegetation and some Chinese Privet (*Ligustrum sinense*) was observed. Napalese Browntop (*Mictostegium vimineum*) was covering almost the entire floodplain floor along Reach 8 and in Reach 11 (but was less prevalent in the latter).

The proposed restoration reaches (Figure 6) have down-cut/incised to below the effective rooting depth of the trees along the stream banks. These unstable reaches are undercutting the trees at the top of the bank and many have fallen into the channel or are in jeopardy of falling. In addition, the stream incision likely has altered the hydrology of the adjacent floodplain and therefore probably has altered/suppressed some of the more wet species that would be found if the floodplain was more "active"/connected.

The mature vegetation buffer will be one of the major constraints for a restoration project because the goal would be to minimize impacts to the existing vegetation (i.e., large trees). The short-term ecological impact to small portions of the buffer would likely be unavoidable. However, the ecological functional lift of restoring the unstable stream channels and reducing the high bed and bank erosion will create a higher functioning ecological system in the long term. Alternatives that try to minimize tree loss while restoring/stabilizing the most severely degraded reaches are presented in section 4.0.

#### Park and Nature Preserve Uses:

The nature preserve has multiple active and passive uses. Two of the three ponds (Kingfisher and Dragonfly) are used for fishing as discussed above. The only other use in the proposed area for restoration (i.e., active construction) is the series of nature trails in the area. These trails (dirt paths) are outside the immediate riparian buffer of 50 feet with the exception of three perpendicular stream crossings (i.e., footbridges) and the Robinson Rockhouse Trail:

- Sierra Loop trail crosses Reach 1 (newly constructed foot bridge) just upstream of confluence with Reach 2
- Sierra Loop trail crosses Reach 1 (foot bridge) just downstream of confluence of Reach 3 and 4
- South Fork trail crosses Reach 2 (newly constructed bridge) just upstream of the confluence with Reach 1
- Robinson Rockhouse trail is within 50 feet of the existing stream (Reach 10).

None of these small pedestrian bridge(s) would be a major constraint to restoration construction. The Park has requested that the City work around each of the newly constructed bridges (i.e., "leave in place"). Robison Rockhouse trail and the Robinson Rockhouse Ruins will be preserved.

#### Visible Utilities:

There is a newly constructed sewer line (Hood Road Annexation) by Charlotte Mecklenburg Utility Department. This project construction occurred 2010-2012 and the sewer line runs along portions of Reach 6, 7, 9, 10, and 11. The maintained sewer easement is generally 20-50 feet from the top of bank on one side. The sewer line crosses Reaches 6, 7 and 11 in one location on each reach. The maintained sewer easement of these newly constructed sewer mains is visible on the aerial photography (Figure 3).

Overhead high transmission power lines cross over Reaches 7, 9, and 10 and the crossings are relatively perpendicular to the channel. The power line and maintained easement is visible in the aerial photography (Figure 3).

#### Site Access and Haul Roads:

Site access potentially could be from four locations. Final access locations will depend on final temporary and permanent easements. The primary access from the upstream end of the project will be through the nature preserve from the primary parking lot area for picnic areas 3-9 and the Frisbee golf course. The fields adjacent to Dragonfly Pond may provide a convenient area for staging and lay down areas for materials and equipment. The access road down to Reaches 1-4, and lower Reach 5 and upper Reach 10 could come from this upstream park access from either use of existing park paths (i.e., Sassafras trail, which is wide and has a gravel base) and/or newly constructed haul roads down to the proposed restoration reaches.

Primary access from the downstream end of the project will likely be from Plaza Road Extension adjacent to Reach 11. This was an access point for construction of the sanitary sewer. There is a cleared area in this location that may provide a temporary staging location. The haul road from the downstream end should utilize the areas previously disturbed by the sewer line construction to the maximum extent possible.

Additional access could come from the Hodges farm, Hood Road, and Rocky River Road. This may provide potential access to the upstream portions of Reaches 3, 4, 6, and 7. The exact details of access will be negotiated with Park and Recreation and/or the appropriate private property owners as the project moves forward.

All haul roads will need to support the movement of equipment and construction material (rock, silt fence, coir matting, etc.). All temporary haul roads and staging areas should be located to minimize tree impacts. It is recommended that a detailed tree survey be performed as part of the design phase.

We also recommended exploring the possibility of using beds of stream that will be restored as haul roads in some locations. This will help reduce impacts to adjacent buffers. However, erosion control will need to be adequate to account for equipment in the stream.

## 4.0 Conceptual Design Alternatives

The goal of the restoration project is to restore/enhance unstable stream systems and preserve a stable stream system to improve the water quality and aquatic/riparian habitat functions of the site's streams and floodplain through the following objectives:

- Reduce sediment input from stream bed and bank erosion by creating stable hydraulic channel geometries.
- Remove excess nutrients and sediment by using existing buffers and reconnecting the stream to either a constructed floodplain or its historic floodplain (reduces incision by correcting dimension and profile).
- Increase dissolved oxygen concentrations through use of in-stream structures and the turbulence they produce in pools.
- Stabilize stream banks using bioengineering and/or specific natural channel design techniques based on constraints and opportunities.
- Improve transport of sediment and wood to create bedform diversity and dynamic equilibrium.
- Improve substrate through use of structures and the elimination of major sediment sources (eroding bed and banks). Correcting the profile and creating localized bed slopes will allow the substrate to coarsen as the fines are transported. Bank source sediment will be greatly reduced by the bank stabilization techniques.
- Create habitat diversity by introducing woody structures such as log vanes, log sills, and/or log cross vanes.
- Protect upstream stable reaches and preserve high quality/unique vegetation and geologic features inside the Nature Preserve.
- Enhance ecological value and educational opportunities within the Park and Nature Preserve.
- Produce mitigation credit.

### 4.1 *Stream Restoration Approaches*

There are two restoration approaches/alternatives presented for this site to meet the above objectives. Both approaches are watershed-based and involve preserving stable upstream reaches, wetlands, and open water, as well as restoration of unstable downstream reaches to a stable form. Both concepts involve construction using heavy equipment and thus some impacts to trees will be unavoidable in order to stabilize the stream banks. However, both concepts would try to minimize impacts to trees that are not currently threatened by erosion.

#### *Alternative 1 (Figure 6 and 7a) — Rosgen Priority 1 Restoration*

A Rosgen Priority 1 restoration approach is proposed on the reaches labeled as restoration on Figure 6a as Alternative 1. Preservation is proposed on upper Reach 2-D, upper Reach 2-E, upper Reach 5-A, upper Reach

6, 6-A, upper Reach 7, 7-A, and 11-A. A Rosgen Priority 1 restoration is the process of re-establishing an incised channel back onto the previous floodplain by constructing a new bankfull/channel-forming discharge channel. The new channel dimension, pattern, and profile could be based on a stable/reference form found in the Park. The existing incised channel could be filled or partially backfilled to create oxbow lakes or vernal pools level with the new floodplain. The Priority 1 approach would start at a nick point/headcut or similar location conducive to bringing the channel up onto its historic floodplain. For lower Reach 2 and Reach 4 the restoration would start at outfall of the pond(s). These pond outfalls may need to be modified to allow for a Priority 1 restoration below. For Reaches 3, 6-8, and 10-C the restoration could start at the bedrock or vegetation feature that has stopped the head cut and separates the restoration (unstable) reach from the preservation (stable reach). Reaches 1, 9, and 10 also could be restored using Priority 1 if Priority 1 is chosen for the reaches above them. Reach 11 would be a transition reach (i.e., Priority 1 transitioning to Priority 2) to tie the upstream Priority 1 restoration to the existing culvert elevation at Plaza Road Extension at the downstream end of the project.

Based on Valley type and project constraints Reaches 1, 3, 4, and possibly 2 could be restored to a Rosgen C stream type. The remaining restoration reaches would likely be restored to a Rosgen Bc stream type.

The location and pattern of the new channel would be based on reference conditions as well as constraints (mature trees, topography, pedestrian bridges, and utility easement). The channel could be woven around/between the trees to maximize tree preservation. There is an opportunity on lower Reach 8 to utilize the abandoned relic stream channel for the lower 750 feet.



*Photo. Example of Priority 1 – Shortly after construction*

In-stream structures could be placed to add habitat, grade control, increase water quality, and provide bedform diversity. Structures are proposed to protect stream bed and banks and increase aquatic habitat diversity. The types of grade control and habitat structures that potentially will be incorporated into the restoration project

include rock cross vanes, log sills, single log vanes, log cross vanes, constructed log and rock riffles, and boulder and wood toe protection.

*Advantages:*

- Reduces bank height and stream bank erosion
- Reduces land loss
- Raises the water table (may help re-establish wetlands on Reach 10 and Lower sections of Reach 8)
- Improves aquatic habitats
- Improves aesthetics

*Disadvantages:*

- Tree Impacts
- Increases flooding of riparian areas in the Nature Preserve (although there are no impacted structures or roads)
- Downstream end of project will require a large grade control structure to transition back to incised condition at Plaza Road Extension.
- Change in hydro-period and groundwater elevation in floodplain could potentially impact riparian vegetation.

*Alternative 2 (Figure 6 and 7b) — Rosgen Priority 2 and 3*

A Rosgen Priority 2 and 3 restoration approach is proposed on the unstable reaches proposed for restoration in Figure 6b as Alternative 2. Preservation is proposed on the same reaches as it is in Alternative 1. A Rosgen Priority 2 restoration is the process of converting the bed of the existing incised channel to a new floodplain. Priority 3 is shaping the banks and stabilizing both bed and banks. If the belt width is too narrow, the stream bed walls are excavated for a Priority 2. However, this will increase tree loss. The ability to perform a Priority 2 restoration would be dictated by how over-wide the existing streams currently are and how close the tree save areas are to the top of banks.

To minimize end-haul material from bank excavation, materials could be placed in the stream bed, with the new channel and floodplain being established on the fill. The new channels dimension, pattern, and profile would be based on a stable/reference form. The Priority 2 approach would start at a nick point/headcut or similar location where the channel becomes incised/unstable

The location and pattern of the new channel will be constrained by existing channel alignment and mature trees.

In-stream structures would be placed in the design channel to provide grade control (maintain overall design slope), add habitat, increase water quality, and provide bedform diversity. These structures are likely necessary due to the geology and constraints on pattern/belt width associated with a Priority 2, as well as the overall steepness of the valley. The structures would help maintain pools and dissipate energy vertically. Other potential structures could protect stream banks and increase aquatic habitat diversity. The types of grade control and habitat structures that potentially can be incorporated into the restoration project include rock cross vanes, log sills, single log vanes, log cross vanes, constructed log and rock riffles, and boulder and wood toe protection.



Photo. Example of Priority 2 – After construction.

*Advantages:*

- Decreases bank height ratios and stream bank erosion
- Allows riparian vegetation to help stabilize banks
- Establishes a small floodplain bench to reduce shear stress during floods
- Improves aquatic habitats
- Prevents wide-scale flooding of original land surface
- Reduces sediment
- Downstream grade transition is easier than Priority 1

*Disadvantages:*

- Tree Impacts
- Higher cost of materials (rock) for bed and stream bank stabilization
- Does not raise water table to previous levels
- Shear stress and velocity higher than Priority 1 during flood due to narrow floodplain
- Upper slopes need to be stabilized for flood events
- Higher erosion risk during floods due to excessive shear stress and velocity

## 4.2 *Riparian Area Restoration Approach and Buffer Reforestation Scheme*

The restoration approach would minimize impacts to trees in all reaches. Areas that are disturbed as part of construction or access would be replanted.

The buffer areas would be treated for removal of invasive species (i.e., Chinese Privet). Re-established or new buffer area would be planted according to the *United States Army Corps of Engineers Stream Mitigation*

*Guidelines*, 2003. To initialize the proposed riparian community, the restoration area could be planted with a mix of pioneer and climax species selected and arranged to meet the following objectives:

- Stabilize disturbed or high stress areas.
- Establish a mix of shade-intolerant canopy and shade-tolerant understory species.

### 4.3 Wetlands

The existing seven small wetlands would be preserved. Based on the presence of mapped hydric soils (Monacan loam and Helena sandy loam) in the floodplain of Reaches 2 and 6-11, there may be an opportunity to restore some small wetland pockets if Alternative 1 (Priority 1 restoration) is chosen. The quantity (acres) of the wetland restoration opportunities would need to be better defined by a detailed soil, groundwater topographic survey, and study. A licensed soil scientist should perform the soil survey.

## 5.0 Mitigation Summary

Restoration at 1:1 is proposed for the design linear feet for all locations where pattern, profile, and dimension would be altered to a stable condition. Preservation at 5:1 is requested for the stable upper reaches and the wetlands that are outside of the current Nature Preserve. No SMUs are proposed for preservation reaches of wetlands inside the Nature Preserve since these are already protected. Figures 6a and 6b summarize the mitigation credit for each alternative by reach and segregated based on public and private parcels.

Both alternatives preserve over 20,000 linear feet of stable stream and restore over 24,000 linear feet of unstable channel. Restoration and Preservation combined could generate approximately 26,590 stream mitigation units (SMUs) and 0.3 wetland mitigation units (WMUs) if all reaches and wetlands shown in Figure 6 are included. Final SMUs would depend on which alternative is pursued, how much pattern is added, if all easements are secured from the County and private owners, and all approvals are granted by the regulatory agencies.

Priority 1 is the recommended restoration approach and has the following advantages over Priority 2/Priority 3:

- The Priority 1 approach involves constructing a new stream channel in the ideal dimension, pattern and profile for its watershed based on a reference reach, achieving the maximum increase in water quality. The ability to alter the dimension, pattern and profile of the stream with the Priority 2/Priority 3 approach is restricted because the new channel must be constructed largely within the existing stream channel.
- Because the Priority 1 restoration approach raises the water table, it has the potential to create riparian wetlands where the original stream channel previously existed. The Priority 2/Priority 3 restoration approach does not raise the water table and does not create riparian wetlands.
- Priority 1 restores the channel by raising it to match its historic floodplain, maximizing the flood prone area and available storage area.
- Priority 2/3 would likely have increase amount of excavation compared to Priority 1 due to the depth of the channel and degree of benching and sloping required for Priority 2/3.

While Priority 1 is the preferred restoration approach for this stream, the Priority 2/Priority 3 approach has a few advantages worth noting:

- The Priority 2/Priority 3 approach involves constructing the new stream channel primarily within the path of the original stream, potentially reducing the soil that needs to be excavated.
- The Priority 2/Priority 3 approach is less likely to increase flood elevations.
- Third, the Priority 2 approach does not significantly alter surrounding groundwater and may not alter the hydro-period of some of the stable adjacent riparian vegetation communities as a Priority 1 might.

## 6.0 Project Recommendations

### 6.1 Summary of Recommendations and Cost/Benefit Explanations

It is recommended that reaches 1 through 11 be restored using natural channel design techniques and that the City seek mitigation credit generated for inclusion into its existing mitigation bank.

Table 6 below describes the costs and benefits of the alternatives as compared to each other.

Table 6: Cost/Benefit Summary

Alternative	Functional Benefit	Mitigation	Construction Cost (est.)	Engineering Cost (est.)*
1	<ul style="list-style-type: none"> <li>• Reduced sedimentation</li> <li>• Transport sediment to create dynamic equilibrium</li> <li>• Increased dissolved oxygen content</li> <li>• Improves aquatic habitat.</li> <li>• Increased floodplain connectivity and infiltration</li> </ul>	Up to 26,700 SMU and 0.3 WMUs	\$2,160,000 - \$3,500,000	\$600,000 - \$1,000,000
2	<ul style="list-style-type: none"> <li>• Reduced sedimentation</li> <li>• Transport sediment to create dynamic equilibrium</li> <li>• Increased dissolved oxygen content</li> <li>• Improves aquatic habitat</li> </ul>	Up to 26,700 SMU and 0.3 WMUs	\$2,400,000 - \$3,840,000	\$600,000 - \$1,000,000
No-build	None	None	None	None

\*Engineering cost includes final planning, survey, permitting and design. It does not include post-construction services (i.e. monitoring, as-built, LOMR, etc.)

Table 7: Estimated Cost Summary

Alternative	Estimated Total Construction Cost (millions)	Construction Cost/ LF Restoration	Construction Cost/SMU
1	\$2.16-3.5	\$90 - 145	\$81 - 131
2	\$2.4-3.84	\$100 - 160	\$90 - 144

For generating an estimated total cost, no land cost is assumed because the property is either public land or a donated conservation easement will be sought. For construction cost/SMU preservation, only credits on private land are included (No preservation in Nature Preserve).

The consequences of a “no-build” alternative include continued degradation of the stream reaches. The stream bed and banks could continue to erode as the stream seeks equilibrium. The impacts of the continued erosion typically are impaired biology activity, impaired habitat, lack of habitat availability, tree loss, increased turbidity, and excess sediment sent downstream.

## 6.2 Stakeholder Feedback

The following stakeholder meetings have been held with the following outcomes:

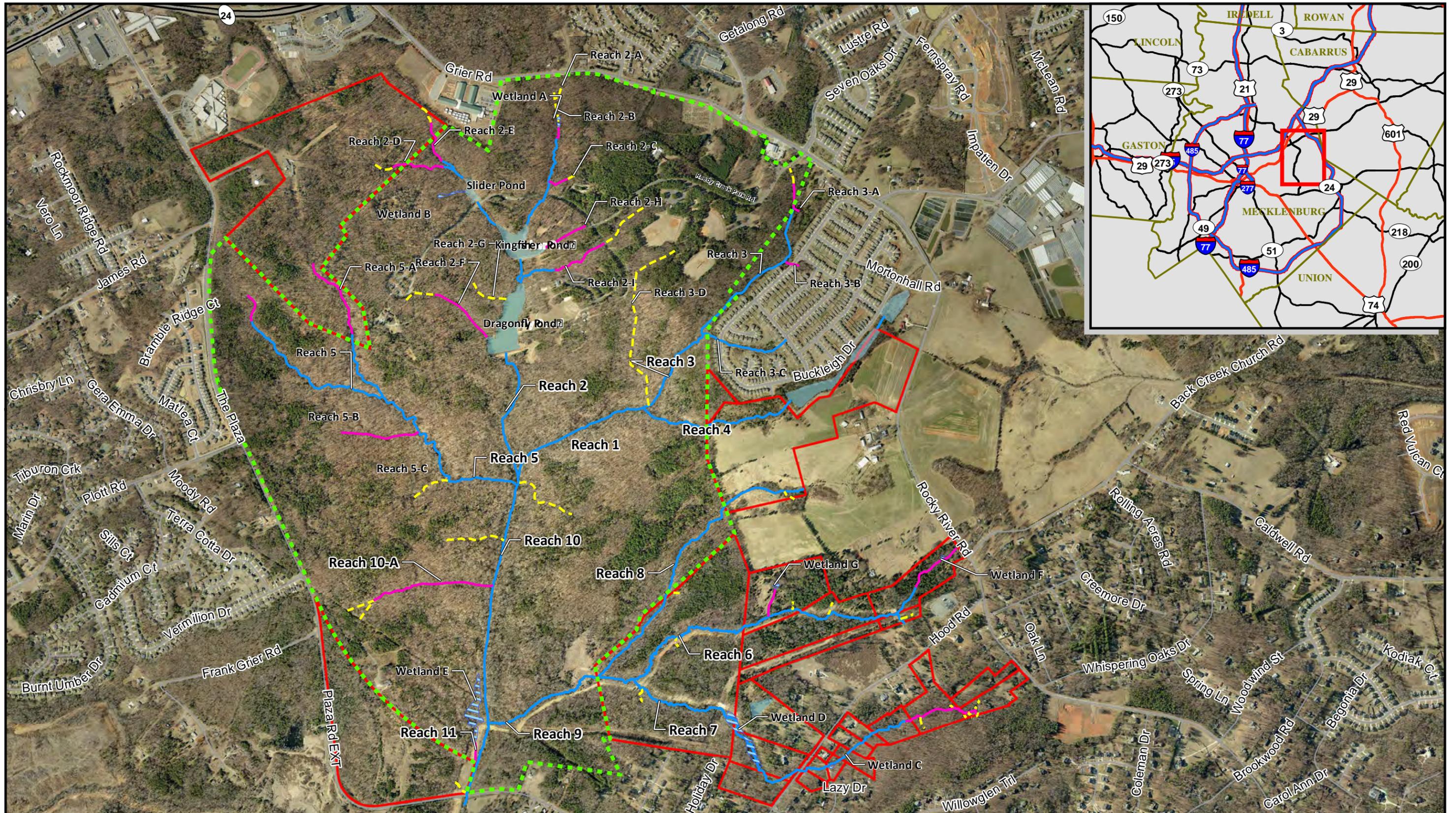
- IRT preliminary site review on November 22, 2011 of Reaches 1-5.
  - IRT members reviewed Reaches 1-5
  - The agencies supported the City further pursuing the site as a potential mitigation project
- Meeting with Parks and Recreation and Reedy Creek Nature Preserve staff on February 3, 2012.
  - Staff supported the project and recommended that it be presented to the Stewardship Advisory Committee (SAC) to gain their support
- Presentation to the SAC on May 9, 2012
  - THE SAC unanimously supported proceeding forward with a restoration project in the Park and Preserve
- IRT site review of Reaches 6-11 on June 21, 2012
  - IRT members (USACE and DWO) support the City further pursuing the site as a potential mitigation project.
  - Through follow-up emails and communication with the City the IRT provided the following comments that will need to be addressed as the project moves forward:
    - Limit buffer disturbance. Tree surveys for dbh's smaller than 12 inches will likely be required.
    - Priority 10 restoration or an enhancement approach focusing on erosion reduction and habitat creation are preferred options.
    - Designs should incorporate woody structure and minimize use of rock
    - Wetland E is a high quality wetland area and should not be impacted
    - Reference streams on-site (Upper Reach 5 and Upper Reach 7) should be considered.
    - Post construction macroinvertebrates monitoring plan since upstream reaches scored high and downstream reaches low in pre-construction monitoring.

Meeting minutes and presentation materials and additional correspondents are located in Appendix 9. Private property owner coordination is on-going and not included in this version of the document.

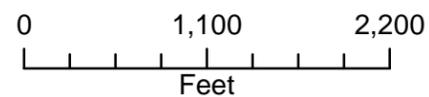
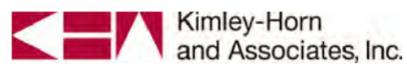
## 7.0 References

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- Harman, William A., Gregory D. Jennings, et al. (1999). *Bankfull Hydraulic Geometry Relationships for North Carolina Streams*. Wildland Hydrology Symposium, AWRA, Bozeman, MT.
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- The Division of Land Resources and The Division of Water Quality, 2001 v.3.0. "Internal Technical Guide for Stream Work in North Carolina."
- United States Fish and Wildlife Service. (2007). *County Lists of Endangered, Threatened, Proposed and Candidate Species for the Southeast Region*. <<http://www.fws.gov/southeast/es/county%20lists.htm>> (accessed 08/24/2010).

# Figures



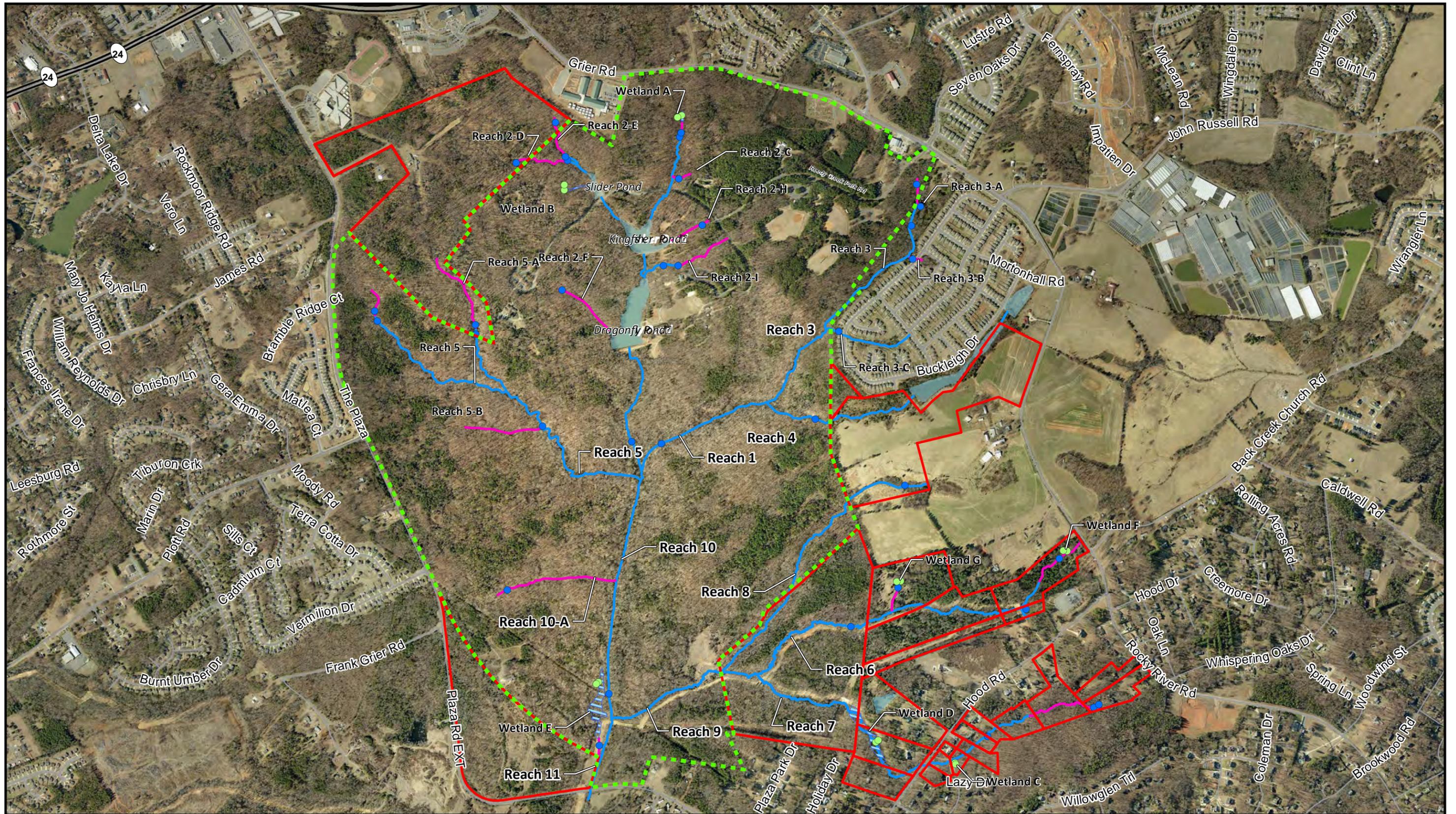
Title: Figure 1 - Vicinity



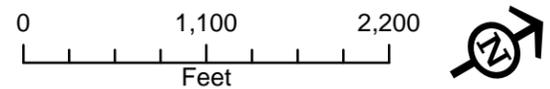
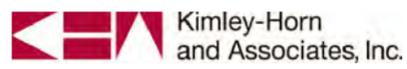
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- Ponds
- Reedy Creek Nature Preserve Forest
- Wetlands
- Potential Additional Parcels
- Perennial RPW
- Seasonal RPW
- Ephemeral





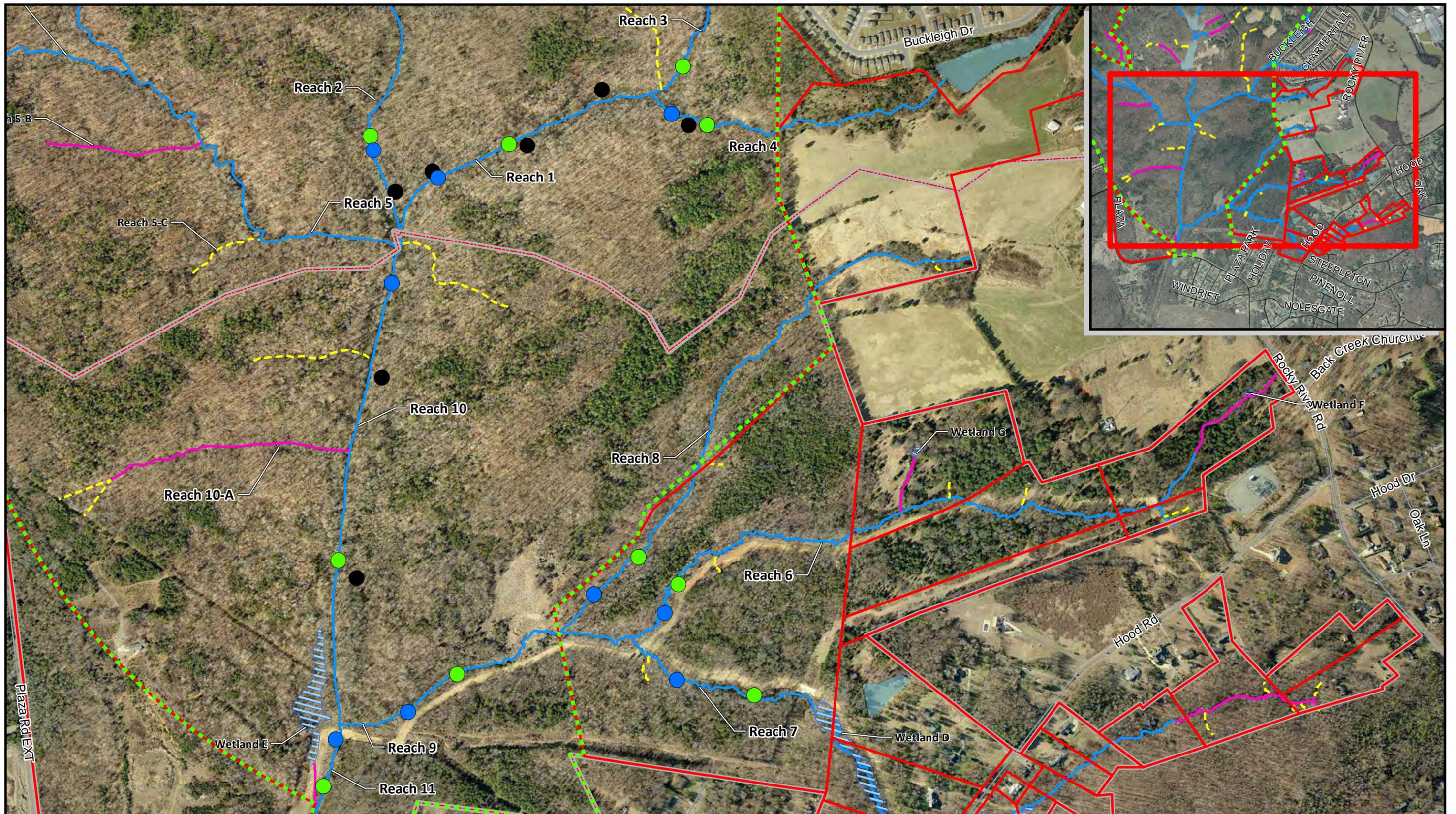
Title: Figure 2 - Jurisdictional Features Figure (2011 Mecklenburg County Aerial)



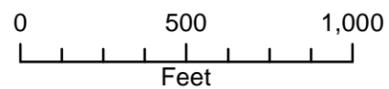
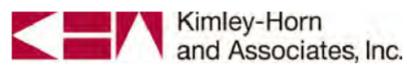
Legend:

- Ponds
- Wetlands
- Wetland Data Points
- Stream Data Points
- Perennial RPW
- Seasonal RPW





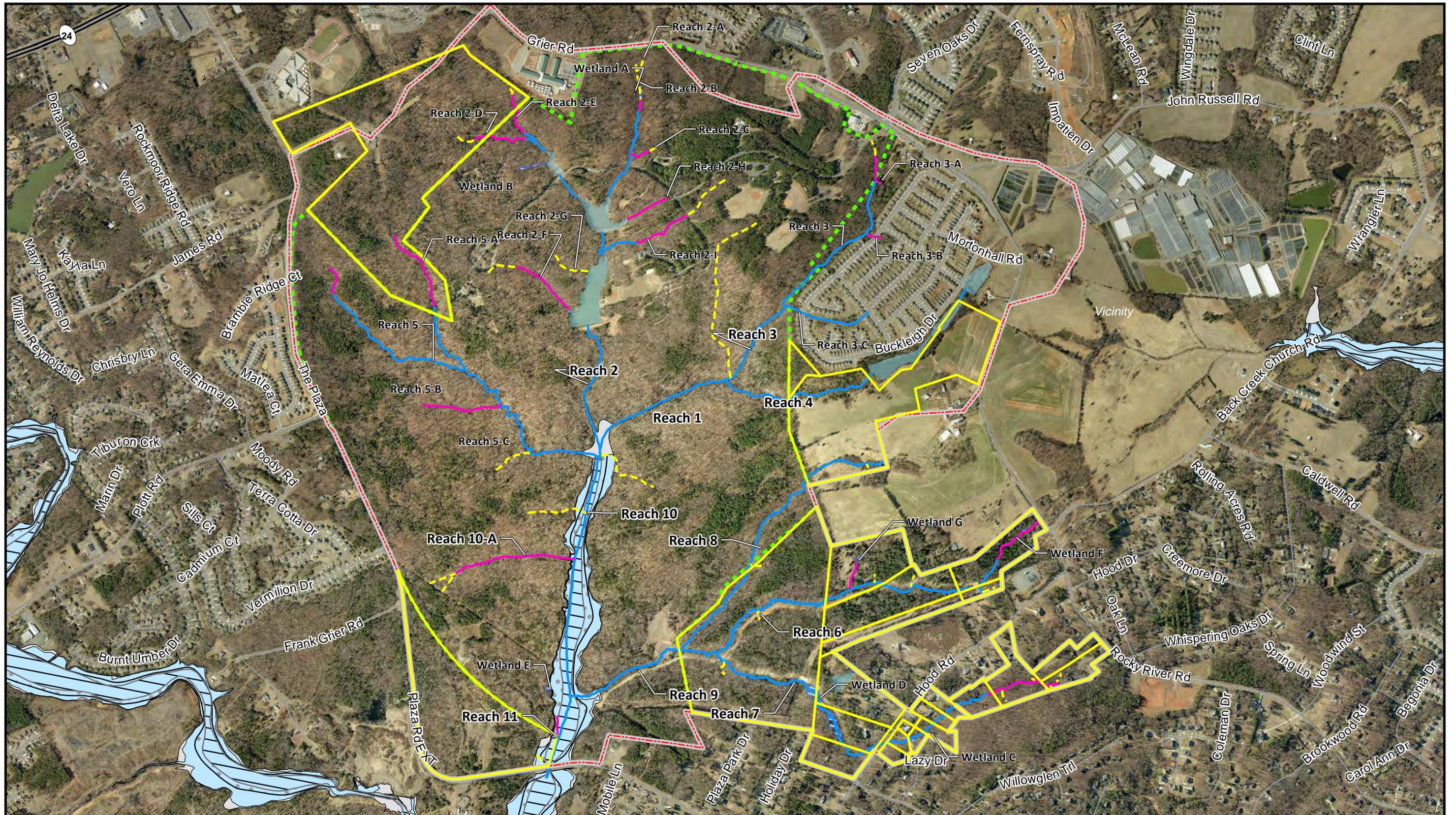
Title: Figure 3 - Data Collection



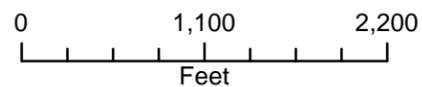
Legend:

- Wetlands
- Perennial RPW
- Seasonal RPW
- Ephemeral
- Reedy Creek Nature Preserve Forest
- Soil Boring Locations
- Geomorphic Data Collection Location
- Water Quality Sampling Locations
- Ponds





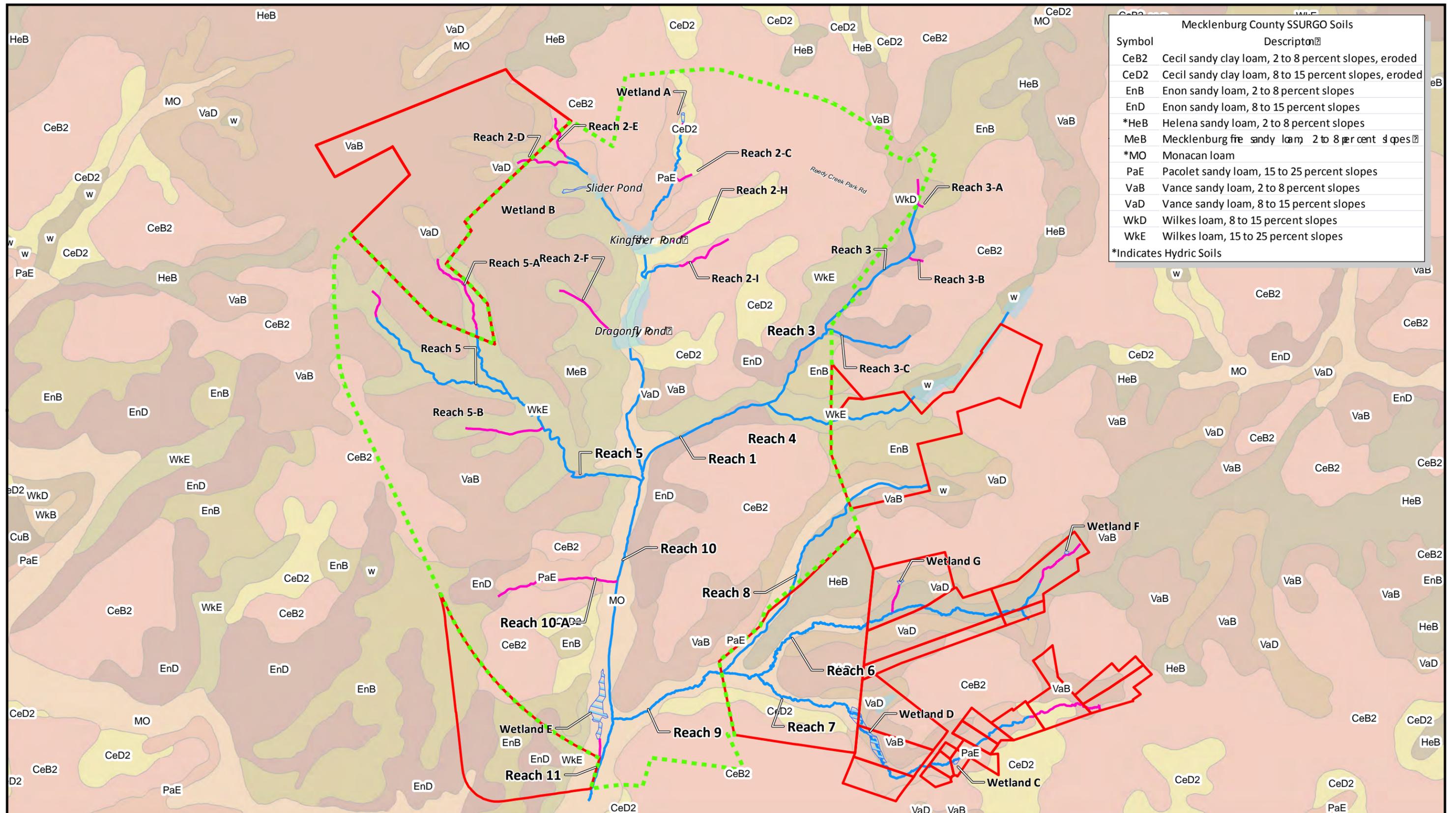
Title: Figure 4 - FEMA Flood Boundaries



Legend:

- RDYCK feas\_study\_area
- Meck. Co. Owned Parcels
- Wetlands
- Ponds
- FEMA Floodway
- Community Floodway
- Existing FEMA 1% Annual Chance Flood
- Future FEMA 1% Annual Chance Flood
- Reedy Creek Nature Preserve
- Perennial RPW
- Seasonal RPW
- Ephemeral

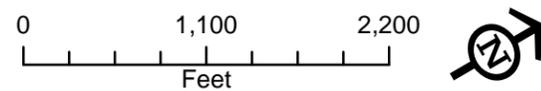
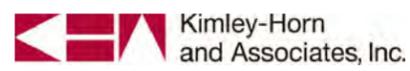




Mecklenburg County SSURGO Soils	
Symbol	Description
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded
CeD2	Cecil sandy clay loam, 8 to 15 percent slopes, eroded
EnB	Enon sandy loam, 2 to 8 percent slopes
EnD	Enon sandy loam, 8 to 15 percent slopes
*HeB	Helena sandy loam, 2 to 8 percent slopes
MeB	Mecklenburg fine sandy loam, 2 to 8 percent slopes
*MO	Monacan loam
PaE	Pacolet sandy loam, 15 to 25 percent slopes
VaB	Vance sandy loam, 2 to 8 percent slopes
VaD	Vance sandy loam, 8 to 15 percent slopes
WkD	Wilkes loam, 8 to 15 percent slopes
WkE	Wilkes loam, 15 to 25 percent slopes

\*Indicates Hydric Soils

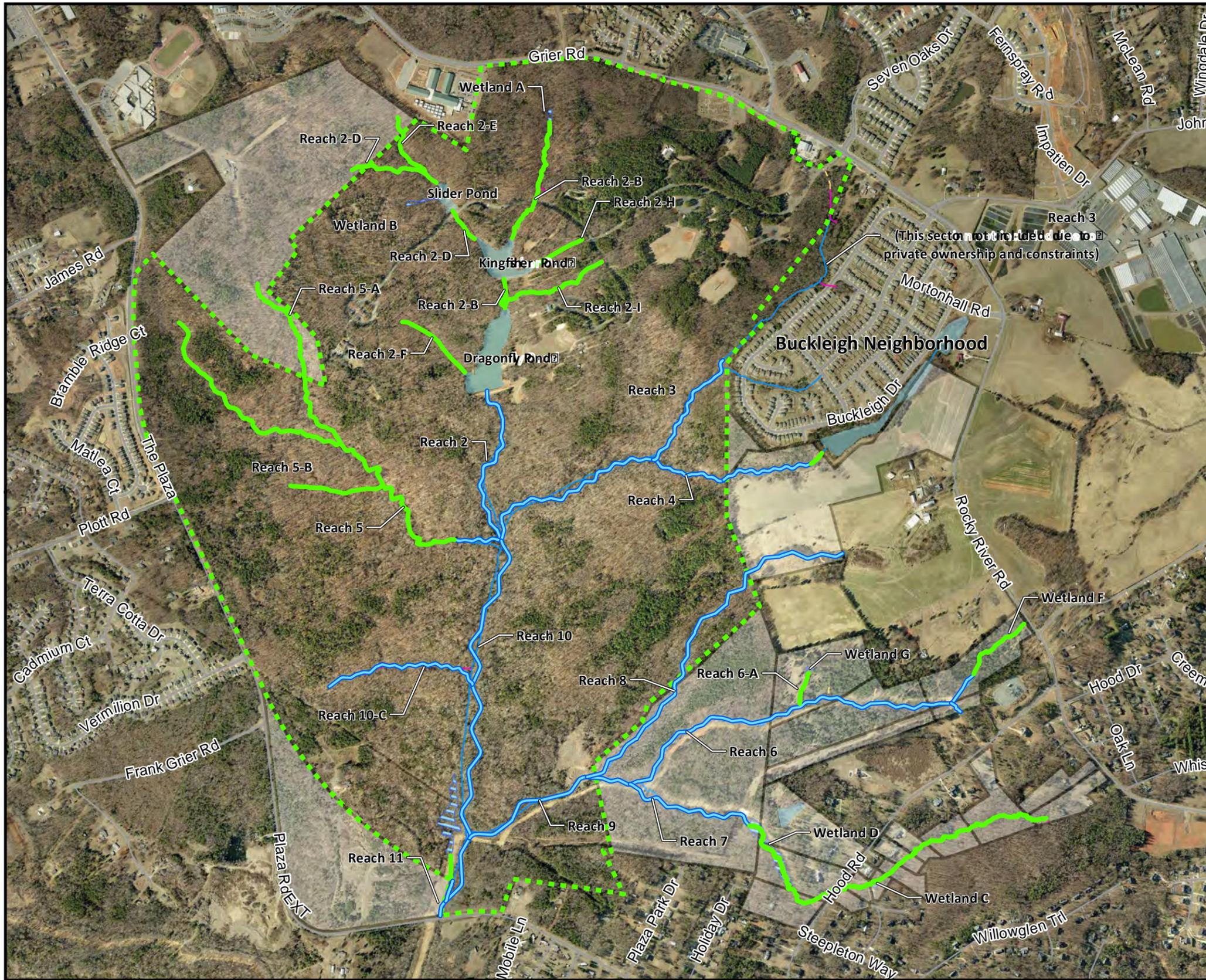
Title: Figure 5 - NRCS SSURGO Soils Figure



Legend:

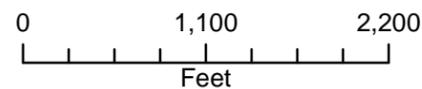
- Wetlands
- Study Area
- Ponds
- Perennial RPW
- Seasonal RPW
- Ephemeral
- Reedy Creek Nature Preserve Forest





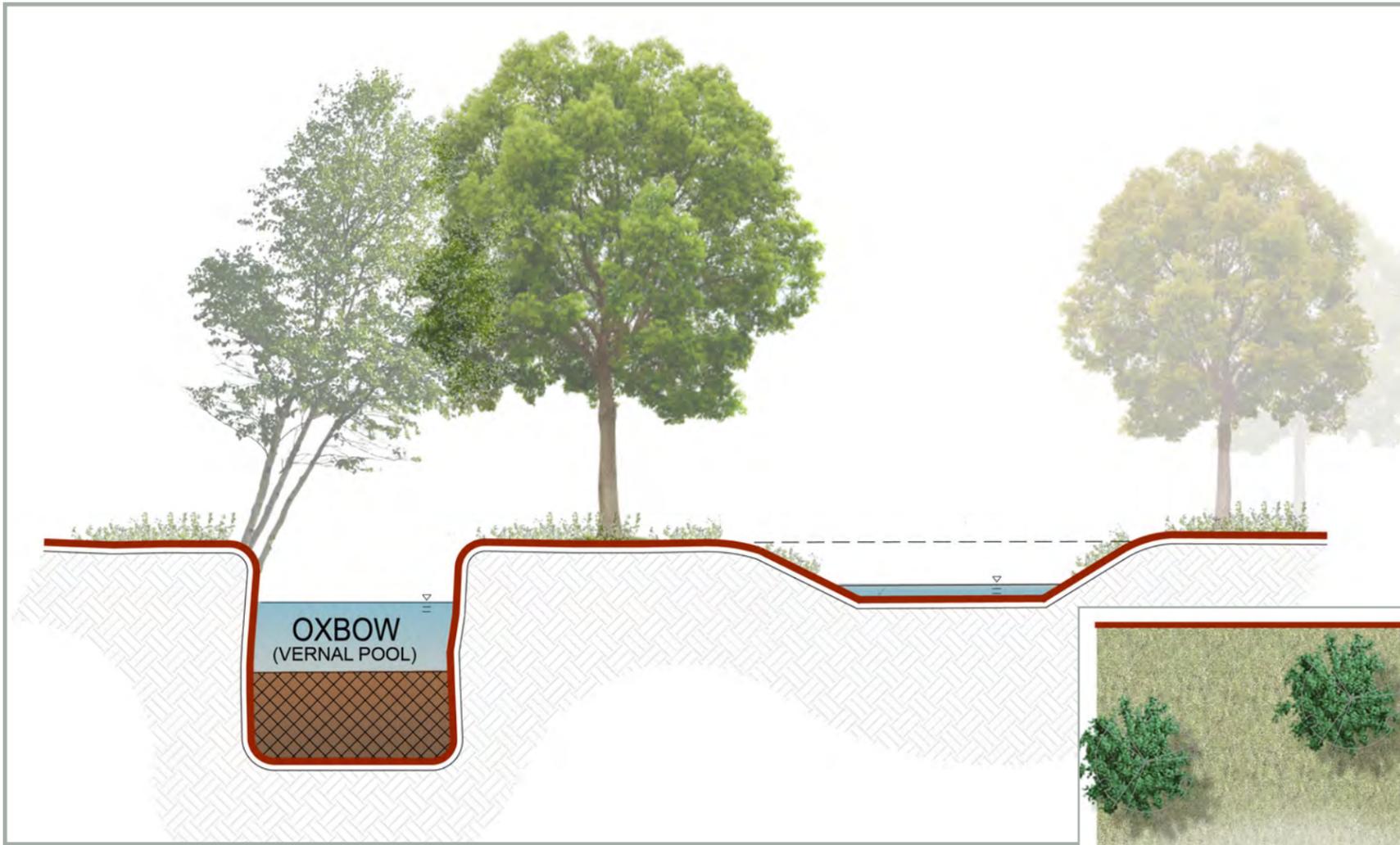
Reach	Mitigation Type	Existing	Credit Ratio	Mitigation Credits
STREAMS (Feet)				
1	Restoration	1,854	1:1	1,854
2	Restoration	1,830	1:1	1,830
3	Restoration	1,353	1:1	1,353
4	Restoration	854	1:1	854
4	Restoration (Private)	990	1:1	990
5	Restoration	490	1:1	490
6	Restoration (Private)	4,522	1:1	4,522
6-B	Restoration (Private)	177	1:1	177
7	Restoration (Private)	2,007	1:1	2,007
8	Restoration	2,395	1:1	2,395
8	Restoration (Private)	1,440	1:1	1,440
9	Restoration	1,634	1:1	1,634
10	Restoration	2,974	1:1	2,974
10-C	Restoration	1,500	1:1	1,500
<b>Subtotal Restoration</b>		<b>24,020</b>	<b>-</b>	<b>24,020</b>
2-B	Preservation	1,725	-	-
2-D	Preservation	1,150	-	-
2-D	Preservation (Private)	180	5:1	36
2-E	Preservation	541	-	-
2-E	Preservation (Private)	190	5:1	38
2-F	Preservation	845	-	-
2-H	Preservation	559	-	-
2-I	Preservation	1,214	-	-
4	Preservation (Private)	229	5:1	46
5	Preservation (Private)	4,579	5:1	916
5-A	Preservation	893	-	-
5-A	Preservation (Private)	1,175	5:1	235
5-B	Preservation (Private)	983	5:1	197
6	Preservation (Private)	869	5:1	174
6-A	Preservation (Private)	352	5:1	70
7	Preservation (Private)	4,294	5:1	859
11-A	Preservation	271	-	-
<b>Subtotal Preservation</b>		<b>20,049</b>	<b>-</b>	<b>2,570</b>
<b>TOTALS</b>		<b>44,069</b>	<b>-</b>	<b>26,590</b>
WETLANDS (Acres)				
A	Preservation	0.18	-	-
B	Preservation	0.10	-	-
C	Preservation (Private)	0.06	5:1	0.012
D	Preservation (Private)	1.34	5:1	0.268
E	Preservation	1.58	-	-
F	Preservation (Private)	0.03	5:1	0.006
G	Preservation (Private)	0.06	5:1	0.012
<b>TOTALS</b>		<b>3.35</b>	<b>-</b>	<b>0.30</b>

Title: Figure 6 - Conceptual Mitigation (Rosgen Priority 1)



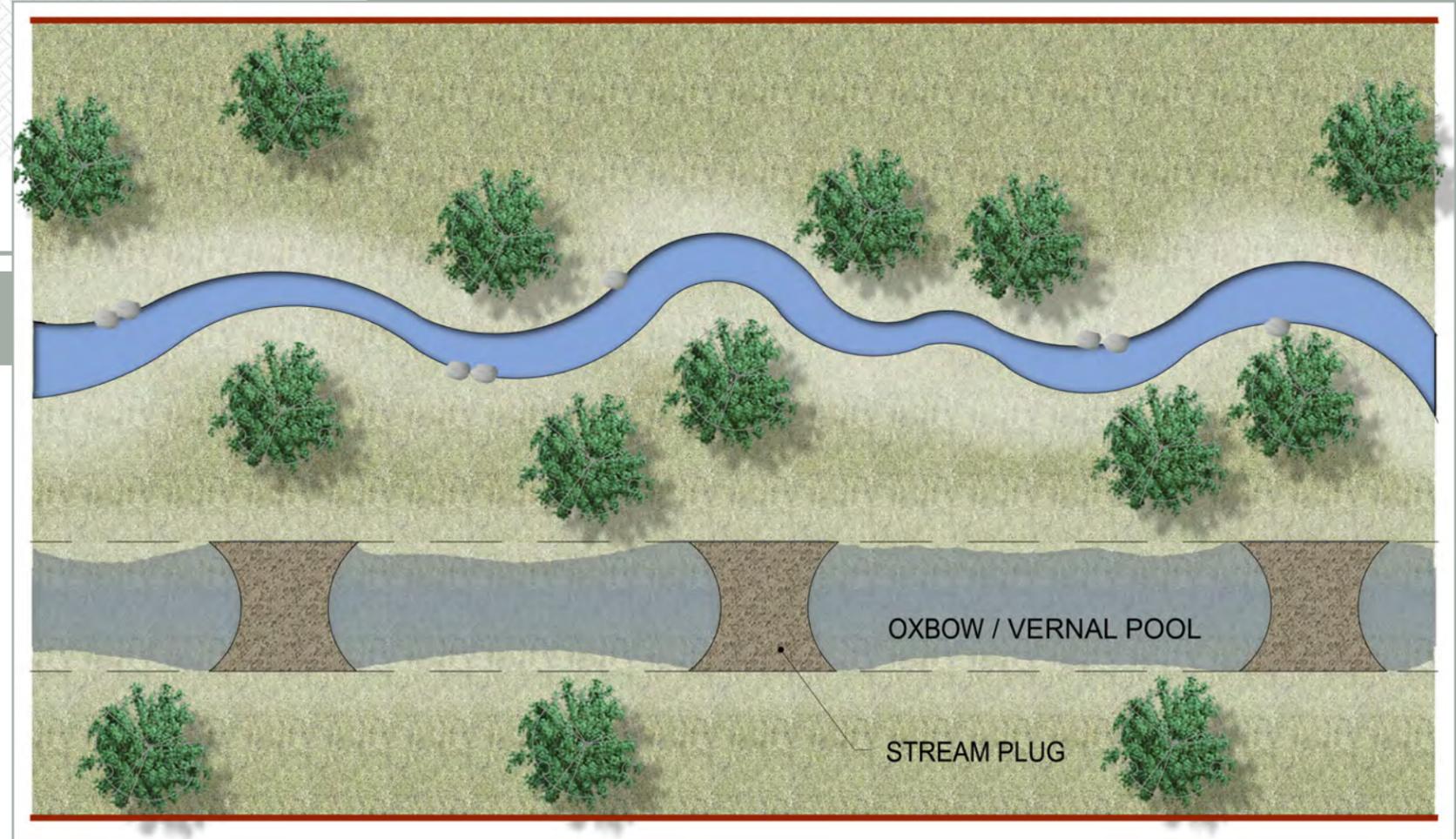
- Legend:**
- Alternative #1 - Conceptual Stream Centerline
  - Stream Preservation
  - Perennial RPW
  - Seasonal RPW
  - Ephemeral
  - Reedy Creek Nature Preserve
  - Other Parcels
  - Ponds/Impounded Areas
  - Wetland Preservation Areas



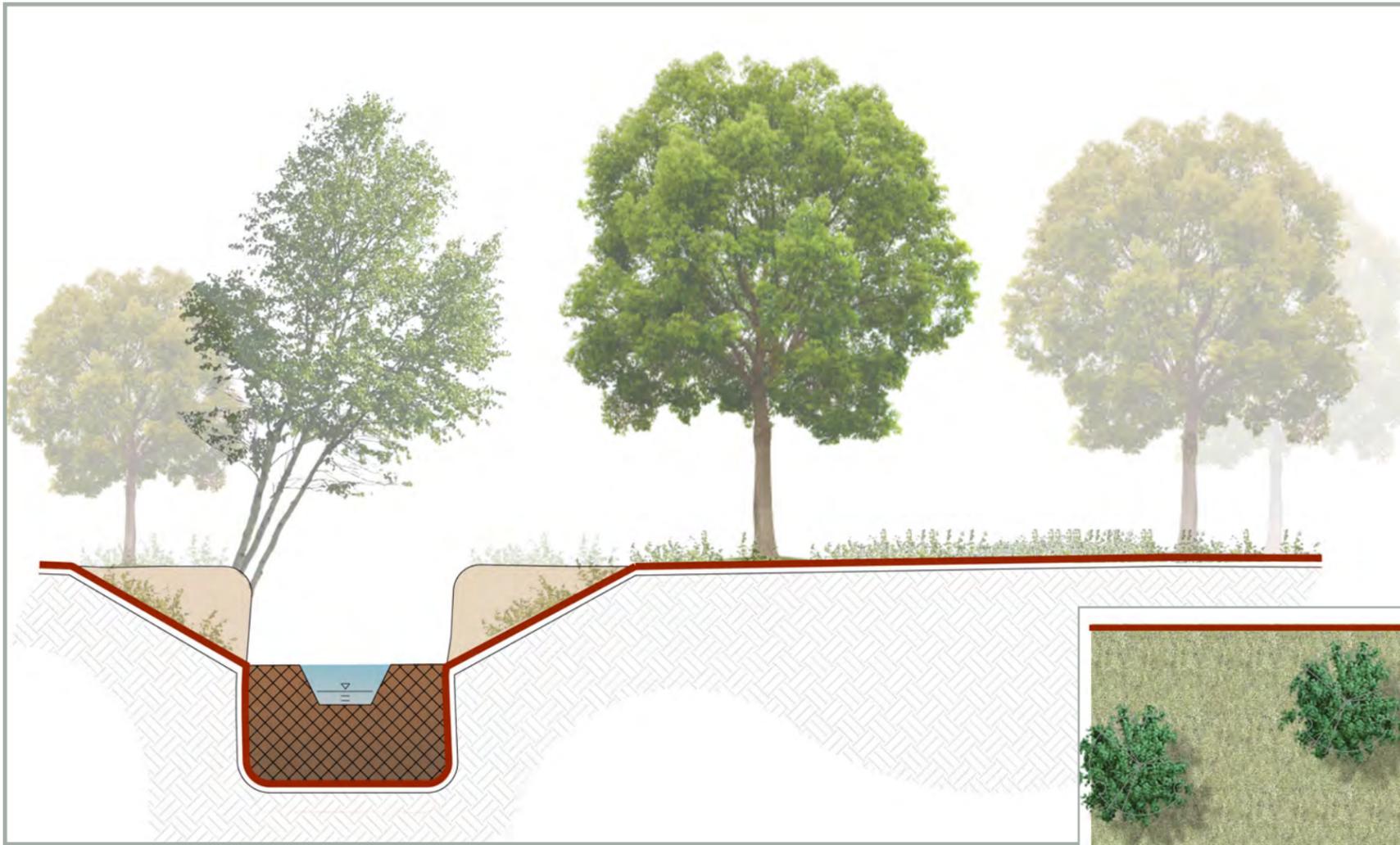


Typical Section

Plan View

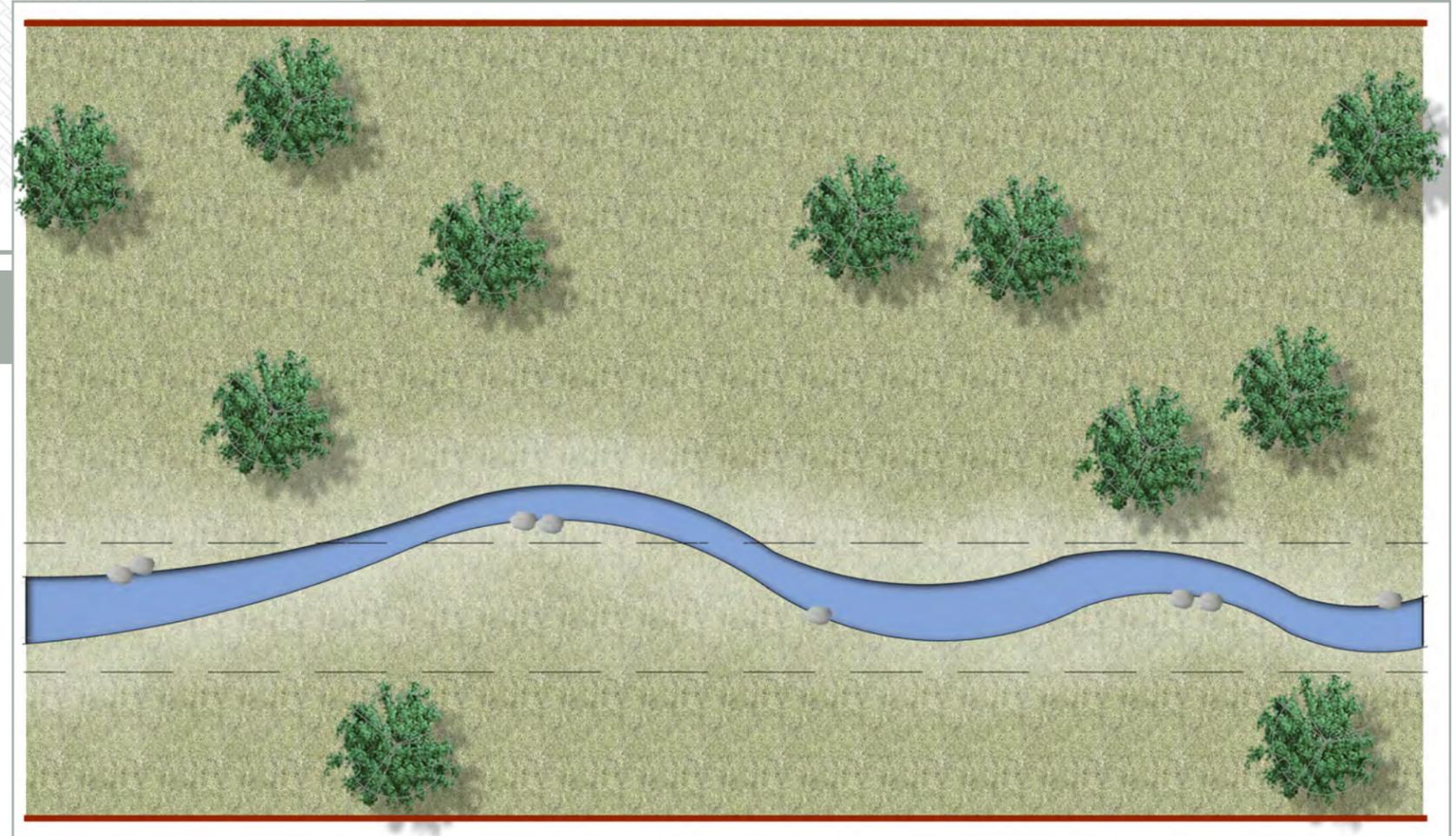


CONCEPT APPROACH 1 - FIGURE 7a



*Typical Section*

*Plan View*

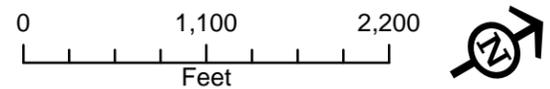
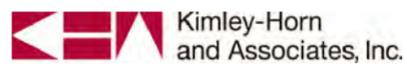


CONCEPT APPROACH 2 - FIGURE 7b





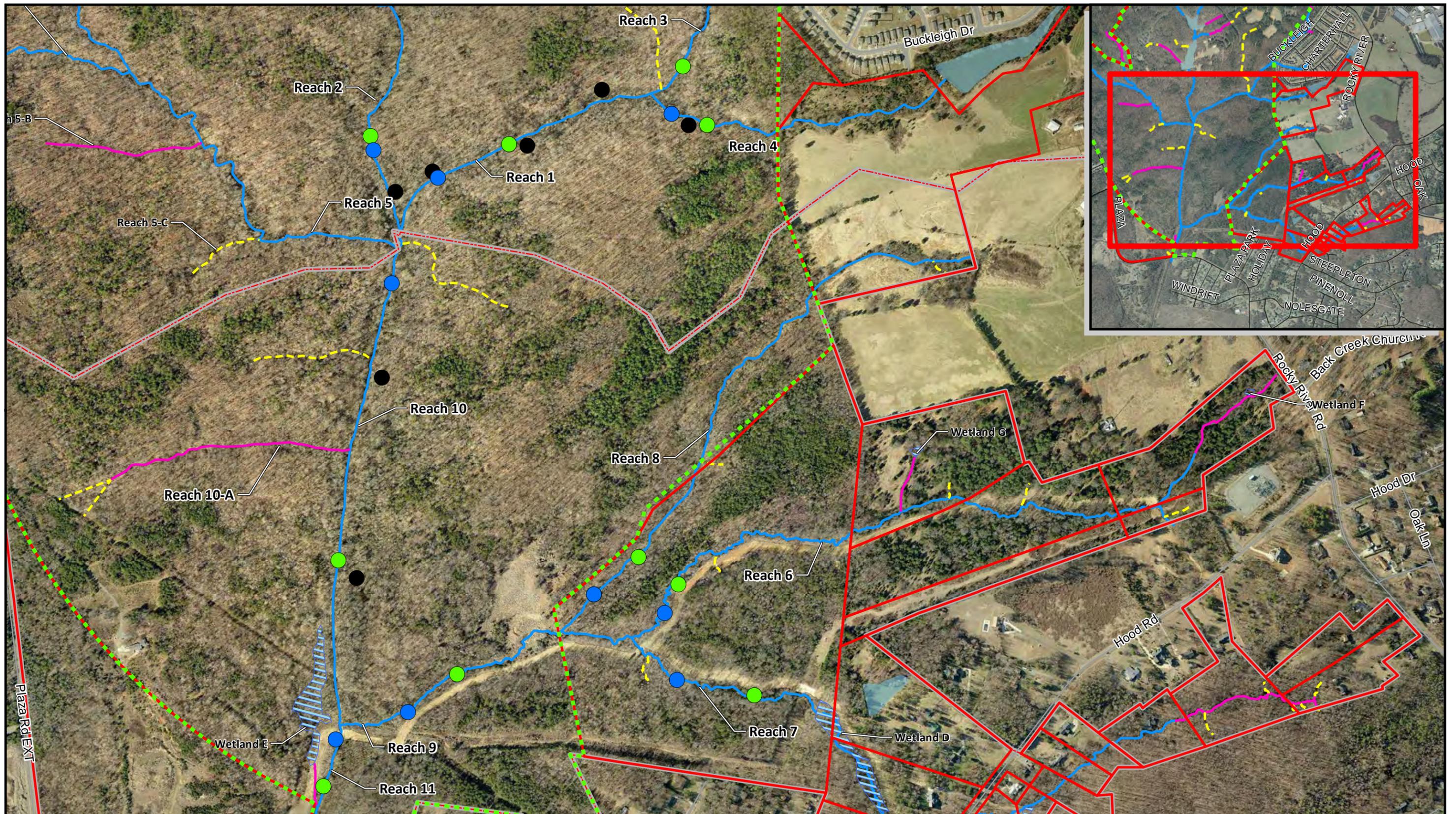
Title: Figure 2 - Jurisdictional Features Figure (2011 Mecklenburg County Aerial)



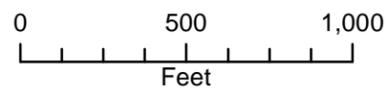
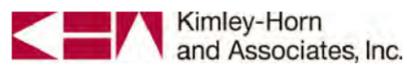
Legend:

- Ponds
- Wetland Data Points
- Perennial RPW
- Wetlands
- Stream Data Points
- Seasonal RPW





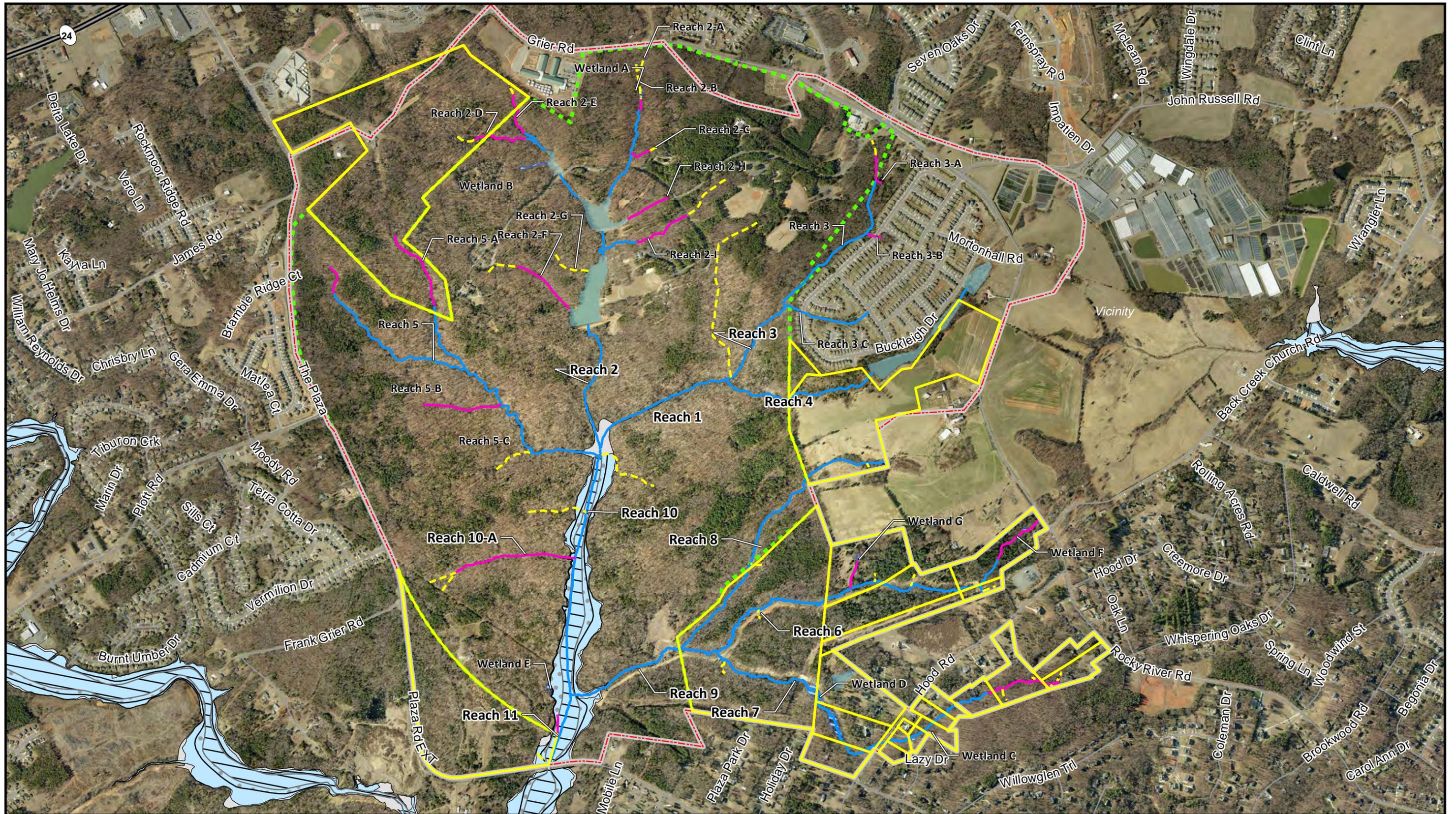
Title: Figure 3 - Data Collection



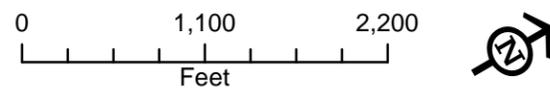
Legend:

- Wetlands
- Perennial RPW
- Seasonal RPW
- Ephemeral
- Reedy Creek Nature Preserve Forest
- Soil Boring Locations
- Geomorphic Data Collection Location
- Water Quality Sampling Locations
- Ponds





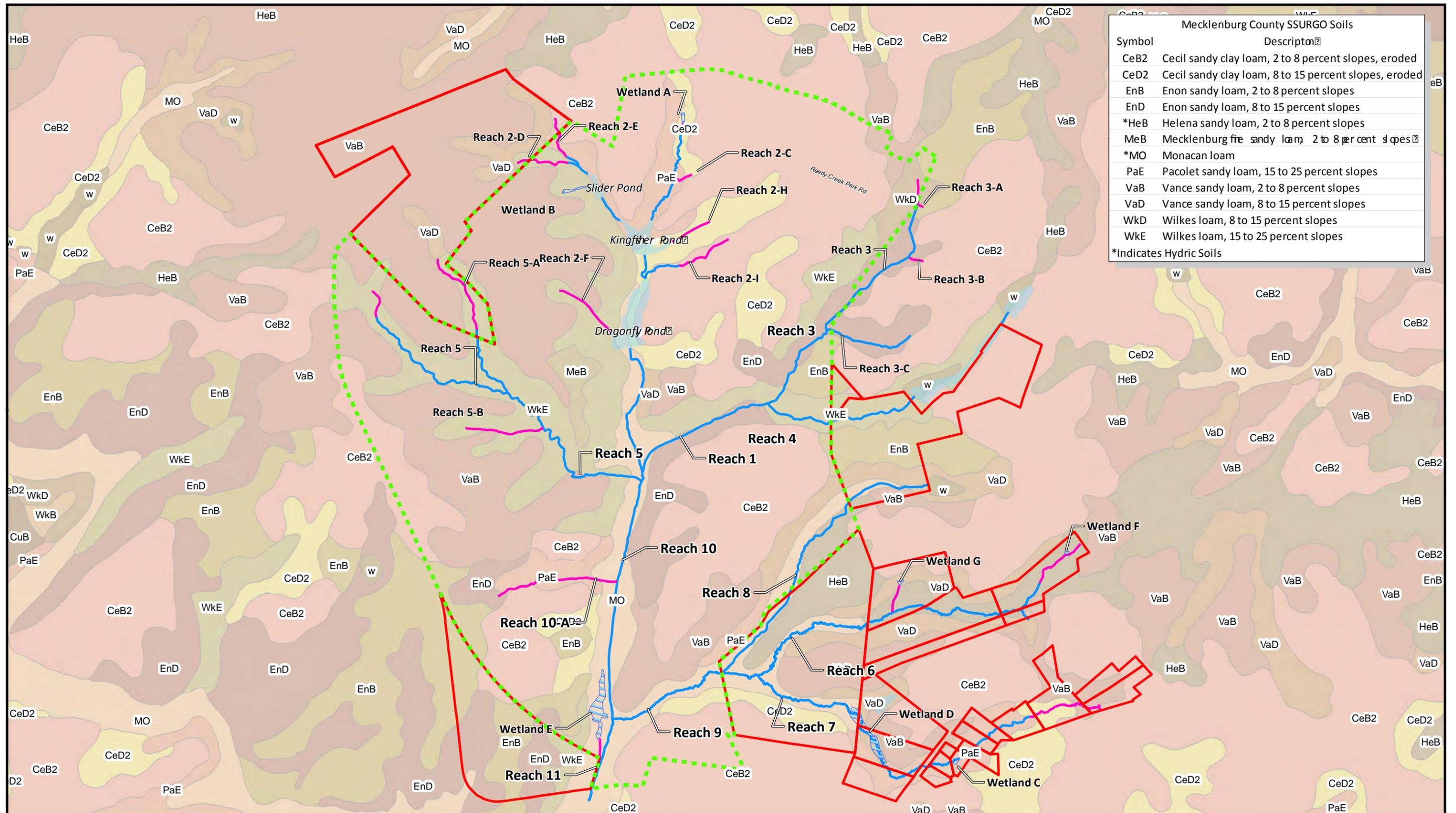
Title: Figure 4 - FEMA Flood Boundaries



Legend:

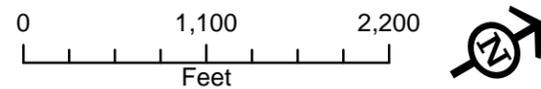
- RDYCK\_feas\_study\_area
- Other Parcels
- Wetlands
- Ponds
- FEMA Floodway
- Community Floodway
- Existing FEMA 1% Annual Chance Flood
- Future FEMA 1% Annual Chance Flood
- Reedy Creek Nature Preserve
- Perennial RPW
- Seasonal RPW
- Ephemeral





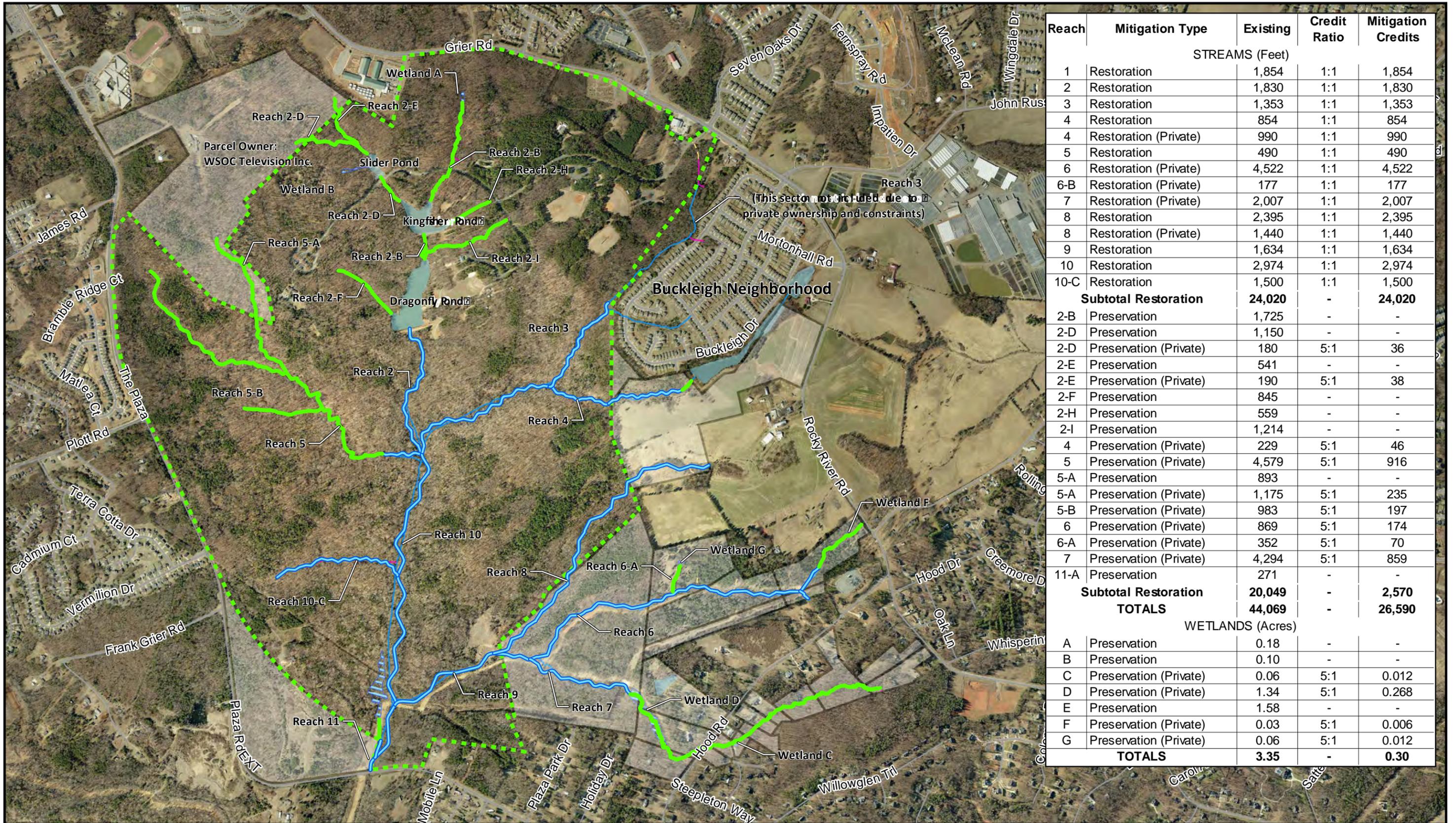
Mecklenburg County SSURGO Soils	
Symbol	Description
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded
CeD2	Cecil sandy clay loam, 8 to 15 percent slopes, eroded
EnB	Enon sandy loam, 2 to 8 percent slopes
EnD	Enon sandy loam, 8 to 15 percent slopes
*HeB	Helena sandy loam, 2 to 8 percent slopes
MeB	Mecklenburg fine sandy loam, 2 to 8 percent slopes
*MO	Monacan loam
PaE	Pacolet sandy loam, 15 to 25 percent slopes
VaB	Vance sandy loam, 2 to 8 percent slopes
VaD	Vance sandy loam, 8 to 15 percent slopes
WkD	Wilkes loam, 8 to 15 percent slopes
WkE	Wilkes loam, 15 to 25 percent slopes
*Indicates Hydric Soils	

Title: Figure 5 - NRCS SSURGO Soils Figure



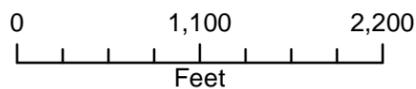
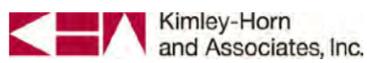
Legend:	
	Wetlands
	Study Area
	Ponds
	Perennial RPW
	Seasonal RPW
	Ephemeral
	Reedy Creek Nature Preserve Forest





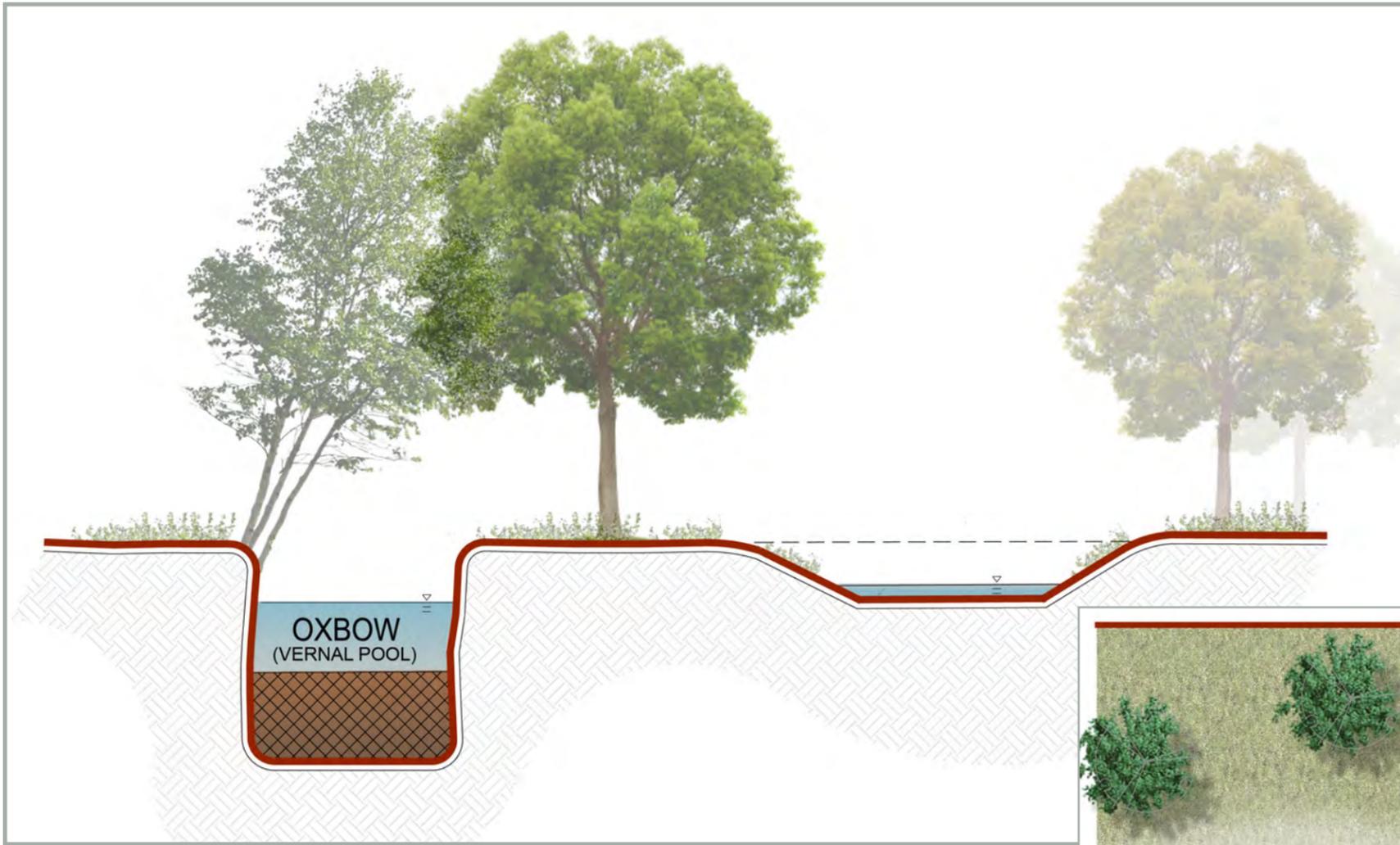
Reach	Mitigation Type	Existing	Credit Ratio	Mitigation Credits
STREAMS (Feet)				
1	Restoration	1,854	1:1	1,854
2	Restoration	1,830	1:1	1,830
3	Restoration	1,353	1:1	1,353
4	Restoration	854	1:1	854
4	Restoration (Private)	990	1:1	990
5	Restoration	490	1:1	490
6	Restoration (Private)	4,522	1:1	4,522
6-B	Restoration (Private)	177	1:1	177
7	Restoration (Private)	2,007	1:1	2,007
8	Restoration	2,395	1:1	2,395
8	Restoration (Private)	1,440	1:1	1,440
9	Restoration	1,634	1:1	1,634
10	Restoration	2,974	1:1	2,974
10-C	Restoration	1,500	1:1	1,500
<b>Subtotal Restoration</b>		<b>24,020</b>	<b>-</b>	<b>24,020</b>
2-B	Preservation	1,725	-	-
2-D	Preservation	1,150	-	-
2-D	Preservation (Private)	180	5:1	36
2-E	Preservation	541	-	-
2-E	Preservation (Private)	190	5:1	38
2-F	Preservation	845	-	-
2-H	Preservation	559	-	-
2-I	Preservation	1,214	-	-
4	Preservation (Private)	229	5:1	46
5	Preservation (Private)	4,579	5:1	916
5-A	Preservation	893	-	-
5-A	Preservation (Private)	1,175	5:1	235
5-B	Preservation (Private)	983	5:1	197
6	Preservation (Private)	869	5:1	174
6-A	Preservation (Private)	352	5:1	70
7	Preservation (Private)	4,294	5:1	859
11-A	Preservation	271	-	-
<b>Subtotal Restoration</b>		<b>20,049</b>	<b>-</b>	<b>2,570</b>
<b>TOTALS</b>		<b>44,069</b>	<b>-</b>	<b>26,590</b>
WETLANDS (Acres)				
A	Preservation	0.18	-	-
B	Preservation	0.10	-	-
C	Preservation (Private)	0.06	5:1	0.012
D	Preservation (Private)	1.34	5:1	0.268
E	Preservation	1.58	-	-
F	Preservation (Private)	0.03	5:1	0.006
G	Preservation (Private)	0.06	5:1	0.012
<b>TOTALS</b>		<b>3.35</b>	<b>-</b>	<b>0.30</b>

Title: Figure 6 - Conceptual Mitigation (Rosgen Priority 1)

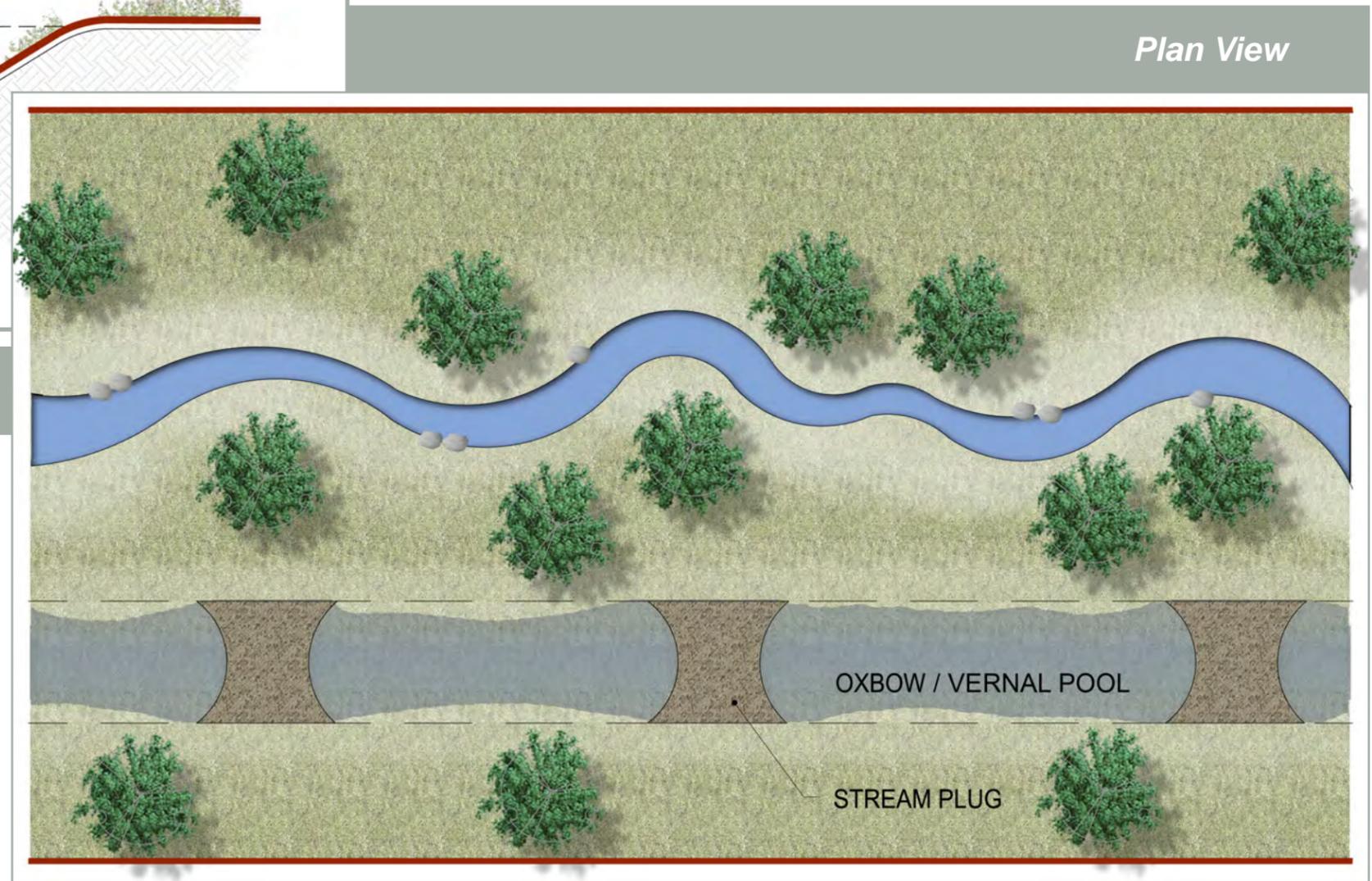


- Legend:**
- Alternative #1 - Conceptual Stream Centerline
  - Stream Preservation
  - Perennial RPW
  - Seasonal RPW
  - Ephemeral
  - Reedy Creek Nature Preserve
  - Other Parcels
  - Ponds/Impounded Areas
  - Wetland Preservation Areas



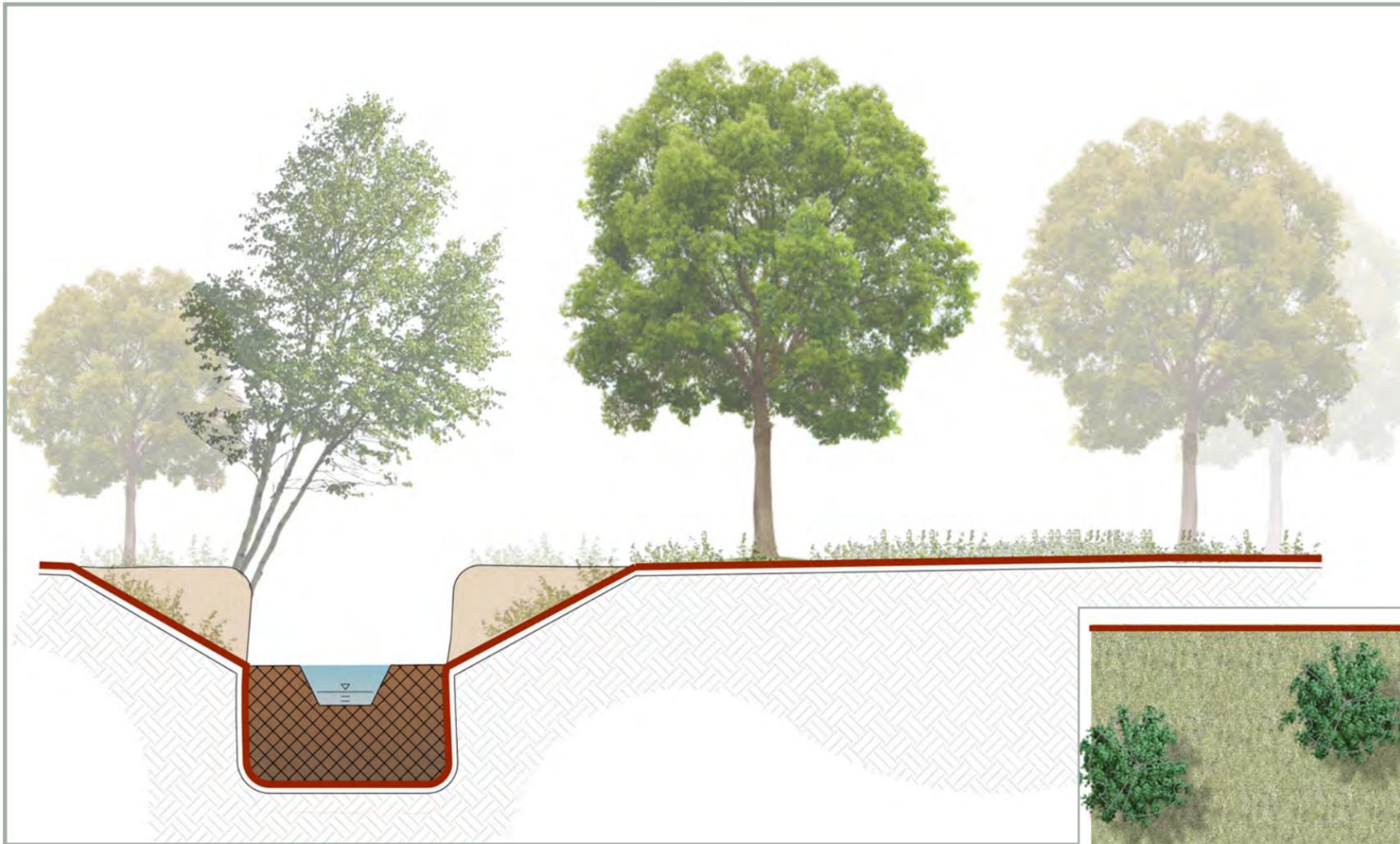


Typical Section



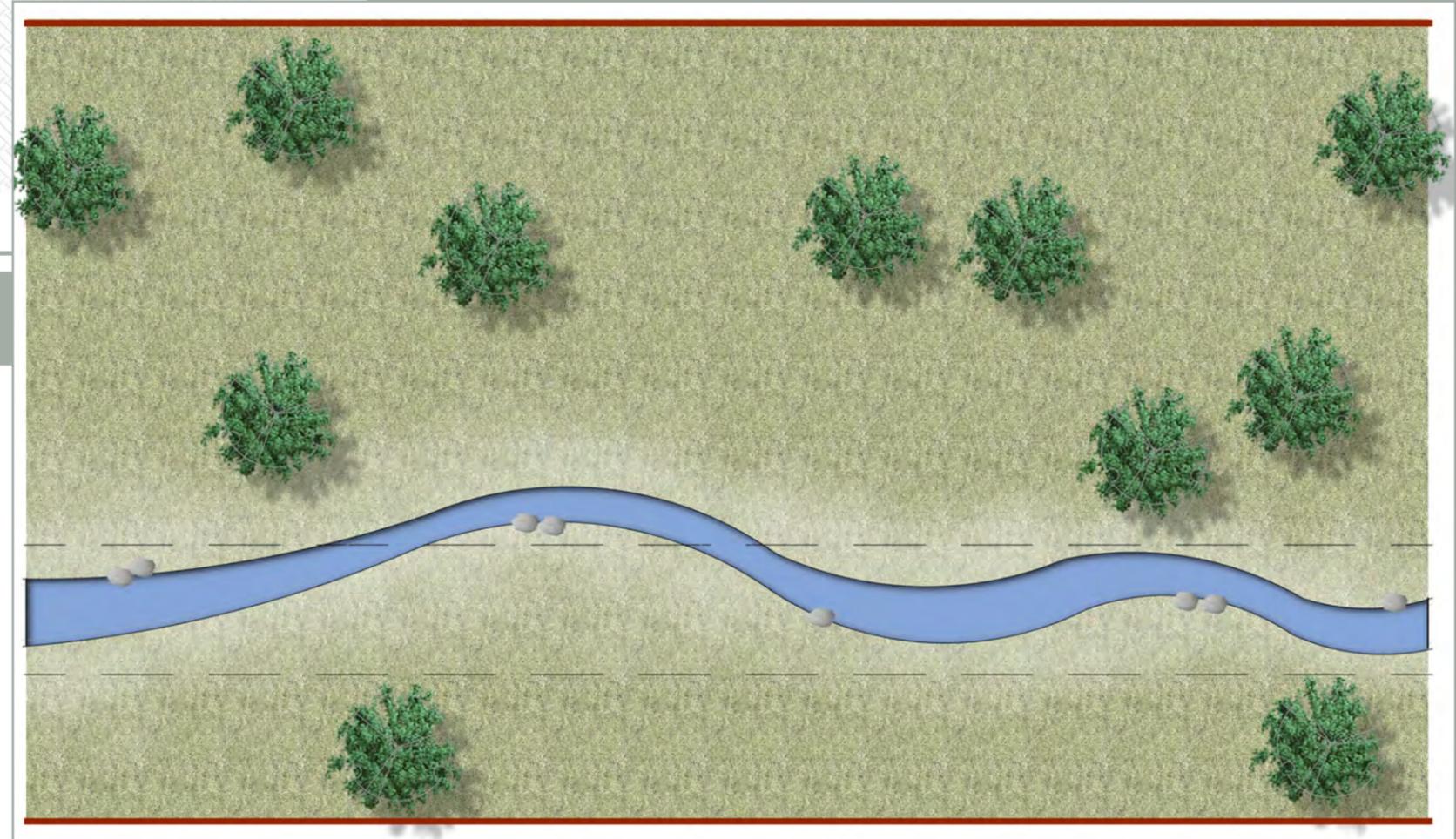
Plan View

CONCEPT APPROACH 1 - FIGURE 7a



*Typical Section*

*Plan View*



CONCEPT APPROACH 2 - FIGURE 7b

# Appendix 1

**Reedy Creek**

Rock River Road  
Charlotte, NC 28213

Inquiry Number: 3065686.6  
May 12, 2011

# The EDR-City Directory Abstract

## TABLE OF CONTENTS

### SECTION

Executive Summary

Findings

*Thank you for your business.*  
Please contact EDR at 1-800-352-0050  
with any questions or comments.

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## EXECUTIVE SUMMARY

### DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Abstract is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Abstract includes a search and abstract of available city directory data. For each address, the directory lists the name of the corresponding occupant at five year intervals.

Business directories including city, cross reference and telephone directories were reviewed, if available, at approximately five year intervals for the years spanning 1921 through 2005. This report compiles information gathered in this review by geocoding the latitude and longitude of properties identified and gathering information about properties within 1320 feet of the target property.

A summary of the information obtained is provided in the text of this report.

### RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. An "X" indicates where information was identified in the source and provided in this report.

<u>Year</u>	<u>Source</u>	<u>TP</u>	<u>Adjoining</u>	<u>Text Abstract</u>	<u>Source Image</u>
2005	Hill-Donnelly Information Services	-	-	-	-
1999	City Publishing Company Inc.	-	-	-	-
1994	R. L. Polk & Co.	-	-	-	-
1991	R. L. Polk & Co.	-	-	-	-
1989	R. L. Polk & Co.	-	-	-	-
1984	R. L. Polk & Co.	-	-	-	-
1979	Hill's City Directory	-	-	-	-
1975	Hills City Directory	-	-	-	-
1974	Hill's City Directory	-	-	-	-
1969	Hill's City Directory	-	-	-	-
1964	Hill's City Directory	-	-	-	-
1959	Hill's City Directory	-	-	-	-
1953	Hill's City Directory	-	-	-	-
1949	Hill's City Directory	-	-	-	-
1944	Hill's City Directory	-	-	-	-
1937	Hill's City Directory	-	-	-	-
1931	Piedmont Directory Company	-	-	-	-
1925	Commercial Service Co.	-	-	-	-
1921	Commercial Service Co.	-	-	-	-

## FINDINGS

### TARGET PROPERTY INFORMATION

#### ADDRESS

Rock River Road  
Charlotte, NC 28213

#### FINDINGS DETAIL

Target Property research detail.

No Addresses Found

## FINDINGS

### ADJOINING PROPERTY DETAIL

The following Adjoining Property addresses were researched for this report. Detailed findings are provided for each address.

No Addresses Found



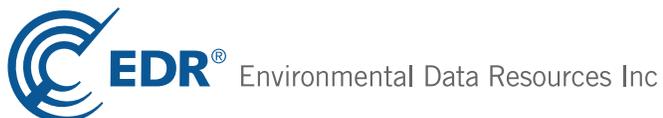


**Reedy Creek**

2900 Rock River Road  
Charlotte, NC 28215

Inquiry Number: 3065686.2s  
May 11, 2011

**The EDR Radius Map™ Report with GeoCheck®**



440 Wheelers Farms Road  
Milford, CT 06461  
Toll Free: 800.352.0050  
[www.edrnet.com](http://www.edrnet.com)

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*Thank you for your business.*  
Please contact EDR at 1-800-352-0050  
with any questions or comments.

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# EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

## TARGET PROPERTY INFORMATION

### ADDRESS

2900 ROCK RIVER ROAD  
CHARLOTTE, NC 28215

### COORDINATES

Latitude (North): 35.267000 - 35° 16' 1.2"  
Longitude (West): 80.712700 - 80° 42' 45.7"  
Universal Tranverse Mercator: Zone 17  
UTM X (Meters): 526131.8  
UTM Y (Meters): 3902492.5  
Elevation: 717 ft. above sea level

## USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 35080-C6 HARRISBURG, NC  
Most Recent Revision: 1996

## AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from: 2005, 2006, 2008  
Source: USDA

## TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7 of the attached EDR Radius Map report:

<u>Site</u>	<u>Database(s)</u>	<u>EPA ID</u>
REEDY CREEK PARK I 2900 ROCKY RIVER ROAD CHARLOTTE, NC 28212	FINDS	N/A

## DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

## STANDARD ENVIRONMENTAL RECORDS

### *Federal NPL site list*

NPL..... National Priority List

## EXECUTIVE SUMMARY

Proposed NPL..... Proposed National Priority List Sites  
NPL LIENS..... Federal Superfund Liens

### ***Federal Delisted NPL site list***

Delisted NPL..... National Priority List Deletions

### ***Federal CERCLIS list***

CERCLIS..... Comprehensive Environmental Response, Compensation, and Liability Information System  
FEDERAL FACILITY..... Federal Facility Site Information listing

### ***Federal CERCLIS NFRAP site List***

CERC-NFRAP..... CERCLIS No Further Remedial Action Planned

### ***Federal RCRA CORRACTS facilities list***

CORRACTS..... Corrective Action Report

### ***Federal RCRA non-CORRACTS TSD facilities list***

RCRA-TSDF..... RCRA - Treatment, Storage and Disposal

### ***Federal RCRA generators list***

RCRA-LQG..... RCRA - Large Quantity Generators  
RCRA-SQG..... RCRA - Small Quantity Generators  
RCRA-CESQG..... RCRA - Conditionally Exempt Small Quantity Generator

### ***Federal institutional controls / engineering controls registries***

US ENG CONTROLS..... Engineering Controls Sites List  
US INST CONTROL..... Sites with Institutional Controls

### ***Federal ERNS list***

ERNS..... Emergency Response Notification System

### ***State- and tribal - equivalent NPL***

NC HSDS..... Hazardous Substance Disposal Site

### ***State and tribal landfill and/or solid waste disposal site lists***

SWF/LF..... List of Solid Waste Facilities  
OLI..... Old Landfill Inventory

### ***State and tribal leaking storage tank lists***

LUST TRUST..... State Trust Fund Database  
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

### ***State and tribal registered storage tank lists***

UST..... Petroleum Underground Storage Tank Database

## EXECUTIVE SUMMARY

AST..... AST Database  
INDIAN UST..... Underground Storage Tanks on Indian Land  
FEMA UST..... Underground Storage Tank Listing

### ***State and tribal institutional control / engineering control registries***

INST CONTROL..... No Further Action Sites With Land Use Restrictions Monitoring

### ***State and tribal voluntary cleanup sites***

VCP..... Responsible Party Voluntary Action Sites  
INDIAN VCP..... Voluntary Cleanup Priority Listing

### ***State and tribal Brownfields sites***

BROWNFIELDS..... Brownfields Projects Inventory

### **ADDITIONAL ENVIRONMENTAL RECORDS**

#### ***Local Brownfield lists***

US BROWNFIELDS..... A Listing of Brownfields Sites

#### ***Local Lists of Landfill / Solid Waste Disposal Sites***

DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations  
ODI..... Open Dump Inventory  
HIST LF..... Solid Waste Facility Listing  
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

#### ***Local Lists of Hazardous waste / Contaminated Sites***

US CDL..... Clandestine Drug Labs  
US HIST CDL..... National Clandestine Laboratory Register

#### ***Local Land Records***

LIENS 2..... CERCLA Lien Information  
LUCIS..... Land Use Control Information System

#### ***Records of Emergency Release Reports***

HMIRS..... Hazardous Materials Information Reporting System

#### ***Other Ascertainable Records***

RCRA-NonGen..... RCRA - Non Generators  
DOT OPS..... Incident and Accident Data  
DOD..... Department of Defense Sites  
FUDS..... Formerly Used Defense Sites  
CONSENT..... Superfund (CERCLA) Consent Decrees  
ROD..... Records Of Decision  
UMTRA..... Uranium Mill Tailings Sites  
MINES..... Mines Master Index File

## EXECUTIVE SUMMARY

TRIS.....	Toxic Chemical Release Inventory System
TSCA.....	Toxic Substances Control Act
FTTS.....	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS.....	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS.....	Section 7 Tracking Systems
ICIS.....	Integrated Compliance Information System
PADS.....	PCB Activity Database System
MLTS.....	Material Licensing Tracking System
RADINFO.....	Radiation Information Database
RAATS.....	RCRA Administrative Action Tracking System
UIC.....	Underground Injection Wells Listing
DRYCLEANERS.....	Drycleaning Sites
NPDES.....	NPDES Facility Location Listing
INDIAN RESERV.....	Indian Reservations
SCRD DRYCLEANERS.....	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER.....	PCB Transformer Registration Database
COAL ASH EPA.....	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE.....	Sleam-Electric Plan Operation Data
FINANCIAL ASSURANCE.....	Financial Assurance Information Listing
COAL ASH.....	Coal Ash Disposal Sites

### EDR PROPRIETARY RECORDS

#### ***EDR Proprietary Records***

Manufactured Gas Plants..... EDR Proprietary Manufactured Gas Plants  
EDR Historical Cleaners..... EDR Proprietary Historic Dry Cleaners

### SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property. Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

### STANDARD ENVIRONMENTAL RECORDS

#### ***State- and tribal - equivalent CERCLIS***

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by

## EXECUTIVE SUMMARY

potentially responsible parties. The data come from the Department of Environment & Natural Resources' Inactive Hazardous Sites Program.

A review of the SHWS list, as provided by EDR, and dated 01/06/2011 has revealed that there are 2 SHWS sites within approximately 1 mile of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>MCLEAN ROAD</b>	<b>2532 MCLEAN ROAD</b>	<b>N 1/2 - 1 (0.592 mi.)</b>	<b>5</b>	<b>19</b>
FULTON WELL	8501 OLD CONCORD ROAD	NW 1/2 - 1 (0.780 mi.)	6	21

### ***State and tribal leaking storage tank lists***

LUST: The Leaking Underground Storage Tank Incidents Management Database contains an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environment, & Natural Resources' Incidents by Address.

A review of the LUST list, as provided by EDR, and dated 03/25/2011 has revealed that there is 1 LUST site within approximately 0.5 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>BAUCOM'S NURSERY CO.</b>	<b>10021 JOHN RUSSEL RD.</b>	<b>N 1/4 - 1/2 (0.352 mi.)</b>	<b>4</b>	<b>8</b>
Incident Phase: Response Incident Phase: Closed Out				

LAST: A listing of leaking aboveground storage tank site locations.

A review of the LAST list, as provided by EDR, and dated 03/25/2011 has revealed that there is 1 LAST site within approximately 0.5 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
FIRE STATION #34	2824 ROCKY RIVER ROAD	0 - 1/8 (0.000 mi.)	2	7

### **ADDITIONAL ENVIRONMENTAL RECORDS**

#### ***Other Ascertainable Records***

IMD: Incident Management Database.

A review of the IMD list, as provided by EDR, and dated 07/21/2006 has revealed that there is 1 IMD site within approximately 0.5 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
<b>BAUCOM'S NURSERY CO.</b>	<b>10021 JOHN RUSSEL RD.</b>	<b>N 1/4 - 1/2 (0.352 mi.)</b>	<b>4</b>	<b>8</b>

# EXECUTIVE SUMMARY

## EDR PROPRIETARY RECORDS

### ***EDR Proprietary Records***

EDR Historical Auto Stations: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

A review of the EDR Historical Auto Stations list, as provided by EDR, has revealed that there is 1 EDR Historical Auto Stations site within approximately 0.25 miles of the target property.

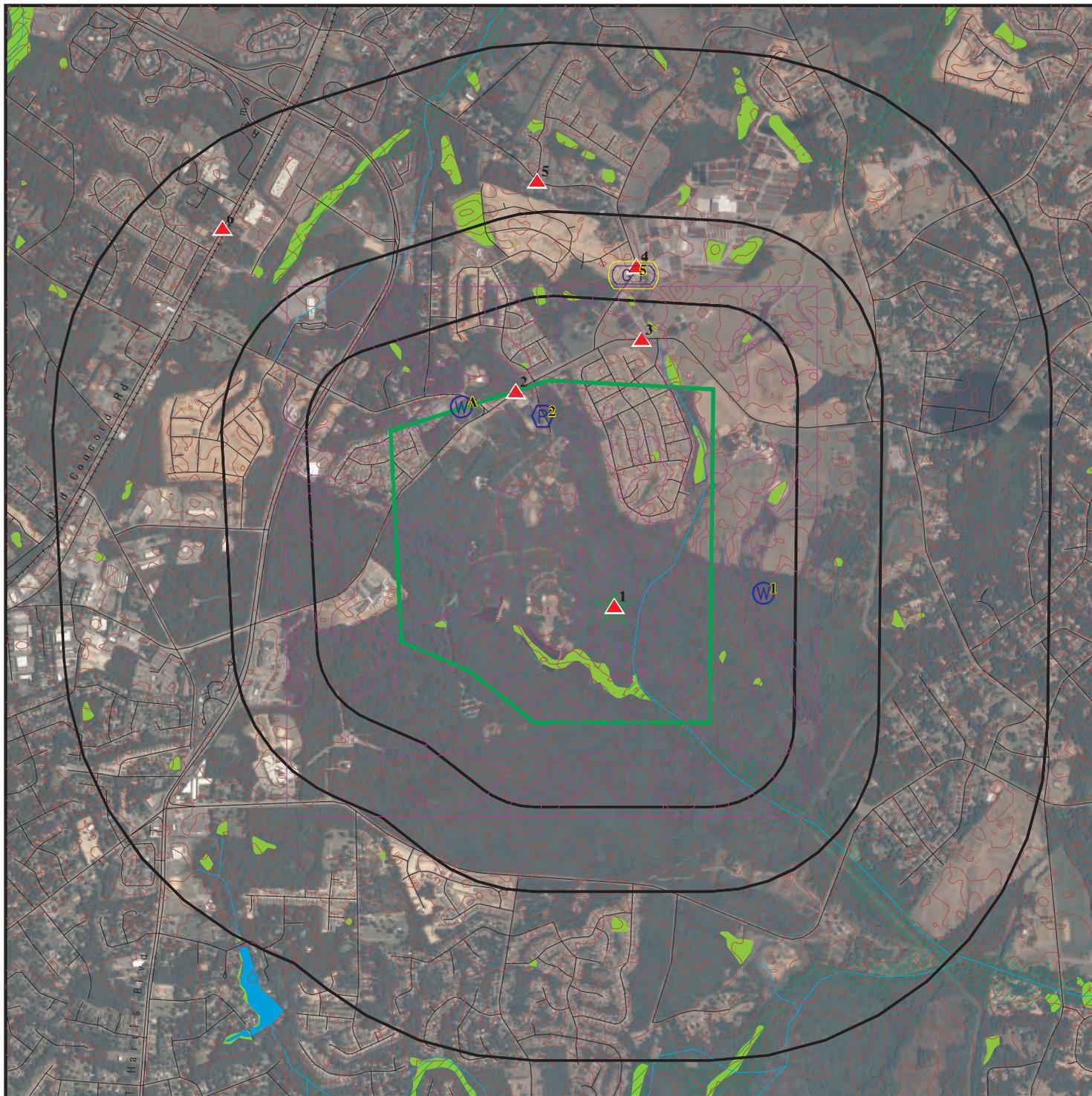
<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Direction / Distance</u>	<u>Map ID</u>	<u>Page</u>
EDS AUTO REPAIR (EDW A HODGES)	3425 E ROCKY RIVER RD	N 1/8 - 1/4 (0.138 mi.)	3	8

## EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 20 records.

<u>Site Name</u>	<u>Database(s)</u>
MALLARD CREEK WWTP	IMD, LAST
HENSON'S, INC. MULCH & MORE	LF, HIST LF
NCDOT ASPHALT SITE #2 (CROWDER CON	HWS
HWY 49 BATTERY DUMP	HWS, IMD
QUEENS PROPERTY	HWS
DOW CHEMICAL CORP/ALLIED	HWS
VIRGINIA CAROLINA CHEMICAL CHARLOT	CERCLIS
C D SPANGLER CONSTRUCTION CO	LF
LTP	FINDS, RCRA-NLR
MC ALPINE CREEK	ERNS
MC ALPINE CREEK	ERNS
IRWIN CREEK	ERNS
OUTSIDE OF PLANT SUGAR CREEK RD	ERNS
11707 STEEL CREEK RD	ERNS
THE PALISADES BEAR CREEK	FINDS
REEDY CREEK SID - GRIMMER	FINDS
REEDY CREEK - LENNAR	FINDS
REEDY CREEK SID - PHASE 3 - RYLAND	FINDS
WILLOWS CREEK S/D	FINDS
CHARLOTTE CITY DUMP	IMD

# OVERVIEW MAP - 3065686.2s



Target Property

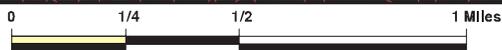
Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites



Indian Reservations BIA

Oil & Gas pipelines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Hazardous Substance Disposal Sites

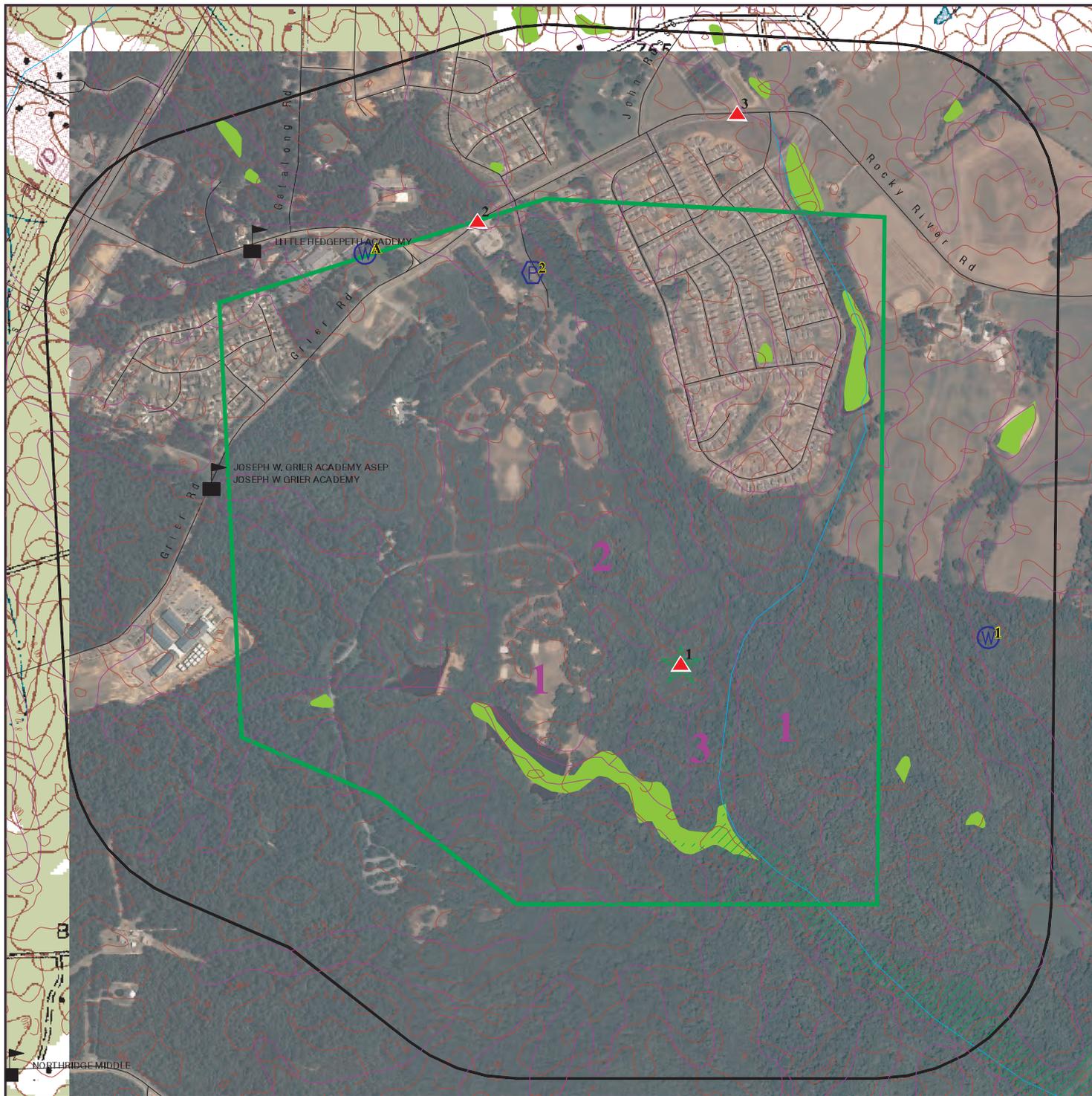


This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Reedy Creek  
 ADDRESS: 2900 Rock River Road  
 Charlotte NC 28215  
 LAT/LONG: 35.2670 / 80.7127

CLIENT: Kimley Horn and Associates Inc.  
 CONTACT: Jason Diaz  
 INQUIRY #: 3065686.2s  
 DATE: May 11, 2011 4:58 pm

# DETAIL MAP - 3065686.2s



-  Target Property
-  Sites at elevations higher than or equal to the target property
-  Sites at elevations lower than the target property
-  Manufactured Gas Plants
-  Sensitive Receptors
-  National Priority List Sites
-  Dept. Defense Sites

-  Indian Reservations BIA
-  Oil & Gas pipelines
-  100-year flood zone
-  500-year flood zone
-  National Wetland Inventory
-  State Wetlands
-  Hazardous Substance Disposal Sites

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Reedy Creek  
 ADDRESS: 2900 Rock River Road  
 Charlotte NC 28215  
 LAT/LONG: 35.2670 / 80.7127

CLIENT: Kimley Horn and Associates Inc.  
 CONTACT: Jason Diaz  
 INQUIRY #: 3065686.2s  
 DATE: May 11, 2011 4:58 pm

## MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
<b><u>STANDARD ENVIRONMENTAL RECORDS</u></b>								
<b><i>Federal NPL site list</i></b>								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
NPL LIENS		TP	NR	NR	NR	NR	NR	0
<b><i>Federal Delisted NPL site list</i></b>								
Delisted NPL		1.000	0	0	0	0	NR	0
<b><i>Federal CERCLIS list</i></b>								
CERCLIS		0.500	0	0	0	NR	NR	0
FEDERAL FACILITY		1.000	0	0	0	0	NR	0
<b><i>Federal CERCLIS NFRAP site List</i></b>								
CERC-NFRAP		0.500	0	0	0	NR	NR	0
<b><i>Federal RCRA CORRACTS facilities list</i></b>								
CORRACTS		1.000	0	0	0	0	NR	0
<b><i>Federal RCRA non-CORRACTS TSD facilities list</i></b>								
RCRA-TSDF		0.500	0	0	0	NR	NR	0
<b><i>Federal RCRA generators list</i></b>								
RCRA-LQG		0.250	0	0	NR	NR	NR	0
RCRA-SQG		0.250	0	0	NR	NR	NR	0
RCRA-CESQG		0.250	0	0	NR	NR	NR	0
<b><i>Federal institutional controls / engineering controls registries</i></b>								
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
<b><i>Federal ERNS list</i></b>								
ERNS		TP	NR	NR	NR	NR	NR	0
<b><i>State- and tribal - equivalent NPL</i></b>								
NC HSDS		1.000	0	0	0	0	NR	0
<b><i>State- and tribal - equivalent CERCLIS</i></b>								
SHWS		1.000	0	0	0	2	NR	2
<b><i>State and tribal landfill and/or solid waste disposal site lists</i></b>								
SWF/LF		0.500	0	0	0	NR	NR	0
OLI		0.500	0	0	0	NR	NR	0
<b><i>State and tribal leaking storage tank lists</i></b>								
LUST		0.500	0	0	1	NR	NR	1

## MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LUST TRUST		0.500	0	0	0	NR	NR	0
LAST		0.500	1	0	0	NR	NR	1
INDIAN LUST		0.500	0	0	0	NR	NR	0
<b>State and tribal registered storage tank lists</b>								
UST		0.250	0	0	NR	NR	NR	0
AST		0.250	0	0	NR	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
FEMA UST		0.250	0	0	NR	NR	NR	0
<b>State and tribal institutional control / engineering control registries</b>								
INST CONTROL		0.500	0	0	0	NR	NR	0
<b>State and tribal voluntary cleanup sites</b>								
VCP		0.500	0	0	0	NR	NR	0
INDIAN VCP		0.500	0	0	0	NR	NR	0
<b>State and tribal Brownfields sites</b>								
BROWNFIELDS		0.500	0	0	0	NR	NR	0
<b>ADDITIONAL ENVIRONMENTAL RECORDS</b>								
<b>Local Brownfield lists</b>								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
<b>Local Lists of Landfill / Solid Waste Disposal Sites</b>								
DEBRIS REGION 9		0.500	0	0	0	NR	NR	0
ODI		0.500	0	0	0	NR	NR	0
HIST LF		0.500	0	0	0	NR	NR	0
INDIAN ODI		0.500	0	0	0	NR	NR	0
<b>Local Lists of Hazardous waste / Contaminated Sites</b>								
US CDL		TP	NR	NR	NR	NR	NR	0
US HIST CDL		TP	NR	NR	NR	NR	NR	0
<b>Local Land Records</b>								
LIENS 2		TP	NR	NR	NR	NR	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
<b>Records of Emergency Release Reports</b>								
HMIRS		TP	NR	NR	NR	NR	NR	0
<b>Other Ascertainable Records</b>								
RCRA-NonGen		0.250	0	0	NR	NR	NR	0
DOT OPS		TP	NR	NR	NR	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	0	0	0	NR	0

## MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
HIST FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
FINDS	X	TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
IMD		0.500	0	0	1	NR	NR	1
UIC		TP	NR	NR	NR	NR	NR	0
DRYCLEANERS		0.250	0	0	NR	NR	NR	0
NPDES		TP	NR	NR	NR	NR	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
SCRD DRYCLEANERS		0.500	0	0	0	NR	NR	0
PCB TRANSFORMER		TP	NR	NR	NR	NR	NR	0
COAL ASH EPA		0.500	0	0	0	NR	NR	0
COAL ASH DOE		TP	NR	NR	NR	NR	NR	0
FINANCIAL ASSURANCE		TP	NR	NR	NR	NR	NR	0
COAL ASH		0.500	0	0	0	NR	NR	0

### EDR PROPRIETARY RECORDS

#### *EDR Proprietary Records*

Manufactured Gas Plants		1.000	0	0	0	0	NR	0
EDR Historical Auto Stations		0.250	0	1	NR	NR	NR	1
EDR Historical Cleaners		0.250	0	0	NR	NR	NR	0

#### NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database



Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**FIRE STATION #34 (Continued)**

**S110629284**

RPOP: False  
Error Flag: 0  
Error Code: N  
Valid: False  
Lat/Long: Not reported  
Lat/Long Decimal: 0 0  
Testlat: Not reported  
Regional Officer Project Mgr: AJS  
Region: MOR  
Company: Not reported  
Contact Person: Not reported  
Telephone: Not reported  
RP Address: Not reported  
RP City,St,Zip: NC  
RP County: Not reported  
Comments: SPILL FROM EMERGENCY GENERATOR  
5 Min Quad: Not reported

**3**  
**North**  
**1/8-1/4**  
**0.138 mi.**  
**728 ft.**

**EDS AUTO REPAIR (EDW A HODGES)**  
**3425 E ROCKY RIVER RD**  
**CHARLOTTE, NC**

**EDR Historical Auto Stations** **1009114229**  
**N/A**

**Relative:**  
**Higher**

EDR Historical Auto Stations:  
Name: EDS AUTO REPAIR (EDW A HODGES)  
Year: 1991  
Type: AUTOMOBILE REPAIRING SERVICE

**Actual:**  
**776 ft.**

**4**  
**North**  
**1/4-1/2**  
**0.352 mi.**  
**1861 ft.**

**BAUCOM'S NURSERY CO.**  
**10021 JOHN RUSSEL RD.**  
**CHARLOTTE, NC 28213**

**IMD** **U003135908**  
**LUST** **N/A**  
**UST**

**Relative:**  
**Higher**

IMD:  
Region: MOR  
Facility ID: 11475  
Date Occurred: 2/28/1992  
Submit Date: 1/13/1994  
GW Contam: No Groundwater Contamination detected  
Soil Contam: Yes  
Incident Desc: UPON REMOVAL OF 4 USTS, SOIL CONTAM. WAS CONFIRMED.  
Operator: MR. GARY BAUCOM  
Contact Phone: Not reported  
Owner Company: BAUCOM'S NURSERY COMPANY  
Operator Address: PO BOX 25558  
Operator City: CHARLOTTE  
Oper City,St,Zip: CHARLOTTE, NC 28212  
Ownership: Private  
Operation: Commercial  
Material: GASOLINE  
Qty Lost 1: Not reported  
Qty Recovered 1: Not reported  
Material: DIESEL  
Qty Lost: Not reported

**Actual:**  
**780 ft.**

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Qty Recovered: Not reported  
Source: Leak-underground  
Type: Gasoline/diesel  
Location: Facility  
Setting: Residential  
Risk Site: L  
Site Priority: E?  
Priority Code: L  
Priority Update: 5/15/1998  
Dem Contact: AJS  
Wells Affected: Not reported  
Num Affected: 0  
Wells Contam: Not reported  
Sampled By: Responsible Parties  
Samples Include: Soil Samples  
7.5 Min Quad: Not reported  
5 Min Quad: Not reported  
Latitude: Not reported  
Longitude: Not reported  
Latitude Number: Not reported  
Longitude Number: Not reported  
Latitude Decimal: Not reported  
Longitude Decimal: Not reported  
GPS: NOD  
Agency: DWM  
Facility ID: 11475  
Last Modified: Not reported  
Incident Phase: RE  
NOV Issued: Not reported  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Sighned: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported  
Closure Request Date: Not reported  
Close-out Report: Not reported

Region: MOR  
Facility ID: 17750  
Date Occurred: 6/9/1997  
Submit Date: 8/25/1997  
GW Contam: No Groundwater Contamination detected  
Soil Contam: Yes  
Incident Desc: SOIL CONTAMINATION DISCOVERED DURING UST CLOSURE  
Operator: CHIP BAUCOM  
Contact Phone: 704-596-3220  
Owner Company: BAUCOM'S NURSERY CO.  
Operator Address: 10020 JOHN RUSSEL RD.  
Operator City: CHARLOTTE  
Oper City,St,Zip: CHARLOTTE, NC 28213  
Ownership: Not reported  
Operation: Not reported  
Material: GASOLINE  
Qty Lost 1: Not reported

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Qty Recovered 1: Not reported  
Source: Leak-underground  
Type: Gasoline/diesel  
Location: Facility  
Setting: Urban  
Risk Site: H  
Site Priority: B  
Priority Code: H  
Priority Update: 5/30/1998  
Dem Contact: CGP  
Wells Affected: Not reported  
Num Affected: 0  
Wells Contam: Not reported  
Sampled By: Not reported  
Samples Include: Not reported  
7.5 Min Quad: Not reported  
5 Min Quad: Not reported  
Latitude: Not reported  
Longitude: Not reported  
Latitude Number: Not reported  
Longitude Number: Not reported  
Latitude Decimal: Not reported  
Longitude Decimal: Not reported  
GPS: NOD  
Agency: DWM  
Facility ID: 17750  
Last Modified: 2/19/1999  
Incident Phase: Closed Out  
NOV Issued: Not reported  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Sighed: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported  
Closure Request Date: Not reported  
Close-out Report: 10/30/1997

**LUST:**

Facility ID: 0-014808  
UST Number: MO-3977  
Incident Number: 11475  
Contamination Type: Soil  
Source Type: Leak-underground  
Product Type: PETROLEUM  
Date Reported: 1992-06-11 00:00:00  
Date Occur: 1992-02-28 00:00:00  
Cleanup: 1992-02-28 00:00:00  
Closure Request: Not reported  
Close Out: Not reported  
Level Of Soil Cleanup Achieved: Not reported  
Tank Regulated Status: Regulated  
# Of Supply Wells: 0  
Commercial/NonCommercial UST Site: COMMERCIAL  
Risk Classification: L

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Risk Class Based On Review: L  
Corrective Action Plan Type: Not reported  
NOV Issue Date: Not reported  
NORR Issue Date: Not reported  
Site Priority: E?  
Phase Of LSA Req: Not reported  
Site Risk Reason: Not reported  
Land Use: Not reported  
MTBE: Not reported  
MTBE1: Unknown  
Flag: No  
Flag1: No  
LUR Filed: Not reported  
Release Detection: 0  
Current Status: File Located in House  
RBCA GW: Not reported  
PETOPT: 3  
RPL: False  
CD Num: 0  
Reel Num: 0  
RPOW: False  
RPOP: False  
Error Flag: 0  
Error Code: Not reported  
Valid: False  
Lat/Long: 35 16 56.64 80 42 38.82  
Lat/Long Decimal: 35.282409999999999 80.710790000000003  
Testlat: Not reported  
Regional Officer Project Mgr: DPB  
Region: Mooresville  
Company: BAUCOM'S NURSERY COMPANY  
Contact Person: MR. GARY BAUCOM  
Telephone: Not reported  
RP Address: PO BOX 25558  
RP City,St,Zip: CHARLOTTE, NC 28212  
RP County: ME  
Comments: Not reported  
5 Min Quad: Not reported

**PIRF:**

Facility Id: 11475  
Date Occurred: 1992-02-11 00:00:00  
Date Reported: 1994-01-13 00:00:00  
Description Of Incident: UPON REMOVAL OF 4 USTS, SOIL CONTAM. WAS CONFIRMED.  
Owner/Operator: MR. GARY BAUCOM  
Ownership: 4  
Operation Type: 6  
Type: 3  
Location: 1  
Site Priority: E?  
Priority Update: 1998-05-15 00:00:00  
Wells Affected Y/N: Not reported  
Samples Include: 0  
7#5 Minute Quad: 3  
5 Minute Quad: 2  
Pirf/Min Soil: Not reported  
Release Code: Not reported  
Source Code: Pirf

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Err Type: Not reported  
Cause: Not reported  
Source: Not reported  
Ust Number: Not reported

Last Modified: Not reported  
**Incident Phase: Response**  
NOV Issued: Not reported  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Signed: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported  
Closure Request Date: Not reported  
Close-out Report: Not reported

Facility ID: 0-014808  
UST Number: MO-5194  
Incident Number: 17750  
Contamination Type: Soil  
Source Type: Leak-underground  
Product Type: PETROLEUM  
Date Reported: 1997-08-01 00:00:00  
Date Occur: 1997-06-09 00:00:00  
Cleanup: 1997-06-09 00:00:00  
Closure Request: Not reported  
Close Out: 1997-10-30 00:00:00  
Level Of Soil Cleanup Achieved: Not reported  
Tank Regulated Status: Regulated  
# Of Supply Wells: 0  
Commercial/NonCommercial UST Site: COMMERCIAL  
Risk Classification: H  
Risk Class Based On Review: L  
Corrective Action Plan Type: Not reported  
NOV Issue Date: Not reported  
NORR Issue Date: Not reported  
Site Priority: B  
Phase Of LSA Req: Not reported  
Site Risk Reason: Not reported  
Land Use: Not reported  
MTBE: Not reported  
MTBE1: Unknown  
Flag: Yes  
Flag1: No  
LUR Filed: Not reported  
Release Detection: 0  
Current Status: File Located in Archives  
RBCA GW: Not reported  
PETOPT: 3  
RPL: False  
CD Num: 12  
Reel Num: 0  
RPOW: False  
RPOP: False  
Error Flag: 0

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Error Code: Y  
Valid: False  
Lat/Long: 35 16 56.64 80 42 38.82  
Lat/Long Decimal: 35.282409999999999 80.710790000000003  
Testlat: Not reported  
Regional Officer Project Mgr: CGP  
Region: Mooresville  
Company: BAUCOM'S NURSERY CO.  
Contact Person: CHIP BAUCOM  
Telephone: 704-596-3220  
RP Address: 10020 JOHN RUSSEL RD.  
RP City,St,Zip: CHARLOTTE, NC 28213  
RP County: MECK.  
Comments: ERRATA DATA ON CD 255. 1-10000-gallon gasoline ust  
5 Min Quad: Q64Q

**PIRF:**

Facility Id: 17750  
Date Occurred: Not reported  
Date Reported: 1997-08-25 00:00:00  
Description Of Incident: SOIL CONTAMINATION DISCOVERED DURING UST CLOSURE  
Owner/Operator: CHIP BAUCOM  
Ownership: Not reported  
Operation Type: Not reported  
Type: 3  
Location: 1  
Site Priority: B  
Priority Update: 1998-05-30 00:00:00  
Wells Affected Y/N: Not reported  
Samples Include: 0  
7#5 Minute Quad: Not reported  
5 Minute Quad: Not reported  
Pirf/Min Soil: Not reported  
Release Code: Not reported  
Source Code: Min\_Soil  
Err Type: Not reported  
Cause: Not reported  
Source: Not reported  
Ust Number: Not reported

Last Modified: 2/19/1999  
**Incident Phase: Closed Out**  
NOV Issued: Not reported  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Signed: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported  
Closure Request Date: Not reported  
Close-out Report: 10/30/1997

**UST:**

Facility ID: 0-014808  
Region: 3  
Facility Telephone: (704) 596-3220

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Last Update: 1994-12-27 00:00:00  
Owner Name: BAUCOM'S NURSERY CO.  
Owner Address: 10021 JOHN RUSSEL RD.  
Owner City,St,Zip: CHARLOTTE, NC 28213  
Owner Phone: (704) 596-3220  
Latitude: 0  
Latitude 1: Not reported  
Longitude: 0  
Longitude 1: Not reported  
GPS String Confirmed: No  
Initials of Individual Confirming GPS: Not reported

Tank ID: 1  
Tank ID Number: Not reported  
Tank Capacity: 10000  
**Status: Permanent Closed**  
Date installed: 1976-02-05 00:00:00  
Date removed: 1997-09-06 00:00:00  
Tank Product: Gasoline, Gasoline Mixture  
Product Type: NON  
Tank Material: Steel  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: Not reported  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: Unknown  
Exterior Protection: Unknown  
Piping material: Unknown  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Tank ID: 2  
Tank ID Number: Not reported  
Tank Capacity: 1000  
**Status: Permanent Closed**  
Date installed: 1966-05-05 00:00:00

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Date removed: 1992-02-28 00:00:00  
Tank Product: Gasoline, Gasoline Mixture  
Product Type: NON  
Tank Material: Steel  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: Not reported  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: Unknown  
Exterior Protection: Unknown  
Piping material: Unknown  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Tank ID: 3  
Tank ID Number: Not reported  
Tank Capacity: 1000  
**Status: Permanent Closed**  
Date installed: 1976-09-24 00:00:00  
Date removed: 1992-01-02 00:00:00  
Tank Product: Diesel, Diesel Mixture  
Product Type: NIU  
Tank Material: Steel  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: 1986-01-05 00:00:00  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: Unknown  
Exterior Protection: Paint  
Piping material: Steel  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Tank ID: 4  
Tank ID Number: Not reported  
Tank Capacity: 1000  
**Status: Permanent Closed**  
Date installed: 1971-09-26 00:00:00  
Date removed: 1992-02-28 00:00:00  
Tank Product: Oil, New/Used/Mixture  
Product Type: NON  
Tank Material: Steel  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: 1988-01-10 00:00:00  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: Unknown  
Exterior Protection: Unknown  
Piping material: Steel  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Tank ID: 5  
Tank ID Number: Not reported  
Tank Capacity: 4000  
**Status: Permanent Closed**  
Date installed: 1974-01-12 00:00:00  
Date removed: 1992-02-27 00:00:00  
Tank Product: Gasoline, Gasoline Mixture  
Product Type: NON  
Tank Material: Steel  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: Not reported  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: None  
Exterior Protection: Cathodic Protection  
Piping material: Steel  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Tank ID: 6  
Tank ID Number: Not reported  
Tank Capacity: 10000  
**Status: Permanent Closed**  
Date installed: 1964-01-01 00:00:00  
Date removed: 1992-12-30 00:00:00  
Tank Product: Diesel, Diesel Mixture  
Product Type: NON  
Tank Material: Unknown  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: Not reported  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: Unknown

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Exterior Protection: Unknown  
Piping material: Unknown  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Tank ID: 7  
Tank ID Number: Not reported  
Tank Capacity: 10000  
**Status: Permanent Closed**  
Date installed: 1964-01-01 00:00:00  
Date removed: 1992-12-30 00:00:00  
Tank Product: Heating Oil/ Fuel  
Product Type: HEA  
Tank Material: Unknown  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: Not reported  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported

Interior Protection: Unknown  
Exterior Protection: Unknown  
Piping material: Unknown  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**BAUCOM'S NURSERY CO. (Continued)**

**U003135908**

Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

Tank ID: 8  
Tank ID Number: Not reported  
Tank Capacity: 10000  
**Status: Permanent Closed**  
Date installed: 1964-01-01 00:00:00  
Date removed: 1992-12-30 00:00:00  
Tank Product: Heating Oil/ Fuel  
Product Type: HEA  
Tank Material: Unknown  
Compartment Tank: No  
Main Tank: No  
Tank Last Used Date: Not reported  
Tank Certified Number: Not reported  
Date Last Certified: Not reported  
Begin Certified Number: Not reported  
End Certified Number: Not reported  
Interior Protection: Unknown  
Exterior Protection: Unknown  
Piping material: Unknown  
Certify Type: Not reported  
Leak Detection Type: Not reported  
Leak Detection Piping 1: Not reported  
Corrosn Protec Tank: Not reported  
Corrosn Protec Pipe: Not reported  
Spill and Overfill: Not reported  
Surface Water: Not reported  
Water Supply Well: Not reported  
Leak Detection Piping 2: Not reported  
Leak Detection Type 2: Not reported  
Corrosion Protection Tank1: Not reported  
Corrosion Piping: Not reported  
Overfill: Not reported  
Corrosion Protection Tank Date: Not reported  
Corrosion Protection Piping Date: Not reported  
Spill Overfill Date: Not reported  
Piping System Type Code: Not reported  
Piping System Type Description: Not reported  
Comment: Not reported

5  
North  
1/2-1  
0.592 mi.  
3128 ft.

**MCLEAN ROAD  
2532 MCLEAN ROAD  
CHARLOTTE, NC**

**SHWS S106936460  
IMD N/A**

**Relative:  
Higher**

SHWS:  
Facility ID: NONCD0002056  
Facility Type: Inactive Hazardous Sites and Pollutant-Only Sites  
Lat/Longitude: 35.284994 / -80.716447  
Geolocation Method: GEOCODING

**Actual:  
737 ft.**

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number  
EPA ID Number

**MCLEAN ROAD (Continued)**

**S106936460**

IMD:

Region: MOR  
Facility ID: 87179  
Date Occurred: 10/28/2004  
Submit Date: 10/28/2004  
GW Contam: Yes, Groundwater Contamination has been detected  
Soil Contam: Not reported  
Incident Desc: SEVERAL WELLS ON MCLEAN ROAD NEAR BAUCOM'S NURSERY HAVE BEEN CONTAMINATED WITH CHLORDANE. MOST HOUSES HAVE BEEN CONNECTED TO CITY WATER, BUT WELLS ARE STILL USE  
Operator: , UNKNOWN  
Contact Phone: Not reported  
Owner Company: UNKNOWN  
Operator Address: Not reported  
Operator City: Not reported  
Oper City, St, Zip: NC  
Ownership: Not Reported  
Operation: Not Reported  
Material: Not reported  
Qty Lost 1: Not reported  
Qty Recovered 1: Not reported  
Source: Unknown  
Type: Pesticide/herbicide  
Location: Not reported  
Setting: Not reported  
Risk Site: Not reported  
Site Priority: Not reported  
Priority Code: A  
Priority Update: Not reported  
Dem Contact: ARL  
Wells Affected: No  
Num Affected: Not reported  
Wells Contam: Not reported  
Sampled By: Not reported  
Samples Include: Not reported  
7.5 Min Quad: Not reported  
5 Min Quad: Not reported  
Latitude: Not reported  
Longitude: Not reported  
Latitude Number: Not reported  
Longitude Number: Not reported  
Latitude Decimal: Not reported  
Longitude Decimal: Not reported  
GPS: NOD  
Agency: DWQ  
Facility ID: 87179  
Last Modified: 7/15/2005  
Incident Phase: Discovery  
NOV Issued: Not reported  
NORR Issued: Not reported  
45 Day Report: Not reported  
Public Meeting Held: Not reported  
Corrective Action Planned: Not reported  
SOC Sighned: Not reported  
Reclassification Report: Not reported  
RS Designation: Not reported  
Closure Request Date: Not reported

MAP FINDINGS

Map ID  
 Direction  
 Distance  
 Elevation

Site

Database(s)

EDR ID Number  
 EPA ID Number

**MCLEAN ROAD (Continued)**

**S106936460**

Close-out Report: Not reported

**6  
 NW  
 1/2-1  
 0.780 mi.  
 4118 ft.**

**FULTON WELL  
 8501 OLD CONCORD ROAD  
 CHARLOTTE, NC**

**SHWS S109015440  
 N/A**

**Relative:  
 Higher**

SHWS:  
 Facility ID: NONCD0001741  
 Facility Type: Inactive Hazardous Sites and Pollutant-Only Sites  
 Lat/Longitude: 35.28341 / -80.73341  
 Geolocation Method: UNKNOWN

**Actual:  
 757 ft.**

Count: 20 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CHARLOTTE	1000106575	DOW CHEMICAL CORP/ALLIED	2 WOODLAWN GREEN RD		HWS
CHARLOTTE	1000707747	QUEENS PROPERTY	RESEARCH DRIVE		HWS
CHARLOTTE	1004747271	LTP	7000 HWY 21 N.	28213	FINDS,RCRA-NLR
CHARLOTTE	1007675692	REEDY CREEK SID - PHASE 3 - RYLAND	PLAZA RD. EXT & DUBLIN CREEK R	0000	FINDS
CHARLOTTE	1007675696	REEDY CREEK - LENNAR	PLAZA RD. EXT. AT DUBLIN CREEK	00000	FINDS
CHARLOTTE	1007675701	REEDY CREEK SID - GRIMMER	P;AZA RD EXT & DUBLIN CREEK RO	00000	FINDS
CHARLOTTE	1007694174	WILLOWS CREEK S/D	10000 STARBROOK PLACE	28215	FINDS
CHARLOTTE	1010493770	THE PALISADES BEAR CREEK	CHARLOTTE E.T.J. STEELE CREEK	00000	FINDS
CHARLOTTE	1014409473	VIRGINIA CAROLINA CHEMICAL CHARLOT	349 TREMONT AVENUE		CERCLIS
CHARLOTTE	2004712980	IRWIN CREEK	IRWIN CREEK		ERNS
CHARLOTTE	2008900456	MC ALPINE CREEK	MC ALPINE CREEK		ERNS
CHARLOTTE	2009900456	MC ALPINE CREEK	MC ALPINE CREEK		ERNS
CHARLOTTE	2010960103	11707 STEEL CREEK RD	11707 STEEL CREEK RD		ERNS
CHARLOTTE	89124854	OUSTIDE OF PLANT SUGAR CREEK RD	OUSTIDE OF PLANT SUGAR CREEK R		ERNS
CHARLOTTE	S103229259	HWY 49 BATTERY DUMP	NC HIGHWAY 49		HWS,IMD
CHARLOTTE	S105029487	CHARLOTTE CITY DUMP	HWY 49 - YORK ROAD		IMD
CHARLOTTE	S105040811	HENSON'S, INC. MULCH & MORE	OLD LANDCASTER HWY		LF,HIST LF
CHARLOTTE	S105425775	MALLARD CREEK WWTP	12400 HIGHWAY 29 NORTH		IMD,LAST
CHARLOTTE	S109015505	NCDOT ASPHALT SITE #2 (CROWDER CON	CROWDER CONST, HWY 16, 6433 BR		HWS
CHARLOTTE	S109164088	C D SPANGLER CONSTRUCTION CO	U.S. HIGHWAY 29		LF

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

**Number of Days to Update:** Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

## STANDARD ENVIRONMENTAL RECORDS

### ***Federal NPL site list***

#### NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/31/2010	Source: EPA
Date Data Arrived at EDR: 01/13/2011	Telephone: N/A
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 15	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

#### NPL Site Boundaries

##### Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)  
Telephone: 202-564-7333

EPA Region 1  
Telephone 617-918-1143

EPA Region 6  
Telephone: 214-655-6659

EPA Region 3  
Telephone 215-814-5418

EPA Region 7  
Telephone: 913-551-7247

EPA Region 4  
Telephone 404-562-8033

EPA Region 8  
Telephone: 303-312-6774

EPA Region 5  
Telephone 312-886-6686

EPA Region 9  
Telephone: 415-947-4246

EPA Region 10  
Telephone 206-553-8665

#### Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/31/2010	Source: EPA
Date Data Arrived at EDR: 01/13/2011	Telephone: N/A
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 15	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

#### NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991	Source: EPA
Date Data Arrived at EDR: 02/02/1994	Telephone: 202-564-4267
Date Made Active in Reports: 03/30/1994	Last EDR Contact: 02/14/2011
Number of Days to Update: 56	Next Scheduled EDR Contact: 05/30/2011
	Data Release Frequency: No Update Planned

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## ***Federal Delisted NPL site list***

### DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/31/2010	Source: EPA
Date Data Arrived at EDR: 01/13/2011	Telephone: N/A
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 15	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

## ***Federal CERCLIS list***

### CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/01/2011	Telephone: 703-412-9810
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 04/29/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Quarterly

### FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA's Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/11/2011	Telephone: 703-603-8704
Date Made Active in Reports: 02/16/2011	Last EDR Contact: 04/15/2011
Number of Days to Update: 36	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Varies

## ***Federal CERCLIS NFRAP site List***

### CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/01/2011	Telephone: 703-412-9810
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 04/29/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Quarterly

## ***Federal RCRA CORRACTS facilities list***

### CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 05/25/2010  
Date Data Arrived at EDR: 06/02/2010  
Date Made Active in Reports: 10/04/2010  
Number of Days to Update: 124

Source: EPA  
Telephone: 800-424-9346  
Last EDR Contact: 02/14/2011  
Next Scheduled EDR Contact: 05/30/2011  
Data Release Frequency: Quarterly

## ***Federal RCRA non-CORRACTS TSD facilities list***

### **RCRA-TSDF: RCRA - Treatment, Storage and Disposal**

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2011  
Date Data Arrived at EDR: 04/05/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 27

Source: Environmental Protection Agency  
Telephone: (404) 562-8651  
Last EDR Contact: 04/05/2011  
Next Scheduled EDR Contact: 07/18/2011  
Data Release Frequency: Quarterly

## ***Federal RCRA generators list***

### **RCRA-LQG: RCRA - Large Quantity Generators**

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011  
Date Data Arrived at EDR: 04/05/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 27

Source: Environmental Protection Agency  
Telephone: (404) 562-8651  
Last EDR Contact: 04/05/2011  
Next Scheduled EDR Contact: 07/18/2011  
Data Release Frequency: Quarterly

### **RCRA-SQG: RCRA - Small Quantity Generators**

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2011  
Date Data Arrived at EDR: 04/05/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 27

Source: Environmental Protection Agency  
Telephone: (404) 562-8651  
Last EDR Contact: 04/05/2011  
Next Scheduled EDR Contact: 07/18/2011  
Data Release Frequency: Quarterly

### **RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators**

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2011  
Date Data Arrived at EDR: 04/05/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 27

Source: Environmental Protection Agency  
Telephone: (404) 562-8651  
Last EDR Contact: 04/05/2011  
Next Scheduled EDR Contact: 07/18/2011  
Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## ***Federal institutional controls / engineering controls registries***

### US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 01/05/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/14/2011	Telephone: 703-603-0695
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 03/14/2011
Number of Days to Update: 14	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Varies

### US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 01/05/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/14/2011	Telephone: 703-603-0695
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 03/14/2011
Number of Days to Update: 14	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Varies

## ***Federal ERNS list***

### ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2010	Source: National Response Center, United States Coast Guard
Date Data Arrived at EDR: 01/07/2011	Telephone: 202-267-2180
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 04/05/2011
Number of Days to Update: 73	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Annually

## ***State- and tribal - equivalent NPL***

### HSDS: Hazardous Substance Disposal Site

Locations of uncontrolled and unregulated hazardous waste sites. The file includes sites on the National Priority List as well as those on the state priority list.

Date of Government Version: 04/06/2006	Source: North Carolina Center for Geographic Information and Analysis
Date Data Arrived at EDR: 02/28/2007	Telephone: 919-754-6580
Date Made Active in Reports: 04/13/2007	Last EDR Contact: 05/10/2011
Number of Days to Update: 44	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Biennially

## ***State- and tribal - equivalent CERCLIS***

### SHWS: Inactive Hazardous Sites Inventory

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 01/06/2011	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 01/18/2011	Telephone: 919-508-8400
Date Made Active in Reports: 02/18/2011	Last EDR Contact: 04/04/2011
Number of Days to Update: 31	Next Scheduled EDR Contact: 07/04/2011
	Data Release Frequency: Quarterly

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## ***State and tribal landfill and/or solid waste disposal site lists***

### SWF/LF: List of Solid Waste Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 04/05/2011	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 04/05/2011	Telephone: 919-733-0692
Date Made Active in Reports: 05/04/2011	Last EDR Contact: 04/05/2011
Number of Days to Update: 29	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Semi-Annually

### OLI: Old Landfill Inventory

Old landfill inventory location information. (Does not include no further action sites and other agency lead sites).

Date of Government Version: 01/06/2011	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 01/18/2011	Telephone: 919-733-4996
Date Made Active in Reports: 02/11/2011	Last EDR Contact: 04/26/2011
Number of Days to Update: 24	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Varies

## ***State and tribal leaking storage tank lists***

### LUST: Regional UST Database

This database contains information obtained from the Regional Offices. It provides a more detailed explanation of current and historic activity for individual sites, as well as what was previously found in the Incident Management Database. Sites in this database with Incident Numbers are considered LUSTs.

Date of Government Version: 03/25/2011	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 03/31/2011	Telephone: 919-733-1308
Date Made Active in Reports: 04/28/2011	Last EDR Contact: 03/31/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 05/30/2011
	Data Release Frequency: Quarterly

### LUST TRUST: State Trust Fund Database

This database contains information about claims against the State Trust Funds for reimbursements for expenses incurred while remediating Leaking USTs.

Date of Government Version: 12/17/2010	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 01/18/2011	Telephone: 919-733-1315
Date Made Active in Reports: 02/11/2011	Last EDR Contact: 04/20/2011
Number of Days to Update: 24	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Semi-Annually

### LAST: Leaking Aboveground Storage Tanks

A listing of leaking aboveground storage tank site locations.

Date of Government Version: 03/25/2011	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 03/31/2011	Telephone: 877-623-6748
Date Made Active in Reports: 04/28/2011	Last EDR Contact: 03/31/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 05/30/2011
	Data Release Frequency: Quarterly

### INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 03/03/2011  
Date Data Arrived at EDR: 03/18/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 45

Source: EPA Region 4  
Telephone: 404-562-8677  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Semi-Annually

**INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land**  
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011  
Date Data Arrived at EDR: 02/01/2011  
Date Made Active in Reports: 03/21/2011  
Number of Days to Update: 48

Source: Environmental Protection Agency  
Telephone: 415-972-3372  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Quarterly

**INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land**  
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/03/2011  
Date Data Arrived at EDR: 02/04/2011  
Date Made Active in Reports: 03/21/2011  
Number of Days to Update: 45

Source: EPA Region 10  
Telephone: 206-553-2857  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Quarterly

**INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land**  
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 09/01/2010  
Date Data Arrived at EDR: 11/05/2010  
Date Made Active in Reports: 01/28/2011  
Number of Days to Update: 84

Source: EPA Region 1  
Telephone: 617-918-1313  
Last EDR Contact: 05/03/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Varies

**INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land**  
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 02/03/2011  
Date Data Arrived at EDR: 02/04/2011  
Date Made Active in Reports: 03/21/2011  
Number of Days to Update: 45

Source: EPA Region 6  
Telephone: 214-665-6597  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Varies

**INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land**  
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009  
Date Data Arrived at EDR: 05/04/2010  
Date Made Active in Reports: 07/07/2010  
Number of Days to Update: 64

Source: EPA Region 7  
Telephone: 913-551-7003  
Last EDR Contact: 05/04/2010  
Next Scheduled EDR Contact: 05/16/2011  
Data Release Frequency: Varies

**INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land**  
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 02/04/2011  
Date Data Arrived at EDR: 02/04/2011  
Date Made Active in Reports: 03/21/2011  
Number of Days to Update: 45

Source: EPA Region 8  
Telephone: 303-312-6271  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Quarterly

***State and tribal registered storage tank lists***

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## UST: Petroleum Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 03/25/2011  
Date Data Arrived at EDR: 03/31/2011  
Date Made Active in Reports: 04/28/2011  
Number of Days to Update: 28

Source: Department of Environment and Natural Resources  
Telephone: 919-733-1308  
Last EDR Contact: 03/31/2011  
Next Scheduled EDR Contact: 05/30/2011  
Data Release Frequency: Quarterly

## AST: AST Database

Facilities with aboveground storage tanks that have a capacity greater than 21,000 gallons.

Date of Government Version: 03/28/2011  
Date Data Arrived at EDR: 03/30/2011  
Date Made Active in Reports: 05/03/2011  
Number of Days to Update: 34

Source: Department of Environment and Natural Resources  
Telephone: 919-715-6183  
Last EDR Contact: 03/28/2011  
Next Scheduled EDR Contact: 07/11/2011  
Data Release Frequency: Semi-Annually

## INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 01/31/2011  
Date Data Arrived at EDR: 02/01/2011  
Date Made Active in Reports: 03/21/2011  
Number of Days to Update: 48

Source: EPA Region 9  
Telephone: 415-972-3368  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Quarterly

## INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 03/03/2011  
Date Data Arrived at EDR: 03/18/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 45

Source: EPA Region 4  
Telephone: 404-562-9424  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Semi-Annually

## INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 11/01/2010  
Date Data Arrived at EDR: 12/02/2010  
Date Made Active in Reports: 01/28/2011  
Number of Days to Update: 57

Source: EPA Region 7  
Telephone: 913-551-7003  
Last EDR Contact: 02/03/2011  
Next Scheduled EDR Contact: 05/16/2011  
Data Release Frequency: Varies

## INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 02/03/2011  
Date Data Arrived at EDR: 02/04/2011  
Date Made Active in Reports: 03/21/2011  
Number of Days to Update: 45

Source: EPA Region 6  
Telephone: 214-665-7591  
Last EDR Contact: 05/02/2011  
Next Scheduled EDR Contact: 08/15/2011  
Data Release Frequency: Semi-Annually

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 09/01/2010	Source: EPA, Region 1
Date Data Arrived at EDR: 11/05/2010	Telephone: 617-918-1313
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 05/03/2011
Number of Days to Update: 84	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

## INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 02/04/2011	Source: EPA Region 8
Date Data Arrived at EDR: 02/04/2011	Telephone: 303-312-6137
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 45	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

## INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/01/2011	Source: EPA Region 5
Date Data Arrived at EDR: 02/23/2011	Telephone: 312-886-6136
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 68	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

## INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/03/2011	Source: EPA Region 10
Date Data Arrived at EDR: 02/04/2011	Telephone: 206-553-2857
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 45	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Quarterly

## FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010	Source: FEMA
Date Data Arrived at EDR: 02/16/2010	Telephone: 202-646-5797
Date Made Active in Reports: 04/12/2010	Last EDR Contact: 04/18/2011
Number of Days to Update: 55	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Varies

## ***State and tribal institutional control / engineering control registries***

### INST CONTROL: No Further Action Sites With Land Use Restrictions Monitoring

A land use restricted site is a property where there are limits or requirements on future use of the property due to varying levels of cleanup possible, practical, or necessary at the site.

Date of Government Version: 04/08/2011	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 04/13/2011	Telephone: 919-508-8400
Date Made Active in Reports: 05/04/2011	Last EDR Contact: 12/17/2110
Number of Days to Update: 21	Next Scheduled EDR Contact: 07/04/2011
	Data Release Frequency: Quarterly

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## ***State and tribal voluntary cleanup sites***

### INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/01/2010	Source: EPA, Region 1
Date Data Arrived at EDR: 01/05/2011	Telephone: 617-918-1102
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 04/05/2011
Number of Days to Update: 75	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Varies

### INDIAN VCP R7: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008	Source: EPA, Region 7
Date Data Arrived at EDR: 04/22/2008	Telephone: 913-551-7365
Date Made Active in Reports: 05/19/2008	Last EDR Contact: 04/20/2009
Number of Days to Update: 27	Next Scheduled EDR Contact: 07/20/2009
	Data Release Frequency: Varies

### VCP: Responsible Party Voluntary Action Sites

Responsible Party Voluntary Action site locations.

Date of Government Version: 04/08/2011	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 04/13/2011	Telephone: 919-508-8400
Date Made Active in Reports: 05/04/2011	Last EDR Contact: 04/04/2011
Number of Days to Update: 21	Next Scheduled EDR Contact: 07/04/2011
	Data Release Frequency: Semi-Annually

## ***State and tribal Brownfields sites***

### BROWNFIELDS: Brownfields Projects Inventory

A brownfield site is an abandoned, idled, or underused property where the threat of environmental contamination has hindered its redevelopment. All of the sites in the inventory are working toward a brownfield agreement for cleanup and liability control.

Date of Government Version: 09/30/2010	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 04/15/2011	Telephone: 919-733-4996
Date Made Active in Reports: 05/04/2011	Last EDR Contact: 04/12/2011
Number of Days to Update: 19	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Varies

## **ADDITIONAL ENVIRONMENTAL RECORDS**

### ***Local Brownfield lists***

US BROWNFIELDS: A Listing of Brownfields Sites

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 12/29/2010	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/30/2010	Telephone: 202-566-2777
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 03/29/2011
Number of Days to Update: 81	Next Scheduled EDR Contact: 07/11/2011
	Data Release Frequency: Semi-Annually

## **Local Lists of Landfill / Solid Waste Disposal Sites**

### ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985	Source: Environmental Protection Agency
Date Data Arrived at EDR: 08/09/2004	Telephone: 800-424-9346
Date Made Active in Reports: 09/17/2004	Last EDR Contact: 06/09/2004
Number of Days to Update: 39	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

### DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009	Source: EPA, Region 9
Date Data Arrived at EDR: 05/07/2009	Telephone: 415-947-4219
Date Made Active in Reports: 09/21/2009	Last EDR Contact: 03/28/2011
Number of Days to Update: 137	Next Scheduled EDR Contact: 07/11/2011
	Data Release Frequency: No Update Planned

### HIST LF: Solid Waste Facility Listing

A listing of solid waste facilities.

Date of Government Version: 11/06/2006	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 02/13/2007	Telephone: 919-733-0692
Date Made Active in Reports: 03/02/2007	Last EDR Contact: 01/19/2009
Number of Days to Update: 17	Next Scheduled EDR Contact: 04/19/2009
	Data Release Frequency: Quarterly

### INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/03/2007	Telephone: 703-308-8245
Date Made Active in Reports: 01/24/2008	Last EDR Contact: 05/09/2011
Number of Days to Update: 52	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

## **Local Lists of Hazardous waste / Contaminated Sites**

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/02/2011	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 03/17/2011	Telephone: 202-307-1000
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 03/08/2011
Number of Days to Update: 46	Next Scheduled EDR Contact: 06/20/2011
	Data Release Frequency: Quarterly

## US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 11/19/2008	Telephone: 202-307-1000
Date Made Active in Reports: 03/30/2009	Last EDR Contact: 03/23/2009
Number of Days to Update: 131	Next Scheduled EDR Contact: 06/22/2009
	Data Release Frequency: No Update Planned

## **Local Land Records**

### LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/01/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/04/2011	Telephone: 202-564-6023
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 87	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

### LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005	Source: Department of the Navy
Date Data Arrived at EDR: 12/11/2006	Telephone: 843-820-7326
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 02/22/2011
Number of Days to Update: 31	Next Scheduled EDR Contact: 06/06/2011
	Data Release Frequency: Varies

## **Records of Emergency Release Reports**

### HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010	Source: U.S. Department of Transportation
Date Data Arrived at EDR: 01/05/2011	Telephone: 202-366-4555
Date Made Active in Reports: 02/25/2011	Last EDR Contact: 04/05/2011
Number of Days to Update: 51	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Annually

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## ***Other Ascertainable Records***

### **RCRA-NonGen: RCRA - Non Generators**

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/05/2011	Telephone: (404) 562-8651
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 04/05/2011
Number of Days to Update: 27	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Varies

### **DOT OPS: Incident and Accident Data**

Department of Transportation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011	Source: Department of Transportation, Office of Pipeline Safety
Date Data Arrived at EDR: 02/11/2011	Telephone: 202-366-4595
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 05/11/2011
Number of Days to Update: 80	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

### **DOD: Department of Defense Sites**

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005	Source: USGS
Date Data Arrived at EDR: 11/10/2006	Telephone: 703-692-8801
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 04/21/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Semi-Annually

### **FUDS: Formerly Used Defense Sites**

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009	Source: U.S. Army Corps of Engineers
Date Data Arrived at EDR: 08/12/2010	Telephone: 202-528-4285
Date Made Active in Reports: 12/02/2010	Last EDR Contact: 03/15/2011
Number of Days to Update: 112	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Varies

### **CONSENT: Superfund (CERCLA) Consent Decrees**

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 10/01/2010	Source: Department of Justice, Consent Decree Library
Date Data Arrived at EDR: 10/29/2010	Telephone: Varies
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 04/04/2011
Number of Days to Update: 91	Next Scheduled EDR Contact: 07/18/2011
	Data Release Frequency: Varies

### **ROD: Records Of Decision**

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011	Source: EPA
Date Data Arrived at EDR: 03/16/2011	Telephone: 703-416-0223
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 03/16/2011
Number of Days to Update: 5	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Annually

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010	Source: Department of Energy
Date Data Arrived at EDR: 10/21/2010	Telephone: 505-845-0011
Date Made Active in Reports: 01/28/2011	Last EDR Contact: 03/04/2011
Number of Days to Update: 99	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Varies

## MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2011	Source: Department of Labor, Mine Safety and Health Administration
Date Data Arrived at EDR: 03/09/2011	Telephone: 303-231-5959
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 03/09/2011
Number of Days to Update: 54	Next Scheduled EDR Contact: 06/20/2011
	Data Release Frequency: Semi-Annually

## TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009	Source: EPA
Date Data Arrived at EDR: 12/17/2010	Telephone: 202-566-0250
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 03/01/2011
Number of Days to Update: 94	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Annually

## TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006	Source: EPA
Date Data Arrived at EDR: 09/29/2010	Telephone: 202-260-5521
Date Made Active in Reports: 12/02/2010	Last EDR Contact: 03/29/2011
Number of Days to Update: 64	Next Scheduled EDR Contact: 07/11/2011
	Data Release Frequency: Every 4 Years

## FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009	Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Date Data Arrived at EDR: 04/16/2009	Telephone: 202-566-1667
Date Made Active in Reports: 05/11/2009	Last EDR Contact: 02/28/2011
Number of Days to Update: 25	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Quarterly

## FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009	Source: EPA
Date Data Arrived at EDR: 04/16/2009	Telephone: 202-566-1667
Date Made Active in Reports: 05/11/2009	Last EDR Contact: 02/28/2011
Number of Days to Update: 25	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Quarterly

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/01/2007	Telephone: 202-564-2501
Date Made Active in Reports: 04/10/2007	Last EDR Contact: 12/17/2007
Number of Days to Update: 40	Next Scheduled EDR Contact: 03/17/2008
	Data Release Frequency: No Update Planned

## HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/01/2007	Telephone: 202-564-2501
Date Made Active in Reports: 04/10/2007	Last EDR Contact: 12/17/2008
Number of Days to Update: 40	Next Scheduled EDR Contact: 03/17/2008
	Data Release Frequency: No Update Planned

## SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009	Source: EPA
Date Data Arrived at EDR: 12/10/2010	Telephone: 202-564-4203
Date Made Active in Reports: 02/25/2011	Last EDR Contact: 05/02/2011
Number of Days to Update: 77	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Annually

## ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/21/2011	Telephone: 202-564-5088
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 03/28/2011
Number of Days to Update: 59	Next Scheduled EDR Contact: 07/11/2011
	Data Release Frequency: Quarterly

## PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010	Source: EPA
Date Data Arrived at EDR: 11/10/2010	Telephone: 202-566-0500
Date Made Active in Reports: 02/16/2011	Last EDR Contact: 04/22/2011
Number of Days to Update: 98	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Annually

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010	Source: Nuclear Regulatory Commission
Date Data Arrived at EDR: 04/06/2010	Telephone: 301-415-7169
Date Made Active in Reports: 05/27/2010	Last EDR Contact: 03/14/2011
Number of Days to Update: 51	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Quarterly

## RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/13/2011	Telephone: 202-343-9775
Date Made Active in Reports: 02/16/2011	Last EDR Contact: 04/13/2011
Number of Days to Update: 34	Next Scheduled EDR Contact: 07/25/2011
	Data Release Frequency: Quarterly

## FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010	Source: EPA
Date Data Arrived at EDR: 04/16/2010	Telephone: (404) 562-9900
Date Made Active in Reports: 05/27/2010	Last EDR Contact: 03/14/2011
Number of Days to Update: 41	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Quarterly

## RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995	Source: EPA
Date Data Arrived at EDR: 07/03/1995	Telephone: 202-564-4104
Date Made Active in Reports: 08/07/1995	Last EDR Contact: 06/02/2008
Number of Days to Update: 35	Next Scheduled EDR Contact: 09/01/2008
	Data Release Frequency: No Update Planned

## BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009	Source: EPA/NTIS
Date Data Arrived at EDR: 03/01/2011	Telephone: 800-424-9346
Date Made Active in Reports: 05/02/2011	Last EDR Contact: 03/01/2011
Number of Days to Update: 62	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Biennially

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/21/2006  
Date Data Arrived at EDR: 08/01/2006  
Date Made Active in Reports: 08/23/2006  
Number of Days to Update: 22

Source: Department of Environment and Natural Resources  
Telephone: 919-733-3221  
Last EDR Contact: 04/04/2011  
Next Scheduled EDR Contact: 07/18/2011  
Data Release Frequency: Quarterly

## UIC: Underground Injection Wells Listing

A listing of uncerground injection wells locations.

Date of Government Version: 02/14/2011  
Date Data Arrived at EDR: 02/16/2011  
Date Made Active in Reports: 03/14/2011  
Number of Days to Update: 26

Source: Department of Environment & Natural Resources  
Telephone: 919-733-3221  
Last EDR Contact: 02/14/2011  
Next Scheduled EDR Contact: 05/30/2011  
Data Release Frequency: Varies

## DRYCLEANERS: Drycleaning Sites

Potential and known drycleaning sites, active and abandoned, that the Drycleaning Solvent Cleanup Program has knowledge of and entered into this database.

Date of Government Version: 01/20/2011  
Date Data Arrived at EDR: 03/30/2011  
Date Made Active in Reports: 04/28/2011  
Number of Days to Update: 29

Source: Department of Environment & Natural Resources  
Telephone: 919-508-8400  
Last EDR Contact: 03/30/2011  
Next Scheduled EDR Contact: 07/11/2011  
Data Release Frequency: Varies

## NPDES: NPDES Facility Location Listing

General information regarding NPDES(National Pollutant Discharge Elimination System) permits.

Date of Government Version: 02/23/2011  
Date Data Arrived at EDR: 02/24/2011  
Date Made Active in Reports: 03/22/2011  
Number of Days to Update: 26

Source: Department of Environment & Natural Resources  
Telephone: 919-733-7015  
Last EDR Contact: 05/09/2011  
Next Scheduled EDR Contact: 08/22/2011  
Data Release Frequency: Varies

## INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005  
Date Data Arrived at EDR: 12/08/2006  
Date Made Active in Reports: 01/11/2007  
Number of Days to Update: 34

Source: USGS  
Telephone: 202-208-3710  
Last EDR Contact: 04/21/2011  
Next Scheduled EDR Contact: 08/01/2011  
Data Release Frequency: Semi-Annually

## SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011  
Date Data Arrived at EDR: 03/09/2011  
Date Made Active in Reports: 05/02/2011  
Number of Days to Update: 54

Source: Environmental Protection Agency  
Telephone: 615-532-8599  
Last EDR Contact: 05/09/2011  
Next Scheduled EDR Contact: 08/08/2011  
Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005	Source: U.S. Geological Survey
Date Data Arrived at EDR: 02/06/2006	Telephone: 888-275-8747
Date Made Active in Reports: 01/11/2007	Last EDR Contact: 04/21/2011
Number of Days to Update: 339	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: N/A

## PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/18/2009	Telephone: 202-566-0517
Date Made Active in Reports: 05/29/2009	Last EDR Contact: 05/05/2011
Number of Days to Update: 100	Next Scheduled EDR Contact: 08/15/2011
	Data Release Frequency: Varies

## COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/03/2011	Telephone: N/A
Date Made Active in Reports: 03/21/2011	Last EDR Contact: 03/18/2011
Number of Days to Update: 77	Next Scheduled EDR Contact: 06/27/2011
	Data Release Frequency: Varies

## COAL ASH DOE: Sleam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005	Source: Department of Energy
Date Data Arrived at EDR: 08/07/2009	Telephone: 202-586-8719
Date Made Active in Reports: 10/22/2009	Last EDR Contact: 04/19/2011
Number of Days to Update: 76	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Varies

## COAL ASH: Coal Ash Disposal Sites

A listing of coal combustion products distribution permits issued by the Division for the treatment, storage, transportation, use and disposal of coal combustion products.

Date of Government Version: 12/31/2007	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 08/04/2009	Telephone: 919-807-6359
Date Made Active in Reports: 08/17/2009	Last EDR Contact: 05/09/2011
Number of Days to Update: 13	Next Scheduled EDR Contact: 08/22/2011
	Data Release Frequency: Varies

## FINANCIAL ASSURANCE 1: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 03/25/2011	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 03/31/2011	Telephone: 919-733-1322
Date Made Active in Reports: 04/28/2011	Last EDR Contact: 03/31/2011
Number of Days to Update: 28	Next Scheduled EDR Contact: 05/30/2011
	Data Release Frequency: Quarterly

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## FINANCIAL ASSURANCE 2: Financial Assurance Information Listing

Information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 11/16/2010  
Date Data Arrived at EDR: 11/19/2010  
Date Made Active in Reports: 12/28/2010  
Number of Days to Update: 39

Source: Department of Environmental & Natural Resources  
Telephone: 919-508-8496  
Last EDR Contact: 04/18/2011  
Next Scheduled EDR Contact: 07/18/2011  
Data Release Frequency: Varies

## EDR PROPRIETARY RECORDS

### *EDR Proprietary Records*

#### Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A  
Date Data Arrived at EDR: N/A  
Date Made Active in Reports: N/A  
Number of Days to Update: N/A

Source: EDR, Inc.  
Telephone: N/A  
Last EDR Contact: N/A  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: No Update Planned

#### EDR Historical Auto Stations: EDR Proprietary Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc.

Date of Government Version: N/A  
Date Data Arrived at EDR: N/A  
Date Made Active in Reports: N/A  
Number of Days to Update: N/A

Source: EDR, Inc.  
Telephone: N/A  
Last EDR Contact: N/A  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: Varies

#### EDR Historical Cleaners: EDR Proprietary Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc.

Date of Government Version: N/A  
Date Data Arrived at EDR: N/A  
Date Made Active in Reports: N/A  
Number of Days to Update: N/A

Source: EDR, Inc.  
Telephone: N/A  
Last EDR Contact: N/A  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

### CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007	Source: Department of Environmental Protection
Date Data Arrived at EDR: 08/26/2009	Telephone: 860-424-3375
Date Made Active in Reports: 09/11/2009	Last EDR Contact: 02/25/2011
Number of Days to Update: 16	Next Scheduled EDR Contact: 06/06/2011
	Data Release Frequency: Annually

### NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Environmental Protection
Date Data Arrived at EDR: 07/22/2010	Telephone: N/A
Date Made Active in Reports: 08/26/2010	Last EDR Contact: 04/19/2011
Number of Days to Update: 35	Next Scheduled EDR Contact: 08/01/2011
	Data Release Frequency: Annually

### NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010	Source: Department of Environmental Conservation
Date Data Arrived at EDR: 02/09/2011	Telephone: 518-402-8651
Date Made Active in Reports: 03/04/2011	Last EDR Contact: 02/09/2011
Number of Days to Update: 23	Next Scheduled EDR Contact: 05/23/2011
	Data Release Frequency: Annually

### PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2008	Source: Department of Environmental Protection
Date Data Arrived at EDR: 12/01/2009	Telephone: 717-783-8990
Date Made Active in Reports: 12/14/2009	Last EDR Contact: 04/04/2011
Number of Days to Update: 13	Next Scheduled EDR Contact: 07/06/2011
	Data Release Frequency: Annually

### RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2009	Source: Department of Environmental Management
Date Data Arrived at EDR: 07/19/2010	Telephone: 401-222-2797
Date Made Active in Reports: 08/26/2010	Last EDR Contact: 02/28/2011
Number of Days to Update: 38	Next Scheduled EDR Contact: 06/13/2011
	Data Release Frequency: Annually

### WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009	Source: Department of Natural Resources
Date Data Arrived at EDR: 07/06/2010	Telephone: N/A
Date Made Active in Reports: 07/26/2010	Last EDR Contact: 03/21/2011
Number of Days to Update: 20	Next Scheduled EDR Contact: 07/04/2011
	Data Release Frequency: Annually

## GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

### Electric Power Transmission Line Data

Source: Rextag Strategies Corp.

Telephone: (281) 769-2247

U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

### AHA Hospitals:

Source: American Hospital Association, Inc.

Telephone: 312-280-5991

The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

### Medical Centers: Provider of Services Listing

Source: Centers for Medicare & Medicaid Services

Telephone: 410-786-3000

A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

### Nursing Homes

Source: National Institutes of Health

Telephone: 301-594-6248

Information on Medicare and Medicaid certified nursing homes in the United States.

### Public Schools

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

### Private Schools

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on private school locations in the United States.

### Daycare Centers: Child Care Facility List

Source: Department of Health & Human Services

Telephone: 919-662-4499

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

### State Wetlands Data: Wetlands Inventory

Source: Department of Environment & Natural Resources

Telephone: 919-733-2090

### Scanned Digital USGS 7.5' Topographic Map (DRG)

Source: United States Geologic Survey

A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## STREET AND ADDRESS INFORMATION

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## **GEOCHECK<sup>®</sup> - PHYSICAL SETTING SOURCE ADDENDUM**

### **TARGET PROPERTY ADDRESS**

REEDY CREEK  
2900 ROCK RIVER ROAD  
CHARLOTTE, NC 28215

### **TARGET PROPERTY COORDINATES**

Latitude (North):	35.26700 - 35° 16' 1.2"
Longitude (West):	80.7127 - 80° 42' 45.7"
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	526131.8
UTM Y (Meters):	3902492.5
Elevation:	717 ft. above sea level

### **USGS TOPOGRAPHIC MAP**

Target Property Map:	35080-C6 HARRISBURG, NC
Most Recent Revision:	1996

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

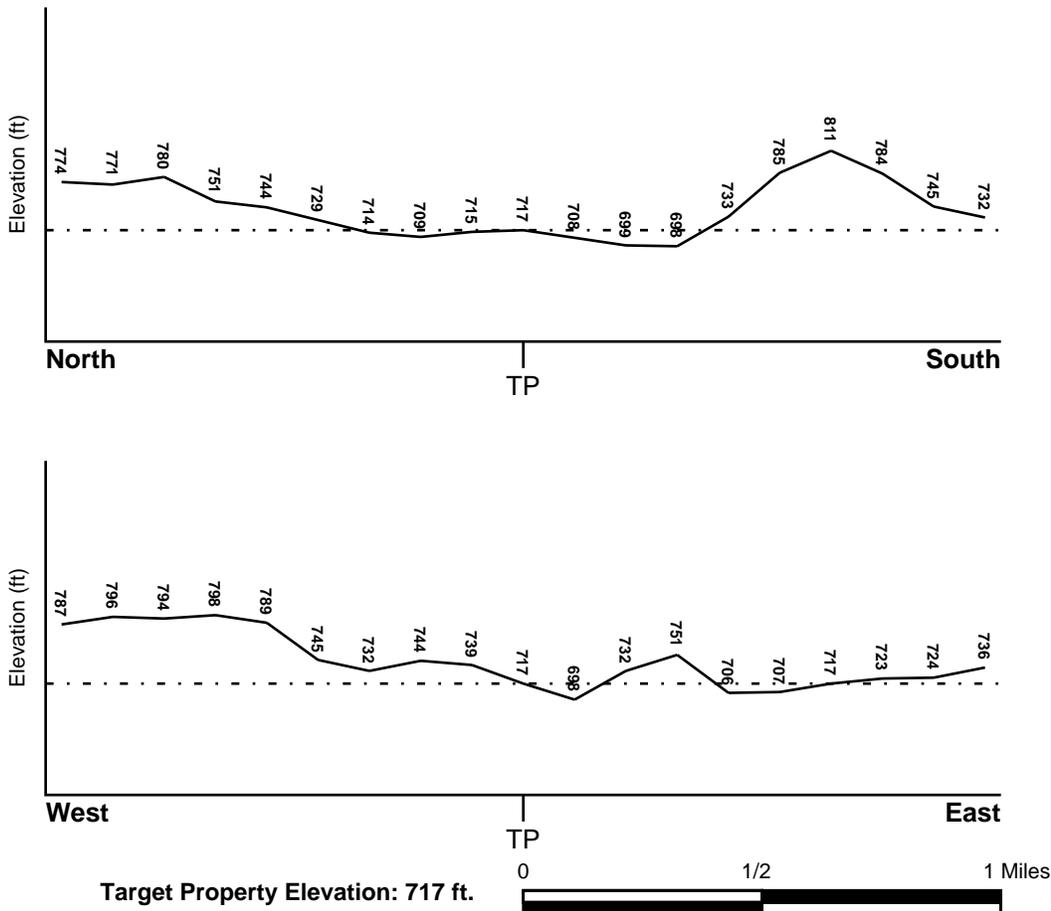
## TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

## TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SE

## SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

## **FEMA FLOOD ZONE**

<u>Target Property County</u> MECKLENBURG, NC	<u>FEMA Flood Electronic Data</u> YES - refer to the Overview Map and Detail Map
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Flood Plain Panel at Target Property: 37119C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

## **NATIONAL WETLAND INVENTORY**

<u>NWI Quad at Target Property</u> HARRISBURG	<u>NWI Electronic Data Coverage</u> YES - refer to the Overview Map and Detail Map
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## **HYDROGEOLOGIC INFORMATION**

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

## **AQUIFLOW®**

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

<u>MAP ID</u>	<u>LOCATION FROM TP</u>	<u>GENERAL DIRECTION GROUNDWATER FLOW</u>
5	1/2 - 1 Mile North	Not Reported

For additional site information, refer to Physical Setting Source Map Findings.

## **GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY**

### **GROUNDWATER FLOW VELOCITY INFORMATION**

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

### **GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY**

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

#### **ROCK STRATIGRAPHIC UNIT**

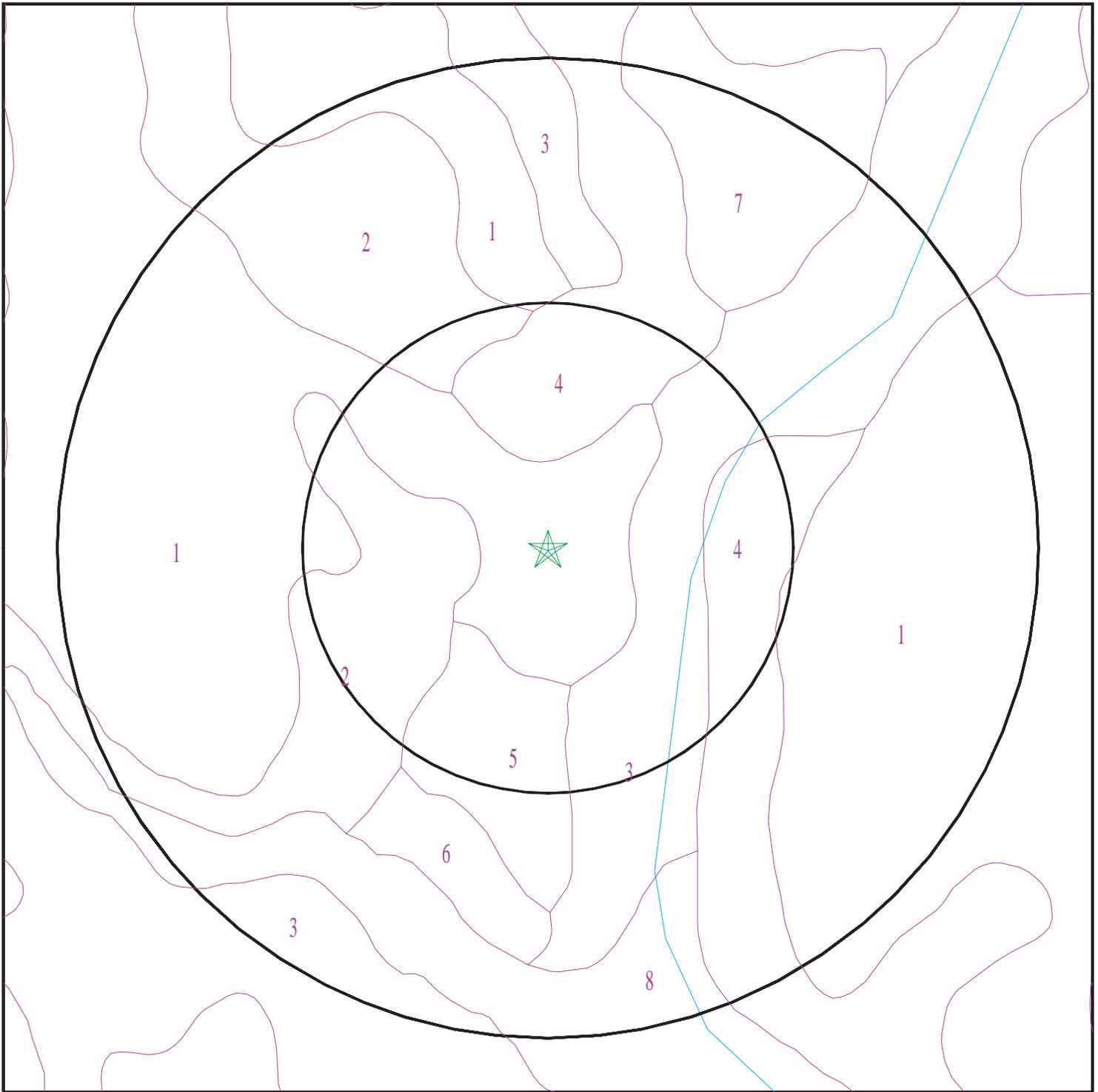
Era: Paleozoic  
System: Ordovian  
Series: Lower Paleozoic granitic rocks  
Code: Pzg1 (*decoded above as Era, System & Series*)

#### **GEOLOGIC AGE IDENTIFICATION**

Category: Plutonic and Intrusive Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

# SSURGO SOIL MAP - 3065686.2s



- ★ Target Property
- SSURGO Soil
- Water



SITE NAME: Reedy Creek  
ADDRESS: 2900 Rock River Road  
Charlotte NC 28215  
LAT/LONG: 35.2670 / 80.7127

CLIENT: Kimley Horn and Associates Inc.  
CONTACT: Jason Diaz  
INQUIRY #: 3065686.2s  
DATE: May 11, 2011 4:59 pm

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

### Soil Map ID: 1

Soil Component Name: Cecil

Soil Surface Texture: sandy clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	5 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6 Min: 4.5
2	5 inches	48 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6 Min: 4.5
3	48 inches	61 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6 Min: 4.5

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 2**

Soil Component Name: Cecil

Soil Surface Texture: sandy clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	5 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6 Min: 4.5
2	5 inches	48 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6 Min: 4.5
3	48 inches	61 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6 Min: 4.5

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 3**

Soil Component Name: Wilkes

Soil Surface Texture: loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	7 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
2	7 inches	14 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
3	14 inches	44 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
4	44 inches	48 inches	bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 4**

Soil Component Name: Enon

Soil Surface Texture: fine sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	7 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 1.4	Max: 7.8 Min: 6.1
2	7 inches	9 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 1.4	Max: 7.8 Min: 6.1
3	9 inches	33 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 1.4	Max: 7.8 Min: 6.1
4	33 inches	72 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 1.4	Max: 7.8 Min: 6.1

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 5**

Soil Component Name: Vance

Soil Surface Texture: loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	50 inches	59 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 1.4 Min: 0.42	Max: 5.5 Min: 4.5
2	38 inches	50 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 1.4 Min: 0.42	Max: 5.5 Min: 4.5
3	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 1.4 Min: 0.42	Max: 5.5 Min: 4.5
4	9 inches	38 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 1.4 Min: 0.42	Max: 5.5 Min: 4.5

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 6**

Soil Component Name: Vance

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 5.5 Min: 4.5
2	9 inches	38 inches	clay	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 5.5 Min: 4.5
3	38 inches	50 inches	sandy clay loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 5.5 Min: 4.5
4	50 inches	59 inches	loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 5.5 Min: 4.5

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 7**

Soil Component Name: Enon

Soil Surface Texture: loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	33 inches	72 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 1.4 Min: 0.42	Max: 7.8 Min: 5.1
2	0 inches	7 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 1.4 Min: 0.42	Max: 7.8 Min: 5.1
3	7 inches	9 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 1.4 Min: 0.42	Max: 7.8 Min: 5.1
4	9 inches	33 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 1.4 Min: 0.42	Max: 7.8 Min: 5.1

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**Soil Map ID: 8**

Soil Component Name: Monacan

Soil Surface Texture: loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat poorly drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 38 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	14 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.1
2	14 inches	25 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.1
3	64 inches	79 inches	stratified sand to clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.1
4	25 inches	64 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 5.1

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

## WELL SEARCH DISTANCE INFORMATION

<u>DATABASE</u>	<u>SEARCH DISTANCE (miles)</u>
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

## **FEDERAL USGS WELL INFORMATION**

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
No Wells Found		

## **FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION**

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
2	NC0160618	1/2 - 1 Mile NNW

Note: PWS System location is not always the same as well location.

## **STATE DATABASE WELL INFORMATION**

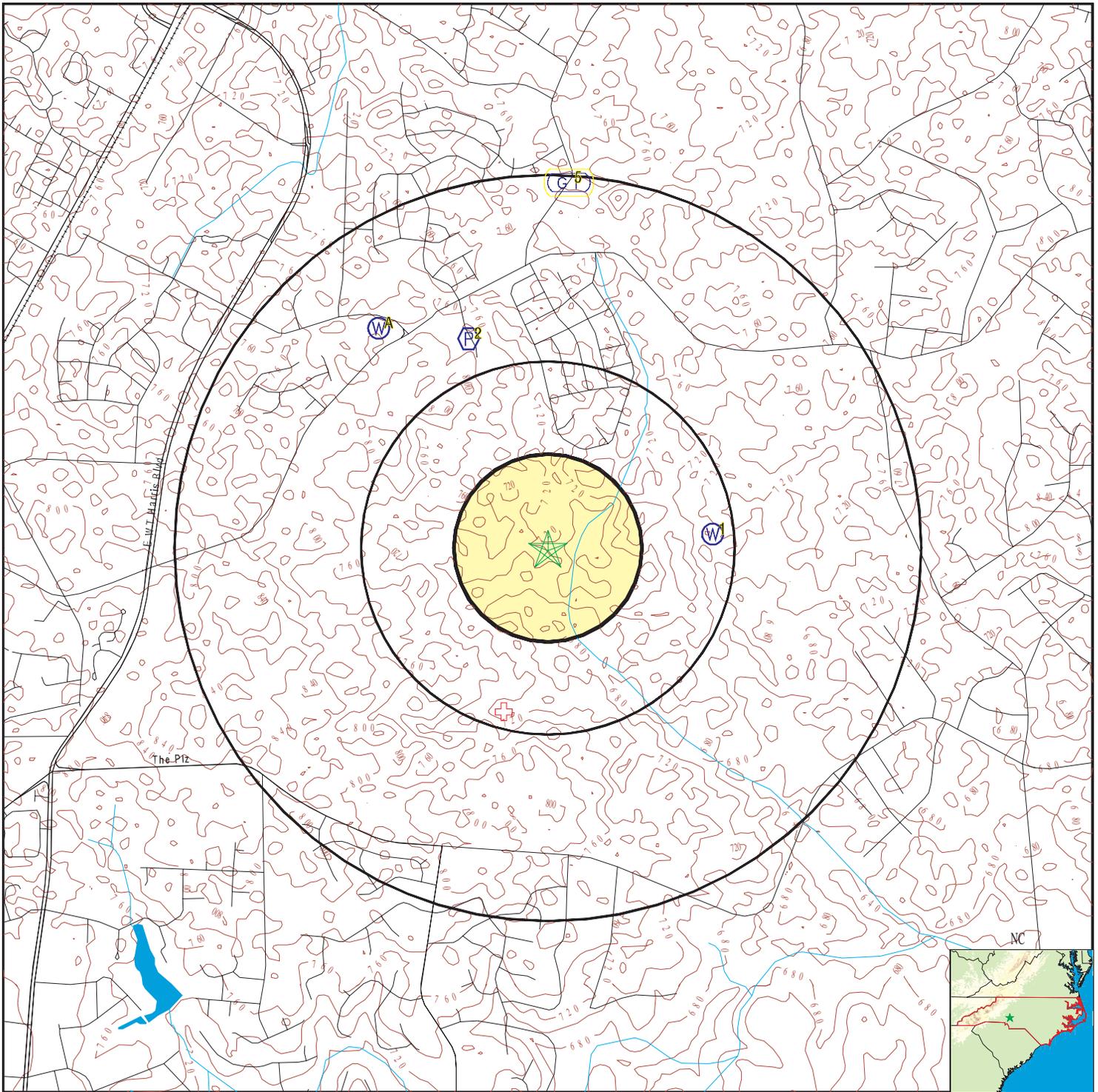
<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
1	NC2000000002820	1/4 - 1/2 Mile East
A3	NC2000000002863	1/2 - 1 Mile NW
A4	NC2000000002867	1/2 - 1 Mile NW

## OTHER STATE DATABASE INFORMATION

### **NORTH CAROLINA NATURAL HERITAGE ELEMENT OCCURRENCES**

<u>ID</u>	<u>Class</u>
NC50001454	Natural Community Occurrence

# PHYSICAL SETTING SOURCE MAP - 3065686.2s



- |  |  |                            |                           |
|--|--|----------------------------|---------------------------|
| County Boundary                            | 0 1/4 1/2 1 Miles                          | Groundwater Flow Direction | Wildlife Areas            |
| Major Roads                                | Indeterminate Groundwater Flow at Location | Natural Areas              | Rare & Endangered Species |
| Contour Lines                              | Groundwater Flow Varies at Location        |                            |                           |
| Earthquake epicenter, Richter 5 or greater |  |                            |                           |
| Water Wells                                |  |                            |                           |
| Public Water Supply Wells                  |  |                            |                           |
| Cluster of Multiple Icons                  |  |                            |                           |

SITE NAME: Reedy Creek  
 ADDRESS: 2900 Rock River Road  
 Charlotte NC 28215  
 LAT/LONG: 35.2670 / 80.7127

CLIENT: Kimley Horn and Associates Inc.  
 CONTACT: Jason Diaz  
 INQUIRY #: 3065686.2s  
 DATE: May 11, 2011 4:59 pm

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Database      EDR ID Number

**1**  
**East**  
**1/4 - 1/2 Mile**  
**Lower**      **NC WELLS**      **NC2000000002820**

Pwsidentif:            NC0160408  
System nam:            ROBINSON PRESBYTERIAN CHURCH  
Pws type:                NC  
County:                 MECKLENBURG  
City:                     CHARLOTTE  
Primary so:              GW  
Water type:              GW  
Facility n:                WELL #1  
Facility a:                S01  
Latitude m:              35.267539  
Longitude :              -80.704889  
Availavili:              A  
Well depth:              200  
Well dep 1:              FT  
Owner name:             ROBINSON PRESBYTERIAN CHURCH  
Site id:                  NC2000000002820

**2**  
**NNW**  
**1/2 - 1 Mile**  
**Higher**      **FRDS PWS**      **NC0160618**

PWS ID:                 NC0160618  
Date Initiated:        7706                     Date Deactivated: Not Reported  
PWS Name:              MARANTHA BAPTIST CHURCH  
                                 CHARLOTTE, NC 28212

Addressee / Facility:    System Owner/Responsible Party  
                                 A. JOHNSON OR PASTOR  
                                 RT 8 BOX 91E  
                                 CHARLOTTE, NC 28212

Addressee / Facility:    System Owner/Responsible Party  
                                 MARANTHA BAPTIST CHURCH  
                                 RT 8 BOX 91E  
                                 CHARLOTTE, NC 28212

Facility Latitude:        35 16 30                     Facility Longitude: 080 43 00  
Facility Latitude:        35 10 45                     Facility Longitude: 080 38 51  
City Served:              CHARLOTTE  
Treatment Class:         Untreated                     Population:                    00000025

Violations information not reported.

**A3**  
**NW**  
**1/2 - 1 Mile**  
**Higher**      **NC WELLS**      **NC2000000002863**

## GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pwsidentif: NC0160835  
 System nam: REEDY CREEK PARK I  
 Pws type: NC  
 County: MECKLENBURG  
 City: CHARLOTTE  
 Primary so: GW  
 Water type: GW  
 Facility n: WELL #1  
 Facility a: S01  
 Latitude m: 35.275368  
 Longitude : -80.72042  
 Availavili: A  
 Well depth: 400  
 Well dep 1: FT  
 Owner name: MECKLENBURG COUNTY PARKS & REC  
 Site id: NC2000000002863

**A4**  
**NW**  
**1/2 - 1 Mile**  
**Higher**

**NC WELLS      NC2000000002867**

Pwsidentif: NC0160836  
 System nam: REEDY CREEK PARK II  
 Pws type: NC  
 County: MECKLENBURG  
 City: CHARLOTTE  
 Primary so: GW  
 Water type: GW  
 Facility n: WELL #1  
 Facility a: S01  
 Latitude m: 35.275724  
 Longitude : -80.721004  
 Availavili: A  
 Well depth: 0  
 Well dep 1: Not Reported  
 Owner name: MECKLENBURG COUNTY PARKS & REC  
 Site id: NC2000000002867

**5**  
**North**  
**1/2 - 1 Mile**  
**Higher**

Site ID: 17750  
 Groundwater Flow: Not Reported  
 Shallowest Water Table Depth: Not Reported  
 Deepest Water Table Depth: Not Reported  
 Average Water Table Depth: 30  
 Depth to rock - shallowest: Not Reported  
 Depth to rock - deepest: Not Reported  
 Depth to rock - average: Not Reported  
 Date: 07/03/1997

**AQUIFLOW      36776**

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID  
Direction  
Distance

Database EDR ID Number

---

GIS ID:  
Classification by Type:  
Occurrence Status:

561550  
Natural Community Occurrence  
Extant

NC\_NHEO NC50001454

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS RADON

## AREA RADON INFORMATION

State Database: NC Radon

### Radon Test Results

Num Results	Avg pCi/L	Min pCi/L	Max pCi/L
1	1.50	1.5	1.5

Federal EPA Radon Zone for MECKLENBURG County: 3

- Note: Zone 1 indoor average level > 4 pCi/L.  
 : Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.  
 : Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 28215

Number of sites tested: 2

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.750 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## TOPOGRAPHIC INFORMATION

### USGS 7.5' Digital Elevation Model (DEM)

Source: United States Geologic Survey

EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

### Scanned Digital USGS 7.5' Topographic Map (DRG)

Source: United States Geologic Survey

A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

## HYDROLOGIC INFORMATION

**Flood Zone Data:** This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

**NWI:** National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

### State Wetlands Data: Wetlands Inventory

Source: Department of Environment & Natural Resources

Telephone: 919-733-2090

## HYDROGEOLOGIC INFORMATION

### AQUIFLOW<sup>R</sup> Information System

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

## GEOLOGIC INFORMATION

### Geologic Age and Rock Stratigraphic Unit

Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

### STATSGO: State Soil Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services

The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

### SSURGO: Soil Survey Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)

Telephone: 800-672-5559

SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## LOCAL / REGIONAL WATER AGENCY RECORDS

### FEDERAL WATER WELLS

#### PWS: Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

#### PWS ENF: Public Water Systems Violation and Enforcement Data

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

#### USGS Water Wells: USGS National Water Inventory System (NWIS)

This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

### STATE RECORDS

#### North Carolina Public Water Supply Wells

Source: Department of Environmental Health

Telephone: 919-715-3243

## OTHER STATE DATABASE INFORMATION

#### NC Natural Areas: Significant Natural Heritage Areas

Source: Center for Geographic Information and Analysis

Telephone: 919-733-2090

A polygon coverage identifying sites (terrestrial or aquatic that have particular biodiversity significance.

A site's significance may be due to the presence of rare species, rare or high quality natural communities, or other important ecological features.

#### NC Game Lands: Wildlife Resources Commission Game Lands

Source: Center for Geographic Information and Analysis

Telephone: 919-733-2090

All publicly owned game lands managed by the North Carolina Wildlife Resources Commission and as listed in Hunting and Fishing Maps.

#### NC Natural Heritage Sites: Natural Heritage Element Occurrence Sites

Source: Center for Geographic Information and Analysis

Telephone: 919-733-2090

A point coverage identifying locations of rare and endangered species, occurrences of exemplary or unique natural ecosystems (terrestrial or aquatic), and special animal habitats (e.g., colonial waterbird nesting sites).

### RADON

#### State Database: NC Radon

Source: Department of Environment & Natural Resources

Telephone: 919-733-4984

Radon Statistical and Non Statistical Data

#### Area Radon Information

Source: USGS

Telephone: 703-356-4020

The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

## PHYSICAL SETTING SOURCE RECORDS SEARCHED

### EPA Radon Zones

Source: EPA

Telephone: 703-356-4020

Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

### OTHER

Airport Landing Facilities: Private and public use landing facilities

Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

### STREET AND ADDRESS INFORMATION

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**Reedy Creek**

2900 Rock River Road  
Charlotte, NC 28215

Inquiry Number: 3065686.3  
May 11, 2011

## Certified Sanborn® Map Report

# Certified Sanborn® Map Report

5/11/11

**Site Name:**

Reedy Creek  
2900 Rock River Road  
Charlotte, NC 28215

**Client Name:**

Kimley Horn and Associates  
4651 Charlotte Park Drive  
Charlotte, NC 28217



EDR Inquiry # 3065686.3

Contact: Jason Diaz

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Kimley Horn and Associates Inc. were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting [www.edrnet.com/sanborn](http://www.edrnet.com/sanborn) and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

## Certified Sanborn Results:

**Site Name:** Reedy Creek  
**Address:** 2900 Rock River Road  
**City, State, Zip:** Charlotte, NC 28215  
**Cross Street:**  
**P.O. #** NA  
**Project:** Reedy Creek  
**Certification #** B8C7-4910-9D2B



Sanborn® Library search results  
Certification # B8C7-4910-9D2B

## UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

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- Library of Congress
- University Publications of America
- EDR Private Collection

*The Sanborn Library LLC Since 1866™*

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**Reedy Creek**

2900 Rock River Road  
Charlotte, NC 28215

Inquiry Number: 3065686.4  
May 11, 2011

# EDR Historical Topographic Map Report

# EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

***Thank you for your business.***  
Please contact EDR at 1-800-352-0050  
with any questions or comments.

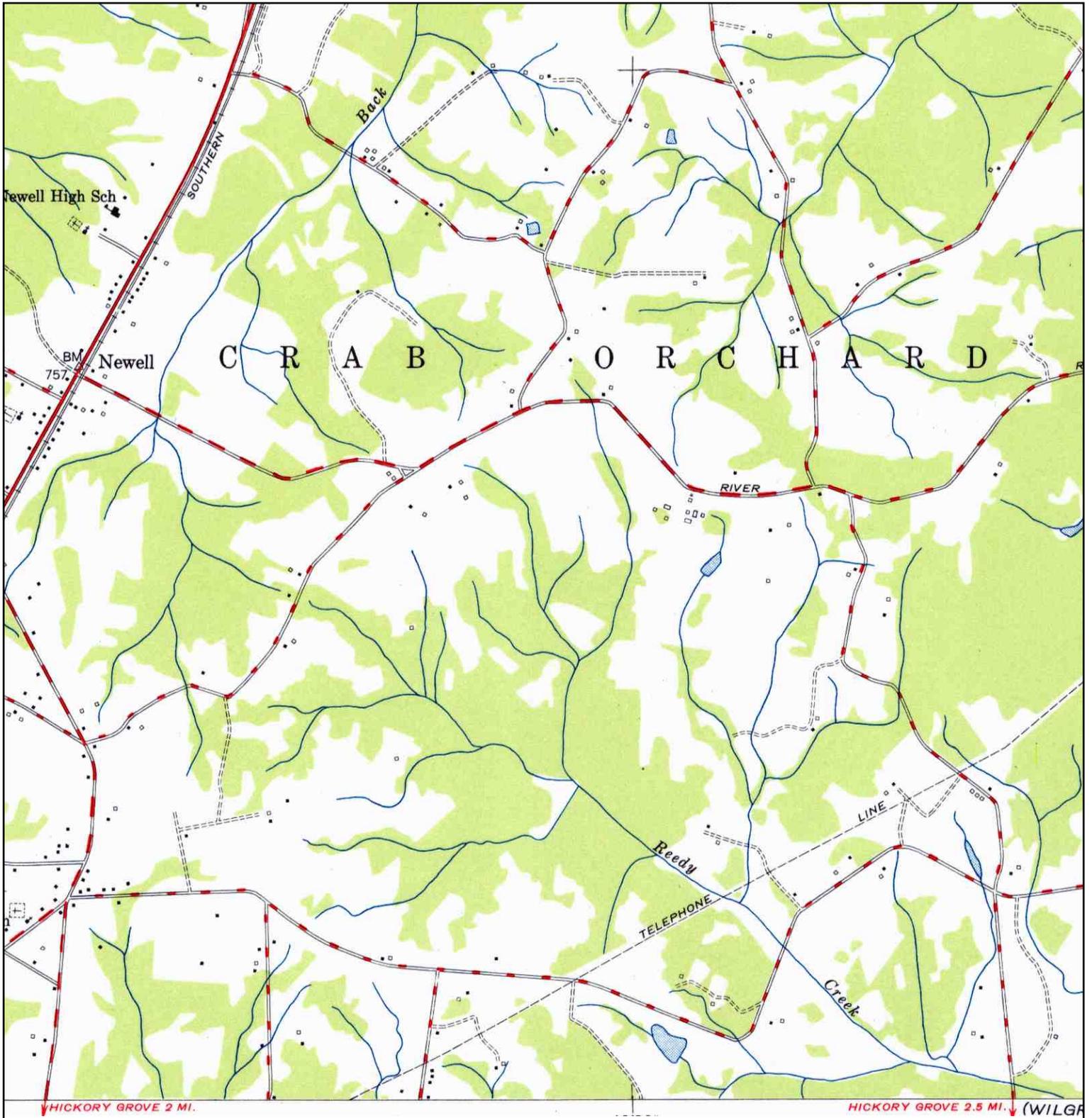
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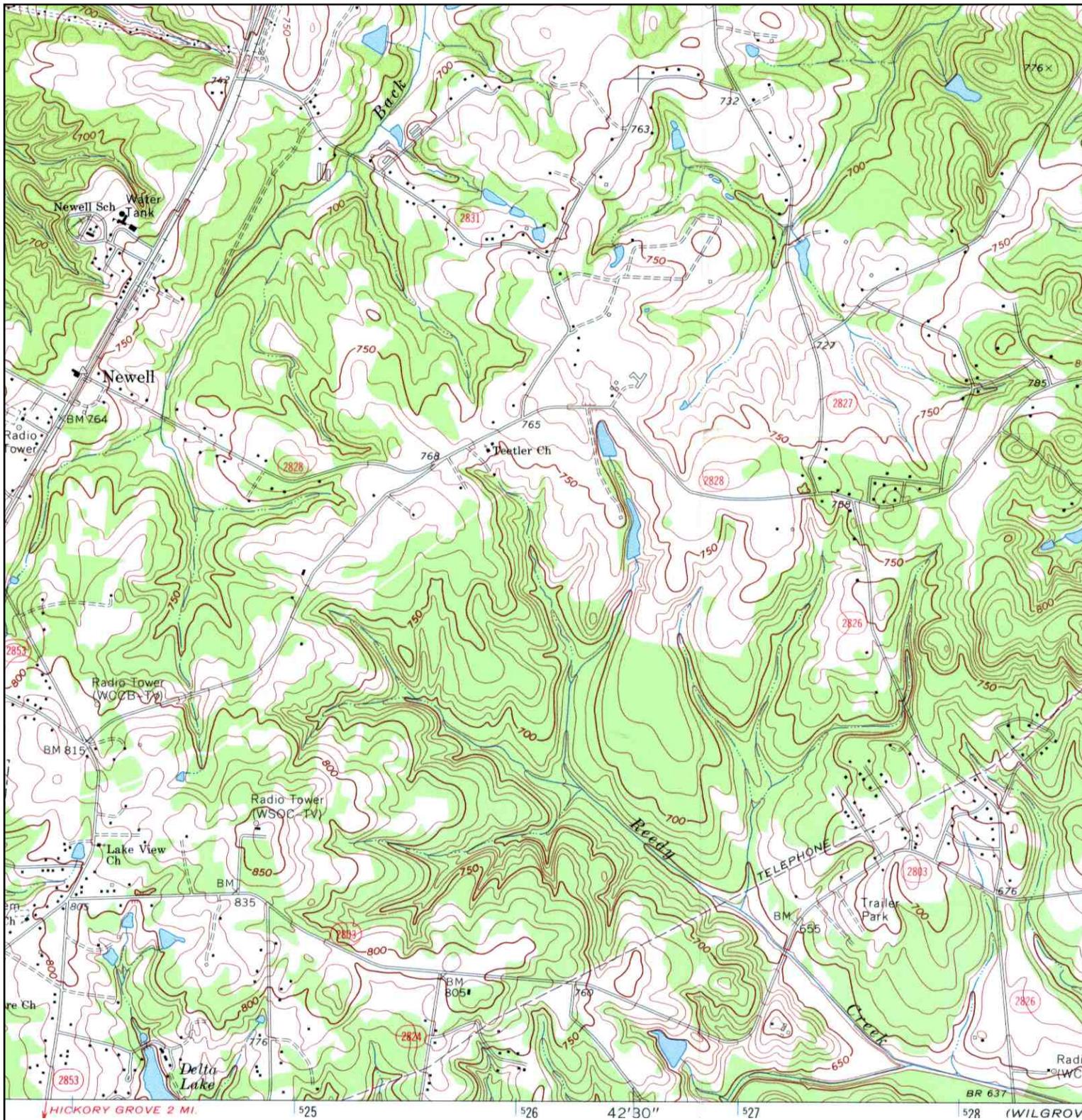
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# Historical Topographic Map



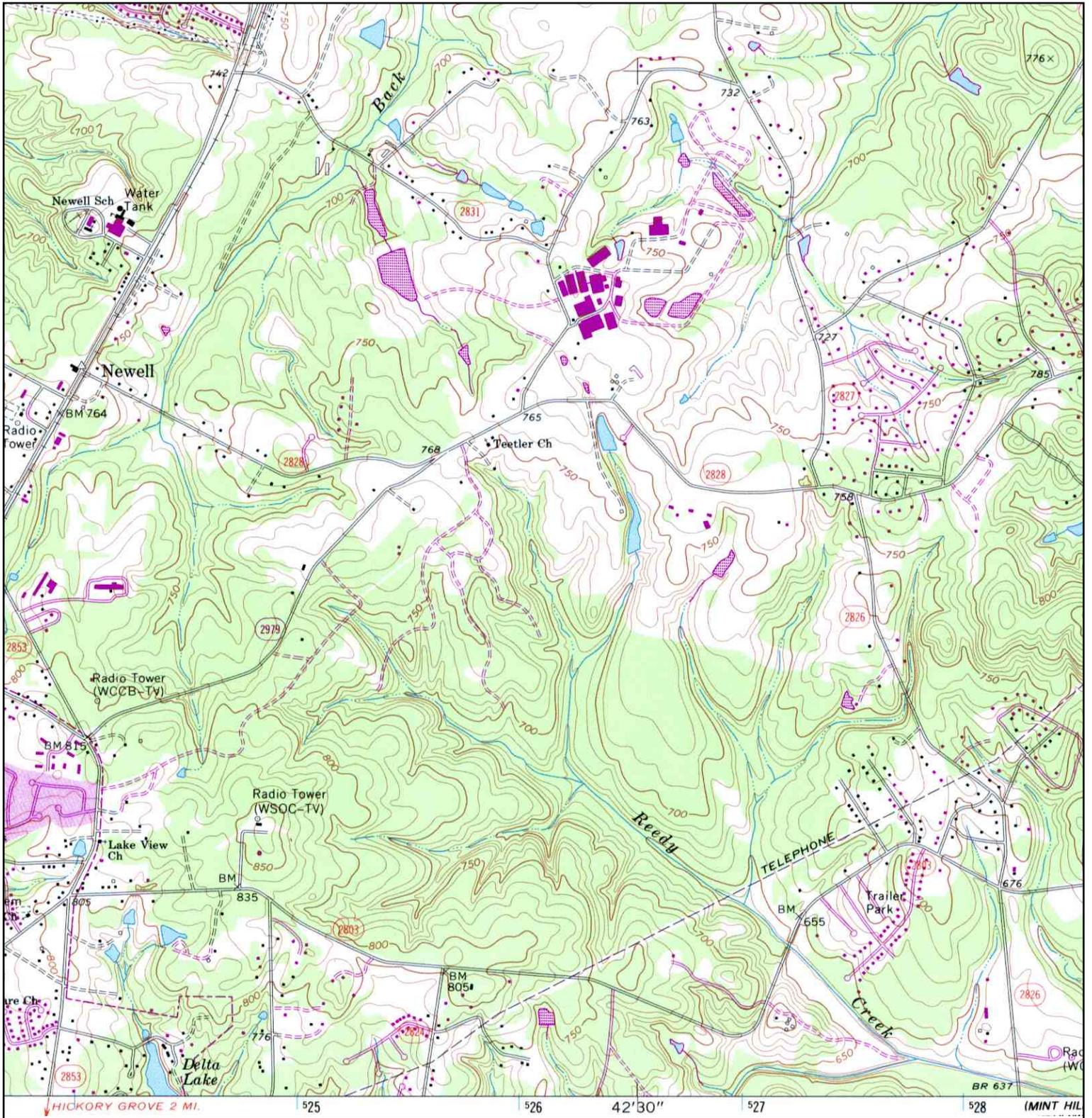
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	<b>NAME:</b> HARRISBURG	<b>ADDRESS:</b> 2900 Rock River Road Charlotte, NC 28215	<b>CONTACT:</b> Jason Diaz
	<b>MAP YEAR:</b> 1949	<b>LAT/LONG:</b> 35.267 / -80.7127	<b>INQUIRY#:</b> 3065686.4
	<b>SERIES:</b> 7.5		<b>RESEARCH DATE:</b> 05/11/2011
	<b>SCALE:</b> 1:24000		

# Historical Topographic Map



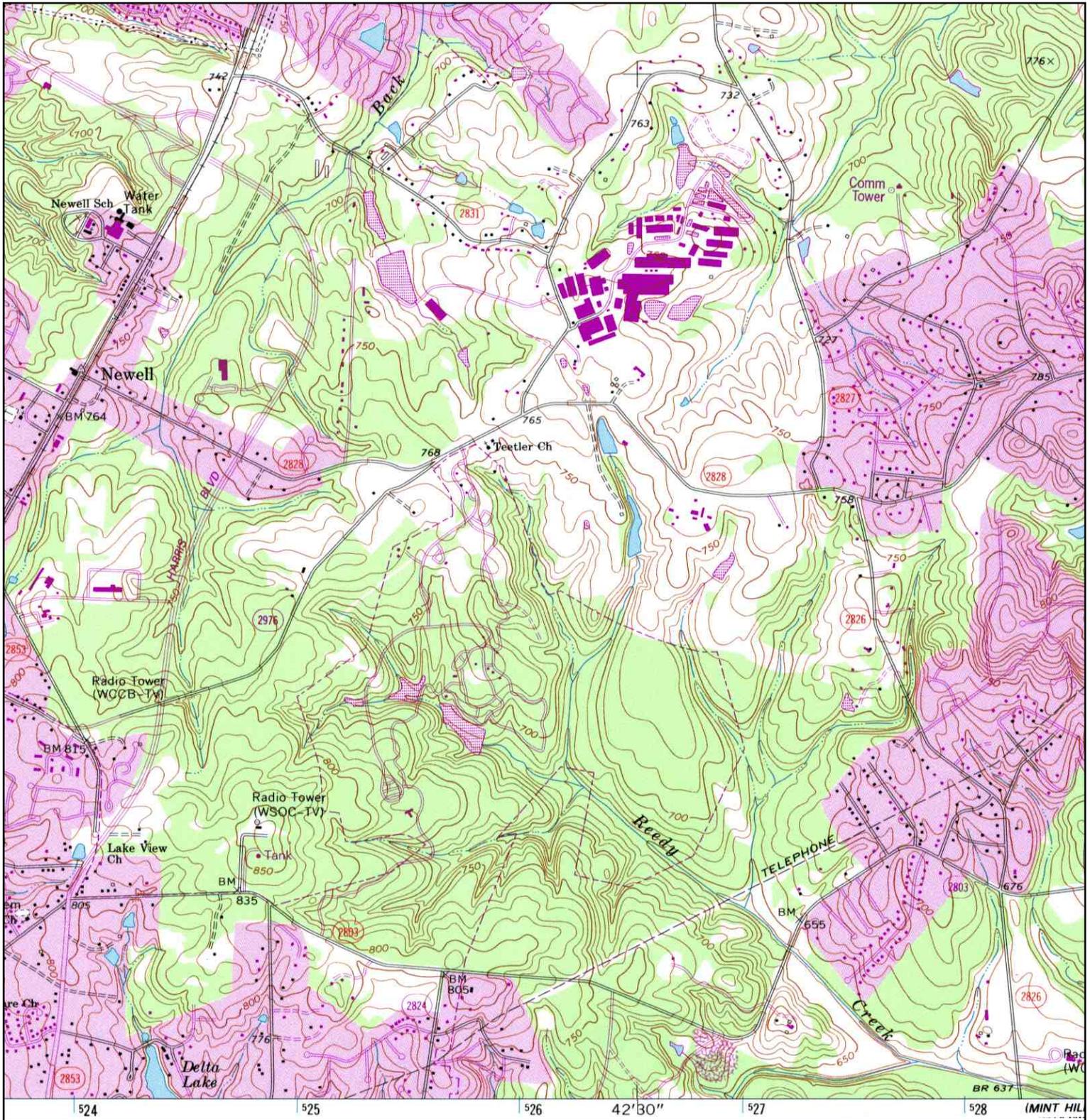
	<b>TARGET QUAD</b>	<b>SITE NAME:</b> Reedy Creek	<b>CLIENT:</b> Kimley Horn and Associates Inc.
	NAME: HARRISBURG	ADDRESS: 2900 Rock River Road	CONTACT: Jason Diaz
	MAP YEAR: 1969	Charlotte, NC 28215	INQUIRY#: 3065686.4
	SERIES: 7.5	LAT/LONG: 35.267 / -80.7127	RESEARCH DATE: 05/11/2011
	SCALE: 1:24000		

# Historical Topographic Map



<p>N ↑</p>	<b>TARGET QUAD</b>	<b>SITE NAME:</b> Reedy Creek	<b>CLIENT:</b> Kimley Horn and Associates Inc.
	NAME: HARRISBURG	<b>ADDRESS:</b> 2900 Rock River Road	<b>CONTACT:</b> Jason Diaz
	MAP YEAR: 1988	Charlotte, NC 28215	<b>INQUIRY#:</b> 3065686.4
	PHOTOREVISED: 1969	<b>LAT/LONG:</b> 35.267 / -80.7127	<b>RESEARCH DATE:</b> 05/11/2011
	SERIES: 7.5		
	SCALE: 1:24000		

# Historical Topographic Map



	<b>TARGET QUAD</b>	<b>SITE NAME:</b> Reedy Creek	<b>CLIENT:</b> Kimley Horn and Associates Inc.
	NAME: HARRISBURG	<b>ADDRESS:</b> 2900 Rock River Road	<b>CONTACT:</b> Jason Diaz
	MAP YEAR: 1993	Charlotte, NC 28215	<b>INQUIRY#:</b> 3065686.4
	SERIES: 7.5	<b>LAT/LONG:</b> 35.267 / -80.7127	<b>RESEARCH DATE:</b> 05/11/2011
	SCALE: 1:24000		



**Reedy Creek**

2900 Rock River Road  
Charlotte, NC 28215

Inquiry Number: 3065686.5  
May 12, 2011

## The EDR Aerial Photo Decade Package

# EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

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**Date EDR Searched Historical Sources:**

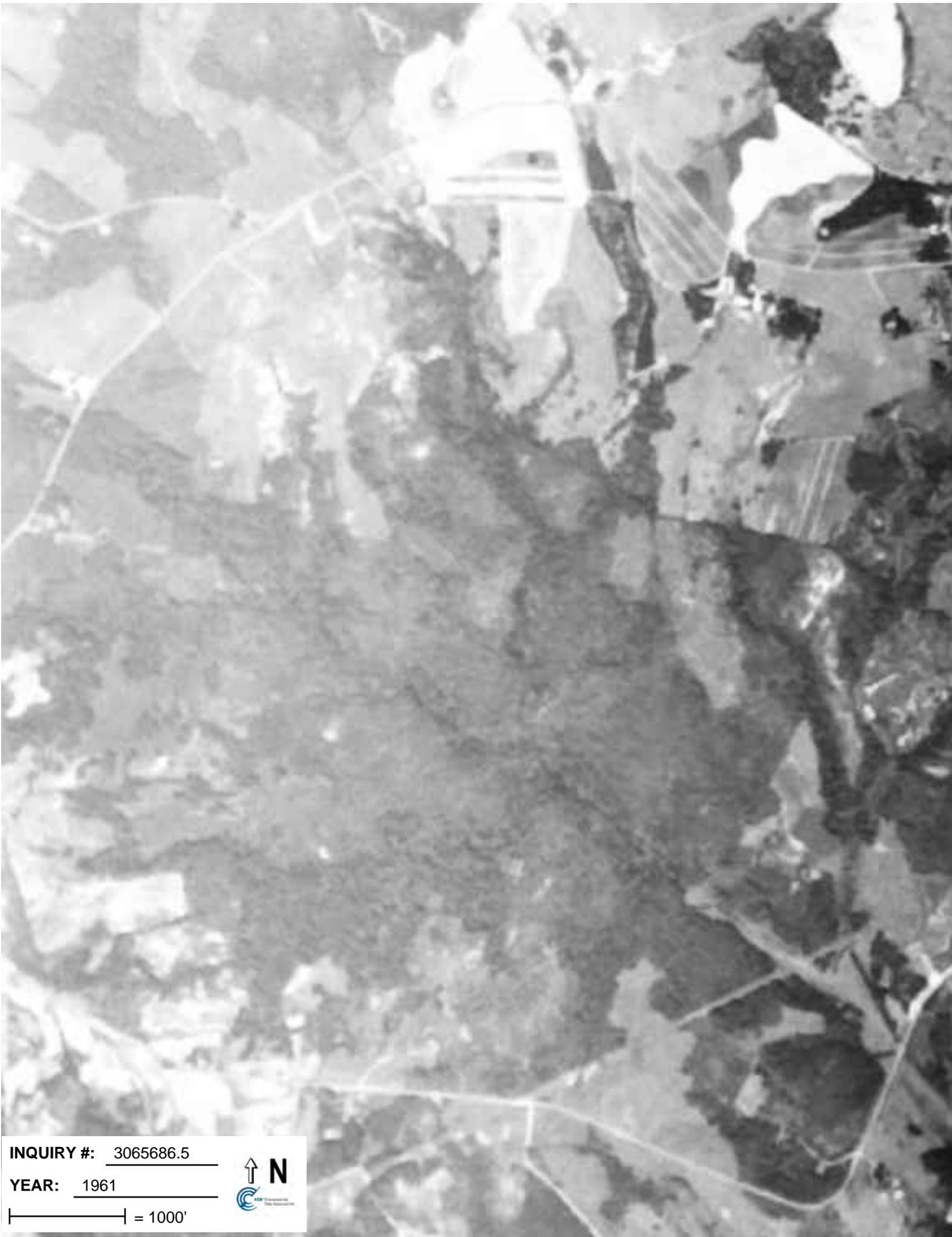
Aerial Photography May 12, 2011

**Target Property:**

2900 Rock River Road

Charlotte, NC 28215

<u>Year</u>	<u>Scale</u>	<u>Details</u>	<u>Source</u>
1961	Aerial Photograph. Scale: 1"=1000'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: August 16, 1961	EDR
1968	Aerial Photograph. Scale: 1"=500'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: February 17, 1968	EDR
1968	Aerial Photograph. Scale: 1"=500'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: February 17, 1968	EDR
1973	Aerial Photograph. Scale: 1"=750'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: November 19, 1973	EDR
1973	Aerial Photograph. Scale: 1"=750'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: November 19, 1973	EDR
1983	Aerial Photograph. Scale: 1"=1000'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: March 03, 1983	EDR
1988	Aerial Photograph. Scale: 1"=750'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: October 12, 1988	EDR
1988	Aerial Photograph. Scale: 1"=750'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: October 12, 1988	EDR
1996	Aerial Photograph. Scale: 1"=750'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: April 23, 1996	EDR
1996	Aerial Photograph. Scale: 1"=750'	Panel #: 35080-C6, Harrisburg, NC;/Flight Date: April 23, 1996	EDR



**INQUIRY #:** 3065686.5

**YEAR:** 1961

 = 1000'





INQUIRY #: 3065686.5

YEAR: 1968

| = 500'





INQUIRY #: 3065686.5

YEAR: 1968

| = 500'





**INQUIRY #:** 3065686.5

**YEAR:** 1973

| = 750'





INQUIRY #: 3065686.5

YEAR: 1973

| = 750'





**INQUIRY #:** 3065686.5  
**YEAR:** 1983  
| = 1000'





INQUIRY #: 3065686.5

YEAR: 1988

| = 750'





INQUIRY #: 3065686.5

YEAR: 1988

| = 750'





**INQUIRY #:** 3065686.5

**YEAR:** 1996

 = 750'





**INQUIRY #:** 3065686.5

**YEAR:** 1996

| = 750'



# Appendix 2



Photo 1: Reach 1 – Looking downstream.



Photo 2: Reach 1 –Left bank.

**Title** | Reach 1 Photographs



Prepared For:

**Project**

Reedy Creek Feasibility Study  
Charlotte, Mecklenburg County, North Carolina

**Date**  
5/23/12

**KHA Project Number**  
015016139

**Site Photo Page**  
1



Photo 3: Reach 2 – Looking downstream.



Photo 4: Reach 2 – Right bank.

**Title** | Reach 2 Photographs



Prepared For:

**Project**

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Charlotte, Mecklenburg County, North Carolina

**Date**  
5/23/12

**KHA Project Number**  
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2



Photo 5: Reach 3 – looking upstream



Photo 6: Reach 3 – Right bank

**Title** | Reach 3 Photographs



Prepared For:

**Project**

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Charlotte, Mecklenburg County, North Carolina

**Date**  
5/23/12

**KHA Project Number**  
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**Site Photo Page**  
3

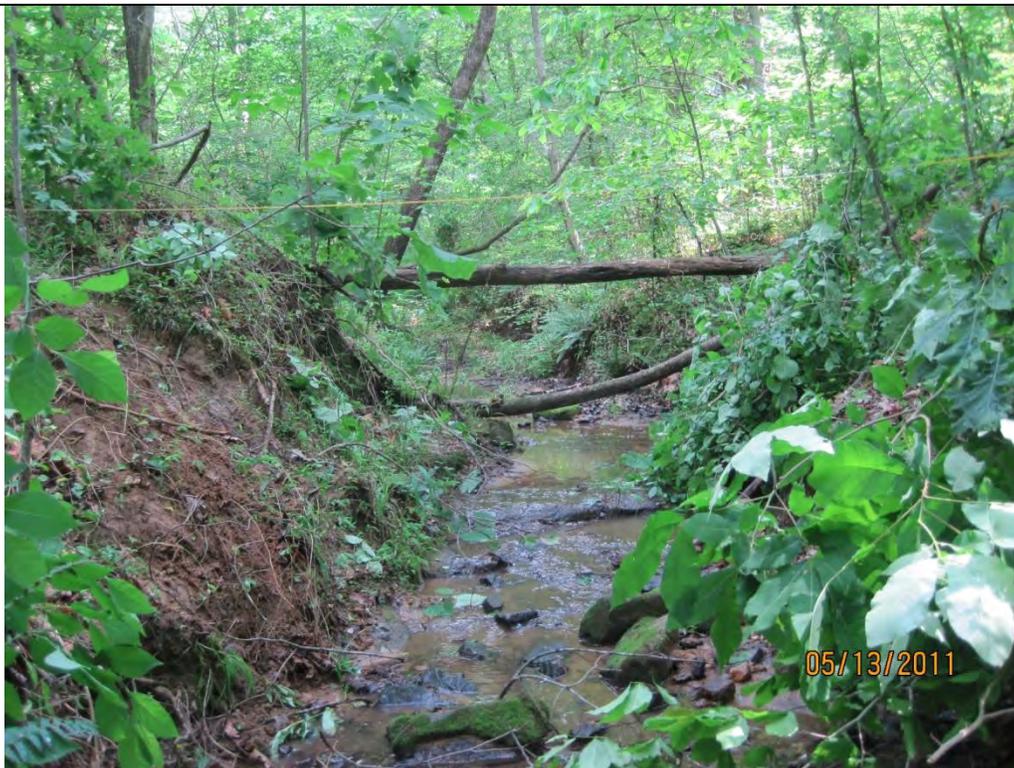


Photo 7: Reach 4 – Looking downstream



Photo 8: Reach 4 – Left bank.

**Title** | Reach 4 Photographs



Prepared For:

**Project**

Reedy Creek Feasibility Study  
Charlotte, Mecklenburg County, North Carolina

**Date**  
5/23/12

**KHA Project Number**  
015016139

**Site Photo Page**  
4



Photo 9: Reach 5 – Unstable degraded area looking upstream

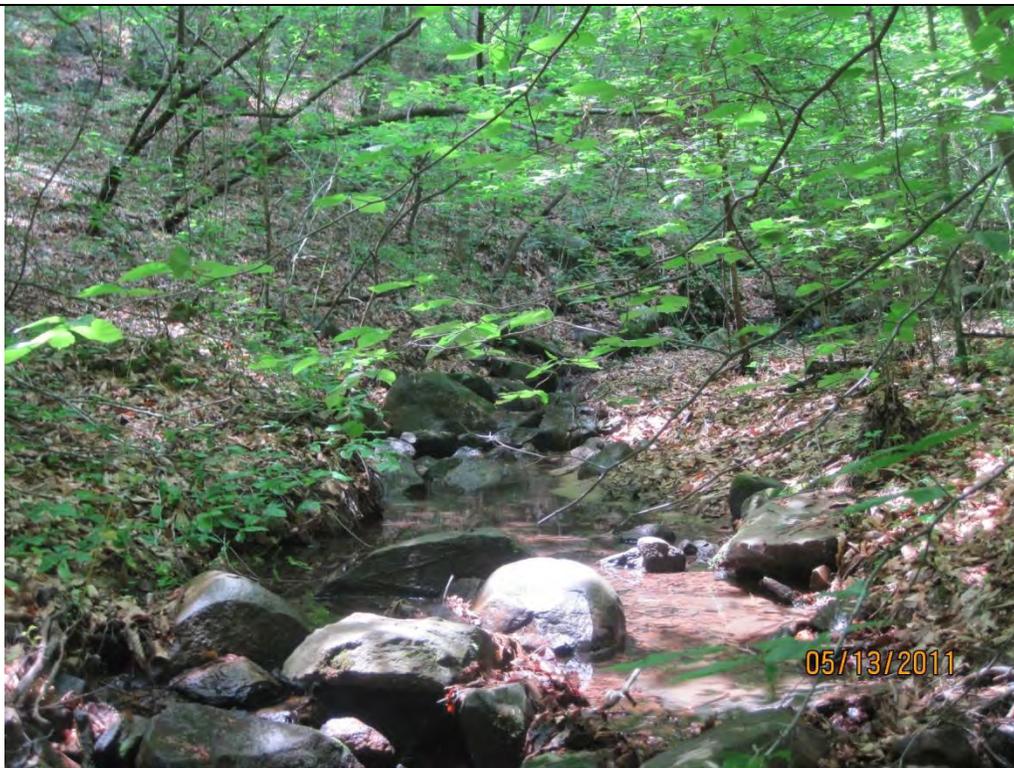


Photo 10: Reach 5 – Preservation area (Potential Reference)

**Title** | Reach 5 Photographs



Prepared For:

**Project**

Reedy Creek Feasibility Study  
Charlotte, Mecklenburg County, North Carolina

**Date**  
5/23/12

**KHA Project Number**  
015016139

**Site Photo Page**  
5



Photo 11: Reach 6 – Unstable degraded area looking downstream



Photo 12: Reach 7 – Unstable degraded area looking downstream

<b>Title</b>	Reach 6 & 7 Photographs		
Prepared For: 	<b>Project</b>	Reedy Creek Feasibility Study Charlotte, Mecklenburg County, North Carolina	
	<b>Date</b>	<b>KHA Project Number</b>	<b>Site Photo Page</b>
	5/23/12	015016139	6



Photo 13: Reach 8 – Unstable degraded area looking downstream



Photo 14: Reach 9 – Unstable degraded area looking downstream

<b>Title</b>	Reach 8 & 9 Photographs		
	<b>Project</b>	Reedy Creek Feasibility Study Charlotte, Mecklenburg County, North Carolina	
	<b>Date</b>	<b>KHA Project Number</b>	<b>Site Photo Page</b>
	5/23/12	015016139	7



Photo 15: Reach 10 – Unstable degraded area looking downstream



Photo 16: Reach 11 – Unstable degraded area looking downstream

**Title** | Reach 10 & 11 Photographs



Prepared For:

**Project**

Reedy Creek Feasibility Study  
Charlotte, Mecklenburg County, North Carolina

**Date**  
5/23/12

**KHA Project Number**  
015016139

**Site Photo Page**  
8



Photo 15: Reach 6 – Stable area above headcut.

<b>Title</b>	Reach 6 Photographs		
Prepared For: 	<b>Project</b>	Reedy Creek Feasibility Study Charlotte, Mecklenburg County, North Carolina	
	<b>Date</b>	<b>KHA Project Number</b>	<b>Site Photo Page</b>
	5/23/12	015016139	9

# Appendix 3

PRELIMINARY MORPHOLOGICAL DATA

Reedy Creek Stream Restoration Feasibility  
Charlotte, North Carolina

VARIABLES (All units are in Feet)	REACH 1 (Existing)		REACH 1 (Design)		NC Piedmont Regional Curves (REACH 1)		REACH 2 (Existing)		REACH 2 (Design)		NC Piedmont Regional Curves (REACH 2)		REACH 3 (Existing)		REACH 3 (Design)		NC Piedmont Regional Curves (REACH 3)		REACH 4 (Existing)		REACH 4 (Design)		NC Piedmont Regional Curves (REACH 4)		Edwards Branch Reference Reach		NORTH MUDDY CREEK - UT4 Reference Reach		Rosgen C4 Reference Reach Data Average Values					
	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Min	Max				
1 Stream Type (Rosgen)	F5		C5		--		F6		C5		--		F5		C5		--		G5		C5		--		C4B4c		B4		C4					
2 Drainage Area (Square miles)	0.58		0.58		0.58		0.52		0.52		0.52		0.26		0.26		0.26		0.17		0.17		0.17		0.20		0.12		--					
3 Bankfull Width (W <sub>bf</sub> )	16.9		16.2		9.4   20.4		12.0		16.2		9.0   19.7		11.4		11.8		6.7   15.6		5.8		10.2		5.5   13.6		16.8		4.9		--					
4 Bankfull Mean Depth (d <sub>bf</sub> )	0.9		0.9		1.3   2.0		1.0		0.9		1.2   2.0		0.8		0.8		1.0   1.6		0.9		0.7		0.9   1.4		1.0		0.4		--					
5 Width/Depth Ratio (W <sub>bf</sub> /d <sub>bf</sub> )	19.4		17.8		7.5   10.0		12.2		17.8		7.4   10.0		13.8		15.7		6.8   10.0		6.6		15.7		6.5   10.0		16.5		12.2		12.0   18.0					
6 Bankfull Cross-Sectional Area (A <sub>bf</sub> )	14.7		14.8		14.8   42.3		11.9		14.8		13.7   39.4		9.5		8.9		8.6   25.1		5.1		6.6		6.4   19.1		17.1		1.9		--					
7 Bankfull Mean Velocity, ft/s (V <sub>bf</sub> )	3.9		3.9		4.1   5.1		4.7		3.8		4.0   5.2		4.3		4.7		3.9   5.2		4.7		3.7		3.9   5.3		3.8		10.2		--					
8 Bankfull Discharge <sup>1</sup> cfs (Q <sub>bf</sub> )	57.0		57.0		60.2   217.7		55.8		55.8		55.6   203.2		41.3		41.3		33.8   131.3		24.3		24.3		24.9   100.5		65.8		19.3		--					
9 Bankfull Maximum Depth (d <sub>bfm</sub> )	1.2		1.5		--		1.6		1.5		--		1.6		1.3		--		1.1		1.1		--		2.2		0.5		--					
10 Max d <sub>bfm</sub> /d <sub>bf</sub> ratio	1.3		1.6		--		1.6		1.6		--		1.9		1.7		--		1.3		1.7		--		2.2		1.2		1.2   1.5					
11 Low Bank Height to Max Bankfull d <sub>bf</sub> ratio	7.8		1.0   1.0		--		4.2		1.0   1.0		--		4.4		1.0   1.0		--		5.2		1.0   1.0		--		1.0		1.2		--					
12 Width of Flood Prone Area (W <sub>fp</sub> )	19.3		35.0		40.0		14.4		35.0		40.0		15.9		26.0		30.0		8.1		22.0		25.0		38.5		8.8		--					
13 Entrenchment Ratio (W <sub>bf</sub> /W <sub>fp</sub> )	1.1		2.2		2.5		1.2		2.2		2.5		1.4		2.2		2.5		1.4		2.2		2.5		2.3		1.8		--					
14 Meander Length (L <sub>m</sub> )	101.7   146.8		97.2		194.4		98.3   125.7		97.2		194.4		17.6   39.8		70.8		141.6		10.3		29.3		61.2   122.4		168.0		36.4		52.1		--			
15 Ratio of Meander Length to Bankfull Width (L <sub>m</sub> /W <sub>bf</sub> )	6.0   8.7		6.0		12.0		8.2   10.4		6.0		12.0		1.5   3.5		6.0		12.0		1.8		5.0		6.0   12.0		10.0		7.5		10.7   14.0					
16 Radius of Curvature (R <sub>c</sub> )	14.2		36.6		40.5   56.7		10.3		47.2		40.5   56.7		9.4		36.3		29.5   41.3		0.9		2.3		25.5   35.7		50.0		60.0		4.0   10.0		--			
17 Ratio of Radius of Curvature to Bankfull Width (R <sub>c</sub> /W <sub>bf</sub> )	0.8		2.2		3.5		0.9		3.9		2.5   3.5		0.8		3.2		2.5   3.5		0.2		0.4		2.5   3.5		3.0		3.6		0.8   2.1		2.5   3.0			
18 Belt Width (W <sub>b</sub> )	20.8		41.2		16.2   71.3		11.9		24.8		16.2   71.3		11.4		24.6		11.8   51.9		9.2		43.5		10.2   44.9		120.0		17.6		20.4		--			
19 Belt Width Ratio (W <sub>b</sub> /W <sub>bf</sub> )	1.2		2.4		1.0   4.4		1.0		2.1		1.0   4.4		1.0		2.1		1.0   4.4		1.6		7.4		1.0   4.4		7.1		3.6		4.2		--			
20 Sinuosity (k) (Stream Length / Valley Length)	1.02		1.05		--		1.03		1.10		--		1.02		1.05		--		1.07		1.10		--		1.10		1.5		--					
21 Valley Slope (S <sub>valley</sub> ) (ft/ft)	0.0050		0.0050		--		0.0155		0.0155		--		0.0152		0.0152		--		0.0120		0.0120		--		0.0053		0.0300		--					
22 Average Stream Slope (S <sub>avg</sub> ) (ft/ft)	0.0049		0.0048		--		0.0151		0.0141		--		0.0149		0.0145		--		0.0112		0.0109		--		0.0048		0.0200		--					
23 Riffle Slope (S <sub>rf</sub> )	0.0053		0.0152		--		0.0339		0.0645		--		0.0263		0.0549		--		0.0113		0.0274		--		0.0014		0.0115		0.0330		0.0510		--	
24 Ratio of Riffle Slope to Avg. Slope (S <sub>rf</sub> /S <sub>avg</sub> )	1.1		3.1		--		2.2		4.3		--		1.8		3.7		--		1.0		2.4		--		0.3		2.4		1.7		2.6		1.5   2.0	
25 Pool Slope (S <sub>pool</sub> )	0.0000		0.0024		--		0.0003		0.0010		--		0.0000		0.0009		--		0.0000		0.0049		--		0.0002		0.0013		0.0000		0.0130		--	
26 Ratio of Pool Slope to Avg. Slope (S <sub>pool</sub> /S <sub>avg</sub> )	0.0		0.5		--		0.0		0.1		--		0.0		0.1		--		0.0		0.4		--		0.1		0.3		0.0		0.7		0.2   0.3	
27 Maximum Pool Depth (D <sub>pool</sub> )	2.1		--		--		2.5		--		--		2.4		--		--		1.3		--		--		3.9		0.8		1.1		--			
28 Ratio of Pool Depth to Bkf Depth (D <sub>pool</sub> /d <sub>bf</sub> )	2.4		--		--		2.5		--		--		2.9		--		--		1.4		--		--		3.8		2.1		2.8		2.5   3.5			
29 Pool Width (W <sub>pool</sub> )	13.0		--		--		12.9		--		--		10.7		--		--		6.3		--		--		17.6		5.2		--		--			
30 Ratio of Pool Width to Bankfull Width (W <sub>pool</sub> /W <sub>bf</sub> )	0.8		--		--		1.1		--		--		0.9		--		--		1.1		--		--		1.1		1.1		1.3		1.7			
31 Pool Area (A <sub>pool</sub> )	15.3		--		--		23.7		--		--		13.0		--		--		5.3		--		--		30.8		3.9		--		--			
32 Ratio of Pool Area to Bankfull Area (A <sub>pool</sub> /A <sub>bf</sub> )	1.0		--		--		2.0		--		--		1.4		--		--		1.0		--		--		1.8		2.1		--		--			
33 Pool to Pool Spacing (p-p)	29.3		94.6		32.4   81.0		46.3		96.7		32.4   81.0		20.8		58.8		23.6   59.0		18.3		49.7		20.4   51.0		46.1		98.7		39.8   45.8		--			
34 Ratio of Pool to Pool Spacing to Bankfull Width (p-p/W <sub>bf</sub> )	1.7		5.6		2.0   5.0		3.8		8.0		2.0   5.0		1.8		5.1		2.0   5.0		3.1		8.5		2.0   5.0		2.7		5.9		8.2		9.4		5.0   7.0	

<sup>1</sup> Historically straightened and ditched channel

<sup>2</sup> Based on The River Field Book, Rosgen Stream type and Associated Manning's "n" Coefficient and Relative Roughness / Friction Factor

<sup>3</sup> Most of the observed reaches were highly degraded and lacked defined riffle and pool features.

<sup>4</sup> Dimension data only because the dimension was locally stable due to bedrock control and/or healthy riparian areas.

<sup>5</sup> Note that Wid ratios can vary by +/- 2.0 units

# Appendix 4



4340-H Taggart Creek Road  
 Charlotte, NC 28208  
 Phone: (704) 676-0778  
 Fax: (704) 676-0596

### SOIL TEST BORING RECORD

**BORING NO.: B-1**

GSE\*: 100.0

(Cut)/Fill: 0

FG: 100.0

**AT GRADE**

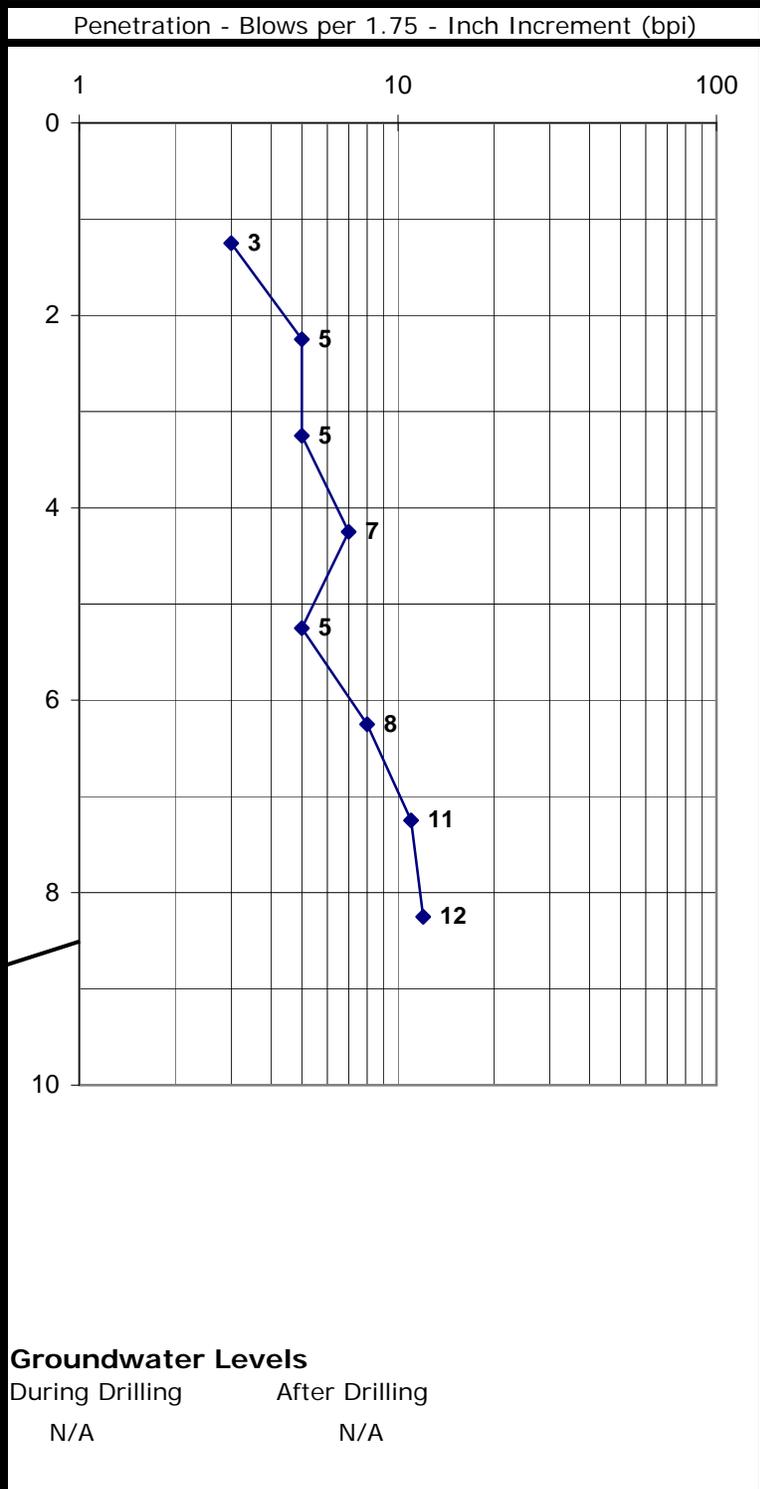
#### PROJECT INFORMATION

#### DRILLING INFORMATION

PROJECT: **Reedy Creek Park Stream Restoration**  
 SITE LOCATION: **Charlotte, NC**  
 BOYLE JOB NO.: **11-003**  
 DATE DRILLED: **5/13/2011**

DRILL RIG.:  
 DRILLING METHOD: **Hand-Auger**  
 SAMPLING METHODS: **ASTM STP-399**  
 HAMMER WT./DROP: **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 4 Inches	0.0	100.0
<b>RESIDUUM</b> - Soft yellowish-brown and gray silty sandy CLAY (CL), rootlets, moist	0.3	99.7
-----	-----	-----
Firm gray and reddish-brown clayey SILT (ML), fine sand, rootlets, moist	2.0	98.0
-----	-----	-----
Firm yellowish-red clayey SILT (ML), moist	4.0	96.0
-----	-----	-----
Loose to medium dense yellowish-red and gray clayey fine SAND (SC)	6.0	94.0
-----	-----	-----
Stiff yellowish-brown and gray sandy CLAY (CL), ferrous staining	8.0	92.0
Boring terminated due to auger refusal in hard clayey soils at 8.5 feet.	8.5	91.5





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**SOIL TEST  
 BORING RECORD**

**BORING NO.: B-2**

GSE\*: 100.0

(Cut)/Fill: 0

FG: 100.0

**AT GRADE**

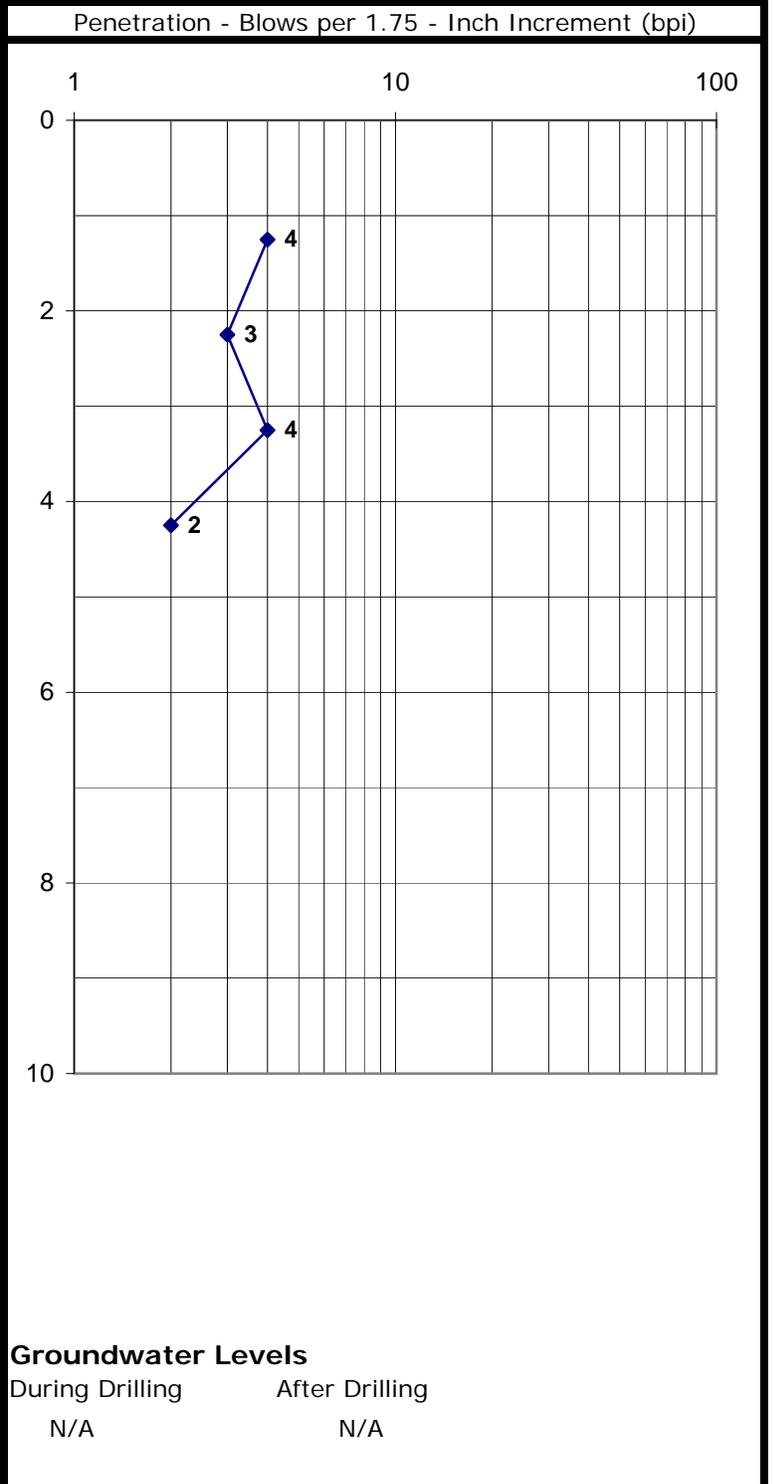
**PROJECT INFORMATION**

**DRILLING INFORMATION**

PROJECT: **Reedy Creek Park Stream Restoration**  
 SITE LOCATION: **Charlotte, NC**  
 BOYLE JOB NO.: **11-003**  
 DATE DRILLED: **5/13/2011**

DRILL RIG.:  
 DRILLING METHOD: **Hand-Auger**  
 SAMPLING METHODS: **ASTM STP-399**  
 HAMMER WT./DROP: **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 6 Inches	0.0	100.0
<b>RESIDUUM</b> - Soft yellowish-brown clayey SILT (ML), rootlets	0.5	99.5
----- Soft brown sandy SILT (ML), moist	3.0	97.0
Boring terminated due to auger refusal in hard silty soils at 4.5 feet.	4.5	95.5





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**SOIL TEST  
 BORING RECORD**

**BORING NO.: B-3**

GSE\*: 100.0

(Cut)/Fill: 0

FG: 100.0

**AT GRADE**

**PROJECT INFORMATION**

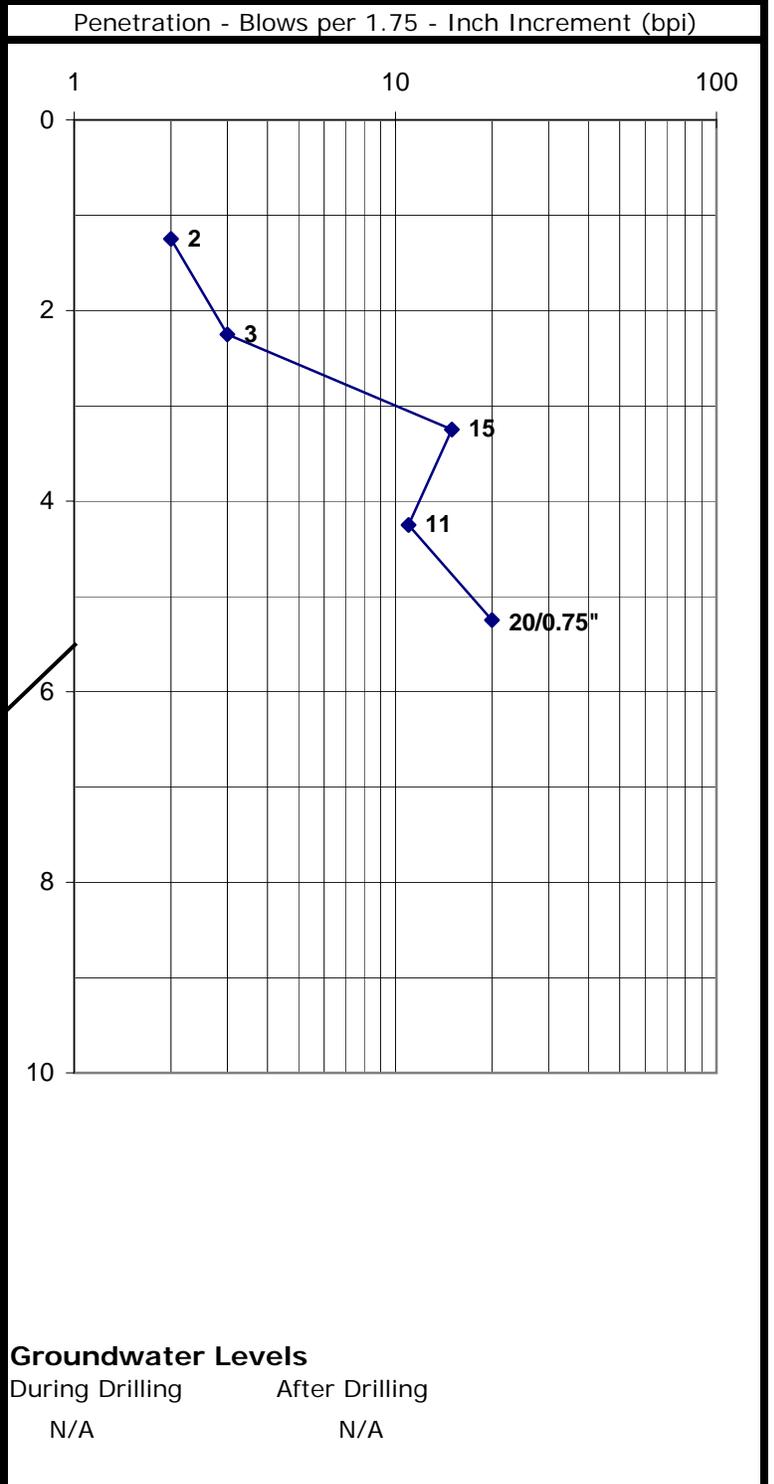
**DRILLING INFORMATION**

PROJECT: **Reedy Creek Park Stream Restoration**  
 SITE LOCATION: **Charlotte, NC**  
 BOYLE JOB NO.: **11-003**  
 DATE DRILLED: **5/13/2011**

DRILL RIG.:  
 DRILLING METHOD: **Hand-Auger**  
 SAMPLING METHODS: **ASTM STP-399**  
 HAMMER WT./DROP **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 6 Inches	0.0	100.0
<b>RESIDUUM</b> - Soft yellowish-red clayey SILT (ML), rootlets, moist	0.5	99.5
Stiff <sup>(1)</sup> dark brown clayey SILT (ML), fine sand, ferrous staining, rock fragments	3.0	97.0
Medium dense grayish-brown clayey fine SAND (SC)	4.0	96.0
Medium dense light brownish-gray fine to medium SAND (SW-SP)	5.0	95.0
Boring terminated due to auger refusal in dense sandy soils at 5.5 feet.	5.5	94.5

(1) Blow count most likely inflated by presence of rock fragments in soil





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**SOIL TEST  
 BORING RECORD**

**BORING NO.: B-4**

GSE\*: 100.0

(Cut)/Fill: 0

FG: 100.0

**AT GRADE**

**PROJECT INFORMATION**

**DRILLING INFORMATION**

PROJECT: **Reedy Creek Park Stream Restoration**  
 SITE LOCATION: **Charlotte, NC**  
 BOYLE JOB NO.: **11-003**  
 DATE DRILLED: **5/13/2011**

DRILL RIG.:  
 DRILLING METHOD: **Hand-Auger**  
 SAMPLING METHODS: **ASTM STP-399**  
 HAMMER WT./DROP: **15 lb., 20 in.**

Description	Depth	Elevation	Penetration - Blows per 1.75 - Inch Increment (bpi)
Topsoil - 6 Inches	0.0	100.0	
<b>RESIDUUM</b> - Firm yellowish-red clayey sandy SILT (ML), rootlets, moist	0.5	99.5	
Firm to stiff reddish-brown clayey sandy SILT (ML), ferrous staining, moist	3.0	97.0	
Medium dense dark gray slightly silty fine SAND (SP)	4.5	95.5	
Medium dense light grayish-brown fine to medium SAND (SW-SP)	5.0	95.0	
Boring terminated due to auger refusal in dense sandy soils at 5.5 feet.	5.5	94.5	

**Groundwater Levels**  
 During Drilling: N/A  
 After Drilling: N/A



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**SOIL TEST  
 BORING RECORD**

**BORING NO.: B-5**

GSE\*: 100.0

(Cut)/Fill: 0

FG: 100.0

**AT GRADE**

**PROJECT INFORMATION**

**DRILLING INFORMATION**

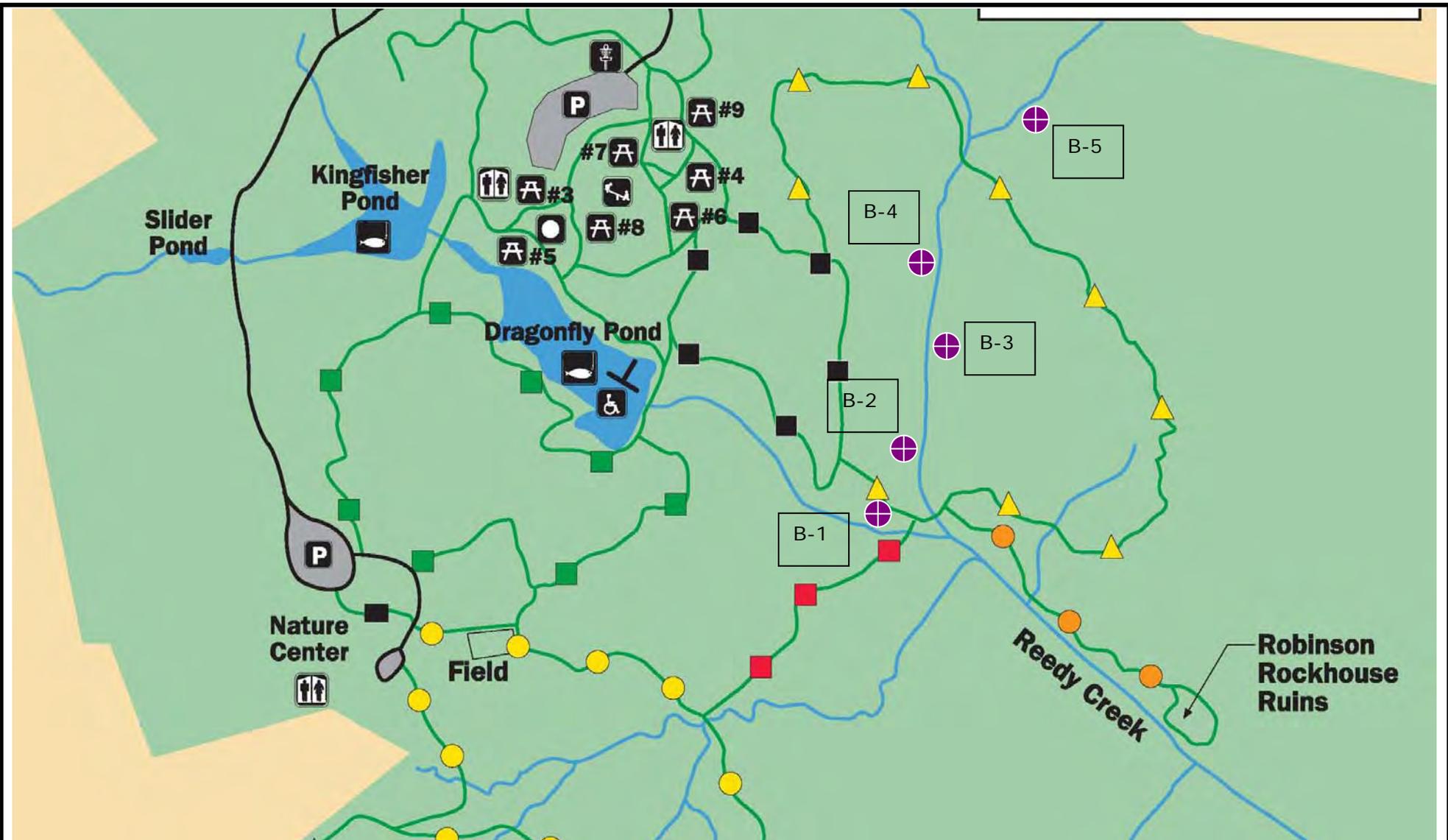
PROJECT: **Reedy Creek Park Stream Restoration**  
 SITE LOCATION: **Charlotte, NC**  
 BOYLE JOB NO.: **11-003**  
 DATE DRILLED: **5/13/2011**

DRILL RIG.:  
 DRILLING METHOD: **Hand-Auger**  
 SAMPLING METHODS: **ASTM STP-399**  
 HAMMER WT./DROP **15 lb., 20 in.**

Description	Depth	Elevation	Penetration - Blows per 1.75 - Inch Increment (bpi)
Topsoil - 6 Inches	0.0	100.0	
<b>RESIDUUM</b> - Soft yellowish-red clayey SILT (ML), rootlets, moist	0.5	99.5	
Stiff to firm brown slightly sandy clayey SILT (ML), moist	3.0	97.0	
Firm reddish-brown and gray clayey SILT (ML), fine sand, ferrous staining, moist	5.0	95.0	
Loose grayish-brown clayey fine SAND (SC), rock fragments, moist	6.0	94.0	
	6.5	93.5	

**Groundwater Levels**  
 During Drilling: N/A  
 After Drilling: N/A



**Legend**

 **B-x** Approximate Location of Soil Test Boring (B-x)

Ref: Boring location plan prepared from 2005 Trail Map of Reedy Creek Park, Mecklenburg Co., NC

NORTH



**BOYLE CONSULTING ENGINEERS, PLLC**  
*Development & Construction Project Services*

Boring Location Plan  
 Reedy Creek Park  
 Stream Restoration  
 Charlotte, North Carolina  
 BOYLE Project No. 11-003

Date: 5/19/11

Drawn By: MR

Scale: NTS

Figure 1

Reedy Creek Park Stream Restoration  
 BOYLE Project No. 11-003

<b>Boring No.</b>	<b>Depths (feet)</b>	<b>Munsell colors (Hue, Value, Chroma)</b>
B-1	0.3-2	10YR 5/1, 10YR 5/6
	2-4	10YR 5/1, 2.5YR 4/4
	4-6	5YR 4/6
	6-8	5YR 4/6, 5Y 6/1
	8-8.5	10YR 5/6, 5Y 6/1
B-2	0.5-3	5YR 4/6
	3-4.5	7.5YR 5/3
B-3	0.5-3	5YR 4/6
	3-4	7.5YR 3/3
	4-5	2.5Y 5/2
	5-5.5	2.5Y 6/2
B-4	0.5-3	5YR 4/6
	3-4.5	5YR 4/4
	4.5-5	7.5YR 4/1
	5-5.5	2.5Y 6/2
B-5	0.5-3	5YR 4/6
	3-5	7.5YR 4/3
	5-6	5YR 4/3, 2.5Y 5/1
	6-6.5	2.5Y 5/2

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria			
Coarse-Grained Soils (More than half of the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieves size)	Clean Gravels (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3		
		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW			
		Gravels with fines	GM <sup>a</sup>	d	Silty Gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4  Atterberg limits below "A" line with P.I. greater than 7	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u			
	GC	Clayey Gravels, gravel-sand-clay mixtures		$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3			
		Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean Sands (Little or no fines)		SW	Well-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
	SP		Poorly graded sands, gravelly sands, little or no fines				
	Sands with fines		SM <sup>a</sup>	d	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4  Atterberg limits below "A" line with P.I. greater than	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
		u					
	SC	Clayey sands, sand-clay mixtures					
Fine-Grained Soils (More than half of material is smaller than No. 200 sieve)	Silts and Clays (Liquid Limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity				
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		OL	Organic silts and organic silty clays of low plasticity				
	Silts and Clays (Liquid Limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts				
		CH	Inorganic clays of high plasticity, fat clays (i.e. Bull Tallow)				
		OH	Organic clays of medium to high plasticity, organic silts				
	Highly Organic Soils	Pt	Peat and other highly organic soils				

Determine percentages of sand and gravel from grain size curve  
 Depending on the percentage of the fines (fraction smaller than No. 200 sieve size),  
 Coarse grained soils are classified as follows:  
 Less than 5% GW, GP, SW, SP  
 More than 12% GM, GC, SM, SC  
 Borderline cases requiring dual symbols<sup>b</sup>  
 5 to 12%

Reference: Winterkorn & Fang, 1975 (ASTM D-2487)

<sup>a</sup>Division of GM and SM groups into subdivision of d and u are for road and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u is used when L.L. is greater than 28.

<sup>b</sup>Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.



## Unified Soil Classification System

# REFERENCE NOTES FOR SOIL TEST BORING RECORDS

## I. Drilling and Sampling Symbols:

SS:	Split Spoon Sampler	GSE:	Ground Surface Elevation
ST:	Shelby Tube Sampler	PG:	Proposed Grade
RC:	Rock Core; NX, BX, AX	BS:	Bulk Sample of Cuttings
NQ:	Rock Core, 2-1/16" Diameter	PA:	Power Auger (no sample)
PM:	Pressuremeter	HSA:	Hollow Stem Auger
DC:	Dutch Cone Penetrometer	WS:	Wash Sample
REC:	Recovery of Core Run (%)	RQD:	Rock Quality of Core Run

Standard Penetration (Blows/Ft) refers to the blows per foot of a 140 lb hammer falling 30 inches on a 2 inch O.D. split spoon sample, as specified in ASTM D-1586. The blow count is commonly referred to as the N value. Autohammer refers to an automatic hammer as opposed to the manual "Cathead" and rope type. Core Drilling meets ASTM D-2113

## II. Correlation of Penetration Resistances to Soil Properties:

### Relative Density of Cohesionless Soils

<u>SPT-N</u>	<u>Relative Density</u>
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
51 or more	Very Dense

### Consistency of Cohesive Soils

<u>SPT-N</u>	<u>Consistency</u>
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
31 or more	Hard

## III. Unified Soil Classification Symbols:

GP:	Poorly Graded Gravel	ML:	Low Plasticity Silts
GW:	Well Graded Gravel	MH:	High Plasticity Silts
GM:	Silty Gravel	CL:	Low Plasticity Clays
GC:	Clayey Gravel	CH:	High Plasticity Clays
SP:	Poorly Graded Sands	OL:	Low Plasticity Organics
SW:	Well Graded Sands	OH:	High Plasticity Organics
SM:	Silty Sands	CL-ML:	Dual Classification (Typical)
SC:	Clayey Sands		

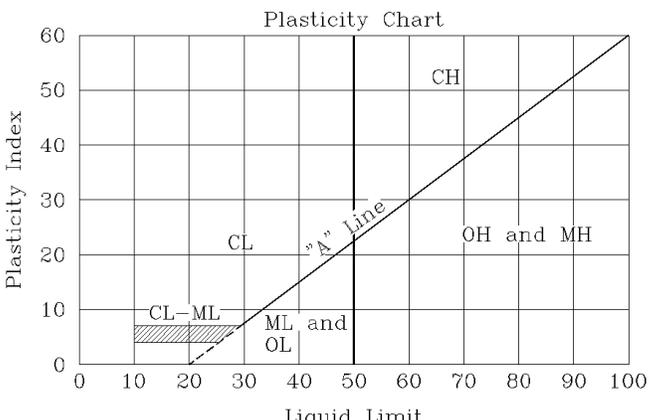
## IV. Water Level Measurement Symbols:

	WL: Water Level
	WL: While Sampling
	WD: While Drilling

DCD: Dry Caved Depth

WCD: Wet Caved Depth

The water levels are those water levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clays and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria		
Coarse-Grained Soils (More than half of the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieves size)	Clean Gravels (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3	
		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW		
		Gravels with fines	GM <sup>a</sup>	d	Silty Gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4  Atterberg limits below "A" line with P.I. greater than 7
				u		
	GC	Clayey Gravels, gravel-sand-clay mixtures	Determine percentages of sand and gravel from grain size curve Depending on the percentage of the fines (fraction smaller than No. 200 sieve size), Coarse grained soils are classified as follows: Less than 5% GW, GP, SW, SP More than 12% GM, GC, SM, SC Borderline cases requiring dual symbols <sup>b</sup> 5 to 12%			
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean Sands (Little or no fines)		SW	Well-graded sands, gravelly sands, little or no fines	$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3
				SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines		SM <sup>a</sup>	d	Silty sands, sand-silt mixtures
	u				Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols	
	SC	Clayey sands, sand-clay mixtures				
Fine-Grained Soils (More than half of material is smaller than No. 200 sieve)	Silts and Clays (Liquid Limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity			
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
		OL	Organic silts and organic silty clays of low plasticity			
	Silts and Clays (Liquid Limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
		CH	Inorganic clays of high plasticity, fat clays (i.e. Bull Tallow)			
		OH	Organic clays of medium to high plasticity, organic silts			
	Highly Organic Soils	Pt	Peat and other highly organic soils			

<sup>a</sup>Division of GM and SM groups into subdivision of d and u are for road and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u is used when L.L. is greater than 28.

<sup>b</sup>Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.



## Unified Soil Classification System

# REFERENCE NOTES FOR SOIL TEST BORING RECORDS

## I. Drilling and Sampling Symbols:

SS:	Split Spoon Sampler	GSE:	Ground Surface Elevation
ST:	Shelby Tube Sampler	PG:	Proposed Grade
RC:	Rock Core; NX, BX, AX	BS:	Bulk Sample of Cuttings
NQ:	Rock Core, 2-1/16" Diameter	PA:	Power Auger (no sample)
PM:	Pressuremeter	HSA:	Hollow Stem Auger
DC:	Dutch Cone Penetrometer	WS:	Wash Sample
REC:	Recovery of Core Run (%)	RQD:	Rock Quality of Core Run

Standard Penetration (Blows/Ft) refers to the blows per foot of a 140 lb hammer falling 30 inches on a 2 inch O.D. split spoon sample, as specified in ASTM D-1586. The blow count is commonly referred to as the N value. Autohammer refers to an automatic hammer as opposed to the manual "Cathead" and rope type. Core Drilling meets ASTM D-2113

## II. Correlation of Penetration Resistances to Soil Properties:

### Relative Density of Cohesionless Soils

<u>SPT-N</u>	<u>Relative Density</u>
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
51 or more	Very Dense

### Consistency of Cohesive Soils

<u>SPT-N</u>	<u>Consistency</u>
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
31 or more	Hard

## III. Unified Soil Classification Symbols:

GP:	Poorly Graded Gravel	ML:	Low Plasticity Silts
GW:	Well Graded Gravel	MH:	High Plasticity Silts
GM:	Silty Gravel	CL:	Low Plasticity Clays
GC:	Clayey Gravel	CH:	High Plasticity Clays
SP:	Poorly Graded Sands	OL:	Low Plasticity Organics
SW:	Well Graded Sands	OH:	High Plasticity Organics
SM:	Silty Sands	CL-ML:	Dual Classification (Typical)
SC:	Clayey Sands		

## IV. Water Level Measurement Symbols:

	WL: Water Level
	WL: While Sampling
	WD: While Drilling

DCD: Dry Caved Depth

WCD: Wet Caved Depth

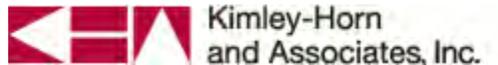
The water levels are those water levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clays and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

# Appendix 5

**REEDY CREEK FEASIBILITY STUDY  
REEDY CREEK STREAM RESTORATION BENTHIC  
MACROINVERTABRATE MONITORING AND WATER QUALITY  
SAMPLING SUMMARY REPORT**

**S&ME Project Nos. 1357-11-011 & 1357-12-009  
Individual Project Order Nos. 015016139-1 & 015016139-4**

Prepared for:



2000 South Boulevard, Suite 440  
Charlotte, North Carolina 28203

Prepared by:



Charlotte, North Carolina

June 5, 2012



June 5, 2012

Kimley-Horn and Associates, Inc.  
2000 South Blvd.  
Suite 440  
Charlotte, North Carolina 28203

Attention: Mr. Will Wilhelm, P.E.

**Subject: Sampling Summary Report**  
Reedy Creek Feasibility Study  
Charlotte, North Carolina  
S&ME Project Nos. 1357-11-011 & 1357-12-009

Dear Mr. Wilhelm:

S&ME, Inc. (S&ME) is pleased to present Kimley-Horn and Associates, Inc. (KHA) with benthic macroinvertebrate monitoring and water quality sampling results in connection with the above-referenced projects. Initial services were performed in general accordance with S&ME Proposal No. 1357-23735-11 rev3 and a March 2010 Master Agreement for Continuing Professional Services between KHA and S&ME, as referenced in the KHA individual project order number 015016139-1. Additional sampling services were performed in general accordance with S&ME Proposal No. 1357-25126-12rev1, dated March 28, 2012.

If you need additional information with respect to this report, please do not hesitate to contact us at 704.523.4726.

Sincerely,

**S&ME**

D. David Homans  
Natural Resources Project Professional

Darrin M. Peine, QEP  
Natural Resources Project Professional

Senior Review by Liz Porter, V.P.

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Appendix II	Physiochemical Field Assessment Data
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## **BACKGROUND INFORMATION**

KHA is conducting an assessment of the Reedy Creek drainage basin for Charlotte-Mecklenburg Storm Water Services. The project area consists of three reaches of Reedy Creek tributaries within the Reedy Creek Park and Nature Preserve, located off Rocky River Road. The Reedy Creek Park and Nature Preserve is owned and managed by Mecklenburg County Parks and Recreation. The approximate location of the project area is depicted by a Site Vicinity map (Figure 1) and the appropriate portion of the 1996 Harrisburg, N.C. USGS topographic map (Figure 2). In support of KHA's assessment, S&ME conducted benthic macroinvertebrate monitoring and water quality sampling at nine representative locations (R1, R2, R3 and R5 through R10) within nine segments (reaches) of Reedy Creek and tributaries of Reedy Creek that KHA identified for possible restoration opportunities. The locations of these sampling site areas are identified on Figure 2, and a 2011 aerial photograph (Figure 3), and the coordinates of each sampling reach are included in Table 1. Photographs of the sampling sites are included in Appendix III.

Fieldwork for sites R1-3 was conducted jointly by S&ME and KHA personnel on May 24, 2011. Additional fieldwork for R5-10 was also conducted jointly by S&ME and KHA personnel on April 25-26 and May 16, 2012.

### **1. SCOPE OF SERVICES**

S&ME's approach to conducting the necessary sampling was based on Task 2.2.2 as specified in the *Reedy Creek Tech Memo - Scope of Services* provided for S&ME by KHA, and is as follows:

#### **1.1 Benthic Macroinvertebrate Sampling**

S&ME conducted benthic macroinvertebrate sampling in accordance with Task 2.2.2 of the aforementioned *Reedy Creek Tech Memo - Scope of Services* at nine specific biomonitoring sites determined by KHA. The field collection effort was lead by S&ME staff trained and certified to collect benthic macroinvertebrate samples as part of the Division of Water Quality (DWQ) 401 certification process, and who have obtained a Certification of Compliance from DWQ's training course: *Aquatic Insect Collection Protocols for Stream Mitigation and Restoration Projects as Related to NCDENR DWQ 401 Certifications*. S&ME staff was assisted in the field by a biologist from KHA.

Samples were collected according to the procedures outlined in the NC Department of Environment and Natural Resources (NCDENR) DWQ December 1, 2011 *Standard Operating Procedure for Benthic Macroinvertebrates (Version 3.0)*. The Standard Collection Method was used for sampling sites with drainage areas greater than three square miles (samples R5 and R10) and the Qual-4 collection method was used for the remaining smaller streams. The Qual-4 collection method entails four samples taken at each monitoring site: one kick net sample, one sweep net sample, one leafpack, and one "visual." In this method, organisms collected were "picked" and preserved in the field using 95% Ethyl Alcohol. S&ME then sent the collected samples and associated Benthos Collection Cards to Lenat Consulting Services (Lenat) in Raleigh, North Carolina. Lenat identified the collected specimens to the lowest possible taxonomic level, and provided abundance values for each taxon. The metrics calculated include total and EPT taxa

richness, EPT abundance, North Carolina Biotic Index (NCBI), and bioclassification values. Metrics were calculated according to the *Standard Operating Procedure for Benthic Macroinvertebrates (Version 3.0)*; bioclassification values for sites sampled with the Qual-4 method were determined using NCDWQ's *Biocriteria for the Small Streams of the North Carolina Mountains and Piedmont: Memorandum (2009)*.

## 1.2 Water Quality Sampling

S&ME also conducted water quality monitoring in general accordance with Task 2.2.2 of the aforementioned *Reedy Creek Tech Memo - Scope of Services*. Water quality parameters were collected approximately concurrently with biological data at each monitoring site. Specifically, the parameters were collected during normal flow conditions and were then used to calculate a water quality index (WQI) using the Charlotte-Mecklenburg Storm Water Services prescribed method. A water quality meter was used to determine ambient water conditions, e.g., surface water temperature, dissolved oxygen, and pH. Grab samples were collected to assess the surface water chemical conditions, e.g., fecal coliform, phosphorous, nitrates, biological oxygen demand (BOD), and total solids. Laboratory results of the grab samples for Reaches 1-3 were analyzed and reported by Shealy Environmental Services, Inc. Laboratory results of the grab samples for Reaches 5-10 were analyzed and reported by Prism Laboratories, Inc.

Following completion of the field and laboratory work identified above, S&ME prepared this written summary that describes the findings of our fieldwork and laboratory analysis. We have included maps of station locations, a list of taxa collected, and summary statistics (taxa richness, abundance, biotic index values, etc.). Ambient and laboratory water quality measurements were also used to provide a calculation of the WQI.

## 2. RESULTS

### 2.1 Benthic Macroinvertebrate Sampling

Table 1 summarizes the benthic macroinvertebrate data collected at each monitoring site. Benthos collection cards, lists of identified taxa prepared by Lenat Consulting Services, and a metric calculation worksheet is included in Appendix I. Note that the metrics calculated by Lenat are based off of dated tolerance values and metric calculations methods and are therefore not consistent with those derived on the metric calculation worksheet.

Summary data indicate that relatively healthy macroinvertebrate communities were present at R3, R6, R8 and R9, all of which received a "Good" or Good-Fair" bioclassification score. The benthic macroinvertebrate communities observed at these sites were of atypically high quality for streams in Mecklenburg County, and the EPT Taxa richness of 13 observed at sites R6 and R9 were notably high for small streams in a generally urban area. A "Fair" bioclassification score was observed for sites R1, R5, R7 and R10. The "Poor" bioclassification score observed at site R2 indicates that the macroinvertebrate community at this reach is impaired.

## **2.2 Water Quality Sampling**

Results of the general water quality sampling are summarized in Table 2. Laboratory water quality results presented in two reports dated June 3 and June 27, 2011 prepared by Shealy Environmental Services, Inc. and one report dated May 10, 2012 prepared by Prism Laboratories, Inc. are include in Appendix II, along with WQI calculation tables. Note that a second sampling effort was necessary in order to obtain the total solids and laboratory turbidity parameters used to calculate the WQI for sites R1, R2 and R3 as these parameters were not collected during the initial sampling effort.

Eight of the nine monitoring sites had an adjusted WQI rating classification of “good” while site R5 received an “average” rating. Sources of possible water quality impairment observed included elevated fecal coliform levels at sites R1, R3, R5, R7, R9 and R10, elevated BOD at sites R5, R6 and R 10 and elevated nitrate levels at sites R3 and R8.

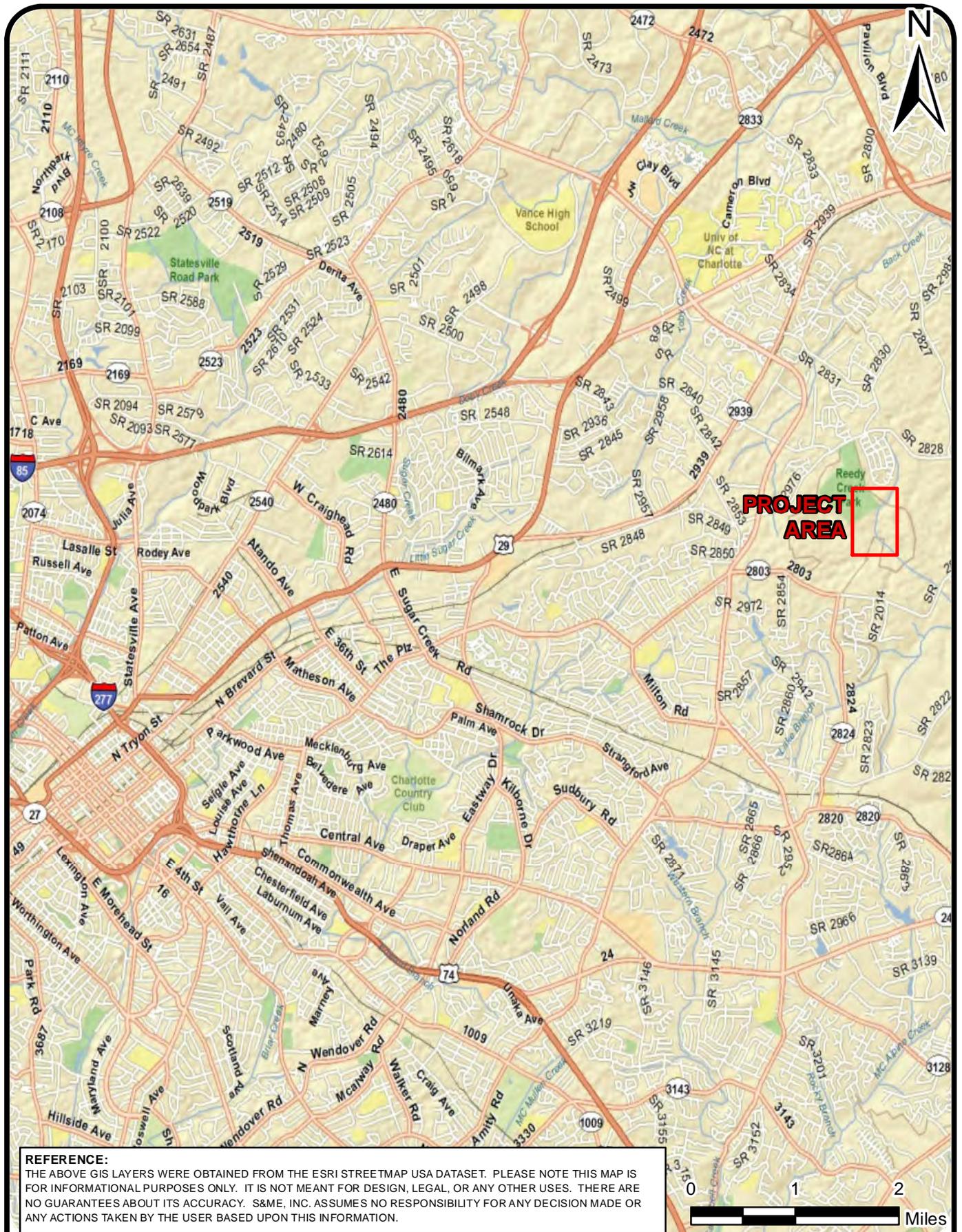
# **FIGURES**

**Figure 1 Site Vicinity Map**

**Figure 2 USGS Topographic Map**

**Figure 3 2011 Aerial Photograph**





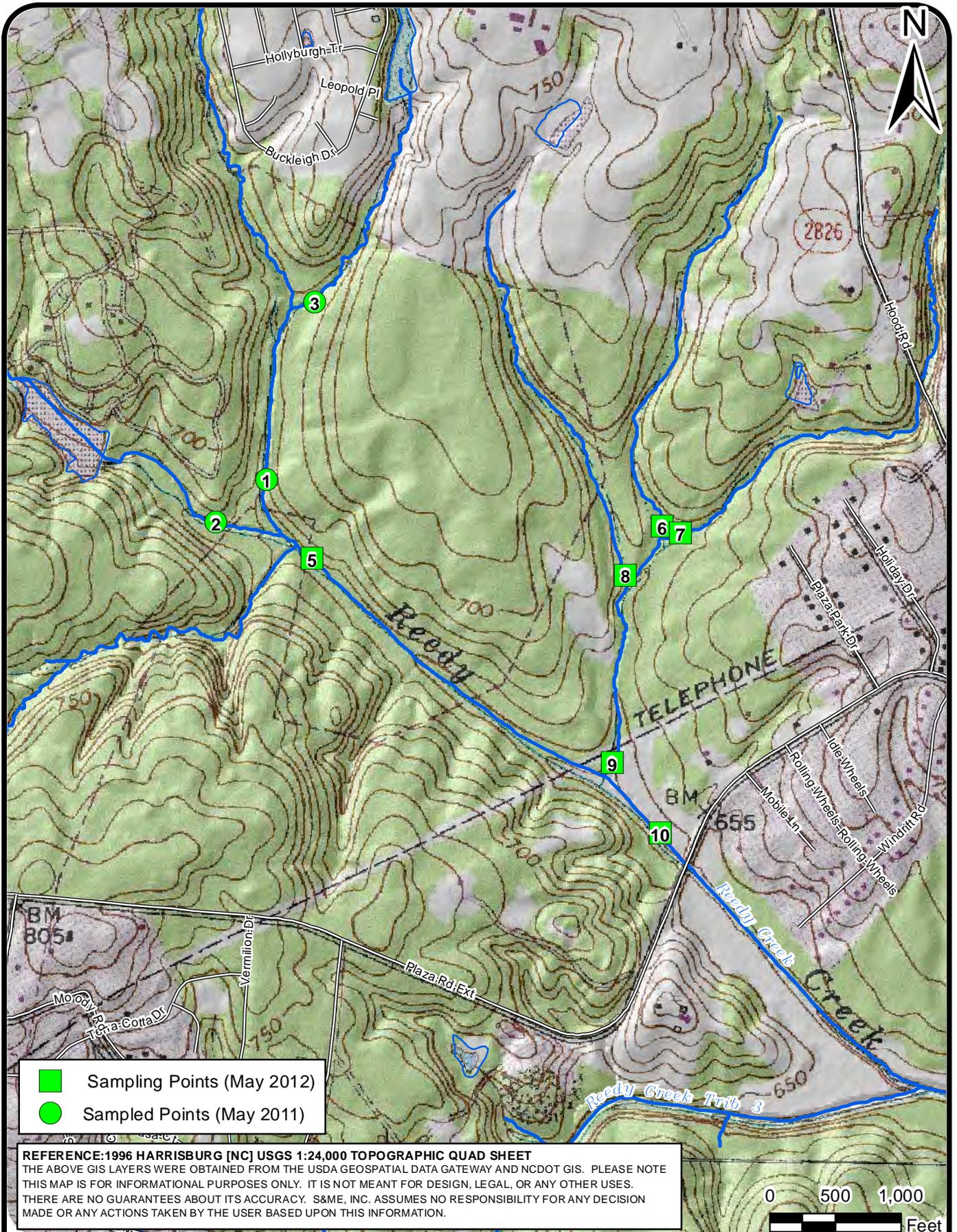
SCALE:	AS SHOWN
DATE:	6-29-2011
DRAWN BY:	DDH
CHECKED BY:	DMP

**S&ME**  
 WWW.SMEINC.COM

**SITE VICINITY MAP**  
 Reedy Creek Feasibility Study  
 Charlotte, North Carolina

PROJECT NO: 1357-11-011

FIGURE NO.  
**1**



- Sampling Points (May 2012)
- Sampled Points (May 2011)

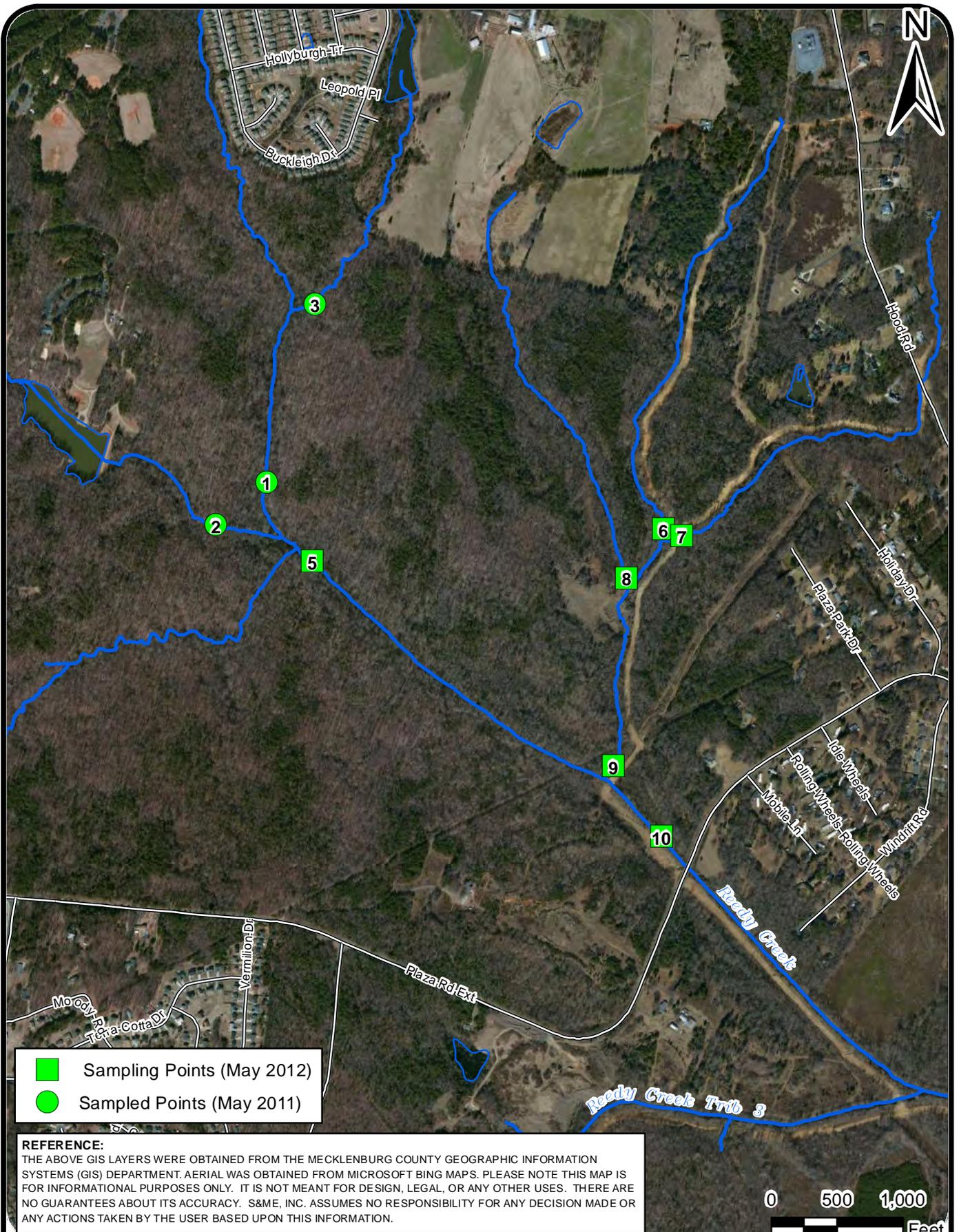
REFERENCE: 1996 HARRISBURG [NC] USGS 1:24,000 TOPOGRAPHIC QUAD SHEET  
 THE ABOVE GIS LAYERS WERE OBTAINED FROM THE USDA GEOSPATIAL DATA GATEWAY AND NCDOT GIS. PLEASE NOTE THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON THIS INFORMATION.

SCALE:	1" = 1,000'
DATE:	3-28-2012
DRAWN BY:	DDH
CHECKED BY:	DMP



USGS TOPOGRAPHIC MAP  
 Reedy Creek Feasibility Study  
 Charlotte, North Carolina  
 PROJECT NO. 1357-11-011; 1357-12-009

FIGURE NO.  
 2



- Sampling Points (May 2012)
- Sampled Points (May 2011)

**REFERENCE:**  
 THE ABOVE GIS LAYERS WERE OBTAINED FROM THE MECKLENBURG COUNTY GEOGRAPHIC INFORMATION SYSTEMS (GIS) DEPARTMENT. AERIAL WAS OBTAINED FROM MICROSOFT BING MAPS. PLEASE NOTE THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON THIS INFORMATION.

SCALE:	1" = 1,000'
DATE:	3-28-2012
DRAWN BY:	DDH
CHECKED BY:	DMP

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2011 AERIAL PHOTOGRAPH  
 Reedy Creek Feasibility Study  
 Charlotte, North Carolina  
 PROJECT NO. 1357-11-011; 1357-12-009

FIGURE NO.  
**3**

# **TABLES**

**Table 1    Macrobenthic Results Summary**

**Table 2    Water Quality Results Summary**



**Table 1:** Macrobenthic Results Summary  
 Reedy Creek Feasibility Study- Additional Samples, Charlotte, N.C.

S&ME Project No. 1357-12-009  
 June 5, 2012

Parameter	Sampling Site								
	R1	R2	R3	R5	R6	R7	R8	R9	R10
<b>Latitude</b>	35.26365	35.26355	35.26803	35.26279	35.26335	35.26322	35.26325	35.25839	35.25692
<b>Longitude</b>	-80.7116	-80.71336	-80.71033	-80.71051	-80.7014	-80.70093	-80.70232	-80.70257	-80.70133
<b>Sampling Method</b>	Qual-4	Qual-4	Qual-4	Standard	Qual-4	Qual-4	Qual-4	Qual-4	Standard
<b>Sampling Date</b>	5/24/2011	5/25/2011	5/25/2011	4/26/2012	4/25/2012	5/16/2012	5/16/2021	4/25/2012	4/26/2012
<b>Total Taxa Richness</b>	16	17	22	31	33	25	35	38	18
<b>Total Abundance</b>	66	55	82	102	175	105	170	143	49
<b>EPT Taxa Richness</b>	4	2	9	9	13	5	9	13	4
<b>EPT Abundance</b>	34	8	48	30	117	11	58	61	15
<b>NCBI</b>	6.69	7.09	5.36	5.87	4.82	6.43	5	5.67	6.23
<b>Bioclassification Score*</b>	Fair	Poor	Good	Fair	Good	Fair	Good	Good-Fair	Fair

\*Bioclassification score for standards samples is calculated using both EPT taxa richness and NCBI score in accordance with NCDWQ's *Standard Operating Procedure for Benthic Macroinvertebrates (Version 3.0)*. Bioclassification score for Qual-4 samples is calculated using NCBI alone in accordance with NCDWQ's *Biocriteria for the Small Streams of the North Carolina Mountains and Piedmont: Memorandum (2009)*.

**Table 2: Water Quality Results Summary**  
 Reedy Creek Feasibility Study- Additional Samples, Charlotte, N.C.

S&ME Project No. 1357-12-009  
 June 5, 2012

Monitoring Site		R1	R2	R3	R5	R6	R7	R8	R9	R10	Class C Water Quality Standards or Typical Range
Sample Dates		5/24/11 6/16/11	5/24/11 6/16/11	5/24/11 6/16/11	4/26/12	4/26/12	4/26/12	4/26/12	4/26/12	4/26/12	
Parameter	Units										
Nitrate	mg/L	0.49	0.086	1.3	0.28	0.52	0.16	1.8	0.68	0.28	<1 mg/L <sup>3</sup>
Phosphorus	mg/L	0.054	0.021	0.025	0.077	0.089	0.09	0.12	0.094	0.08	<0.4 mg/L <sup>3</sup>
BOD5	mg/L	ND	ND	ND	20	16	2.1	ND	ND	13	<5 mg/L <sup>3</sup>
Fecal Coliform	col/100ml	520	100	690	1000	62	350	200	740	470	< 200/100ml mean <sup>2</sup>
Turbidity (lab)	NTU	ND	4.4	1.2	2.6	2.8	11	1.8	4.4	2.9	< 50 NTU <sup>2</sup>
pH	SU	6.95	6.26	7.44	8.01	7.75	7.98	8.18	8.18	8.01	Between 6.0 and 9.0 <sup>2</sup>
DO	mg/L	9.22	6.54	8.93	8.11	7.18	8.67	8.91	8.41	8.11	> than 5.0 mg/l <sup>2</sup>
Temperature	°C	19.25	18.4	19.22	16	14.2	13.2	11.6	14.2	15.5	< 2.8° C above natural water temperature <sup>2</sup>
TS	mg/L	96	100	93	90	110	100	120	100	90	<200 mg/L <sup>3</sup>
WQI	--	81.1	74.9	81.1	68.4	71.9	76.7	79.4	75.7	71.0	--

mg/L = milligram per liter; col/100ml = colonies per 100 milliliters; NTU = nephelometric turbidity unit

SU = standard units; °C = degrees Celsius; ND = Not detected

<sup>1</sup> WQI Scores: 0-25 = poor; 26-50 = fair; 51-70 = average; 71-90 = good; and 91-100 = excellent

<sup>2</sup> Class C Water Quality Standard

<sup>3</sup> Typical Range

Highlighted values are outside of typical range and / or exceed Class C Water Quality Standards

# **APPENDIX I**

## **BIOLOGICAL FIELD ASSESSMENT DATA**

Benthos Collection Cards **(S&ME)**

Taxa list and abundance for Reedy Creek Sties  
(R1-R3), Mecklenburg County, 25 May 2011  
**(Lenat)**

List of macroinvertebrates collected at Reedy  
Creek sites, Mecklenburg County, April and May  
2012. **(Lenat)**

Benthic Macroinvertebrate Calculations **(S&ME)**

Sample Site: Reach 1 Reedy Creek

BENTHOS COLLECTION CARD

DATE 5/24/11 COLLECT. TIME 10:00 COLLECTORS S&ME, KHA CARD# 1  
 STAT. LOC. 35.26365, -80.71160 RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>1 ft</u>	Bank erosion	None	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>5</u> %	Max depth	<u>3 ft</u>	Canopy	% <u>100</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>5</u> %	Width	<u>6 ft</u>	Aufwuchs	None	<b>Mod</b>	Severe
Sand (1/12")	<u>60</u> %	Current	<u>slow</u>	Podostemum	<b>None</b>	Mod	Severe
Silt, fine particles	<u>30</u> %	Recent Rain?	<b>No</b>	Tribs present?		<b>no</b>	
Other	<u>-</u> %	<u>Photos (#)</u>					

<u>Instream Habitat: (0, +, ++)</u>			<u>Samples: (# + Comments)</u>		<u>Water Chemistry</u>	
Pools	<u>+</u>	Backwaters	<u>0</u>	Kicks	<u>1</u>	pH <u>6.95</u>
Riffles	<u>+</u>	Detritus	<u>+</u>	Sweeps	<u>1</u>	Conductivity
Snags	<u>0</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen <u>9.22</u>
Undercut	<u>+</u>	Other		Rock-Log		Temperature <u>19.25 C</u>
Root Mats	<u>0</u>			Sand		Total Dissolved Solids
				Visuals	<u>1</u>	
				Other		

Field Observation: **Severely eroded banks, unknown cause**

Sample Site: Reach 2 Reedy Creek

BENTHOS COLLECTION CARD

DATE 5/24/11 COLLECT. TIME 10:45 COLLECTORS S&ME, KHA CARD# 2  
 STAT. LOC. 35.26355, -80.71336 RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>1 ft</u>	Bank erosion	None	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>10</u> %	Max depth	<u>3 ft</u>	Canopy	% <u>100</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>10</u> %	Width	<u>6 ft</u>	Aufwuchs	None	<b>Mod</b>	Severe
Sand (1/12")	<u>60</u> %	Current	<u>slow</u>	Podostemum	<b>None</b>	Mod	Severe
Silt, fine particles	<u>20</u> %	Recent Rain?	<b>No</b>	Tribs present?		<b>no</b>	
Other	<u>-</u> %	<u>Photos (#)</u>					

<u>Instream Habitat: (0, +, ++)</u>			<u>Samples: (# + Comments)</u>		<u>Water Chemistry</u>	
Pools	<u>+</u>	Backwaters	<u>0</u>	Kicks	<u>1</u>	pH <u>6.26</u>
Riffles	<u>+</u>	Detritus	<u>+</u>	Sweeps	<u>1</u>	Conductivity
Snags	<u>+</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen <u>6.54</u>
Undercut	<u>+</u>	Other		Rock-Log		Temperature <u>18.4 C</u>
Root Mats	<u>0</u>			Sand		Total Dissolved Solids
				Visuals	<u>1</u>	
				Other		

Field Observation: **Severely eroded banks, unknown cause; substrate course sand**

Sample Site: Reach 3 Reedy Creek

BENTHOS COLLECTION CARD

DATE 5/24/11 COLLECT. TIME 12:45 COLLECTORS S&ME, KHA CARD# 3  
 STAT. LOC. 35.26803, -80.71033 RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>1 ft</u>	Bank erosion	None	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>10</u> %	Max depth	<u>3 ft</u>	Canopy	% <u>100</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>10</u> %	Width	<u>9 ft</u>	Aufwuchs	None	<b>Mod</b>	Severe
Sand (1/12")	<u>60</u> %	Current	<u>slow</u>	Podostemum	<b>None</b>	Mod	Severe
Silt, fine particles	<u>20</u> %	Recent Rain?	<b>No</b>	Tribs present?		<b>no</b>	
Other	<u>-</u> %	<u>Photos (#)</u>					

<u>Instream Habitat: (0, +, ++)</u>			<u>Samples: (# + Comments)</u>		<u>Water Chemistry</u>	
Pools	<u>+</u>	Backwaters	<u>0</u>	Kicks	<u>1</u>	pH <u>7.4</u>
Riffles	<u>+</u>	Detritus	<u>+</u>	Sweeps	<u>1</u>	Conductivity
Snags	<u>+</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen <u>8.9</u>
Undercut	<u>+</u>	Other		Rock-Log		Temperature <u>19.2 C</u>
Root Mats	<u>0</u>			Sand		Total Dissolved Solids
				Visuals	<u>1</u>	
				Other		

Field Observation: **Severely eroded banks, unknown cause; substrate coarse sand with bedrock**

Sample Site: Reach 5 Reedy Creek

BENTHOS COLLECTION CARD

DATE 4/26/12 COLLECT. TIME 13:15 COLLECTORS S&ME, KHA CARD# 5  
 STAT. LOC. 35.26279° N, -80.71051° W RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>5</u> %	Mid depth	<u>inches</u>	Bank erosion	None	<u>Mod</u>	<u>Severe</u>
Cobble (2 1/2 - 10")	<u>25</u> %	Max depth	<u>0.5 ft</u>	Canopy	% <u>75</u>	Type	<u>trees</u>
Gravel (2 1/2 - 1/12")	<u>20</u> %	Width	<u>10 ft</u>	Aufwuchs	<u>None</u>	<u>Mod</u>	Severe
Sand (1/12")	<u>40</u> %	Current	<u>slow</u>	Podostemum	<u>None</u>	Mod	Severe
Silt, fine particles	<u>10</u> %	Recent Rain?	<u>No</u>	Tribs present?		<u>Yes</u>	
Other	- %	<u>Photos (#)</u>					

<u>Instream Habitat:</u> (0, +, ++)		<u>Samples:</u> (# + Comments)		<u>Water Chemistry</u>	
Pools	<u>+</u> Backwaters	<u>0</u>	Kicks	<u>2</u>	pH <u>8.01</u>
Riffles	<u>+</u> Detritus	<u>+</u>	Sweeps	<u>3</u>	Conductivity <u>105.6</u>
Snags	<u>0</u> Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen <u>8.11</u>
Undercut	<u>+</u> Other		Rock-Log	<u>2</u>	Temperature <u>16.0 C</u>
Root Mats	<u>+</u>		Sand	<u>1</u>	Total Dissolved Solids
			Visuals	<u>1</u>	
			Other		

Field Observation: **Reedy Creek main stem inside the nature preserve park**

Sample Site: Reach 6 Reedy Creek

BENTHOS COLLECTION CARD

DATE 4/25/12 COLLECT. TIME 14:30 COLLECTORS S&ME, KHA CARD# 3  
 STAT. LOC. 35.26335° N, -80.70140° W RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>inches</u>	Bank erosion	<input type="text" value="None"/>	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>5</u> %	Max depth	<u>0.5 ft</u>	Canopy	% <u>75</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>35</u> %	Width	<u>3 ft</u>	Aufwuchs	<input type="text" value="None"/>	<b>Mod</b>	Severe
Sand (1/12")	<u>50</u> %	Current	<u>slow</u>	Podostemum	<input type="text" value="None"/>	Mod	Severe
Silt, fine particles	<u>10</u> %	Recent Rain?	<u>No</u>	Tribs present?		<b>No</b>	
Other	- %	<u>Photos (#)</u>					

<u>Instream Habitat:</u> (0, +, ++)		<u>Samples:</u> (# + Comments)		<u>Water Chemistry</u>			
Pools	<u>0</u>	Backwaters	<u>0</u>	Kicks	<u>1</u>	pH	<u>7.75</u>
Riffles	<u>+</u>	Detritus	<u>+</u>	Sweeps	<u>1</u>	Conductivity	<u>140.2</u>
Snags	<u>+</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen	<u>7.18</u>
Undercut	<u>+</u>	Other		Rock-Log	<u>1</u>	Temperature	<u>14.2 C</u>
Root Mats	<u>0</u>			Sand		Total Dissolved Solids	
				Visuals			
				Other			

Field Observation: **Reedy Creek main stem inside the nature preserve park**

Sample Site: Reach 7 Reedy Creek

BENTHOS COLLECTION CARD

DATE 4/25/12 COLLECT. TIME 12:45 COLLECTORS S&ME, KHA CARD# 2  
 STAT. LOC. 35.26322° N, -80.70093° W RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>inches</u>	Bank erosion	<input type="text" value="None"/>	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>15</u> %	Max depth	<u>0.5 ft</u>	Canopy	% <u>75</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>25</u> %	Width	<u>3 ft</u>	Aufwuchs	<input type="text" value="None"/>	<b>Mod</b>	Severe
Sand (1/12")	<u>50</u> %	Current	<u>slow</u>	Podostemum	<input type="text" value="None"/>	Mod	Severe
Silt, fine particles	<u>10</u> %	Recent Rain?	<u>No</u>	Tribs present?		<b>No</b>	
Other	- %	<u>Photos (#)</u>					

<u>Instream Habitat:</u> (0, +, ++)		<u>Samples:</u> (# + Comments)		<u>Water Chemistry</u>	
Pools	<u>0</u> Backwaters	<u>0</u> Kicks	<u>1</u>	pH	<u>7.98</u>
Riffles	<u>+</u> Detritus	<u>+</u> Sweeps	<u>1</u>	Conductivity	<u>122.6</u>
Snags	<u>+</u> Aquatic weeds	<u>0</u> Leaf Packs	<u>1</u>	Dissolved Oxygen	<u>8.67</u>
Undercut	<u>0</u> Other	Rock-Log	<u>1</u>	Temperature	<u>13.2 C</u>
Root Mats	<u>0</u>	Sand		Total Dissolved Solids	
		Visuals			
		Other			

Field Observation: **Headwater tributary; shallow water depth. Sample on 4/25/12 was broken during shipment and was resampled on 5/16/12.**

Sample Site: Reach 8 Reedy Creek

BENTHOS COLLECTION CARD

DATE 4/25/12 COLLECT. TIME 09:40 COLLECTORS S&ME, KHA CARD# 1  
 STAT. LOC. 35.26325° N, -80.70232° W RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u>	% Mid depth	<u>inches</u>	Bank erosion	<input type="text" value="None"/>	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>10</u>	% Max depth	<u>0.5 ft</u>	Canopy	% <u>75</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>30</u>	% Width	<u>3 ft</u>	Aufwuchs	<input type="text" value="None"/>	<b>Mod</b>	Severe
Sand (1/12")	<u>50</u>	% Current	<u>slow</u>	Podostemum	<input type="text" value="None"/>	Mod	Severe
Silt, fine particles	<u>10</u>	% Recent Rain?	<u>slight</u>	Tribs present?		<b>No</b>	
Other	<u>-</u>	% <u>Photos (#)</u>					

<u>Instream Habitat:</u> (0, +, ++)		<u>Samples:</u> (# + Comments)		<u>Water Chemistry</u>			
Pools	<u>0</u>	Backwaters	<u>0</u>	Kicks	<u>1</u>	pH	<u>8.18</u>
Riffles	<u>+</u>	Detritus	<u>+</u>	Sweeps	<u>1</u>	Conductivity	<u>164.0</u>
Snags	<u>+</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen	<u>8.91</u>
Undercut	<u>0</u>	Other		Rock-Log	<u>1</u>	Temperature	<u>11.6 C</u>
Root Mats	<u>+</u>			Sand		Total Dissolved Solids	
				Visuals			
				Other			

Field Observation: **Headwater tributary; shallow water depth. Sample on 4/25/12 was broken during shipment and was resampled on 5/16/12.**

Sample Site: Reach 9 Reedy Creek

BENTHOS COLLECTION CARD

DATE 4/25/12 COLLECT. TIME 08:30 COLLECTORS S&ME, KHA CARD# 4  
 STAT. LOC. 35.25839° N, -80.70257° W RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>inches</u>	Bank erosion	<input type="text" value="None"/>	Mod	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>5</u> %	Max depth	<u>0.5 ft</u>	Canopy	% <u>25</u>	Type	<b>shrubs</b>
Gravel (2 1/2 - 1/12")	<u>30</u> %	Width	<u>5 ft</u>	Aufwuchs	<input type="text" value="None"/>	<b>Mod</b>	Severe
Sand (1/12")	<u>55</u> %	Current	<u>slow</u>	Podostemum	<input type="text" value="None"/>	Mod	Severe
Silt, fine particles	<u>10</u> %	Recent Rain?	<u>slight</u>	Tribs present?		<b>No</b>	
Other	-	% <u>Photos (#)</u>					

<u>Instream Habitat:</u> (0, +, ++)			<u>Samples:</u> (# + Comments)		<u>Water Chemistry</u>	
Pools	<u>+</u>	Backwaters	<u>0</u>	Kicks	<u>1</u>	pH <u>8.18</u>
Riffles	<u>+</u>	Detritus	<u>+</u>	Sweeps	<u>1</u>	Conductivity <u>139.9</u>
Snags	<u>+</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen <u>8.41</u>
Undercut	<u>0</u>	Other		Rock-Log	<u>1</u>	Temperature <u>14.2 C</u>
Root Mats	<u>0</u>			Sand		Total Dissolved Solids
				Visuals		
				Other		

Field Observation: **Under an existing power-line right of way**

Sample Site: Reach 10 Reedy Creek

BENTHOS COLLECTION CARD

DATE 4/26/12 COLLECT. TIME 15:30 COLLECTORS S&ME, KHA CARD# 6  
 STAT. LOC. 35.25692° N, -80.70133° W RIVER BASIN Catawba COUNTY Mecklenburg

<u>Substrate:</u>		<u>River:</u>		<u>Field Parameters:</u>			
Boulder (10")	<u>0</u> %	Mid depth	<u>inches</u>	Bank erosion	None	<u>Mod</u>	<b>Severe</b>
Cobble (2 1/2 - 10")	<u>5</u> %	Max depth	<u>0.5 ft</u>	Canopy	% <u>70</u>	Type	<b>trees</b>
Gravel (2 1/2 - 1/12")	<u>15</u> %	Width	<u>14 ft</u>	Aufwuchs	<u>None</u>	<b>Mod</b>	Severe
Sand (1/12")	<u>70</u> %	Current	<u>slow</u>	Podostemum	<b>None</b>	Mod	Severe
Silt, fine particles	<u>10</u> %	Recent Rain?	<u>No</u>	Tribs present?		<b>No</b>	
Other	<u>-</u> %	<u>Photos (#)</u>					

<u>Instream Habitat:</u> (0, +, ++)		<u>Samples:</u> (# + Comments)		<u>Water Chemistry</u>			
Pools	<u>0</u>	Backwaters	<u>0</u>	Kicks	<u>0</u>	pH	<u>8.01</u>
Riffles	<u>0</u>	Detritus	<u>+</u>	Sweeps	<u>5</u>	Conductivity	<u>105.6</u>
Snags	<u>0</u>	Aquatic weeds	<u>0</u>	Leaf Packs	<u>1</u>	Dissolved Oxygen	<u>8.11</u>
Undercut	<u>0</u>	Other	<u>sand</u>	Rock-Log	<u>0</u>	Temperature	<u>15.5 C</u>
Root Mats	<u>+</u>			Sand	<u>3</u>	Total Dissolved Solids	
				Visuals	<u>1</u>		
				Other			

Field Observation: **Reedy Creek main stem. Sandy stream system with little available habitat. No riffles to use kick net**

Table 3. Taxa list and abundance for Reedy Creek sites (R1-R3), Mecklenburg County, 25 May 2011, S&ME

<u>Taxon</u>	<u>TV</u>	<u>Feeding Gr<sup>1</sup></u>	<u>R1</u>	<u>R2</u>	<u>R3</u>
<b>EPHEMEROPTERA</b>					
Baetis flavistriga	7.0	Scraper	16	-	1
Baetis pluto	4.3	Scraper	2	-	6
Acerpenna pygmaea	3.9	C-G	-	-	2
Maccaffertium modestum	5.5	C-G	-	2	12
Paraleptophlebia sp	0.9	C-G	-	-	2
<b>TRICHOPTERA</b>					
Cheumatopsyche spp	6.2	Filterer	12	6	11
Hydropsyche betteni	7.8	Filterer	4	-	1
Diplectrona modesta	2.2	Filterer	-	-	2
Chirnarra sp	2.8	Filterer	-	-	11
<b>COLEOPTERA</b>					
Stenelmis crenata	7.0	C-G	-	-	1
Neoporus sp	8.6	Predator	-	6	-
<b>ODONATA</b>					
Argia sp	8.2	Predator	-	-	3
<b>DIPTERA: MISCELANEOUS</b>					
Tipula spp	7.3	Shredder	7	11	3
Antocha sp	4.3	Scraper	-	-	1
Hexatoma sp	4.3	Predator	-	-	5
Pseuodplimnophila sp	7.2	C-G	-	-	2
Anopheles sp	8.6	Filterer	1	-	-
Dixa spp	2.6	Predator	-	2	6
Empididae	7.6	C-G	-	1	-
Simulium sp	6.0	Predator	8	2	4
Simulium venustum	7.1	Predator	1	8	-
Bittacomorpha sp	-	C-G	-	1	-
<b>DIPTERA: CHIRONOMIDAE</b>					
Ablabesmyia mallochi	7.2	Predator	-	-	1
Conchapelopia group	8.4	Predator	1	1	2
Chironomus spp	9.6	C-G	-	5	-
Cryptochironomus sp	6.4	Predator	-	-	1
Microtendipes sp	5.5	C-G	3	-	4
Phaenopsectra flavipes gr.	7.9	C-G	1	-	-
Phaenopsectra sp	6.5	C-G	4	-	-
Paracladopelma sp	5.5	Predator?	1	-	-
Polypedilum illinoense	9.0	C-G	1	-	-
Polypedilum flavum	4.9	C-G	-	2	1
Polypedilum fallax	6.4	C-G	-	1	-
Rheotanytarsus sp	5.9	Filterer	-	1	-
Eukifferiella claripennis gr	5.6	C-G	2	-	-
Parametriocnemus lundbecki	3.7	C-G	2	2	-
<b>CRUSTACEA</b>					
Cambarus sp	7.6	Omnivore	-	3	-
<b>MOLLUSCA</b>					
Physella sp	8.8	Scraper	-	1	-
<sup>1</sup> C-G = Collector-Gatherer, TV = Tolerance Value					
Total Taxa Richness			18	18	22
EPT Taxa Richness			4	2	9
NC Biotic Index			6.5	7.1	4.9

### Notes

- All sites are too small for a Bioclassification (rating) using normal DWQ criteria for streams greater than 4 meters wide.
- DWQ criteria for small stream assume permanent flow and are based solely on Biotic Index values. These criteria give ratings of Fair for R1, Poor for R2 and Good for R3.
- Low dissolved oxygen is suggested for site R2 (at least in some microhabitats) by the abundance of *Chironomus*.
- Site R3 is much different than all other sites, with several intolerant species being present: *Chimarra*, *Diplectrona modesta*, and *Paraleptophlebia* and *Baetis pluto*. This site has unusually good water quality for a stream in Mecklenburg County.

Table 1. List of macroinvertebrates collected at Reedy Creek sites, Mecklenburg County, April and May 2012.

Taxa	Site:	R6	R7	R8	R9	R5	R10
<b>EPHEMEROPTERA</b>							
Maccaffertium modestum		3	-	3	10	2	-
Paraleptophlebia/Habrophliodes		3	1	3	5	-	1
Ameletus lineatus		1	-	-	-	-	-
Baetis pluto		10	-	-	4	6	-
B. flavistriga		-	-	-	-	1	-
Centroptilum triangulifer		-	-	-	1	-	-
Dipheter hageni		-	1	3	-	-	-
Paracloeodes fleeki		1	-	1	3	1	-
Plauditus cestus		2	-	-	-	-	-
P. dubius gr (2-3?)		14	-	-	-	-	-
Pseudocloeon propinquum		25	-	5	22	1	9
Eurylophella verisimilis		2	-	-	1	-	-
<b>PLECOPTERA</b>							
Eccoptura xanthenes		-	-	-	1	-	-
Perlesta sp		12	-	37	4	-	-
Haploperla brevis		38	-	2	5	-	-
<b>TRICHOPTERA</b>							
Cheumatopsyche spp		5	7	1	1	13	4
Diplectrone modesta		-	-	3	-	-	-
Chimarra sp		-	-	-	1	2	-
Pycnopsyche spp		-	-	-	3	2	-
Ironoquia punctatissima		-	1	-	-	-	1
Trienodes ignitus		-	1	-	-	-	-
Lepidostoma sp		1	-	-	-	2	-
<b>COLEOPTERA</b>							
Helichus spp		2	1	2	3	-	-
Stenelmis crenata		-	-	-	1	-	-
Neoporus spp		2	-	3	-	4	3
Tropisternus sp (larvae)		-	4	-	-	-	-
<b>ODONATA</b>							
Calopteryx sp		-	1	-	7	-	4
Cordulegaster sp		1	1	-	-	1	-
Ophiogomphus sp		3	-	1	6	-	1
Progomphus obscurus		-	1	-	7	-	4
Stylogomphus albistylus		1	-	1	1	-	-
Boyeria vinosa (very small)		1	-	-	-	-	1
<b>DIPTERA: MISC.</b>							
Dixa sp		-	-	-	3	-	-
Dixella indiana		-	1	2	2	3	2
Hexatoma sp		-	-	3	-	-	-
Tipula sp		3	3	10	10	2	-
Pseudolimnophila sp		-	-	1	1	1	-
Simulium spp (3+)		7	37	1	16	23	10
Chrysops sp		-	2	-	-	-	-

Taxa	Site:	R6	R7	R8	R9	R5	R10
DIPTERA: CHIRONOMIDAE							
Conchapelopia group		1	9	22	2	5	-
Natarsia sp		-	1	1	-	-	-
Procladius sp		1	-	-	-	-	-
Zavrelimyia sp		-	1	1	-	1	-
Brillia sp		-	-	1	-	-	-
Corynoneura spp		-	-	-	1	2	1
Thienemaniella spp		-	-	1	1	3	1
Cricotopus bicinctus		-	-	-	3	1	-
Cricotopus vierriensis gr		-	-	-	-	-	1
Krenosmittia sp		-	-	1	-	-	-
Parametrioconemus lundbecki		7	11	25	4	6	-
Tvetenia bavarica gr		4	-	2	3	3	-
Eukiefferiella claripennis gr		-	-	-	-	1	-
Rheosmittia sp		-	-	-	1	-	-
Rheotanytarsus sp		1	-	-	-	-	1
Paratanytarsus sp		-	3	-	1	-	-
Tanytarsus spp		-	-	-	-	2	1
Chironomus spp		13	10	-	2	6	1
Cryptochironomus spp		-	1	5	-	-	-
Microtendipes sp		-	-	-	-	2	-
Paratendipes sp		-	1	1	-	-	-
Polypedilum aviceps		3	3	17	-	2	-
Polypedilum illinoense gr		-	-	1	3	1	-
Polypedilum fallax gr		1	-	1	1	-	-
Polypedilum tritum		1	-	-	-	-	-
Polypedilum scalaenum gr		-	-	2	-	-	-
Phaenopsectra sp		-	1	-	1	-	-
Phaenopsectra flavipes gr		-	-	1	-	1	-
Tribelos jucundum		1	-	-	-	-	-
OLIGOCHAETA							
Ecclipidrilus sp		-	-	-	1	-	-
Lumbriculus variegatus		-	-	1	-	-	-
Nais sp		4	-	-	-	-	-
CRUSTACEA							
Cambarus spp		1	-	-	1	1	3
MOLLUSCA							
Physa sp		-	2	5	-	1	-
Total Taxa Richness		33	24	30	38	31	18
EPT Taxa Richness		13	5	9	13	9	4
EPT Abundance		116	11	58	61	30	15
NC Biotic Index		4.2	6.2	4.9	5.5	5.6	5.9
Width (ft)		3	2.5	2.5	5	10	14

### Notes

-Rating by Small-stream criteria would give:

Excellent – R6

Good – R8

Good-Fair – R9, R5, R10

Fair – R7

Looking only at NCBI values for larger streams (ignoring EPT taxa richness), we would get:

Excellent – R6 and R8

Good – R9 and R5

Good-Fair – R7 and R10

Just looking at a gradient of water quality, we get:

R6 > R8 > R9/R5 > R7/R10

-These data give a very nice picture of water/habitat quality in the Reedy Creek catchment. R6 has the best water quality, with minor problem in the R8 trib and more severe problems in the R7 trib. These combine to produce only minor stress at the downstream R9 site. An EPT taxa richness of 13 is high for such small streams. [I have been sampling many such tribs in Orange and Chatham counties.]

-Both mainstem sites show some problems, more severe at the downstream site.

-Very few taxa of interest, except that this is Mecklenburg County where it is rare to find any abundant stoneflies. The *Perlesta* looks a little different from the usual species, and may be an unknown or unassociated species. *Krenosmittia* is rarely seen, although this may reflect its small size and habitat.

Benthic Macroinvertebrate Calculations  
 Reedy Creek Feasibility Study- Additional Sampling, Charlotte, N.C.

S&ME Project No. 1357-12-009  
 June 5, 2012

Collection date:		R1	R2	R3	R6	R7	R8	R9	R5	R10
		5/25/11	5/25/11	5/25/11	4/25/12	5/16/12	5/16/21	4/26/12	4/26/12	4/26/12
Taxon	TV	Number Identified								
<b>EPHEMEROPTERA</b>										
Maccaffertium modestum	5.7	0	2	12	3	0	3	10	2	0
Paraleptophlebia/Habrophliodes	1.2	0	0	2	3	1	3	5	0	1
Ameletus lineatus	2.4	0	0	0	1	0	0	0	0	0
Baetis pluto	3.4	2	0	6	10	0	0	4	6	0
Baetis flavistriga	6.8	16	0	1	0	0	0	0	1	0
Acerpenna pygmaea	3.7	0	0	2	0	0	0	0	0	0
Centroptilum triangulifer	3.8	0	0	0	0	0	0	1	0	0
Dipheter hageni	1.1	0	0	0	0	1	3	0	0	0
Paracloeodes fleeki	8	0	0	0	1	0	1	3	1	0
Plauditus cestus	4.6	0	0	0	2	0	0	0	0	0
Plauditus dubius gr (2-3?)	2.2	0	0	0	14	0	0	0	0	0
Pseudocloeon propinquum	5.8	0	0	0	25	0	5	22	1	9
Eurylophella verisimilis	3.9	0	0	0	2	0	0	1	0	0
<b>PLECOPTERA</b>										
Eccoptura xanthenes	4.7	0	0	0	0	0	0	1	0	0
Perlesta sp	2.9	0	0	0	12	0	37	4	0	0
Haploperla brevis	1.4	0	0	0	38	0	2	5	0	0
<b>TRICHOPTERA</b>										
Cheumatopsyche spp	6.6	12	6	11	5	7	1	1	13	4
Hydropsyche betteni	7.9	4	0	1	0	0	0	0	0	0
Diplectrona modesta	2.3	0	0	2	0	0	3	0	0	0
Chimarra sp	3.3	0	0	11	0	0	0	1	2	0
Pycnopsyche spp	2.5	0	0	0	0	0	0	3	2	0
Ironoquia punctatissima	6.7	0	0	0	0	1	0	0	0	1
Triaenodes ignitus	2.7	0	0	0	0	1	0	0	0	0
Lepidostoma sp	1	0	0	0	1	0	0	0	2	0
<b>COLEOPTERA</b>										
Helichus spp	4.1	0	0	0	2	1	2	3	0	0
Stenelmis crenata	7.8	0	0	1	0	0	0	1	0	0
Neoporus spp	5	0	6	0	2	0	3	0	4	3
Tropisternus sp (larvae)	9.3	0	0	0	0	4	0	0	0	0
<b>ODONATA</b>										
Argia sp	8.3	0	0	3	0	0	0	0	0	0
Calopteryx sp	7.5	0	0	0	0	1	0	7	0	4
Cordulegaster sp	5.7	0	0	0	1	1	0	0	1	0
Ophiogomphus sp	5.9	0	0	0	3	0	1	6	0	1

**Benthic Macroinvertebrate Calculations**  
**Reedy Creek Feasibility Study- Additional Sampling, Charlotte, N.C.**

**S&ME Project No. 1357-12-009**  
**June 5, 2012**

		R1	R2	R3	R6	R7	R8	R9	R5	R10
Collection date:		5/25/11	5/25/11	5/25/11	4/25/12	5/16/12	5/16/21	4/26/12	4/26/12	4/26/12
Taxon	TV	Number Identified								
Progomphus obscurus	8.2	0	0	0	0	1	0	7	0	4
Stylogomphus albistylus	5	0	0	0	1	0	1	1	0	0
Boyeria vinosa (very small)	5.8	0	0	0	1	0	0	0	0	1
DIPTERA: MISC.										
Dixa sp	2.5	0	2	6	0	0	0	3	0	0
Dixella indiana	4.9	0	0	0	0	1	2	2	3	2
Empididae	7.6	0	1	0	0	0	0	0	0	0
Hexatoma sp	3.5	0	0	5	0	0	3	0	0	0
Antocha sp.	4.4	0	0	1	0	0	0	0	0	0
Tipula sp	7.5	7	11	3	3	3	10	10	2	0
Pseudolimnophila sp	6.2	0	0	2	0	0	1	1	1	0
Anopheles sp.	8.6	1	0	0	0	0	0	0	0	0
Simulium spp (3+)	4.9	8	2	4	7	37	1	16	23	10
Simulium venustum	7.3	1	8	0	0	0	0	0	0	0
Bittacomorpha sp	--	0	1	0	0	0	0	0	0	0
Chrysops sp	6.7	0	0	0	0	2	0	0	0	0
DIPTERA: CHIRONOMIDAE										
Ablabesmyia mallochi	7.4	0	0	1	0	0	0	0	0	0
Brillia sp	5.7	0	0	0	0	0	1	0	0	0
Chironomus spp	9.3	0	5	0	13	10	0	2	6	1
Conchapelopia group	--	1	1	2	1	9	22	2	5	0
Corynoneura spp	5.7	0	0	0	0	0	0	1	2	1
Cricotopus bicinctus	8.7	0	0	0	0	0	0	3	1	0
Cricotopus vierriensis gr	5.4	0	0	0	0	0	0	0	0	1
Cryptochironomus spp	6.4	0	0	1	0	1	5	0	0	0
Eukiefferiella claripennis gr	6.2	2	0	0	0	0	0	0	1	0
Krenosmittia sp	--	0	0	0	0	0	1	0	0	0
Microtendipes sp	4.6	3	0	4	0	0	0	0	2	0
Natarsia sp	9.6	0	0	0	0	1	1	0	0	0
Paracladopelma sp	6.3	1	0	0	0	0	0	0	0	0
Parametrioconemus lundbecki	3.9	2	2	0	7	11	25	4	6	0
Paratanytarsus sp	8	0	0	0	0	3	0	1	0	0
Paratendipes sp	5.6	0	0	0	0	1	1	0	0	0

**Benthic Macroinvertebrate Calculations**  
**Reedy Creek Feasibility Study- Additional Sampling, Charlotte, N.C.**

**S&ME Project No. 1357-12-009**  
**June 5, 2012**

Collection date:		R1	R2	R3	R6	R7	R8	R9	R5	R10
		5/25/11	5/25/11	5/25/11	4/25/12	5/16/12	5/16/21	4/26/12	4/26/12	4/26/12
Taxon	TV	Number Identified								
Phaenopsectra flavipes gr	--	1	0	0	0	0	1	0	1	0
Phaenopsectra sp	--	4	0	0	0	1	0	1	0	0
Polypedilum aviceps	3.6	0	0	0	3	3	17	0	2	0
Polypedilum fallax gr	6.5	0	1	0	1	0	1	1	0	0
Polypedilum flavum	5.7	0	2	1	0	0	0	0	0	0
Polypedilum illinoense gr	8.7	1	0	0	0	0	1	3	1	0
Polypedilum scalaenum gr	8.5	0	0	0	0	0	2	0	0	0
Polypedilum tritum	--	0	0	0	1	0	0	0	0	0
Procladius sp	8.8	0	0	0	1	0	0	0	0	0
Rheosmittia sp	6.8	0	0	0	0	0	0	1	0	0
Rheotanytarsus sp	6.5	0	1	0	1	0	0	0	0	1
Tanytarsus spp	6.6	0	0	0	0	0	0	0	2	1
Thienemaniella spp	6.4	0	0	0	0	0	1	1	3	1
Tribelos jucundum	5.7	0	0	0	1	0	0	0	0	0
Tvetenia bavarica gr	3.6	0	0	0	4	0	2	3	3	0
Zavrelimyia sp	8.6	0	0	0	0	1	1	0	1	0
OLIGOCHAETA										
Eclipidrilus sp	--	0	0	0	0	0	0	1	0	0
Lumbriculus variegatus	--	0	0	0	0	0	1	0	0	0
Nais sp	8.7	0	0	0	4	0	0	0	0	0
CRUSTACEA										
Cambarus spp	7.5	0	3	0	1	0	0	1	1	3
MOLLUSCA										
Physa sp	8.7	0	1	0	0	2	5	0	1	0
<b>TOTALS</b>		<b>66</b>	<b>55</b>	<b>82</b>	<b>175</b>	<b>105</b>	<b>170</b>	<b>143</b>	<b>102</b>	<b>49</b>

<b>Summary Metrics</b>	<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R6</b>	<b>R7</b>	<b>R8</b>	<b>R9</b>	<b>R5</b>	<b>R10</b>
Survey Method	Qual4	Standard	Standard						
Total Taxa Richness	16	17	22	33	25	35	38	31	18
Total Abundance	66	55	82	175	105	170	143	102	49
EPT Taxa Richness	4	2	9	13	5	9	13	9	4
EPT Abundance	34	8	48	117	11	58	61	30	15
NC Raw Biotic Index	6.49	6.89	5.16	4.62	6.23	4.80	5.47	5.67	6.03
Seasonally Corrected Biotic Index	6.69	7.09	5.36	4.82	6.43	5.00	5.67	5.87	6.23
Biotic Index Bioclassification Score	Fair	Poor	Good	Good	Fair	Good	Good-Fair	Fair	Fair

# **APPENDIX II**

## **PHYSIOCHEMICAL FIELD ASSESSMENT DATA**

Water Quality Laboratory Results:  
Report of Analysis 6/3/2011 (**Shealy**)  
Report of Analysis 6/27/2011 (**Shealy**)  
Sample Results 5/10/2012 (**Prism**)

Water Quality Index (WQI) Calculations  
(**S&ME**)



## Report of Analysis

### **S&ME, Inc.**

9751 Southern Pine Blvd  
Charlotte, NC 28273  
Attention: Joey Lawler

Project Name: **Reedy Creek**

Project Number: **1357-11-011**

Lot Number: **ME24031**

Date Completed: **06/03/2011**



**Nisreen Saikaly**  
Project Manager



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The following non-paginated documents are considered part of this report: Chain of Custody Record and Sample Receipt Checklist.

\* ME24031 \*

# SHEALY ENVIRONMENTAL SERVICES, INC.

SC DHEC No: 32010

NELAC No: E87653

NC DEHNR No: 329

## Case Narrative

**S&ME, Inc.**

**Lot Number: ME24031**

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.

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Shealy is not NELAC certified for Phosphorus by 365.1 but is certified in SC and NC.

Shealy is not NELAC certified for VPH, but is certified for VPH in NC.

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

# SHEALY ENVIRONMENTAL SERVICES, INC.

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## Sample Summary

S&ME, Inc.

Lot Number: ME24031

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Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	Reach 1	Aqueous	05/24/2011 1200	05/24/2011
002	Reach 2	Aqueous	05/24/2011 1100	05/24/2011
003	Reach 3	Aqueous	05/24/2011 1220	05/24/2011

---

(3 samples)

# SHEALY ENVIRONMENTAL SERVICES, INC.

## Executive Summary

S&ME, Inc.

Lot Number: ME24031

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	Reach 1	Aqueous	Nitrate - N	353.2	0.49		mg/L	5
001	Reach 1	Aqueous	Phosphorus	365.1	0.054		mg/L	5
001	Reach 1	Aqueous	TDS	SM 2540C	100		mg/L	5
001	Reach 1	Aqueous	Fecal Coliform-MF	SM 9222D	520		col/100	5
002	Reach 2	Aqueous	Nitrate - N	353.2	0.086		mg/L	6
002	Reach 2	Aqueous	Phosphorus	365.1	0.021		mg/L	6
002	Reach 2	Aqueous	TDS	SM 2540C	92		mg/L	6
002	Reach 2	Aqueous	Fecal Coliform-MF	SM 9222D	100	*	col/100	6
003	Reach 3	Aqueous	Nitrate - N	353.2	1.3		mg/L	7
003	Reach 3	Aqueous	Phosphorus	365.1	0.025		mg/L	7
003	Reach 3	Aqueous	TDS	SM 2540C	130		mg/L	7
003	Reach 3	Aqueous	Fecal Coliform-MF	SM 9222D	690	*	col/100	7

(12 detections)

# Inorganic non-metals

Client: **S&ME, Inc.**

Laboratory ID: **ME24031-001**

Description: **Reach 1**

Matrix: **Aqueous**

Date Sampled: **05/24/2011 1200**

Date Received: **05/24/2011**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(BOD, 5 day) SM 5210B	1	05/30/2011 1002	LDJ	05/25/2011 1141	6379
1		(Nitrate - N) 353.2	1	05/24/2011 1829	SMH		60308
1		(Phosphorus) 365.1	1	05/26/2011 1835	PMM	05/26/2011 0937	60426
1		(TDS) SM 2540C	1	05/25/2011 1400	MML		60331
1		(Fecal Colifo) SM	1	05/25/2011 1610	HBB	05/24/2011 1628	

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
BOD, 5 day		SM 5210B	ND		2.0	mg/L	1
Nitrate - N		353.2	0.49		0.020	mg/L	1
Phosphorus	7723-14-0	365.1	0.054		0.010	mg/L	1
TDS		SM 2540C	100		10	mg/L	1
Fecal Coliform-MF		SM 9222D	520		2	col/100mL	1

PQL = Practical quantitation limit

B = Detected in the method blank

E = Quantitation of compound exceeded the calibration range

ND = Not detected at or above the PQL

J = Estimated result < PQL and ≥ MDL

P = The RPD between two GC columns exceeds 40%

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

N = Recovery is out of criteria

H = Out of holding time

# Inorganic non-metals

Client: <b>S&amp;ME, Inc.</b>	Laboratory ID: <b>ME24031-002</b>
Description: <b>Reach 2</b>	Matrix: <b>Aqueous</b>
Date Sampled: <b>05/24/2011 1100</b>	
Date Received: <b>05/24/2011</b>	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(BOD, 5 day) SM 5210B	1	05/30/2011 1002	LDJ	05/25/2011 1141	6379
1		(Nitrate - N) 353.2	1	05/24/2011 1832	SMH		60308
1		(Phosphorus) 365.1	1	05/26/2011 1835	PMM	05/26/2011 0937	60426
1		(TDS) SM 2540C	1	05/25/2011 1400	MML		60331
1		(Fecal Colifo) SM	1	05/25/2011 1610	HBB	05/24/2011 1628	

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
BOD, 5 day		SM 5210B	ND		2.0	mg/L	1
Nitrate - N		353.2	0.086		0.020	mg/L	1
Phosphorus	7723-14-0	365.1	0.021		0.010	mg/L	1
TDS		SM 2540C	92		10	mg/L	1
Fecal Coliform-MF		SM 9222D	100	*	2	col/100mL	1

**Footnote(s): \* Estimated**

PQL = Practical quantitation limit	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range
ND = Not detected at or above the PQL	J = Estimated result < PQL and ≥ MDL	P = The RPD between two GC columns exceeds 40%
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"	N = Recovery is out of criteria	H = Out of holding time

# Inorganic non-metals

Client: **S&ME, Inc.**

Laboratory ID: **ME24031-003**

Description: **Reach 3**

Matrix: **Aqueous**

Date Sampled: **05/24/2011 1220**

Date Received: **05/24/2011**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(BOD, 5 day) SM 5210B	1	05/30/2011 1002	LDJ	05/25/2011 1141	6379
1		(Nitrate - N) 353.2	1	05/24/2011 1833	SMH		60308
1		(Phosphorus) 365.1	1	05/26/2011 1835	PMM	05/26/2011 0937	60426
1		(TDS) SM 2540C	1	05/25/2011 1400	MML		60331
1		(Fecal Colifo) SM	1	05/25/2011 1610	HBB	05/24/2011 1628	

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
BOD, 5 day		SM 5210B	ND		2.0	mg/L	1
Nitrate - N		353.2	1.3		0.020	mg/L	1
Phosphorus	7723-14-0	365.1	0.025		0.010	mg/L	1
TDS		SM 2540C	130		10	mg/L	1
Fecal Coliform-MF		SM 9222D	690	*	2	col/100mL	1

**Footnote(s): \* Estimated**

PQL = Practical quantitation limit	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range
ND = Not detected at or above the PQL	J = Estimated result < PQL and ≥ MDL	P = The RPD between two GC columns exceeds 40%
Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"	N = Recovery is out of criteria	H = Out of holding time





Report of Analysis

S&ME, Inc.  
9751 Southern Pine Blvd  
Charlotte, NC 28273  
Attention: Darrin Peine

Project Name: Reedy Creek

Project Number: 1357-11-011

Lot Number: MF16043

Date Completed: 06/27/2011



Nisreen Saikaly  
Project Manager



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**\* MF 16043 \***

# SHEALY ENVIRONMENTAL SERVICES, INC.

SC DHEC No: 32010

NELAC No: E87653

NC DEHNR No: 329

## Case Narrative

S&ME, Inc.

Lot Number: MF16043

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.

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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.

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Shealy is not NELAC certified for VPH, but is certified for VPH in NC.

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

# SHEALY ENVIRONMENTAL SERVICES, INC.

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## Sample Summary

S&ME, Inc.

Lot Number: MF16043

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Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	Reach 1	Aqueous	06/16/2011 1100	06/16/2011
002	Reach 2	Aqueous	06/16/2011 1045	06/16/2011
003	Reach 3	Aqueous	06/16/2011 1130	06/16/2011

---

(3 samples)

# SHEALY ENVIRONMENTAL SERVICES, INC.

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## Executive Summary

S&ME, Inc.

Lot Number: MF16043

Sample	Sample ID	Matrix	Parameter	Method	Result	Q	Units	Page
001	Reach 1	Aqueous	TS	SM 2540B	96		mg/L	5
002	Reach 2	Aqueous	TS	SM 2540B	100		mg/L	6
002	Reach 2	Aqueous	Turbidity	180.1	4.4		NTU	6
003	Reach 3	Aqueous	TS	SM 2540B	93		mg/L	7
003	Reach 3	Aqueous	Turbidity	180.1	1.2		NTU	7

(5 detections)

# Inorganic non-metals

Client: S&ME, Inc.	Laboratory ID: MF16043-001
Description: Reach 1	Matrix: Aqueous
Date Sampled: 06/16/2011 1100	
Date Received: 06/16/2011	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(TS) SM 2540B	1	06/22/2011 0813	ARW		62360
1		(Turbidity) 180.1	1	06/17/2011 1330	ARW		

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
TS		SM 2540B	96		10	mg/L	1
Turbidity		180.1	ND		1.0	NTU	1

PQL = Practical quantitation limit

B = Detected in the method blank

E = Quantitation of compound exceeded the calibration range

ND = Not detected at or above the PQL

J = Estimated result < PQL and ≥ MDL

P = The RPD between two GC columns exceeds 40%

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

N = Recovery is out of criteria

H = Out of holding time

# Inorganic non-metals

Client: S&ME, Inc.	Laboratory ID: MF16043-002
Description: Reach 2	Matrix: Aqueous
Date Sampled: 06/16/2011 1045	
Date Received: 06/16/2011	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(TS) SM 2540B	1	06/22/2011 0813	ARW		62360
1		(Turbidity) 180.1	1	06/17/2011 1330	ARW		

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
TS		SM 2540B	100		10	mg/L	1
Turbidity		180.1	4.4		1.0	NTU	1

PQL = Practical quantitation limit

B = Detected in the method blank

E = Quantitation of compound exceeded the calibration range

ND = Not detected at or above the PQL

J = Estimated result < PQL and ≥ MDL

P = The RPD between two GC columns exceeds 40%

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"

N = Recovery is out of criteria

H = Out of holding time

# Inorganic non-metals

Client: S&ME, Inc.	Laboratory ID: MF16043-003
Description: Reach 3	Matrix: Aqueous
Date Sampled: 06/16/2011 1130	
Date Received: 06/16/2011	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(TS) SM 2540B	1	06/22/2011 0813	ARW		62360
1		(Turbidity) 180.1	1	06/17/2011 1330	ARW		

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
TS		SM 2540B	93		10	mg/L	1
Turbidity		180.1	1.2		1.0	NTU	1

PQL = Practical quantitation limit      B = Detected in the method blank      E = Quantitation of compound exceeded the calibration range  
 ND = Not detected at or above the PQL      J = Estimated result < PQL and ≥ MDL      P = The RPD between two GC columns exceeds 40%  
 Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W"      N = Recovery is out of criteria      H = Out of holding time



# SHEALY ENVIRONMENTAL SERVICES, INC.

Shealy Environmental Services, Inc.  
 Document Number: F-AD-016  
 Revision Number: 8

Page 1 of 1  
 Replaces Date: 02/23/11  
 Effective Date: 05/06/11

## Sample Receipt Checklist (SRC)

Client: SIME Cooler Inspected by/date: lu 16/16/11 Lot #: MF11043

Means of receipt: <input checked="" type="checkbox"/> SESI <input type="checkbox"/> Client <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Airborne Exp <input type="checkbox"/> Other			
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	1. Were custody seals present on the cooler?	
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	2. If custody seals were present, were they intact and unbroken?	
Cooler ID/temperature upon receipt: <u>5/5</u> °C <u>1</u> °C <u>1</u> °C <u>1</u> °C <u>1</u> °C <u>1</u> °C <u>1</u> °C <u>1</u> °C			
Method: <input type="checkbox"/> Temperature Blank <input checked="" type="checkbox"/> Against Bottles			
Method of coolant: <input checked="" type="checkbox"/> Wet Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> Dry Ice <input type="checkbox"/> None			
If response is No (or Yes for 14, 15, 16), an explanation/resolution must be provided.			
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	3. If temperature of any cooler exceeded 6.0°C, was Project Manager notified? PM notified by SRC, phone, note (circle one), other: _____ (For coolers received via commercial courier, PMs are to be notified immediately.)
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>	4. Is the commercial courier's packing slip attached to this form?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		5. Were proper custody procedures (relinquished/received) followed?
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	5a. Were samples relinquished by client to commercial courier?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		6. Were sample IDs listed?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		7. Was collection date & time listed?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		8. Were tests to be performed listed on the COC?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		9. Did all samples arrive in the proper containers for each test?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		10. Did all container label information (ID, date, time) agree with COC?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		11. Did all containers arrive in good condition (unbroken, lids on, etc.)?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		12. Was adequate sample volume available?
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		13. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		14. Were any samples containers missing?
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		15. Were there any excess samples not listed on COC?
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	16. Were bubbles present >"pea-size" (¼" or 6mm in diameter) in any VOA vials?
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	17. Were all metals/O&G/HEM/nutrient samples received at a pH of <2?
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	18. Were all cyanide and/or sulfide samples received at a pH >12?
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	19. Were all applicable NH3/TKN/cyanide/phenol/BNA/pest/PCB/herb (<0.2mg/L) samples free of residual chlorine?
Yes <input type="checkbox"/>	No <input type="checkbox"/>	NA <input checked="" type="checkbox"/>	20. Were collection temperatures documented on the COC for NC samples?
<b>Sample Preservation</b> (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 <sub>2</sub> SO <sub>4</sub> , HNO <sub>3</sub> , HCl, NaOH) with the SR # (number) _____			
Sample(s) _____ were received with bubbles >6 mm in diameter.			
Sample(s) _____ were received with TRC >0.2 mg/L for NH3/TKN/cyanide/BNA/pest/PCB/herb.			

**Corrective Action taken, if necessary:**

Was client notified: Yes  No

SESI employee: \_\_\_\_\_

Comments: \_\_\_\_\_

Did client respond: Yes  No

Date of response: \_\_\_\_\_

S&ME, Inc - Charlotte  
Darren Peine  
9751 Southern Pine Blvd.  
Charlotte, NC 28273-5560

Project: Reedy Creek

Lab Submittal Date: 04/26/2012

Prism Work Order: 2040612

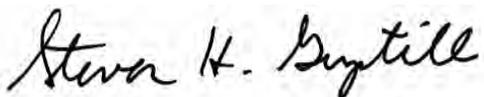
This data package contains the analytical results for the project identified above and includes a Case Narrative, Sample Results and Chain of Custody. Unless otherwise noted, all samples were received in acceptable condition and processed according to the referenced methods.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative.

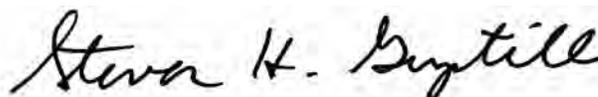
Please call if you have any questions relating to this analytical report.

Respectfully,

**PRISM LABORATORIES, INC.**



Project Manager



Reviewed By

**Data Qualifiers Key Reference:**

- A Seed value is greater than 1 mg/L, but validity of the data is not affected.
- BRL Below Reporting Limit
- MDL Method Detection Limit
- RPD Relative Percent Difference
- \* Results reported to the reporting limit. All other results are reported to the MDL with values between MDL and reporting limit indicated with a J.

Client Sample ID	Lab Sample ID	Matrix	Date Sampled	Date Received
R6	2040612-01	Water	04/26/12	04/26/12
R7	2040612-02	Water	04/26/12	04/26/12
R8	2040612-03	Water	04/26/12	04/26/12
R9	2040612-04	Water	04/26/12	04/26/12
R10	2040612-05	Water	04/26/12	04/26/12
R5	2040612-06	Water	04/26/12	04/26/12

Samples received in good condition at 3.7 degrees C unless otherwise noted.

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Sample Matrix: Water

Client Sample ID: R6  
Prism Sample ID: 2040612-01  
Prism Work Order: 2040612  
Time Collected: 04/26/12 11:55  
Time Submitted: 04/26/12 14:07

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
<b>Anions by Ion Chromatography</b>									
Nitrate as N	0.52	mg/L	0.10	0.0015	1	*300.0	4/27/12 16:50	RSL	P2D0498
<b>General Chemistry Parameters</b>									
Biochemical Oxygen Demand	16 A	mg/L	2.0		1	*SM5210 B	4/27/12 14:30	MSV	P2E0005
Phosphorus-Total	0.089	mg/L	0.050	0.0088	1	*SM4500-P F	5/1/12 8:19	CLB	P2D0549
Total Solids	110	mg/L	20	4.9	1	*SM2540 B	4/30/12 12:30	JAB	P2D0544
Turbidity	2.8	NTU	0.40	0.022	1	*180.1	4/27/12 8:45	JAB	P2D0515
<b>Microbiological Parameters</b>									
Fecal Coliforms	62	CFU/100 ml	2		1	*SM9222 D	4/26/12 15:04	RSL	P2D0521

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Project: Reedy Creek

Sample Matrix: Water

Client Sample ID: R7  
 Prism Sample ID: 2040612-02  
 Prism Work Order: 2040612  
 Time Collected: 04/26/12 12:00  
 Time Submitted: 04/26/12 14:07

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
<b>Anions by Ion Chromatography</b>									
Nitrate as N	0.16	mg/L	0.10	0.0015	1	*300.0	4/27/12 17:06	RSL	P2D0498
<b>General Chemistry Parameters</b>									
Biochemical Oxygen Demand	2.1 A	mg/L	2.0		1	*SM5210 B	4/27/12 14:30	MSV	P2E0005
Phosphorus-Total	0.090	mg/L	0.050	0.0088	1	*SM4500-P F	5/1/12 8:19	CLB	P2D0549
Total Solids	100	mg/L	20	4.9	1	*SM2540 B	4/30/12 12:30	JAB	P2D0544
Turbidity	11	NTU	0.40	0.022	1	*180.1	4/27/12 8:45	JAB	P2D0515
<b>Microbiological Parameters</b>									
Fecal Coliforms	350	CFU/100 ml	2		1	*SM9222 D	4/26/12 15:04	RSL	P2D0521

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Project: Reedy Creek

Sample Matrix: Water

Client Sample ID: R8  
 Prism Sample ID: 2040612-03  
 Prism Work Order: 2040612  
 Time Collected: 04/26/12 11:45  
 Time Submitted: 04/26/12 14:07

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
<b>Anions by Ion Chromatography</b>									
Nitrate as N	1.8	mg/L	0.10	0.0015	1	*300.0	4/27/12 16:33	RSL	P2D0498
<b>General Chemistry Parameters</b>									
Biochemical Oxygen Demand	BRL <sub>A</sub>	mg/L	2.0		1	*SM5210 B	4/27/12 14:30	MSV	P2E0005
Phosphorus-Total	0.12	mg/L	0.050	0.0088	1	*SM4500-P F	5/1/12 8:19	CLB	P2D0549
Total Solids	120	mg/L	20	4.9	1	*SM2540 B	4/30/12 12:30	JAB	P2D0544
Turbidity	1.8	NTU	0.40	0.022	1	*180.1	4/27/12 8:45	JAB	P2D0515
<b>Microbiological Parameters</b>									
Fecal Coliforms	200	CFU/100 ml	2		1	*SM9222 D	4/26/12 15:04	RSL	P2D0521

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Project: Reedy Creek

Sample Matrix: Water

Client Sample ID: R9  
 Prism Sample ID: 2040612-04  
 Prism Work Order: 2040612  
 Time Collected: 04/26/12 12:15  
 Time Submitted: 04/26/12 14:07

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
<b>Anions by Ion Chromatography</b>									
Nitrate as N	0.68	mg/L	0.10	0.0015	1	*300.0	4/27/12 17:22	RSL	P2D0498
<b>General Chemistry Parameters</b>									
Biochemical Oxygen Demand	BRL <sub>A</sub>	mg/L	2.0		1	*SM5210 B	4/27/12 14:30	MSV	P2E0005
Phosphorus-Total	0.094	mg/L	0.050	0.0088	1	*SM4500-P F	5/1/12 8:19	CLB	P2D0549
Total Solids	100	mg/L	20	4.9	1	*SM2540 B	4/30/12 12:30	JAB	P2D0544
Turbidity	4.4	NTU	0.40	0.022	1	*180.1	4/27/12 8:45	JAB	P2D0515
<b>Microbiological Parameters</b>									
Fecal Coliforms	740	CFU/100 ml	2		1	*SM9222 D	4/26/12 15:04	RSL	P2D0521

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Project: Reedy Creek

Sample Matrix: Water

Client Sample ID: R10  
Prism Sample ID: 2040612-05  
Prism Work Order: 2040612  
Time Collected: 04/26/12 12:20  
Time Submitted: 04/26/12 14:07

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
<b>Anions by Ion Chromatography</b>									
Nitrate as N	0.28	mg/L	0.10	0.0015	1	*300.0	4/27/12 17:39	RSL	P2D0498
<b>General Chemistry Parameters</b>									
Biochemical Oxygen Demand	13 A	mg/L	2.0		1	*SM5210 B	4/27/12 14:30	MSV	P2E0005
Phosphorus-Total	0.080	mg/L	0.050	0.0088	1	*SM4500-P F	5/1/12 8:19	CLB	P2D0549
Total Solids	90	mg/L	20	4.9	1	*SM2540 B	4/30/12 12:30	JAB	P2D0544
Turbidity	2.9	NTU	0.40	0.022	1	*180.1	4/27/12 8:45	JAB	P2D0515
<b>Microbiological Parameters</b>									
Fecal Coliforms	470	CFU/100 ml	2		1	*SM9222 D	4/26/12 15:04	RSL	P2D0521

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Project: Reedy Creek

Sample Matrix: Water

Client Sample ID: R5  
Prism Sample ID: 2040612-06  
Prism Work Order: 2040612  
Time Collected: 04/26/12 13:15  
Time Submitted: 04/26/12 14:07

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
<b>Anions by Ion Chromatography</b>									
Nitrate as N	0.28	mg/L	0.10	0.0015	1	*300.0	4/27/12 17:55	RSL	P2D0498
<b>General Chemistry Parameters</b>									
Biochemical Oxygen Demand	20 A	mg/L	7.0		1	*SM5210 B	4/27/12 14:30	MSV	P2E0005
Phosphorus-Total	0.077	mg/L	0.050	0.0088	1	*SM4500-P F	5/1/12 8:19	CLB	P2D0549
Total Solids	90	mg/L	20	4.9	1	*SM2540 B	4/30/12 12:30	JAB	P2D0544
Turbidity	2.6	NTU	0.40	0.022	1	*180.1	4/27/12 8:45	JAB	P2D0515
<b>Microbiological Parameters</b>									
Fecal Coliforms	1000	CFU/100 ml	2		1	*SM9222 D	4/26/12 15:04	RSL	P2D0521

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Prism Work Order: 2040612  
Time Submitted: 4/26/2012 2:07:00PM

**Anions by Ion Chromatography - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch P2D0498 - NO PREP</b>										
<b>Blank (P2D0498-BLK1)</b>										
Prepared & Analyzed: 04/26/12										
Nitrate as N	BRL	0.10	mg/L							
<b>LCS (P2D0498-BS1)</b>										
Prepared & Analyzed: 04/26/12										
Nitrate as N	1.88	0.10	mg/L	2.000		94	90-110			

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**General Chemistry Parameters - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch P2D0515 - NO PREP</b>										
<b>Blank (P2D0515-BLK1)</b>				Prepared & Analyzed: 04/27/12						
Turbidity	BRL	0.40	NTU							
<b>LCS (P2D0515-BS1)</b>				Prepared & Analyzed: 04/27/12						
Turbidity	3.65	0.40	NTU	4.000		91	90-110			
<b>Duplicate (P2D0515-DUP1)</b>				Source: 2040612-06		Prepared & Analyzed: 04/27/12				
Turbidity	2.73	0.40	NTU		2.64			3	20	
<b>Batch P2D0544 - NO PREP</b>										
<b>Blank (P2D0544-BLK1)</b>				Prepared & Analyzed: 04/30/12						
Total Solids	BRL	20	mg/L							
<b>LCS (P2D0544-BS1)</b>				Prepared & Analyzed: 04/30/12						
Total Solids	982	20	mg/L	1000		98	90-110			
<b>Duplicate (P2D0544-DUP1)</b>				Source: 2040612-06		Prepared & Analyzed: 04/30/12				
Total Solids	84.0	20	mg/L		90.0			7	20	
<b>Batch P2D0549 - SM4500-PB5</b>										
<b>Blank (P2D0549-BLK1)</b>				Prepared: 04/30/12 Analyzed: 05/01/12						
Phosphorus-Total	BRL	0.050	mg/L							
<b>LCS (P2D0549-BS1)</b>				Prepared: 04/30/12 Analyzed: 05/01/12						
Phosphorus-Total	2.00	0.050	mg/L	2.000		100	90-110			

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Project: Reedy Creek

Prism Work Order: 2040612  
Time Submitted: 4/26/2012 2:07:00PM

**General Chemistry Parameters - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch P2E0005 - NO PREP</b>										
<b>Blank (P2E0005-BLK1)</b>				Prepared & Analyzed: 04/27/12						
Biochemical Oxygen Demand	BRL	2.0	mg/L							
<b>LCS (P2E0005-BS1)</b>				Prepared & Analyzed: 04/27/12						
Biochemical Oxygen Demand	208	2.0	mg/L	198.0		105	85-115			

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Prism Work Order: 2040612  
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**Microbiological Parameters - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch P2D0521 - NO PREP**

**Blank (P2D0521-BLK1)** Prepared & Analyzed: 04/26/12

Fecal Coliforms	BRL	2	CFU/100 ml							
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**Duplicate (P2D0521-DUP1)** Source: 2040612-03 Prepared & Analyzed: 04/26/12

Fecal Coliforms	200	2	CFU/100 ml		200			0	20	
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**Sample Extraction Data**

Prep Method: SM4500-PB5

Lab Number	Batch	Initial	Final	Date/Time
2040612-01	P2D0549	50 mL	50 mL	04/30/12 14:18
2040612-02	P2D0549	50 mL	50 mL	04/30/12 14:18
2040612-03	P2D0549	50 mL	50 mL	04/30/12 14:18
2040612-04	P2D0549	50 mL	50 mL	04/30/12 14:18
2040612-05	P2D0549	50 mL	50 mL	04/30/12 14:18
2040612-06	P2D0549	50 mL	50 mL	04/30/12 14:18



### R1 Water Quality Index Calculation

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Factor	Total
Nitrate	0.49	mg/L	97	0.1	9.7	0.11	10.8
TP	0.054	mg/L	98	0.1	9.8	0.11	10.9
BOD-5*	2	mg/L	80	0.11	8.8	0.12	9.8
Fecal Coliform	520	c/100ml	28	0.16	4.48	0.18	5.0
Turbidity	0	NTU	99	0.08	7.92	0.09	8.8
pH	6.95	Units	87	0.11	9.57	0.12	10.6
DO	97	% sat***	99	0.17	16.83	0.19	18.7
	9.22	mg/L					
Temperature**	19.25	°C	--	0.1	--	--	--
TS	96	mg/L	84	0.07	5.88	0.08	6.5
<b>TOTALS:</b>					<b>73.0</b>		<b>81.1</b>

### R2 Water Quality Index Calculation

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Factor	Total
Nitrate	0.086	mg/L	97	0.1	9.7	0.11	10.8
TP	0.021	mg/L	99	0.1	9.9	0.11	11.0
BOD-5*	2	mg/L	80	0.11	8.8	0.12	9.8
Fecal Coliform	100	c/100ml	44	0.16	7.04	0.18	7.8
Turbidity	4.4	NTU	87	0.08	6.96	0.09	7.7
pH	6.26	Units	62	0.11	6.82	0.12	7.6
DO	69	% sat***	73	0.17	12.41	0.19	13.8
	6.54	mg/L					
Temperature**	18.4	°C	--	0.1	--	--	--
TS	100	mg/L	83	0.07	5.81	0.08	6.5
<b>TOTALS:</b>					<b>67.4</b>		<b>74.9</b>

### R3 Water Quality Index Calculation

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Factor	Total
Nitrate	1.3	mg/L	96	0.1	9.6	0.11	10.7
TP	0.025	mg/L	99	0.1	9.9	0.11	11.0
BOD-5*	2	mg/L	80	0.11	8.8	0.12	9.8
Fecal Coliform	690	c/100ml	26	0.16	4.16	0.18	4.6
Turbidity	1.2	NTU	95	0.08	7.6	0.09	8.4
pH	7.44	Units	93	0.11	10.23	0.12	11.4
DO	96	% sat***	99	0.17	16.83	0.19	18.7
	8.93	mg/L					
Temperature**	19.22	°C	--	0.1	--	--	--
TS	93	mg/L	84	0.07	5.88	0.08	6.5
<b>TOTALS:</b>					<b>73.0</b>		<b>81.1</b>

\*BOD results were below the reporting limit, thus the reporting limit of 3.7 was used to provide a conservative Q-value estimate.

\*\*No exposed upstream area was available for temperature change sampling. In order to compensate for this, the weighting factors of all other components of the WQI were adjusted up so that the sum of the remaining factors equals 1.

\*\*\*DO percent saturation calculated based on the known saturation level for the observed mg/L at the observed temperature

### R5 Water Quality Index Calculation

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Factor	Total
Nitrate	0.28	mg/L	97	0.1	9.7	0.11	10.8
TP	0.077	mg/L	97	0.1	9.7	0.11	10.8
BOD-5	20	mg/L	12	0.11	1.32	0.12	1.5
Fecal Coliform	1000	c/100ml	22	0.16	3.52	0.18	3.9
Turbidity	2.6	NTU	91	0.08	7.28	0.09	8.1
pH	8.01	Units	84	0.11	9.24	0.12	10.3
DO	81	% sat***	88	0.17	14.96	0.19	16.6
	8.11	mg/L					
Temperature**	16	°C	--	0.1	--	--	--
TS	90	mg/L	84	0.07	5.88	0.08	6.5
<b>TOTALS:</b>					<b>61.6</b>		<b>68.4</b>

### R6 Water Quality Index Calculation

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Factor	Total
Nitrate	0.52	mg/L	96	0.1	9.6	0.11	10.7
TP	0.089	mg/L	96	0.1	9.6	0.11	10.7
BOD-5	16	mg/L	18	0.11	1.98	0.12	2.2
Fecal Coliform	62	c/100ml	50	0.16	8	0.18	8.9
Turbidity	2.8	NTU	91	0.08	7.28	0.09	8.1
pH	7.75	Units	91	0.11	10.01	0.12	11.1
DO	69	% sat***	73	0.17	12.41	0.19	13.8
	7.18	mg/L					
Temperature**	14.2	°C	--	0.1	--	--	--
TS	110	mg/L	83	0.07	5.81	0.08	6.5
<b>TOTALS:</b>					<b>64.7</b>		<b>71.9</b>

### R7 Water Quality Index Calculation

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Factor	Total
Nitrate	0.16	mg/L	97	0.1	9.7	0.11	10.8
TP	0.09	mg/L	96	0.1	9.6	0.11	10.7
BOD-5	2.1	mg/L	78	0.11	8.58	0.12	9.5
Fecal Coliform	350	c/100ml	32	0.16	5.12	0.18	5.7
Turbidity	11	NTU	74	0.08	5.92	0.09	6.6
pH	7.98	Units	85	0.11	9.35	0.12	10.4
DO	81	% sat***	88	0.17	14.96	0.19	16.6
	8.67	mg/L					
Temperature**	13.2	°C	--	0.1	--	--	--
TS	100	mg/L	83	0.07	5.81	0.08	6.5
<b>TOTALS:</b>					<b>69.0</b>		<b>76.7</b>

**R8 Water Quality Index Calculation**

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Weighting Factor	Adjusted Total
Nitrate	1.8	mg/L	95	0.1	9.5	0.11	10.6
TP	0.12	mg/L	92	0.1	9.2	0.11	10.2
BOD-5*	2	mg/L	80	0.11	8.8	0.12	9.8
Fecal Coliform	200	c/100ml	37	0.16	5.92	0.18	6.6
Turbidity	1.8	NTU	99	0.08	7.92	0.09	8.8
pH	8.18	Units	87	0.11	9.57	0.12	10.6
DO	80	% sat***	87	0.17	14.79	0.19	16.4
	8.91	mg/L					
Temperature**	11.6	°C	--	0.1	--	--	--
TS	120	mg/L	82	0.07	5.74	0.08	6.4
<b>TOTALS:</b>					<b>71.4</b>		<b>79.4</b>

**R9 Water Quality Index Calculation**

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Weighting Factor	Adjusted Total
Nitrate	0.68	mg/L	96	0.1	9.6	0.11	10.7
TP	0.094	mg/L	96	0.1	9.6	0.11	10.7
BOD-5*	2	mg/L	80	0.11	8.8	0.12	9.8
Fecal Coliform	740	c/100ml	25	0.16	4	0.18	4.4
Turbidity	4.4	NTU	87	0.08	6.96	0.09	7.7
pH	8.18	Units	78	0.11	8.58	0.12	9.5
DO	80	% sat***	87	0.17	14.79	0.19	16.4
	8.41	mg/L					
Temperature**	14.2	°C	--	0.1	--	--	--
TS	100	mg/L	83	0.07	5.81	0.08	6.5
<b>TOTALS:</b>					<b>68.1</b>		<b>75.7</b>

**R10 Water Quality Index Calculation**

Parameter	Test Results		Q-Value	Weighing		Adjusted	
				Factor	Total	Weighting Factor	Adjusted Total
Nitrate	0.28	mg/L	97	0.1	9.7	0.11	10.8
TP	0.08	mg/L	97	0.1	9.7	0.11	10.8
BOD-5	13	mg/L	25	0.11	2.75	0.12	3.1
Fecal Coliform	470	c/100ml	29	0.16	4.64	0.18	5.2
Turbidity	2.9	NTU	90	0.08	7.2	0.09	8.0
pH	8.01	Units	84	0.11	9.24	0.12	10.3
DO	80	% sat***	87	0.17	14.79	0.19	16.4
	8.11	mg/L					
Temperature**	15.5	°C	--	0.1	--	--	--
TS	90	mg/L	84	0.07	5.88	0.08	6.5
<b>TOTALS:</b>					<b>63.9</b>		<b>71.0</b>

\*BOD results were below the reporting limit, thus the reporting limit was used to provide a conservative Q-value estimate.

\*\*No exposed upstream area was available for temperature change sampling. In order to compensate for this, the weighting factors of all other components of the WQI were adjusted up so that the sum of the remaining factors equals 1.

\*\*\*DO percent saturation calculated based on the known saturation level for the observed mg/L at the observed temperature

# **APPENDIX III**

## **SITE PHOTOGRAPHS**





1 Reach 1. Facing upstream



2 Reach 2. Facing upstream



3 Reach 3. Facing upstream



4 Reach 6. Facing downstream



5 Reach 7. Facing downstream



6 Reach 8. Facing downstream

Taken by: DMP

Checked by: DMH



**SITE PHOTOGRAPHS**

Reedy Creek Feasibility Study  
Mecklenburg County, North Carolina

Project Nos.: 1357-11-011 & 12-009

**Photo Page 1**



7 Reach 9. Facing downstream



8 Reach 10. Facing downstream



9 Reach 5. Facing downstream

Taken by: DMP

Checked by: DMH



**SITE PHOTOGRAPHS**

Reedy Creek Feasibility Study  
Mecklenburg County, North Carolina

Project Nos.: 1357-11-011 & 12-009

**Photo Page 2**

# Appendix 6

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>		Location: <b>Reach 3</b>	
Station: <b>200 feet upstream</b>		Observers: <b>Will Wilhelm</b>	
Date: <b>5/10/2010</b>	Stream Type:	Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>8.70 (A)</b>	Bankfull Height (ft) =	<b>1.60 (B)</b>	( A ) / ( B ) =	<b>5.44 (C)</b>
					<b>10.0</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>3.00 (D)</b>	Study Bank Height (ft) =	<b>8.70 (A)</b>	( D ) / ( A ) =	<b>0.34 (E)</b>
					<b>5.0</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>50% (F)</b>	( F ) × ( E ) =			<b>4.35 (G)</b>
					<b>7.5</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>110 (H)</b>				<b>9.0</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>20% (I)</b>				<b>7.1</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<b>10</b>
	<b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage
	<b>5</b>

<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Extreme</b>	<b>Adjective Rating and Total Score</b>	<b>Extreme</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>		Location: <b>Reach 3</b>	
Station: <b>400 feet upstream (Right)</b>		Observers: <b>Will Wilhelm</b>	
Date: <b>5/10/2010</b>	Stream Type:	Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>7.20 (A)</b>	Bankfull Height (ft) =	<b>2.00 (B)</b>	( A ) / ( B ) =	<b>3.60 (C)</b>
					<b>10.0</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>4.50 (D)</b>	Study Bank Height (ft) =	<b>7.20 (A)</b>	( D ) / ( A ) =	<b>0.63 (E)</b>
					<b>3.0</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>30% (F)</b>	( F ) × ( E ) =			<b>2.16 (G)</b>
					<b>7.5</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>50 (H)</b>				
					<b>3.2</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>75% (I)</b>				
					<b>2.1</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>				
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td><b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage</td> <td style="text-align: center;"><b>8</b></td> </tr> <tr> <td></td> <td style="text-align: center;"><b>7</b></td> </tr> </table>	<b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage	<b>8</b>		<b>7</b>
<b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage	<b>8</b>				
	<b>7</b>				

<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Extreme</b>	<b>Adjective Rating and Total Score</b>	<b>Very High</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		<b>40.8</b>

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>		Location: <b>Reach 3</b>	
Station: <b>200 feet upstream</b>		Observers: <b>Will Wilhelm</b>	
Date: <b>5/10/2010</b>	Stream Type:	Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>6.50 (A)</b>	Bankfull Height (ft) =	<b>2.50 (B)</b>	( A ) / ( B ) =	<b>2.60 (C)</b>
					<b>8.8</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>1.50 (D)</b>	Study Bank Height (ft) =	<b>6.50 (A)</b>	( D ) / ( A ) =	<b>0.23 (E)</b>
					<b>6.2</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>75% (F)</b>	( F ) × ( E ) =			<b>4.875 (G)</b>
					<b>7.7</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>90 (H)</b>				
					<b>7.9</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>5% (I)</b>				
					<b>10.0</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<b>5</b>
	<b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage
	<b>5</b>

<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Extreme</b>	<b>Adjective Rating and Total Score</b>	<b>Extreme</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>	Location: <b>Reach 4</b>
Station: <b>400 feet upstream (Right)</b>	Observers: <b>Will Wilhelm</b>
Date: <b>5/13/2011</b>	Stream Type: _____ Valley Type: _____

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>6.00 (A)</b>	Bankfull Height (ft) =	<b>1.50 (B)</b>	$(A) / (B) =$	<b>4.00 (C)</b>
					<b>10.0</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>2.00 (D)</b>	Study Bank Height (ft) =	<b>6.00 (A)</b>	$(D) / (A) =$	<b>0.33 (E)</b>
					<b>5.8</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>50% (F)</b>	$(F) \times (E) =$			<b>3 (G)</b>
					<b>7.8</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>80 (H)</b>				<b>5.9</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>80% (I)</b>				<b>1.9</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<b>0</b>
	<b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage
	<b>0</b>

Very Low	Low	Moderate	High	Very High	Extreme	<b>Adjective Rating and Total Score</b>	<b>High</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		<b>31.4</b>

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>	Location: <b>Reach 4</b>
Station: <b>300 feet upstream survey XS-1</b>	Observers: <b>Will Wilhelm</b>
Date: <b>5/13/2011</b>	Stream Type: _____ Valley Type: _____

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>3.90</b> (A)	Bankfull Height (ft) =	<b>1.20</b> (B)	( A ) / ( B ) =	<b>3.25</b> (C)
					<b>10.0</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>1.00</b> (D)	Study Bank Height (ft) =	<b>3.90</b> (A)	( D ) / ( A ) =	<b>0.26</b> (E)
					<b>6.3</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>25%</b> (F)	( F ) × ( E ) =			<b>0.975</b> (G)
					<b>8.8</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>90</b> (H)				
					<b>7.9</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>5%</b> (I)				
					<b>10.0</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<div style="border: 1px solid black; padding: 5px; background-color: #ADD8E6; width: 100px; margin: 0 auto;"> <b>10</b> </div>
	<div style="border: 1px solid black; padding: 5px; background-color: #ADD8E6; width: 100px; margin: 0 auto;"> <b>0</b> </div>

Very Low	Low	Moderate	High	Very High	Extreme	<b>Adjective Rating and Total Score</b>	<b>Extreme</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		<b>53.0</b>

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>		Location: <b>Reach 7</b>	
Station:		Observers: <b>Will Wilhelm/Jason Diaz</b>	
Date: <b>5/15/2012</b>	Stream Type:	Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)	
Study Bank Height (ft) =	<b>9.50 (A)</b>	Bankfull Height (ft) =	<b>2.00 (B)</b>	( A ) / ( B ) =	<b>4.75 (C)</b>	
					<b>10.0</b>	
<b>Root Depth / Study Bank Height ( E )</b>						
Root Depth (ft) =	<b>1.50 (D)</b>	Study Bank Height (ft) =	<b>9.50 (A)</b>	( D ) / ( A ) =	<b>0.16 (E)</b>	
					<b>7.8</b>	
<b>Weighted Root Density ( G )</b>						
Root Density as % =	<b>30% (F)</b>	( F ) × ( E ) =		<b>2.85 (G)</b>	<b>9.5</b>	
<b>Bank Angle ( H )</b>						
Bank Angle as Degrees =	<b>50 (H)</b>					<b>3.0</b>
<b>Surface Protection ( I )</b>						
Surface Protection as % =	<b>90% (I)</b>					<b>1.0</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage
	<b>0</b>

Very Low	Low	Moderate	High	Very High	Extreme	<b>Adjective Rating and Total Score</b>	<b>High</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>			Location: <b>Reach 7</b>		
Station:			Observers: <b>Will Wilhelm/Jason Diaz</b>		
Date: <b>5/15/2012</b>		Stream Type:		Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>9.00 (A)</b>	Bankfull Height (ft) =	<b>2.00 (B)</b>	( A ) / ( B ) =	<b>4.50 (C)</b>
					<b>10.0</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>2.00 (D)</b>	Study Bank Height (ft) =	<b>9.00 (A)</b>	( D ) / ( A ) =	<b>0.22 (E)</b>
					<b>6.2</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>30% (F)</b>	( F ) × ( E ) =			<b>2.7 (G)</b>
					<b>9.5</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>45 (H)</b>				
					<b>3.0</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>90% (I)</b>				
					<b>1.0</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<ul style="list-style-type: none"> <li><b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage</li> </ul>
	<b>0</b>

<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Extreme</b>	<b>Adjective Rating and Total Score</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50	<b>Moderate</b>
						<b>29.7</b>

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>		Location: <b>Reach 6</b>	
Station:		Observers: <b>Will Wilhelm/Jason Diaz</b>	
Date: <b>5/15/2012</b>	Stream Type:	Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>8.00 (A)</b>	Bankfull Height (ft) =	<b>1.50 (B)</b>	( A ) / ( B ) =	<b>5.33 (C)</b>
					<b>10.0</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>1.50 (D)</b>	Study Bank Height (ft) =	<b>8.00 (A)</b>	( D ) / ( A ) =	<b>0.19 (E)</b>
					<b>7.0</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>20% (F)</b>	( F ) × ( E ) =			<b>1.6 (G)</b>
					<b>10.0</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =			<b>75 (H)</b>		
					<b>5.8</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =			<b>50% (I)</b>		
					<b>4.0</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<ul style="list-style-type: none"> <li><b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage</li> </ul>
	<b>0</b>

<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Extreme</b>	<b>Adjective Rating and Total Score</b>	<b>High</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		<b>36.8</b>

**Bank Sketch**

**Worksheet 3-11.** Form to calculate Bank Erosion Hazard Index (BEHI) variables and an overall BEHI rating. Use **Figure 3-7** with BEHI variables to determine BEHI score.

Stream: <b>Reedy Creek</b>			Location: <b>Reach 11</b>		
Station:			Observers: <b>Will Wilhelm/Jason Diaz</b>		
Date: <b>5/15/2012</b>		Stream Type:		Valley Type:	

<b>Study Bank Height / Bankfull Height ( C )</b>					<b>BEHI Score</b> (Fig. 3-7)
Study Bank Height (ft) =	<b>6.00 (A)</b>	Bankfull Height (ft) =	<b>2.00 (B)</b>	( A ) / ( B ) =	<b>3.00 (C)</b>
					<b>9.5</b>
<b>Root Depth / Study Bank Height ( E )</b>					
Root Depth (ft) =	<b>1.50 (D)</b>	Study Bank Height (ft) =	<b>6.00 (A)</b>	( D ) / ( A ) =	<b>0.25 (E)</b>
					<b>6.5</b>
<b>Weighted Root Density ( G )</b>					
Root Density as % =	<b>10% (F)</b>	( F ) × ( E ) =			<b>0.6 (G)</b>
					<b>10.0</b>
<b>Bank Angle ( H )</b>					
Bank Angle as Degrees =	<b>85 (H)</b>				<b>7.0</b>
<b>Surface Protection ( I )</b>					
Surface Protection as % =	<b>5% (I)</b>				<b>10.0</b>

<b>Bank Material Adjustment:</b>	<b>Bank Material Adjustment</b>
<ul style="list-style-type: none"> <li><b>Bedrock</b> (Overall Very Low BEHI)</li> <li><b>Boulders</b> (Overall Low BEHI)</li> <li><b>Cobble</b> (Subtract 10 points if uniform medium to large cobble)</li> <li><b>Gravel or Composite Matrix</b> (Add 5–10 points depending on percentage of bank material that is composed of sand)</li> <li><b>Sand</b> (Add 10 points)</li> <li><b>Silt/Clay</b> (no adjustment)</li> </ul>	<ul style="list-style-type: none"> <li><b>Stratification Adjustment</b> Add 5–10 points, depending on position of unstable layers in relation to bankfull stage</li> </ul>
	<b>0</b>

<b>Very Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>	<b>Extreme</b>	<b>Adjective Rating and Total Score</b>	<b>Very High</b>
5 – 9.5	10 – 19.5	20 – 29.5	30 – 39.5	40 – 45	46 – 50		<b>43.0</b>

**Bank Sketch**

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 1
LENGTH ASSESSED:	3,709
TOTAL TONS/YR:	2,206
TOTAL TONS/YR/FT:	0.59

LEFT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	High	10	3.5	116	4,060
Extreme	Low	10	1.9	930	17,670
Very High	Very High	10	1.1	207	2,277
Very High	High	10	0.9	152	1,368
Very High	Low	10	0.5	448	2,240
TOTAL FT <sup>3</sup> /YR					27,615
TOTAL YD <sup>3</sup> /YR					1,023
TOTAL TONS/YR					1,330

RIGHT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Very High	8	5	66	2,640
Extreme	High	8	3.5	136	3,808
Extreme	Low	8	1.9	442	6,718
Very High	Very High	8	1.1	215	1,892
Very High	High	8	0.9	146	1,051
Very High	Low	8	0.5	496	1,984
Low	Very High	8	0.15	88	106
Low	Low	8	0.002	267	4
TOTAL FT <sup>3</sup> /YR					18,203
TOTAL YD <sup>3</sup> /YR					674
TOTAL TONS/YR					876

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 2
LENGTH ASSESSED:	3,435
TOTAL TONS/YR:	1,093
TOTAL TONS/YR/FT:	0.32

LEFT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	6	7	55	2,310
Extreme	High	6	3.5	105	2,205
Extreme	Low	6	1.9	253	2,884
High	Extreme	6	0.4	73	175
High	Very High	6	0.22	165	218
High	High	6	0.2	43	52
High	Low	6	0.12	514	370
Low	High	6	0.004	97	2
Low	Low	6	0.002	413	5
TOTAL FT <sup>3</sup> /YR					8,221
TOTAL YD <sup>3</sup> /YR					304
TOTAL TONS/YR					396

RIGHT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	6.5	7	104	4,732
Extreme	Very High	6.5	5	102	3,315
Extreme	High	6.5	3.5	52	1,183
Extreme	Low	6.5	1.9	334	4,125
High	Extreme	6.5	0.4	28	73
High	Very High	6.5	0.22	166	237
High	High	6.5	0.2	185	241
High	Low	6.5	0.12	746	582
TOTAL FT <sup>3</sup> /YR					14,487
TOTAL YD <sup>3</sup> /YR					537
TOTAL TONS/YR					698

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 3
LENGTH ASSESSED:	2,834
TOTAL TONS/YR:	1,332
TOTAL TONS/YR/FT:	0.47

LEFT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	8	7	97	5,432
Extreme	Low	8	1.9	247	3,754
Very High	High	8	0.9	173	1,246
Very High	Low	8	0.5	196	784
High	High	8	0.2	133	213
High	Low	8	0.12	318	305
Low	Low	8	0.002	252	4
TOTAL FT <sup>3</sup> /YR					11,738
TOTAL YD <sup>3</sup> /YR					435
TOTAL TONS/YR					565

RIGHT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	6	7	135	5,670
Extreme	Very High	6	5	174	5,220
Extreme	High	6	3.5	33	693
Extreme	Low	6	1.9	276	3,146
Very High	Very High	6	1.1	86	568
Very High	Low	6	0.5	22	66
High	High	6	0.2	143	172
High	Low	6	0.12	549	395
TOTAL FT <sup>3</sup> /YR					15,930
TOTAL YD <sup>3</sup> /YR					590
TOTAL TONS/YR					767

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 4
LENGTH ASSESSED:	3,684
TOTAL TONS/YR:	986
TOTAL TONS/YR/FT:	0.27

LEFT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	3	7	28	588
Extreme	Very High	3	5	124	1,860
Extreme	High	3	3.5	4	42
Extreme	Low	3	1.9	140	798
Very High	Extreme	3	1.6	26	125
Very High	Very High	3	1.1	146	482
Very High	High	3	0.9	285	770
Very High	Low	3	0.5	713	1,070
High	Extreme	3	0.4	13	16
High	High	3	0.2	129	77
High	Low	3	0.12	235	85
TOTAL FT <sup>3</sup> /YR					5,911
TOTAL YD <sup>3</sup> /YR					219
TOTAL TONS/YR					285

RIGHT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	5	7	50	1,750
Extreme	Very High	5	5	148	3,700
Extreme	High	5	3.5	175	3,063
Extreme	Low	5	1.9	353	3,354
Very High	Very High	5	1.1	78	429
Very High	High	5	0.9	299	1,346
Very High	Low	5	0.5	367	918
Low	High	5	0.004	89	2
Low	Low	5	0.002	282	3
TOTAL FT <sup>3</sup> /YR					14,563
TOTAL YD <sup>3</sup> /YR					539
TOTAL TONS/YR					701

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 5
LENGTH ASSESSED:	974
TOTAL TONS/YR:	390
TOTAL TONS/YR/FT:	0.40

LEFT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Very High	7	5	30	1,050
Extreme	Low	7	1.9	62	825
Very High	Very High	7	1.1	146	1,124
Very High	Low	7	0.5	70	245
High	High	7	0.2	163	228
High	Low	7	0.12	16	13
TOTAL FT <sup>3</sup> /YR					3,485
TOTAL YD <sup>3</sup> /YR					129
TOTAL TONS/YR					168

RIGHT BANK

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	7	7	12	588
Extreme	High	7	3.5	76	1,862
Extreme	Low	7	1.9	22	293
Very High	Very High	7	1.1	153	1,178
Very High	High	7	0.9	90	567
Very High	Low	7	0.5	36	126
Low	High	7	0.004	82	2
Low	Low	7	0.002	16	0
TOTAL FT <sup>3</sup> /YR					4,616
TOTAL YD <sup>3</sup> /YR					171
TOTAL TONS/YR					222

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 6
LENGTH ASSESSED:	9,042
TOTAL TONS/YR:	860
TOTAL TONS/YR/FT:	0.10

BOTH BANKS

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	8	7	92	5,152
Extreme	Extreme	4	7	88	2,464
Extreme	Low	8	1.9	138	2,098
Extreme	Low	4	1.9	134	1,018
High	Extreme	8	0.4	184	589
High	Extreme	4	0.4	178	285
High	Low	8	0.12	276	265
High	Low	4	0.12	266	128
Moderate	Extreme	8	0.4	1104	3,533
Moderate	Extreme	4	0.4	1066	1,706
Moderate	Low	8	0.03	1656	397
Moderate	Low	4	0.03	1600	192
Low	Extreme	8	0.004	460	15
Low	Extreme	4	0.004	444	7
Low	Low	8	0.002	690	11
Low	Low	4	0.002	666	5
				TOTAL FT <sup>3</sup> /YR	17,864
				TOTAL YD <sup>3</sup> /YR	662
				TOTAL TONS/YR	860

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 7
LENGTH ASSESSED:	4,014
TOTAL TONS/YR:	475
TOTAL TONS/YR/FT:	0.12

BOTH BANKS

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	8	7	60	3,360
Extreme	Low	8	1.9	140	2,128
High	Extreme	8	0.4	180	576
High	Low	8	0.12	422	405
Moderate	Extreme	8	0.4	904	2,893
Moderate	Low	8	0.03	2108	506
Low	Extreme	8	0.004	60	2
Low	Low	8	0.002	140	2
				TOTAL FT <sup>3</sup> /YR	9,872
				TOTAL YD <sup>3</sup> /YR	366
				TOTAL TONS/YR	475

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 8
LENGTH ASSESSED:	7,672
TOTAL TONS/YR:	853
TOTAL TONS/YR/FT:	0.11

BOTH BANKS

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	8	7	76	4,256
Extreme	Extreme	7.5	7	52	2,730
Extreme	Extreme	4	7	18	504
Extreme	Low	8	1.9	76	1,155
Extreme	Low	7.5	1.9	120	1,710
Extreme	Low	4	1.9	40	304
High	Extreme	8	0.4	154	493
High	Extreme	7.5	0.4	104	312
High	Extreme	4	0.4	34	54
High	Low	8	0.12	154	148
High	Low	7.5	0.12	242	218
High	Low	4	0.12	80	38
Moderate	Extreme	8	0.4	920	2,944
Moderate	Extreme	7.5	0.4	622	1,866
Moderate	Extreme	4	0.4	208	333
Moderate	Low	8	0.03	920	221
Moderate	Low	7.5	0.03	1450	326
Moderate	Low	4	0.03	484	58
Low	Extreme	8	0.004	384	12
Low	Extreme	7.5	0.004	258	8
Low	Extreme	4	0.004	86	1
Low	Low	8	0.002	384	6
Low	Low	7.5	0.002	604	9
Low	Low	4	0.002	202	2
				TOTAL FT <sup>3</sup> /YR	17,709
				TOTAL YD <sup>3</sup> /YR	656
				TOTAL TONS/YR	853

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 9
LENGTH ASSESSED:	3,269
TOTAL TONS/YR:	51
TOTAL TONS/YR/FT:	0.02

BOTH BANKS

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Moderate	Extreme	6	0.4	327	785
Moderate	Low	6	0.03	1471	265
Low	Low	6	0.002	1471	18
				TOTAL FT <sup>3</sup> /YR	1,067
				TOTAL YD <sup>3</sup> /YR	40
				TOTAL TONS/YR	51

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 10
LENGTH ASSESSED:	9,500
TOTAL TONS/YR:	595
TOTAL TONS/YR/FT:	0.06

BOTH BANKS - REACH 10

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
Extreme	Extreme	7	7	32	1,568
Extreme	Low	7	1.9	292	3,884
High	Extreme	7	0.4	98	274
High	Low	7	0.12	878	738
Moderate	Extreme	7	0.4	488	1,366
Moderate	Low	7	0.03	4388	921
Low	Extreme	7	0.004	32	1
Low	Low	7	0.002	292	4
TOTAL FT <sup>3</sup> /YR					8,756
TOTAL YD <sup>3</sup> /YR					324
TOTAL TONS/YR					422

BOTH BANKS - REACH 10a

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
High	Low	10	0.12	3000	3,600
TOTAL FT <sup>3</sup> /YR					3,600
TOTAL YD <sup>3</sup> /YR					133
TOTAL TONS/YR					173

SEDIMENT LOADING ASSESSMENT

SITE:	REACH 11
LENGTH ASSESSED:	1,788
TOTAL TONS/YR:	63
TOTAL TONS/YR/FT:	0.04

BOTH BANKS

A	B	C	D	E	F
BEHI	NBS	BANK HEIGHT (FT)	FEET/YEAR (from NC Curve Rev. 3-31-09)	BANK LENGTH (FT)	VOLUME/YEAR (FT <sup>3</sup> /YEAR)
High	Extreme	9.5	0.4	36	137
High	Low	9.5	0.12	322	367
Moderate	Extreme	9.5	0.4	126	479
Moderate	Low	9.5	0.03	1126	321
Low	Extreme	9.5	0.004	18	1
Low	Low	9.5	0.002	160	3
				TOTAL FT <sup>3</sup> /YR	1,307
				TOTAL YD <sup>3</sup> /YR	48
				TOTAL TONS/YR	63

SEDIMENT LOADING ASSESSMENT

Reach	Bank Length (FT)	TOTAL TONS/YR	TOTAL TONS/YR/FT
1	3,709	2,206	0.59
2	3,435	1,093	0.32
3	2,834	1,332	0.47
4	3,684	986	0.27
5	974	390	0.40
6	9,042	860	0.10
7	4,014	475	0.12
8	7,672	853	0.11
9	3,269	51	0.02
10	9,500	595	0.06
11	1,788	63	0.04
TOTAL	49,921	8,905	0.18

# Appendix 7

# Technical Memorandum

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Date: March 26, 2011

Project: WO#2 – Reedy Creek

Subject: Reach 5 Assessment (Southwest Reach)

To: William Harris, E.I.

Purpose: For Review

## Assessment

Kimley-Horn and Associates, Inc. (KHA) staff Will Wilhelm and Jason Diaz performed a visual assessment of the subject site on May 13, 2011. The lower 500 feet of stream (reach 5) showed obvious visual signs of impairment through bed/bank erosion and active headcuts. The stream does not have access to an active floodprone area/bench because of this down-cutting/incision. This incision is likely caused from historical straightening and historic land uses. However, upstream of this unstable 500 feet the stream visually appeared to be in a stable condition with adequate access to a floodprone area. The stream makes this transition from a highly unstable to stable at a large headcut that has been stopped by a large bedrock outcrop. Upstream of the bedrock the stream and its tributaries appear to be in equilibrium with little or no signs of instability. These reaches are ideal for reference reaches for the restoration efforts in the other Reedy Creek reaches.

## Mitigation Potential

A majority of the stream (reach 5) and its tributaries (reach 5-A and 5-B) are contained on public property and approximately 1,200 feet of reach 5-B is located on a private parcel (See Figure 1). Table 1 below lists the parcels and owner names. All of reach 5 and its jurisdictional tributaries would qualify for mitigation credit ratio assuming conservation easements were obtained and the Interagency Review Team (IRT) agreed to allow preservation on within the existing nature preserve. The City may argue that the mitigation plan for this area is a complete watershed approach and incorporates restoration and preservation to protect the watershed and its assets in perpetuity through measures such as a conservation easement. Table 2 and Figure 1 below summarize of the estimated mitigation potential of the reach when combined with the other components (Reach 1-4) of the Reedy Creek project:

**Table 1. Parcels**

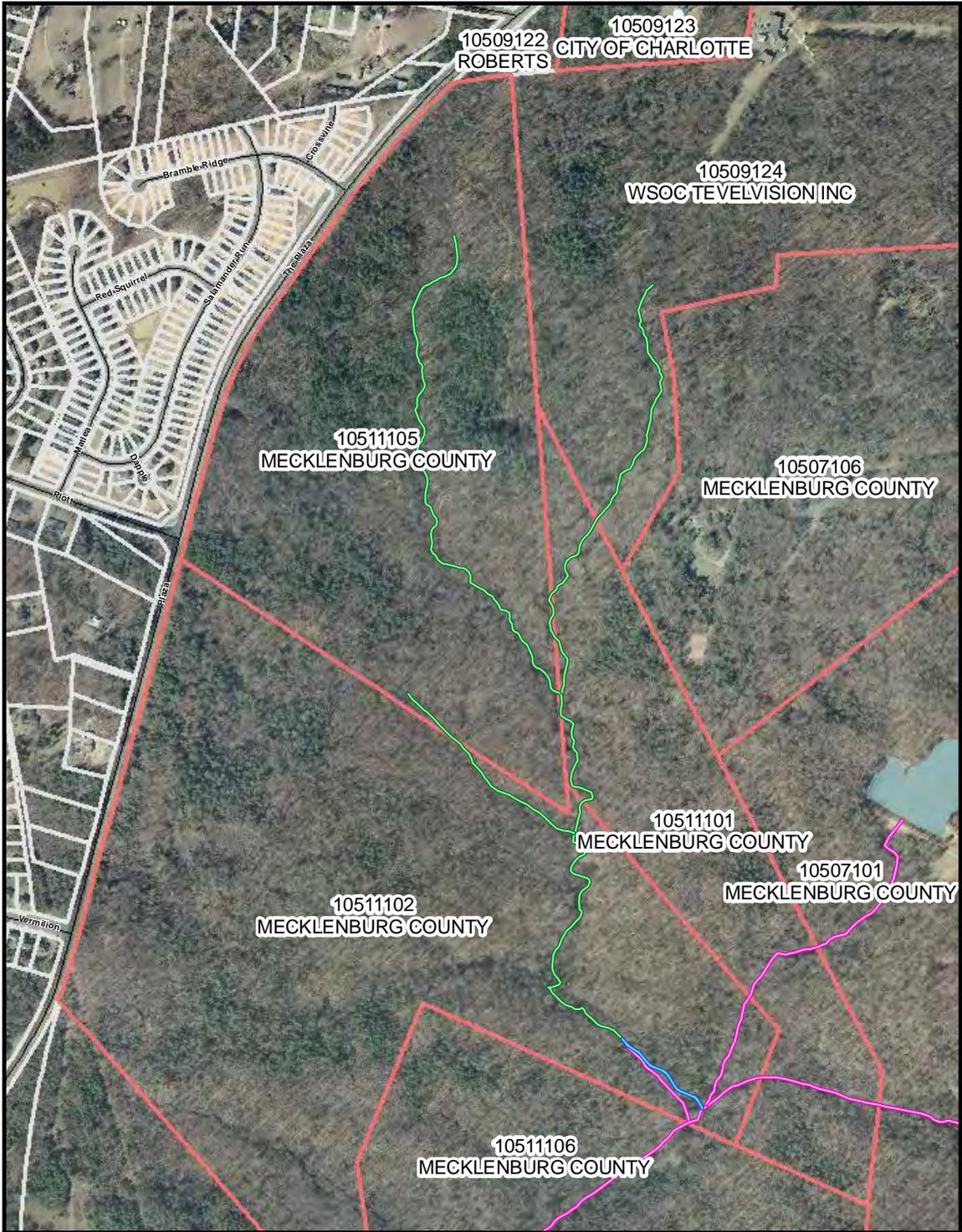
Parcel Identification Number	Owner
10509124	WSOC Television Inc.
10507101	Mecklenburg County
10507106	Mecklenburg County
10511101	Mecklenburg County
10511102	Mecklenburg County
10511105	Mecklenburg County

**Table 2. Mitigation Credit Potential**

Reach	Mitigation Type	Length (feet)*		Credit Ratio	Mitigation Credit
		Existing	Design		
5	Restoration	487	491	1:1	491
5	Preservation	4,579	4,579	5:1	916
5-A	Preservation	2,064	2,064	5:1	413
5-B	Preservation	978	978	5:1	196
TOTALS	--	8,108	8,112	--	2,016

\*Stream lengths based on Mecklenburg County GIS data layer(s).

**Figure 1. Mitigation Potential for Reach 5**



<p><b>Title:</b> Figure 1 - Mitigation Potential</p>		<p><b>Legend:</b></p> <ul style="list-style-type: none"> <li><span style="color: blue;">—</span> Existing Stream Centerline</li> <li><span style="color: green;">—</span> Concept Stream Restoration</li> <li><span style="color: pink;">—</span> Stream Preservation</li> <li><span style="background-color: lightblue; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Ponds/Impounded Areas</li> <li><span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Parcels</li> </ul>	
	<p>0    300    600</p> <p>Feet</p>		

Site Photos



Photo 1: Restoration Potential/Lower 500 Feet of Reach 5



Photo 2: Restoration Potential/Lower 500 Feet of Reach 5

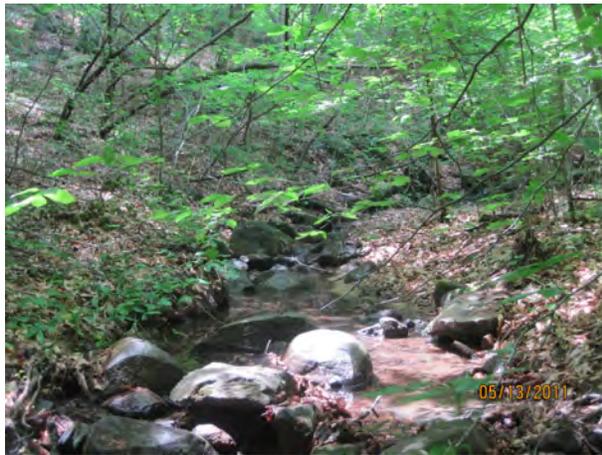


Photo 3: Preservation/Potential Reference Reach 5



Photo 4: Preservation/Potential Reference Reach 5



Photo 5: Preservation/Potential Reference Reach 5



Photo 6: Preservation/Potential Reference Reach 5

# Appendix 8

# Reach 1 - Cross Section 2 (Riffle)

○ Ground Points

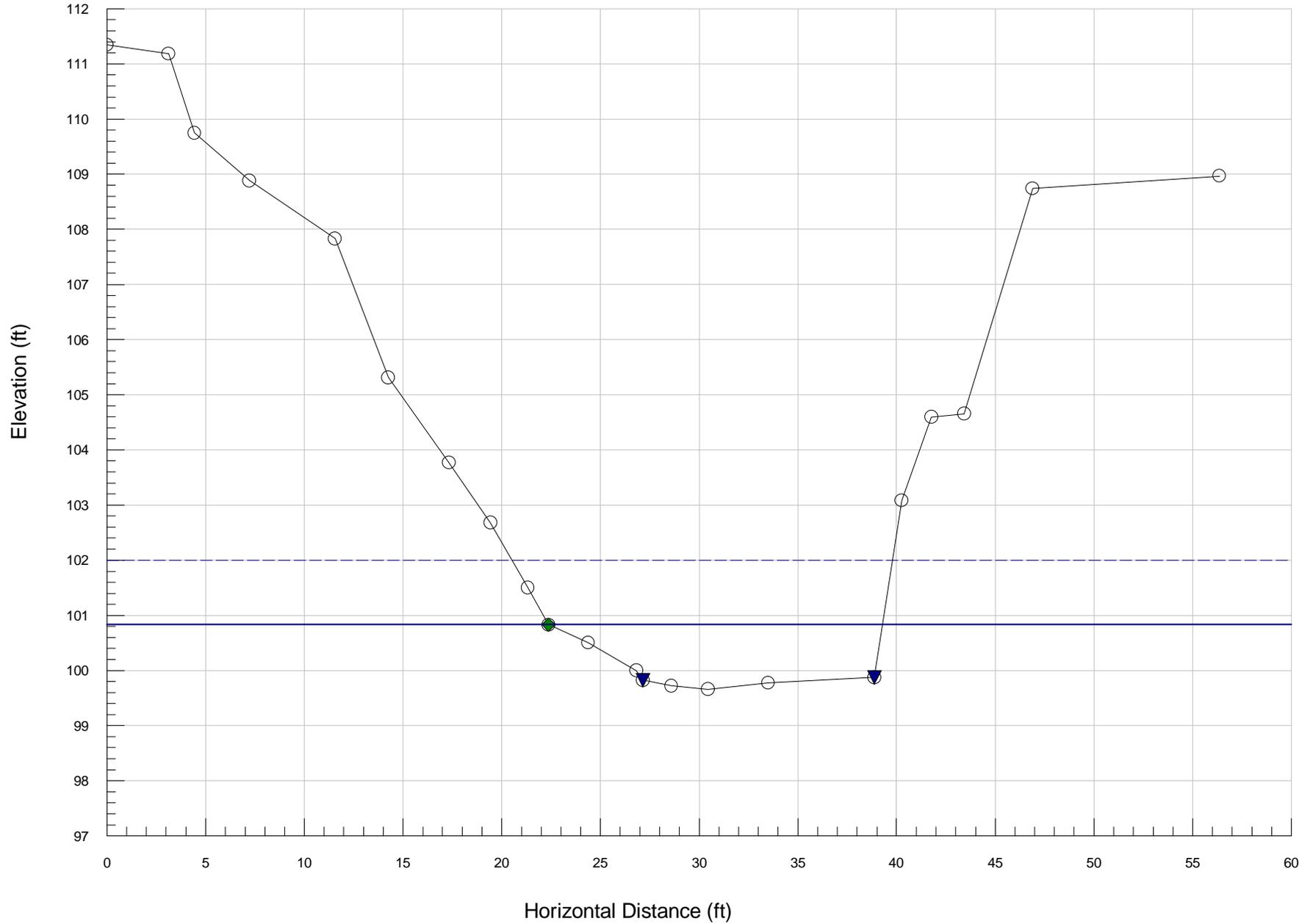
◆ Bankfull Indicators

▼ Water Surface Points

$wbkf = 16.9$

$Dbkf = .87$

$Abkf = 14.7$



# Reach 1 - Cross Section 1 (Pool)

○ Ground Points

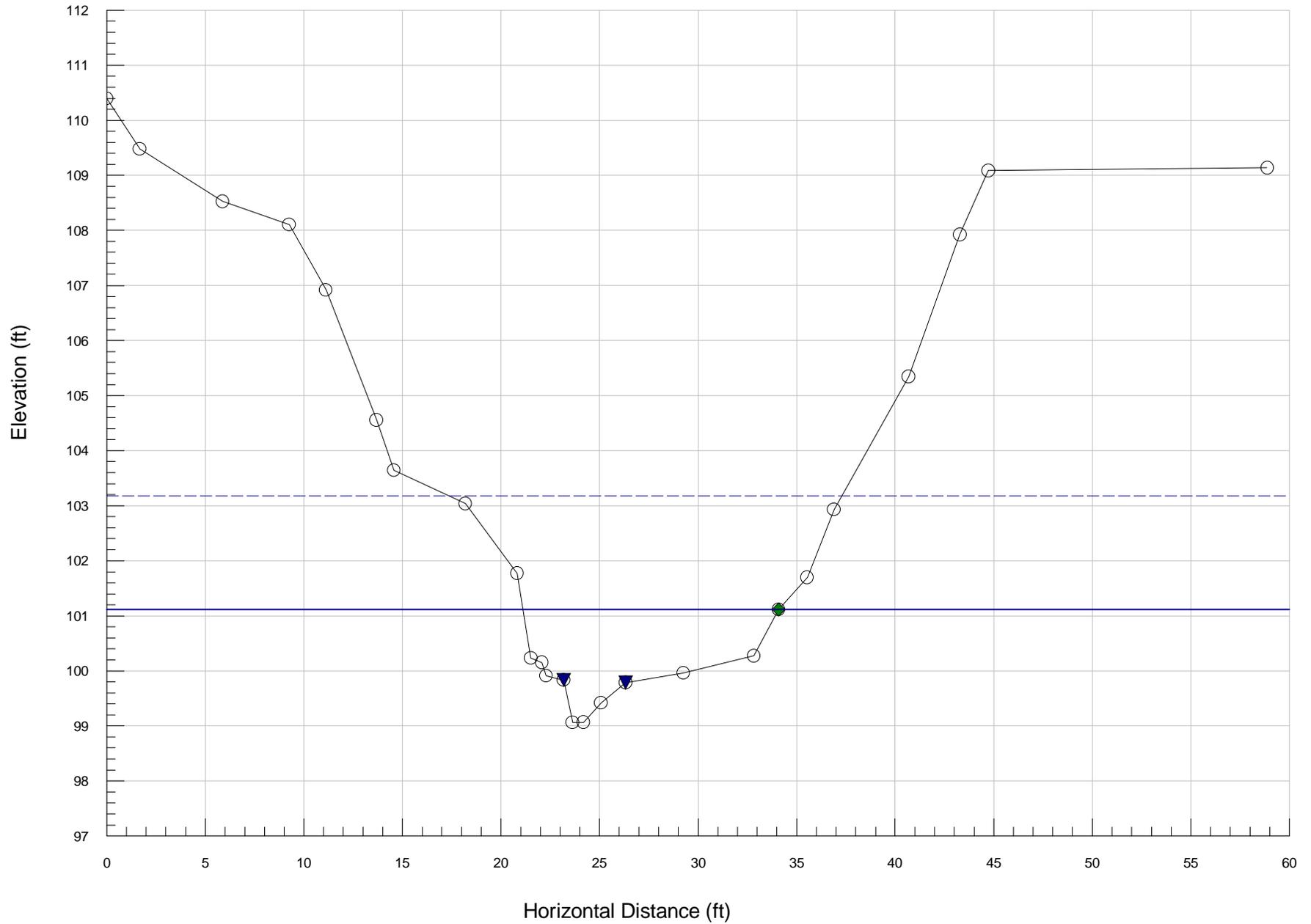
◆ Bankfull Indicators

▼ Water Surface Points

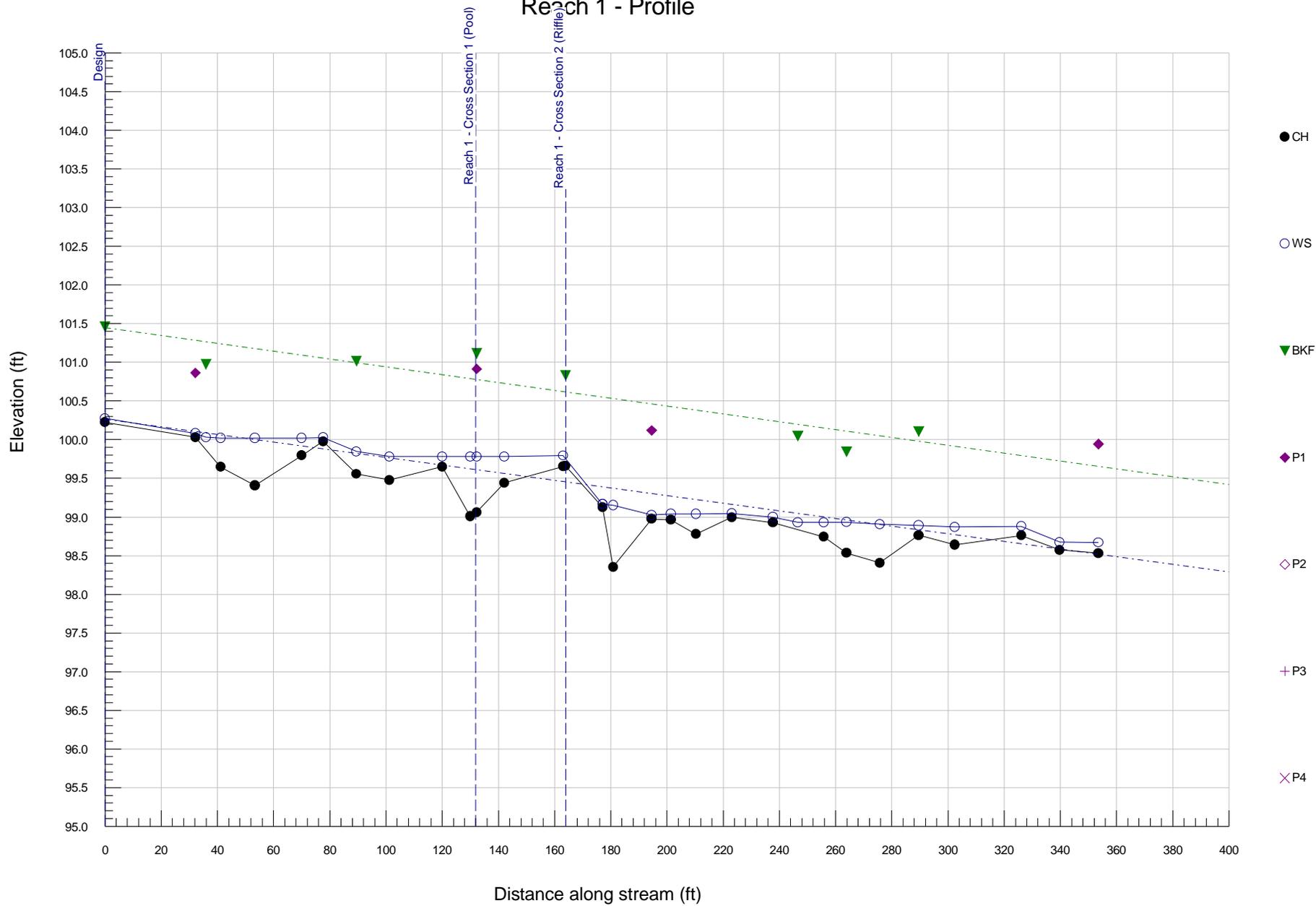
$w_{bkf} = 13$

$D_{bkf} = 1.18$

$A_{bkf} = 15.3$

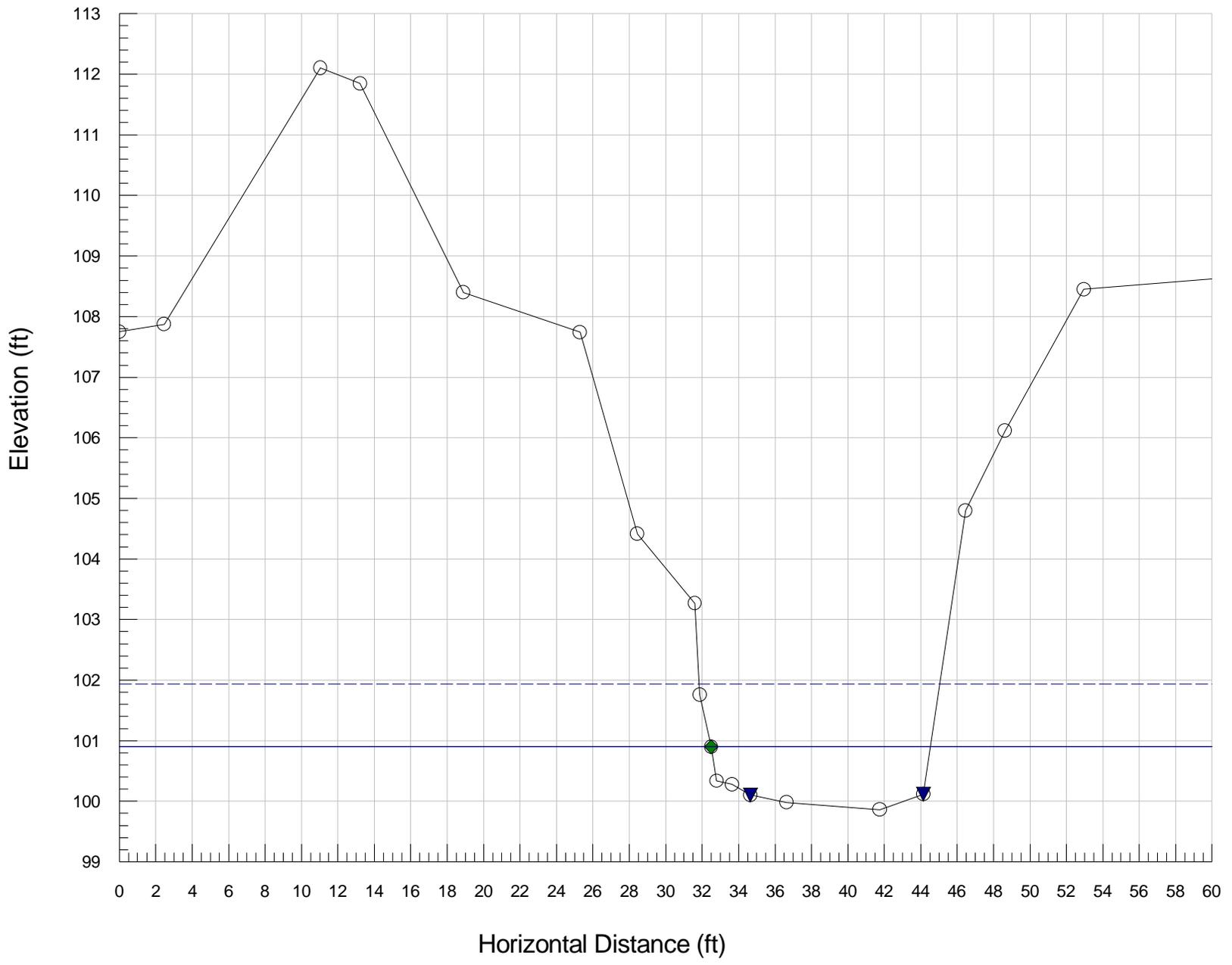


# Reach 1 - Profile



# Reach 10 - Cross Section 1 (Riffle)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 12      Dbkf = .86      Abkf = 10.3



# Reach 10 - Cross Section 2 (Pool)

○ Ground Points

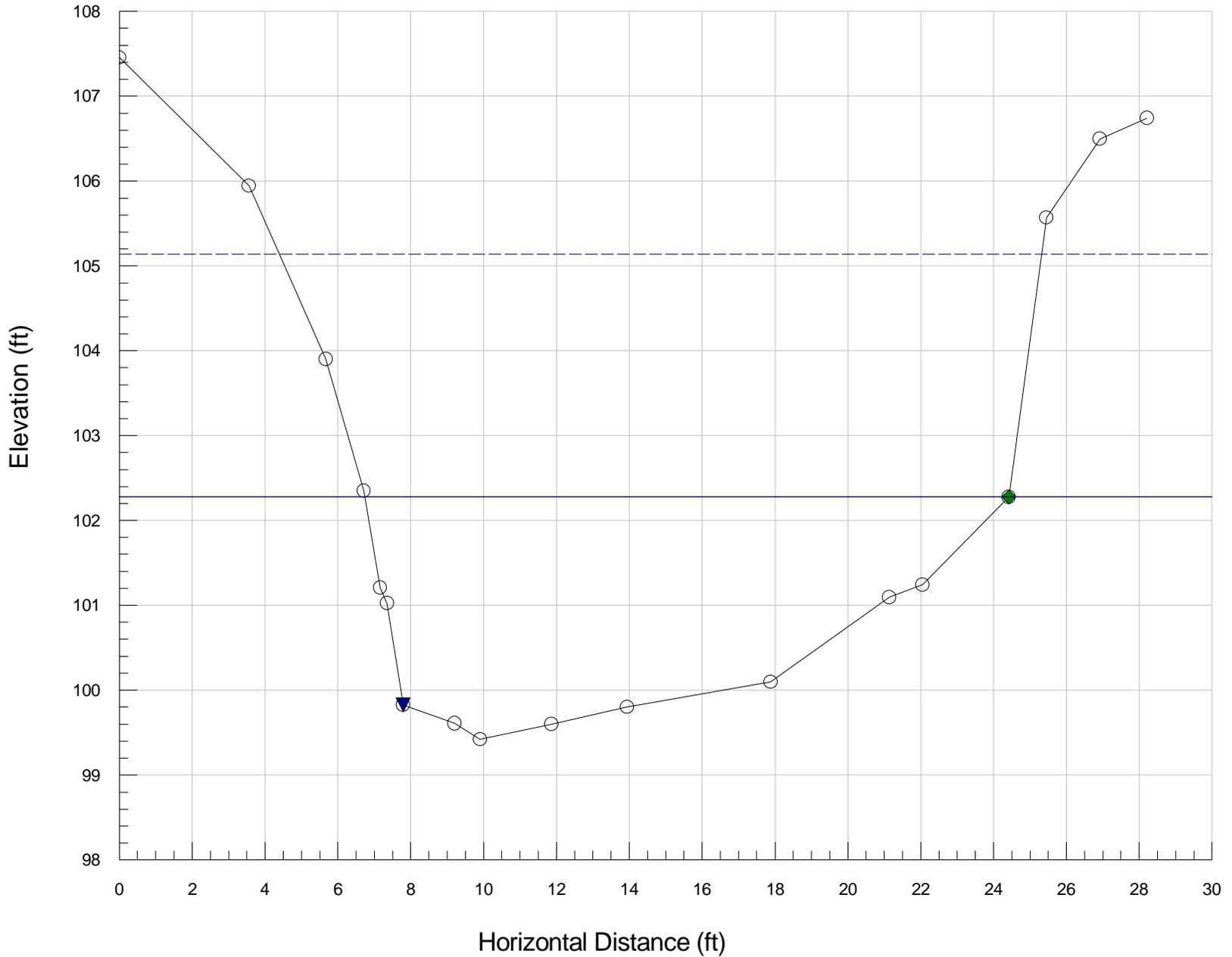
◆ Bankfull Indicators

▼ Water Surface Points

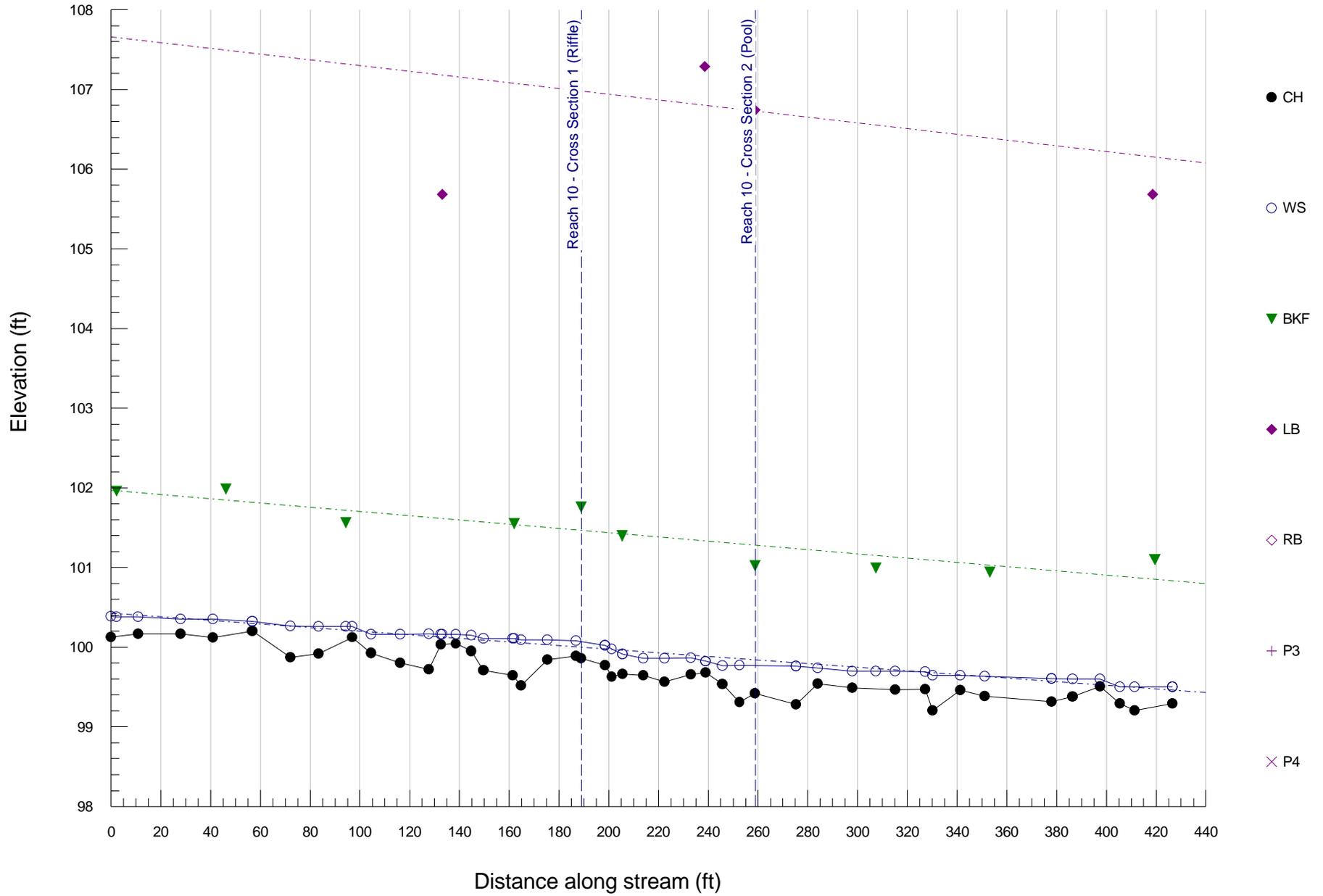
wbkf = 17.7

Dbkf = 1.95

Abkf = 34.5

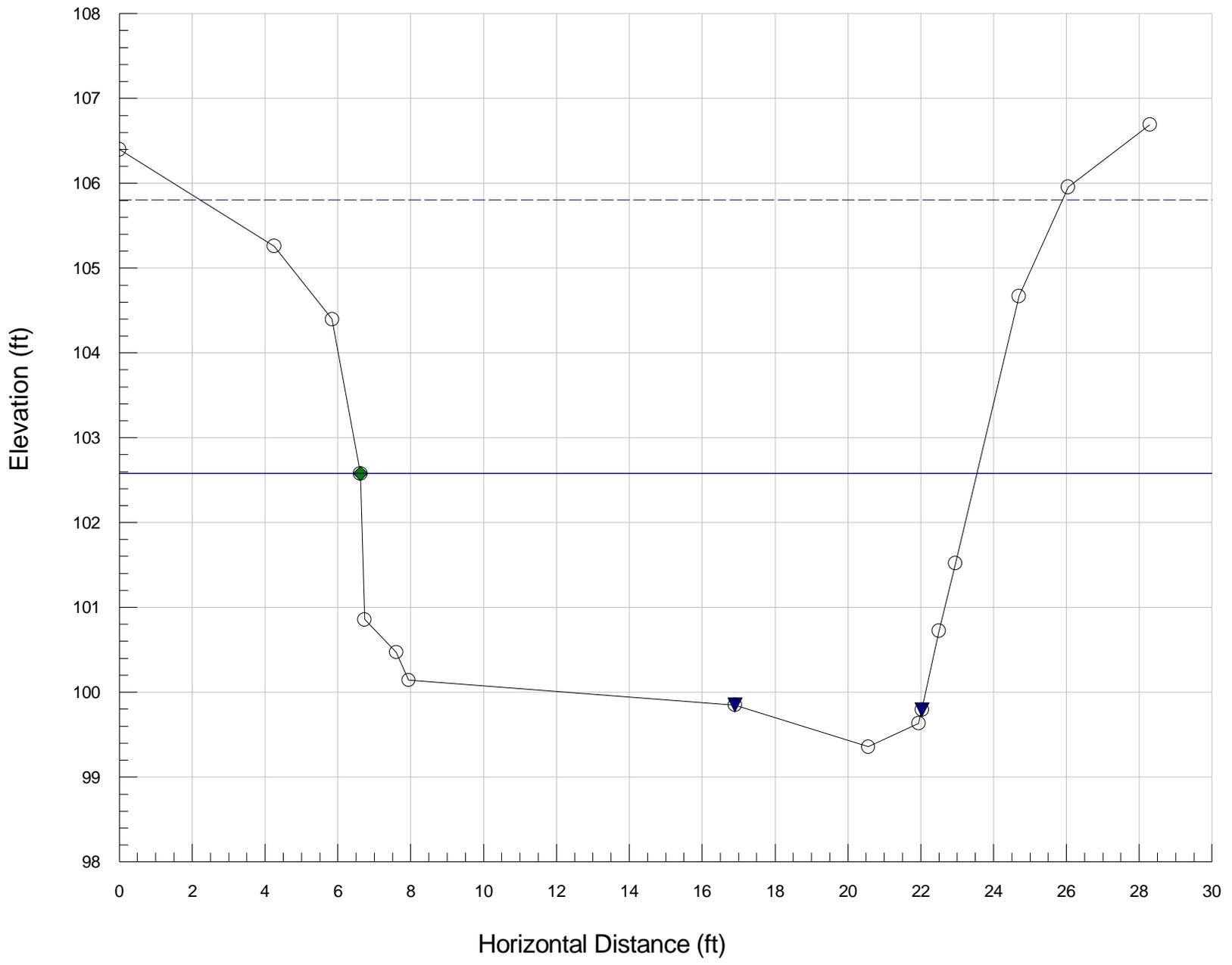


# Reach 10 - Profile



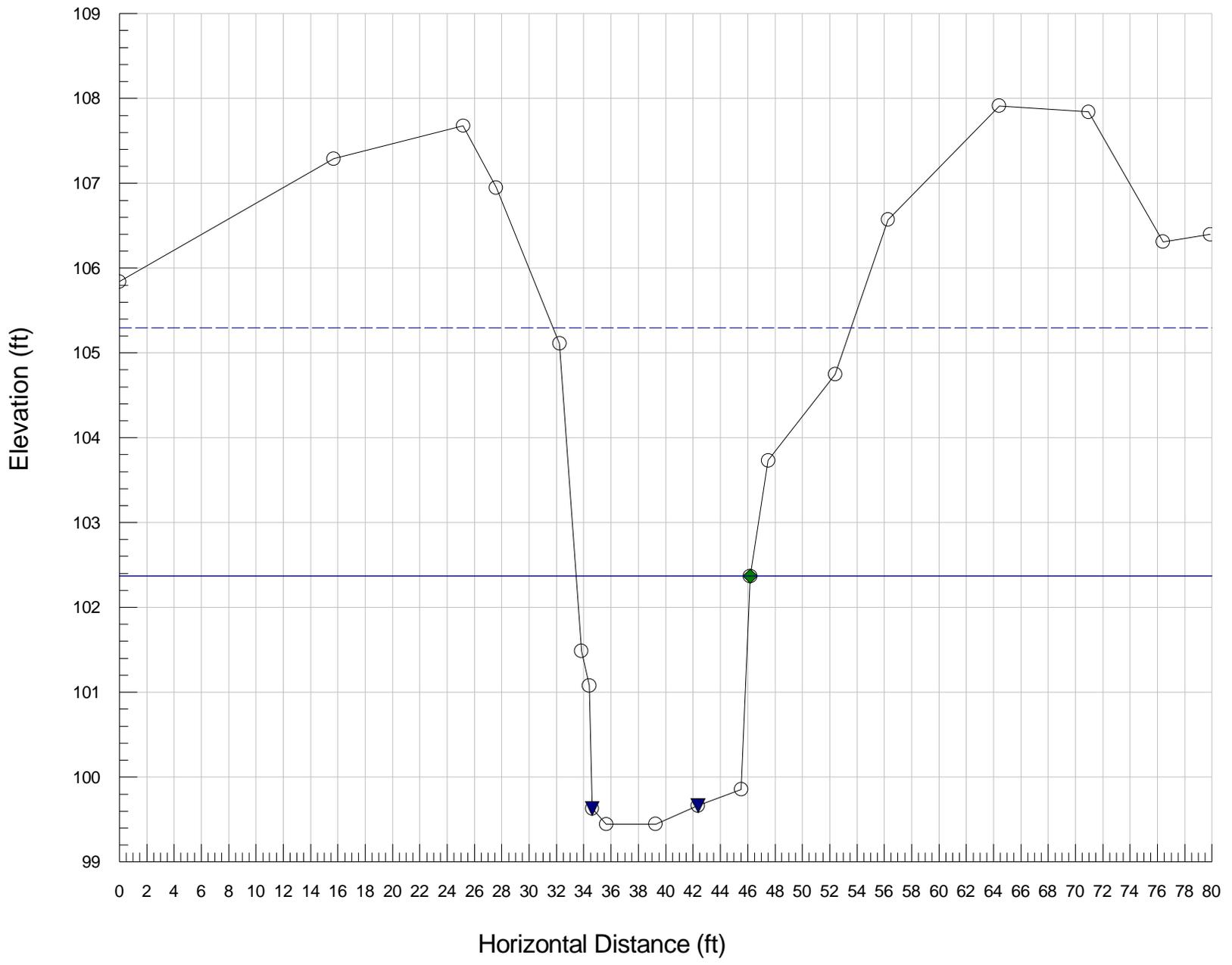
# Reach 11 - Cross Section 1 (Pool)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 16.9      Dbkf = 2.55      Abkf = 43.2

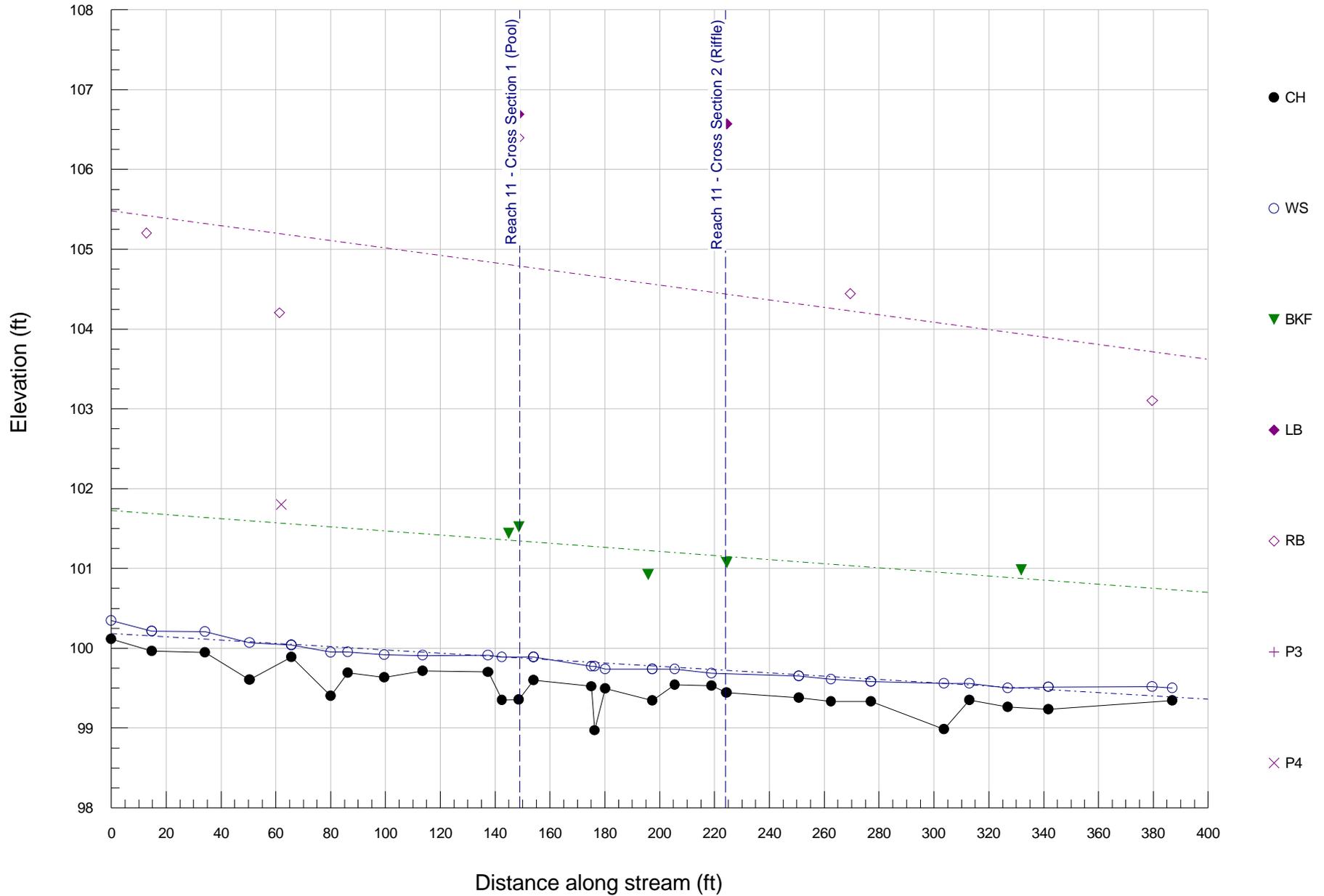


# Reach 11 - Cross Section 2 (Riffle)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 12.8      Dbkf = 2.55      Abkf = 32.6



# Reach 10 - Profile



# Reach 2 - Cross Section (Riffle)

○ Ground Points

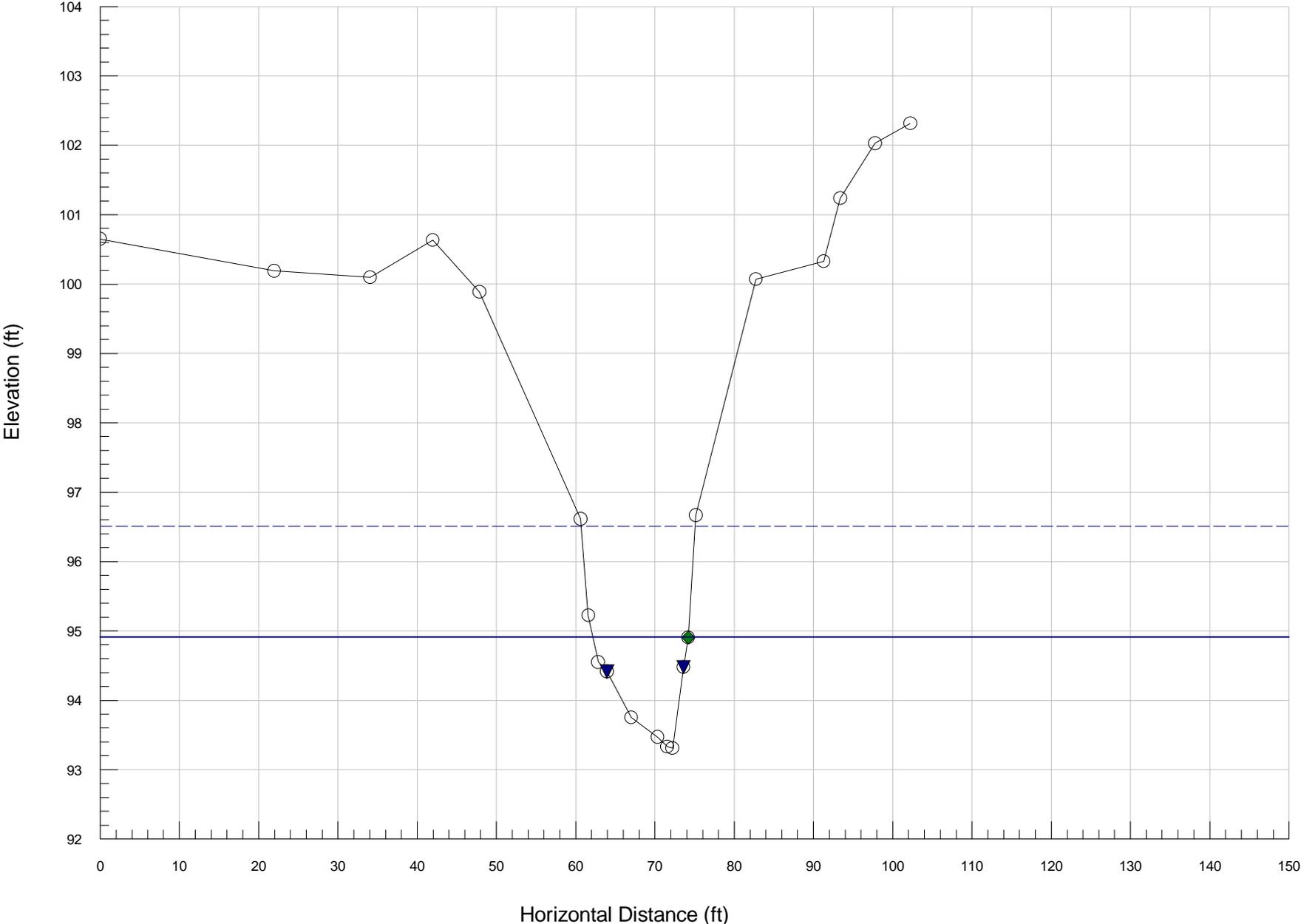
◆ Bankfull Indicators

▼ Water Surface Points

wbkf = 12

Dbkf = .99

Abkf = 11.9



# Reach 2 - Cross Section 2 (Pool)

○ Ground Points

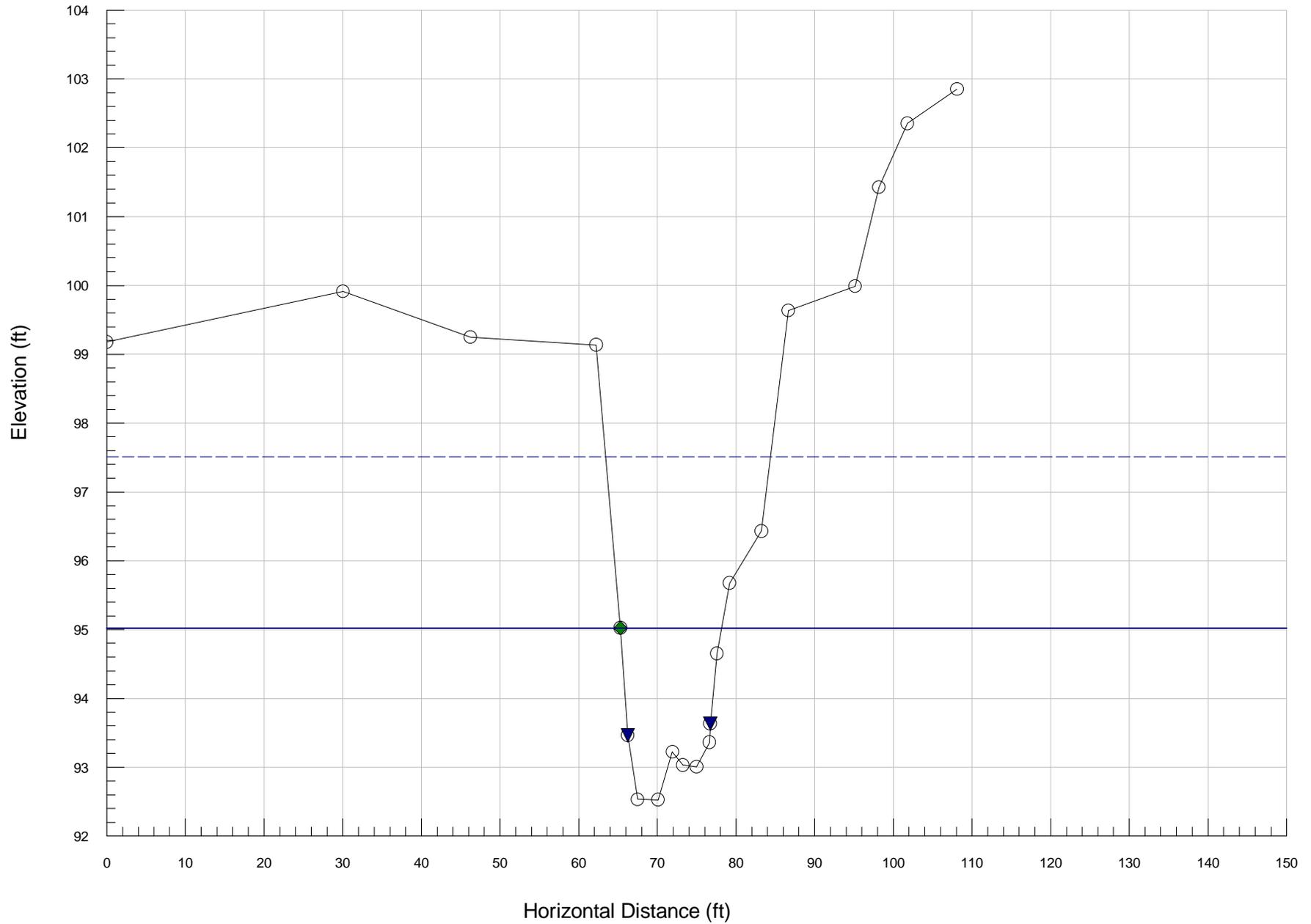
◆ Bankfull Indicators

▼ Water Surface Points

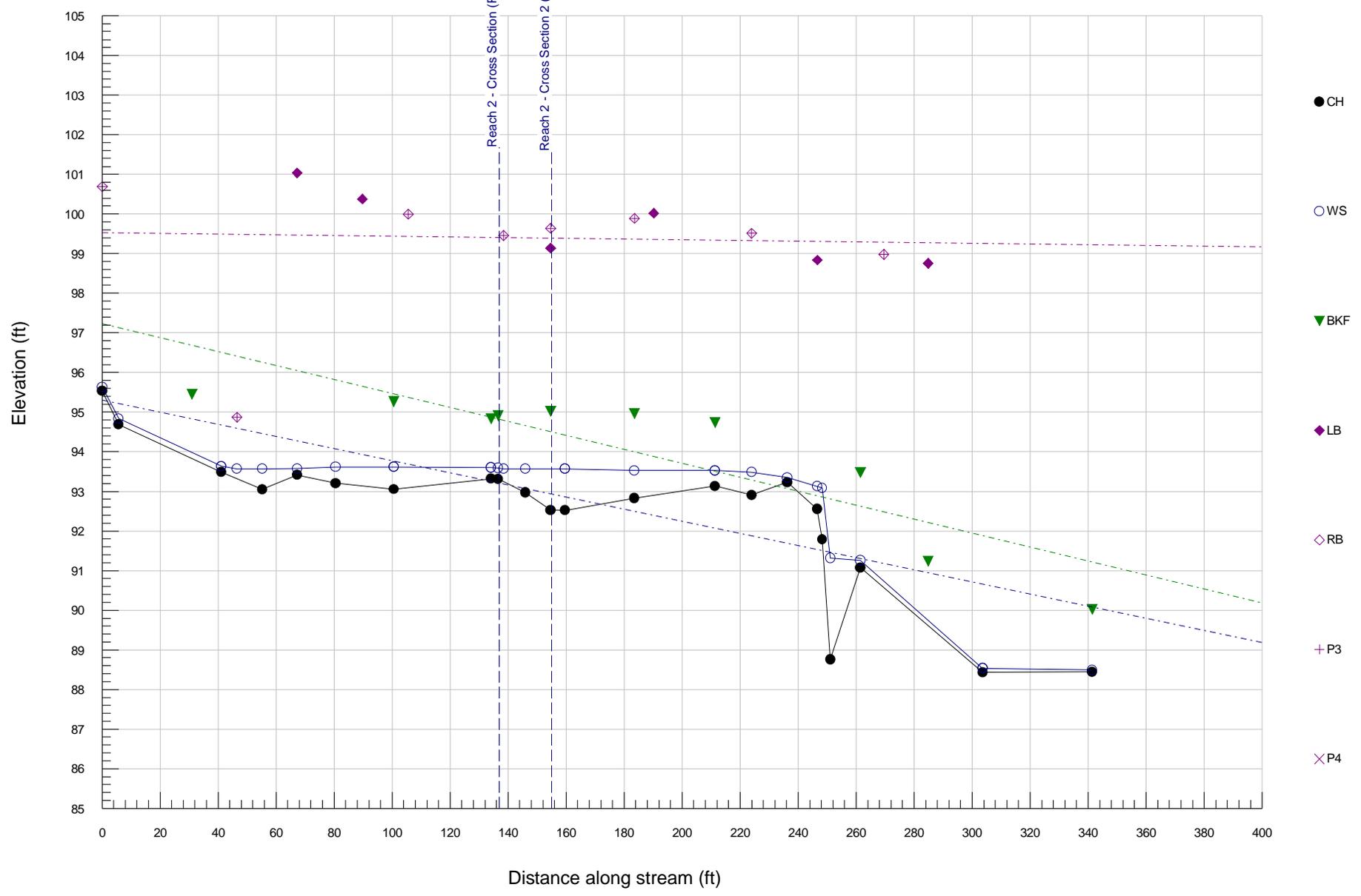
$wbkf = 12.9$

$Dbkf = 1.84$

$Abkf = 23.7$



# Reach 2 - Profile



# Reach 3 - Cross Section 2 (Riffle)

○ Ground Points

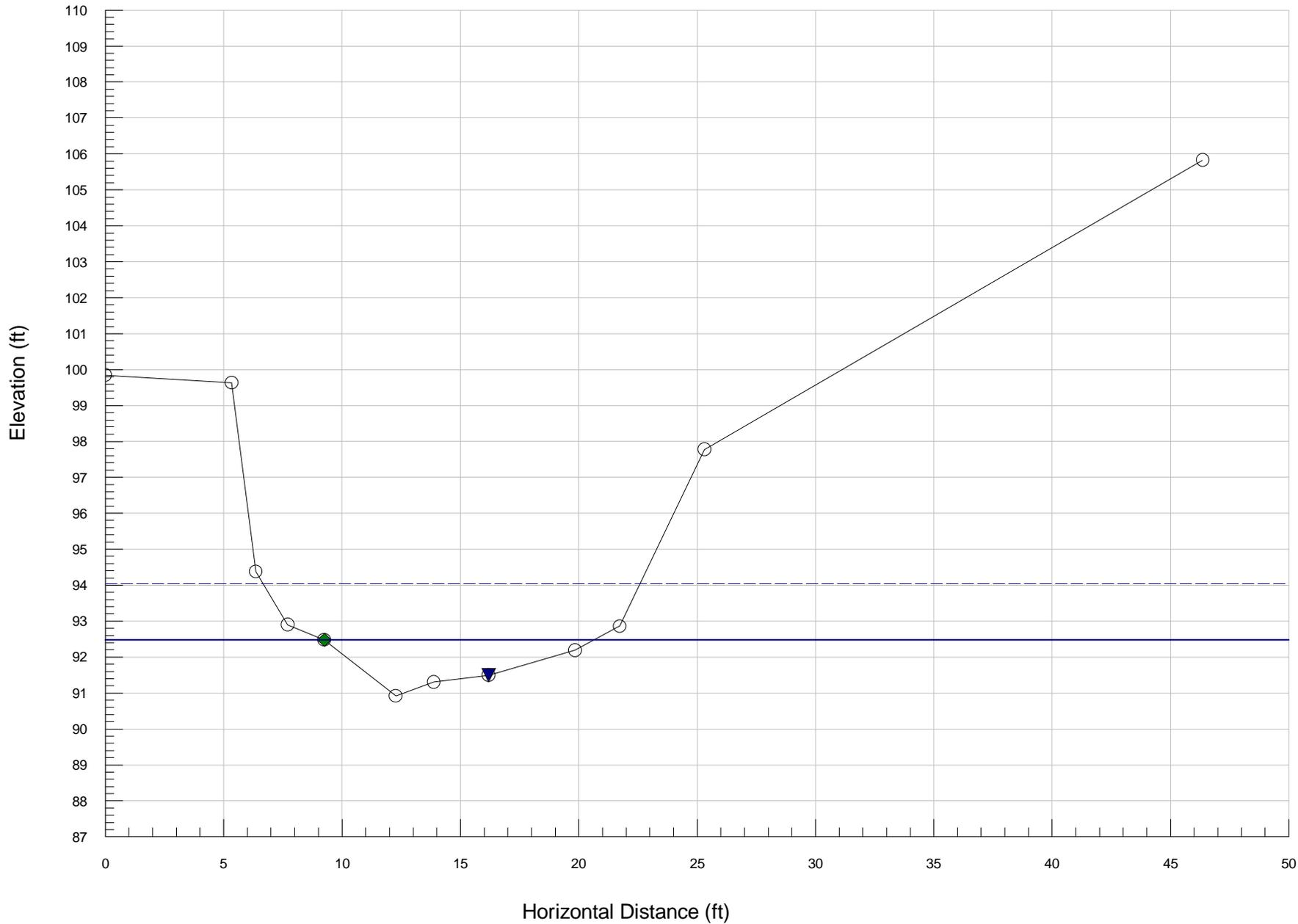
◆ Bankfull Indicators

▼ Water Surface Points

wbkf = 11.4

Dbkf = .83

Abkf = 9.52



# Reach 3 - Cross Section 1 (Pool)

○ Ground Points

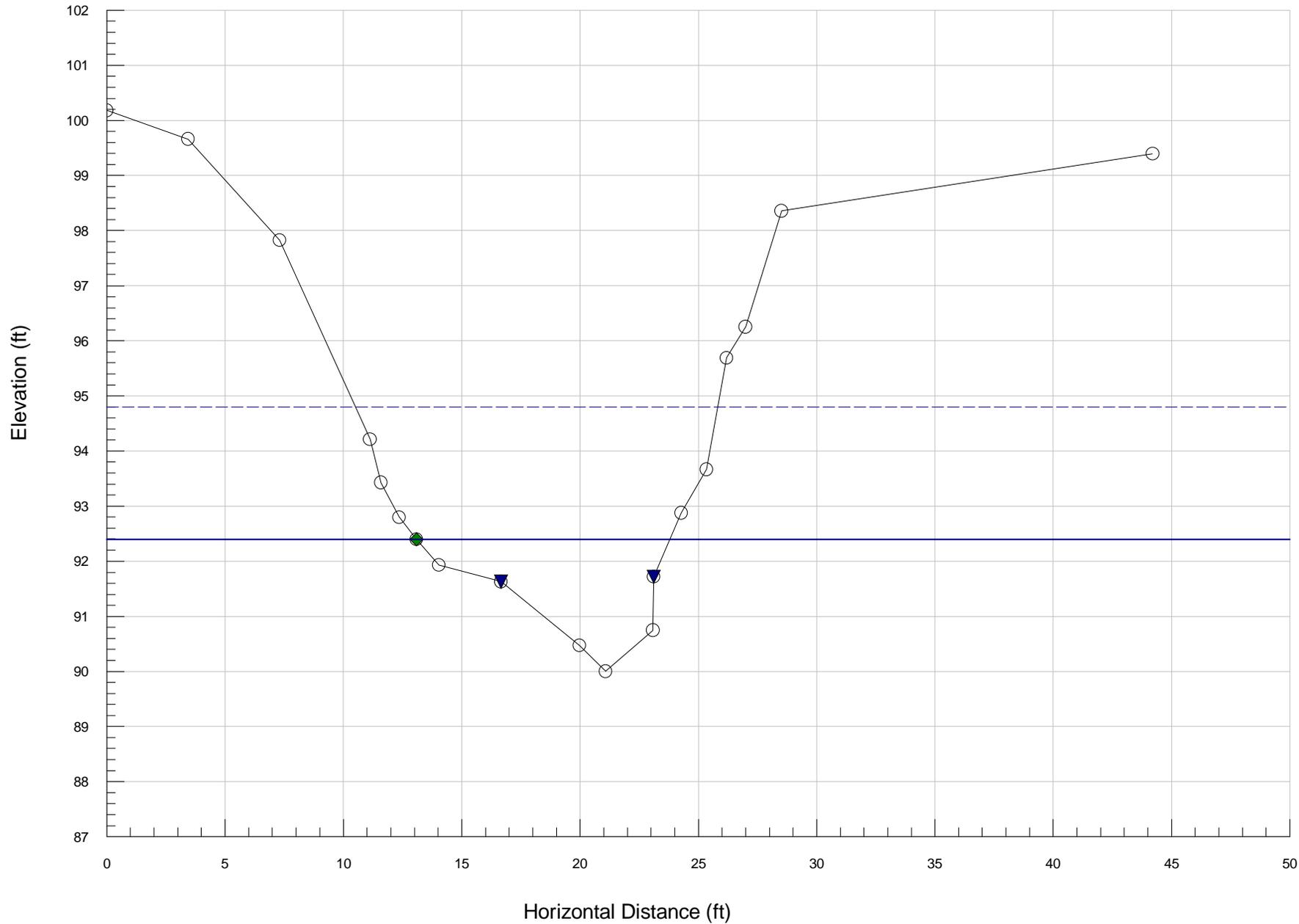
◆ Bankfull Indicators

▼ Water Surface Points

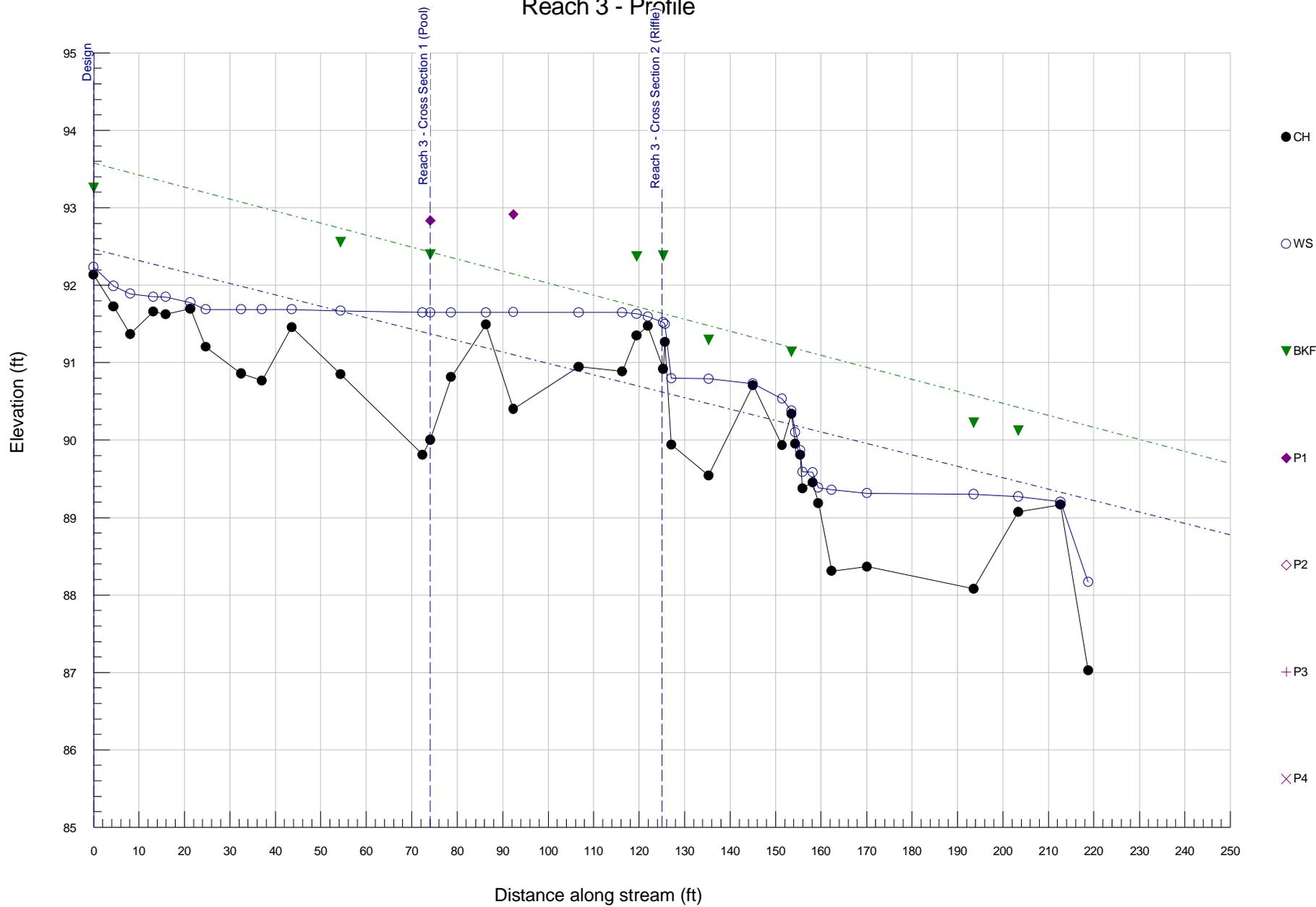
$wbkf = 10.7$

$Dbkf = 1.22$

$Abkf = 13$



# Reach 3 - Profile



# Reach 4 - Cross Section 1 (Riffle)

○ Ground Points

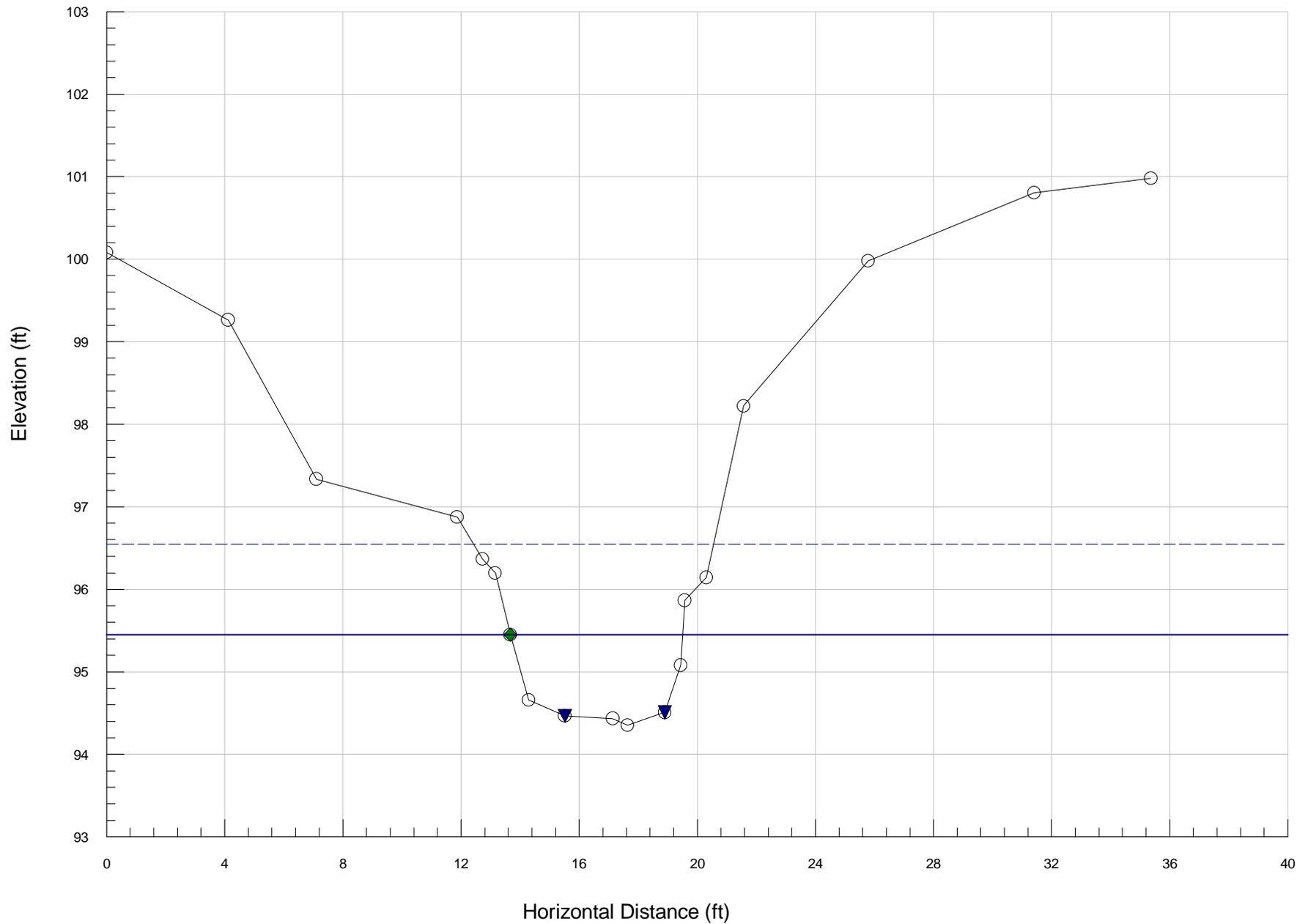
◆ Bankfull Indicators

▼ Water Surface Points

$wbkf = 5.84$

$Dbkf = .88$

$Abkf = 5.14$



# Reach 4 - Cross Section 2 (Pool)

○ Ground Points

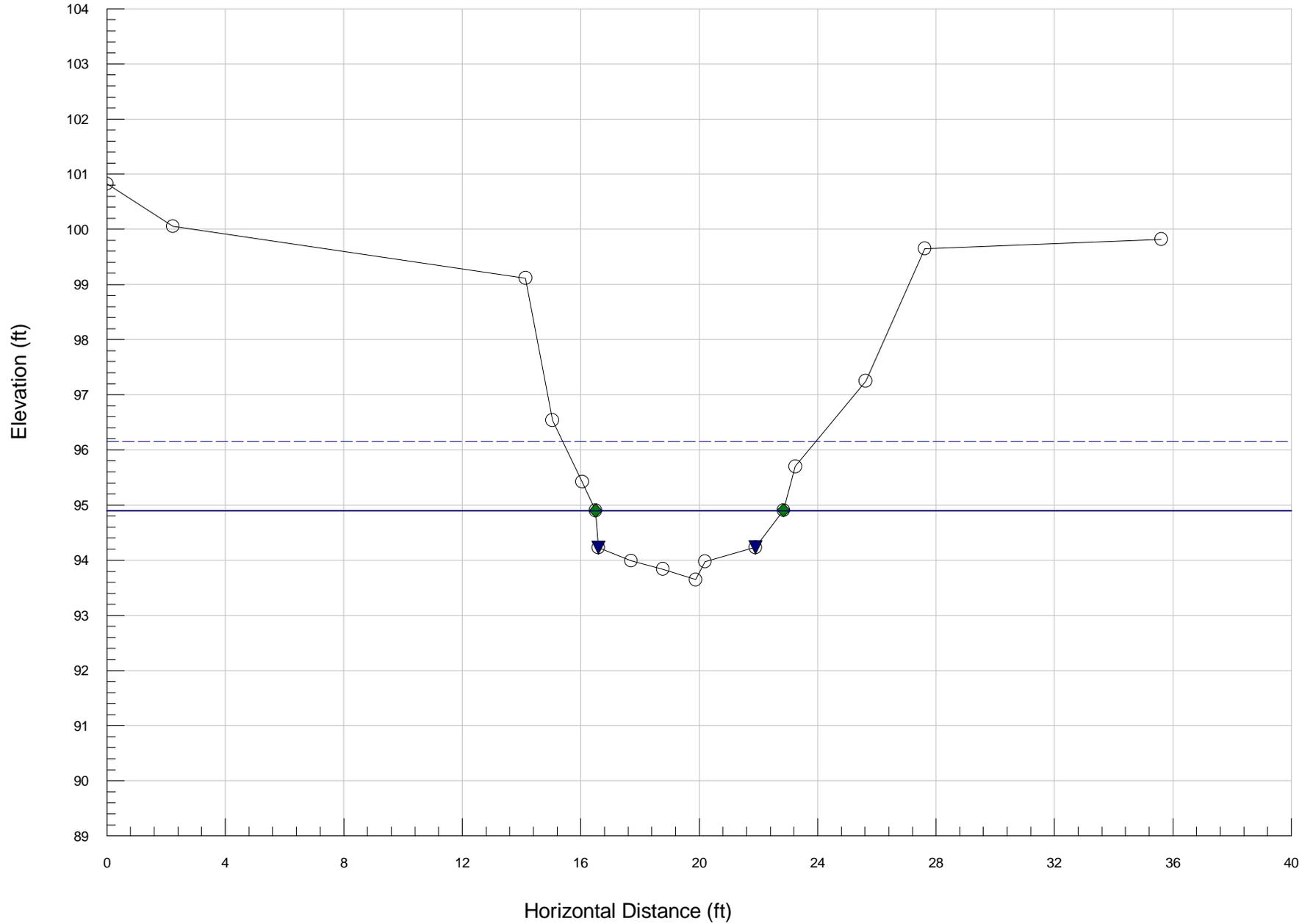
◆ Bankfull Indicators

▼ Water Surface Points

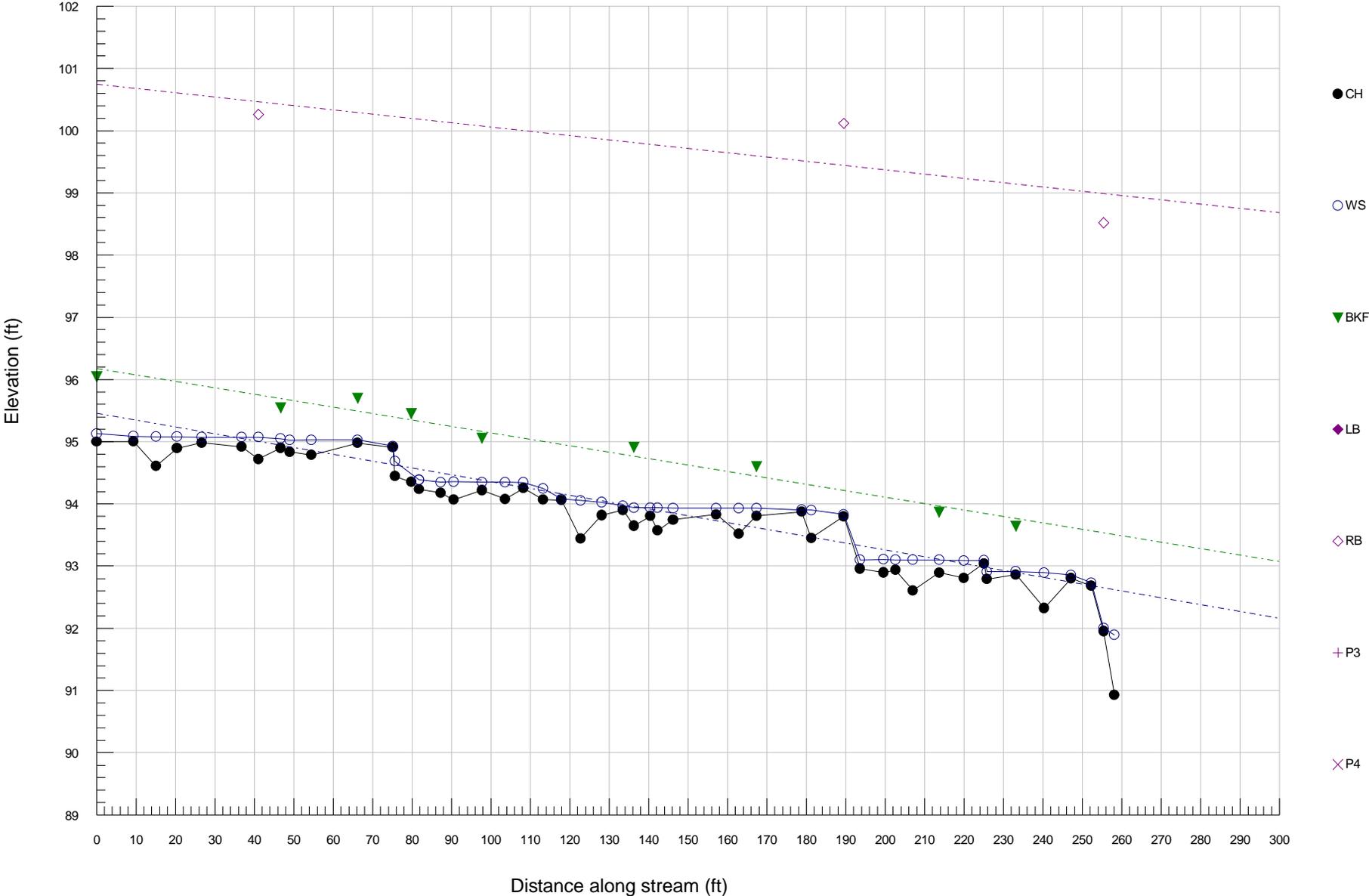
$wbkf = 6.34$

$Dbkf = .83$

$Abkf = 5.26$



# Reach 4 - Profile



# Reach 6 - Cross Section 1 (Riffle)

○ Ground Points

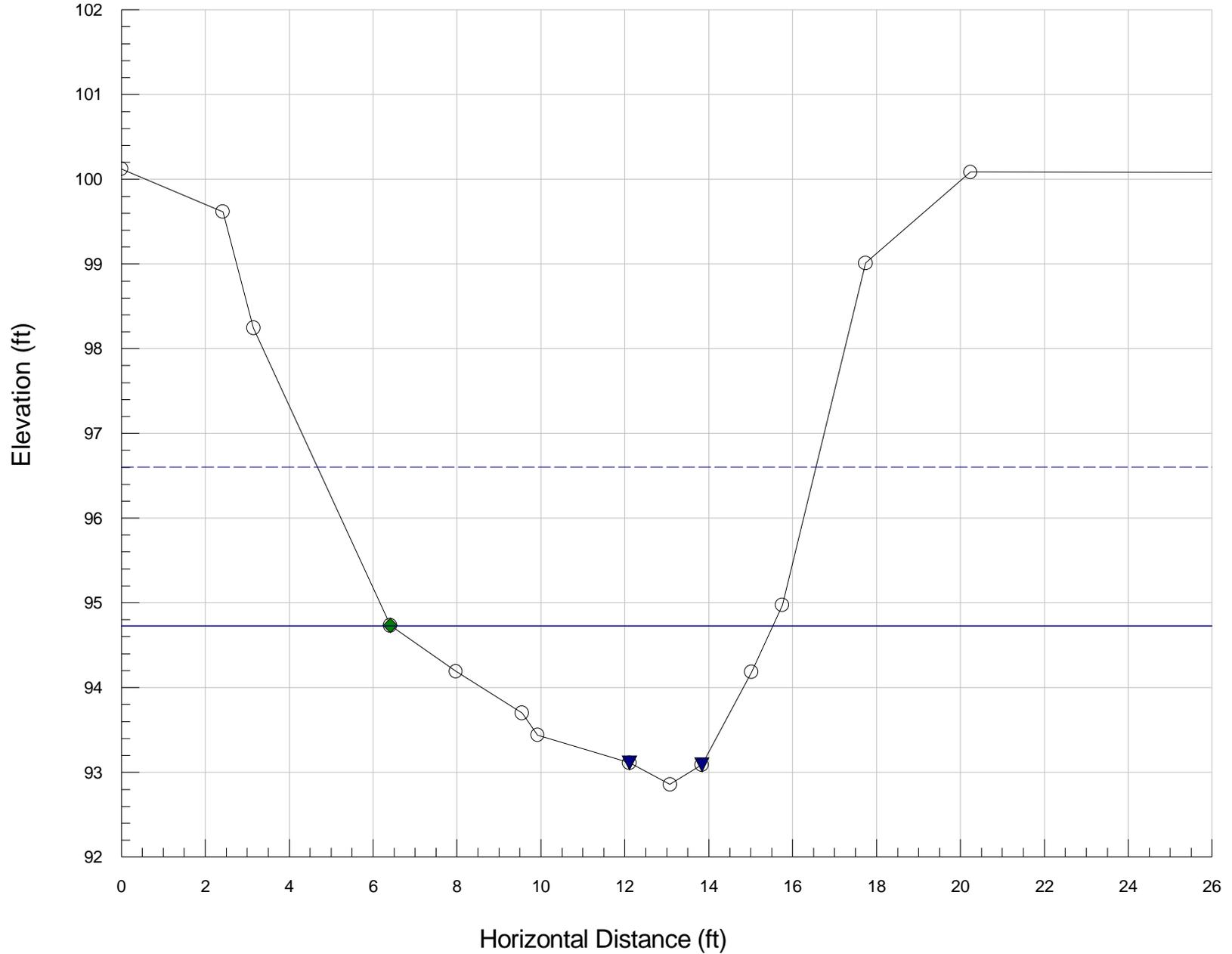
◆ Bankfull Indicators

▼ Water Surface Points

$W_{bkf} = 9.1$

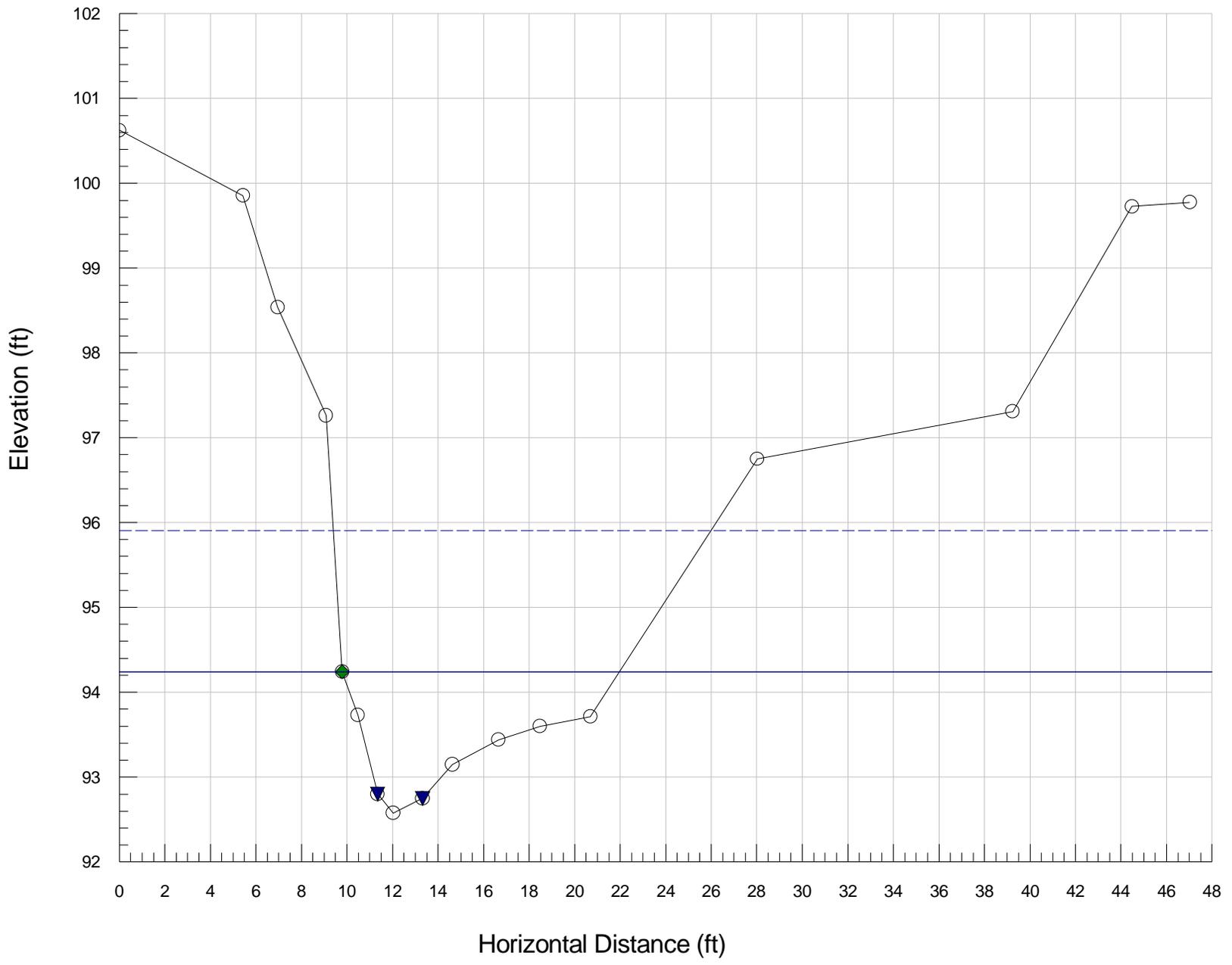
$D_{bkf} = 1.07$

$A_{bkf} = 9.72$

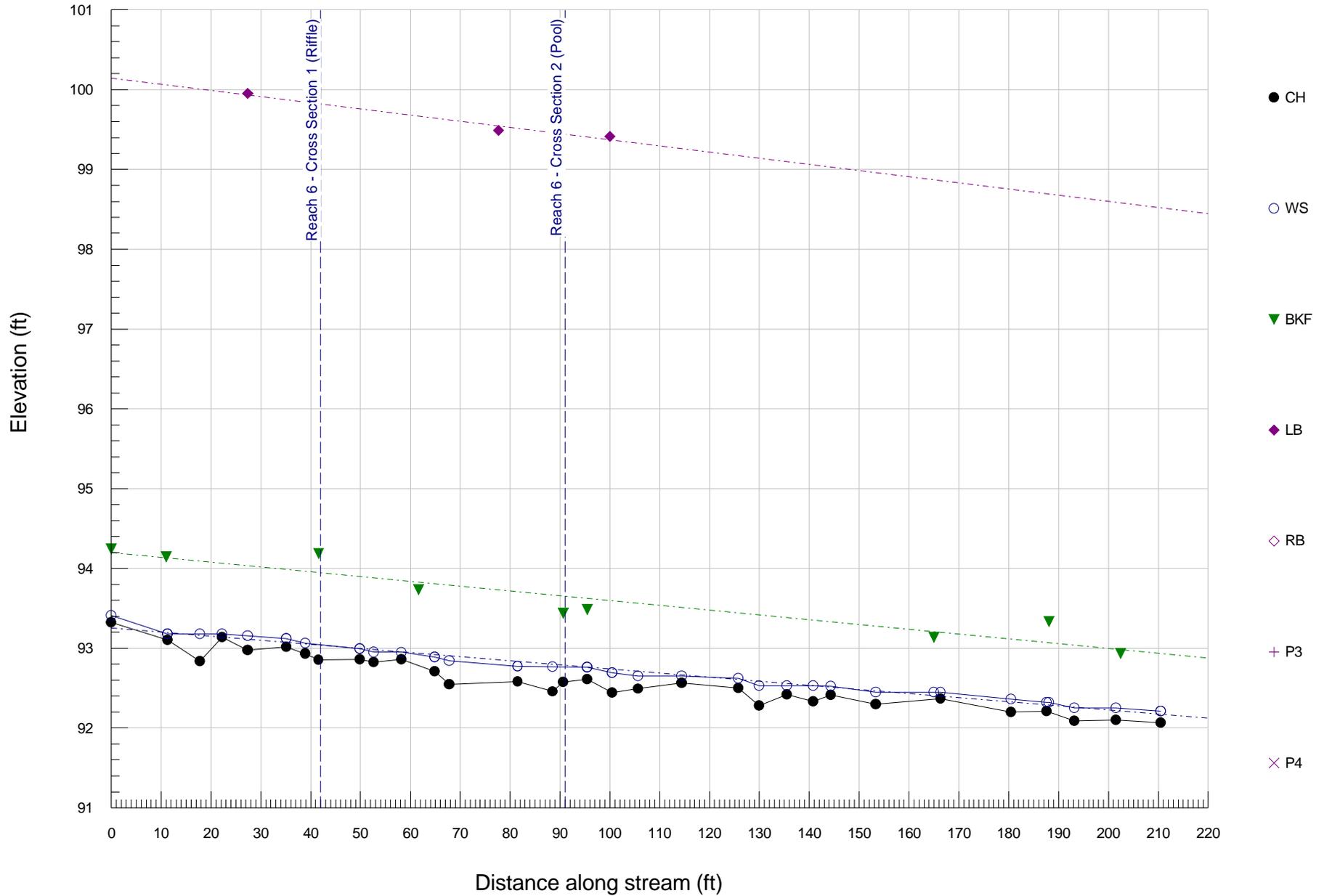


# Reach 6 - Cross Section 2 (Pool)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 12.2      Dbkf = .88      Abkf = 10.7

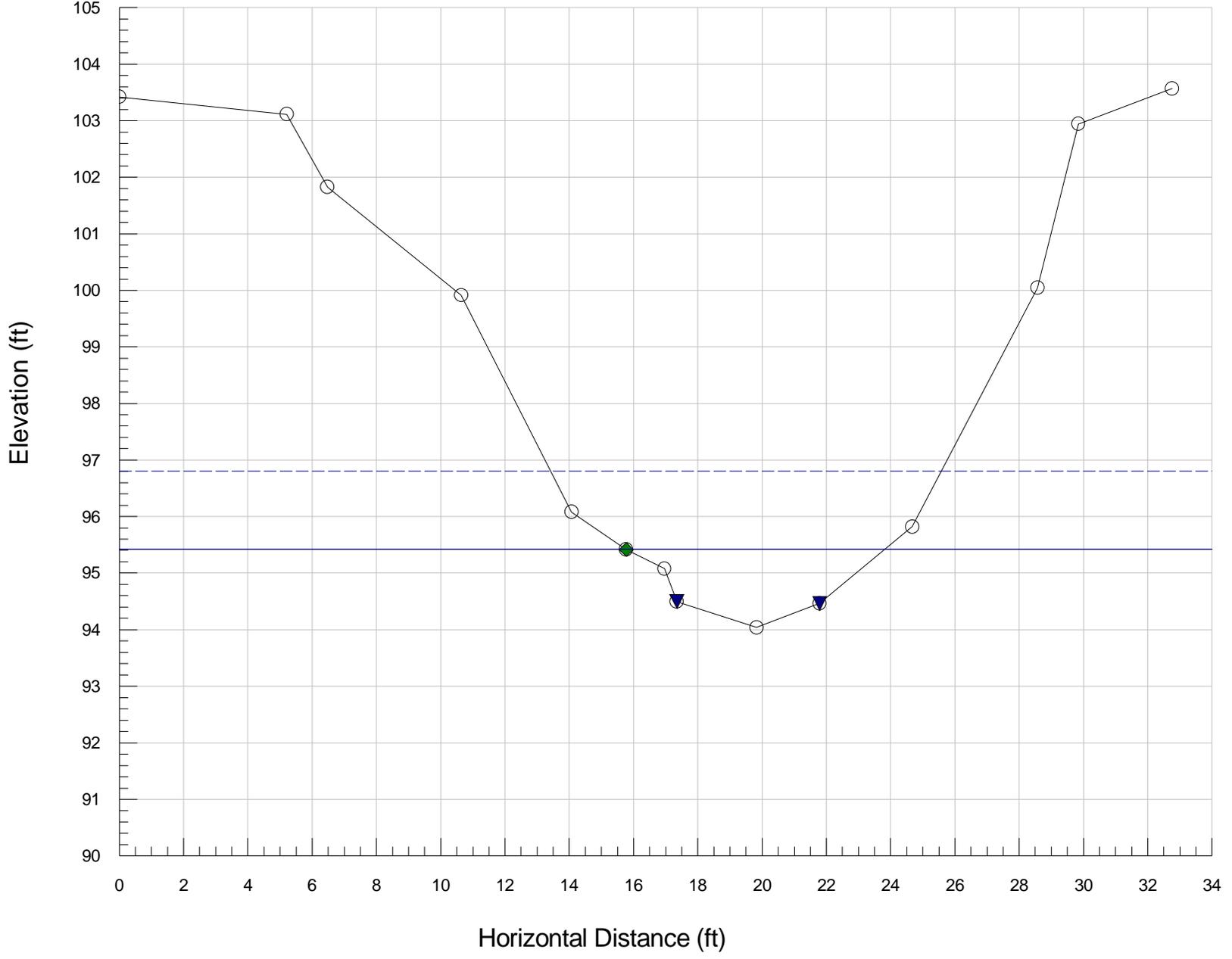


# Reach 6 - Profile



# Reach 7 - Cross Section 1 (Pool)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 8.05      Dbkf = .82      Abkf = 6.57



# Reach 7 - Cross Section 2 (Riffle)

○ Ground Points

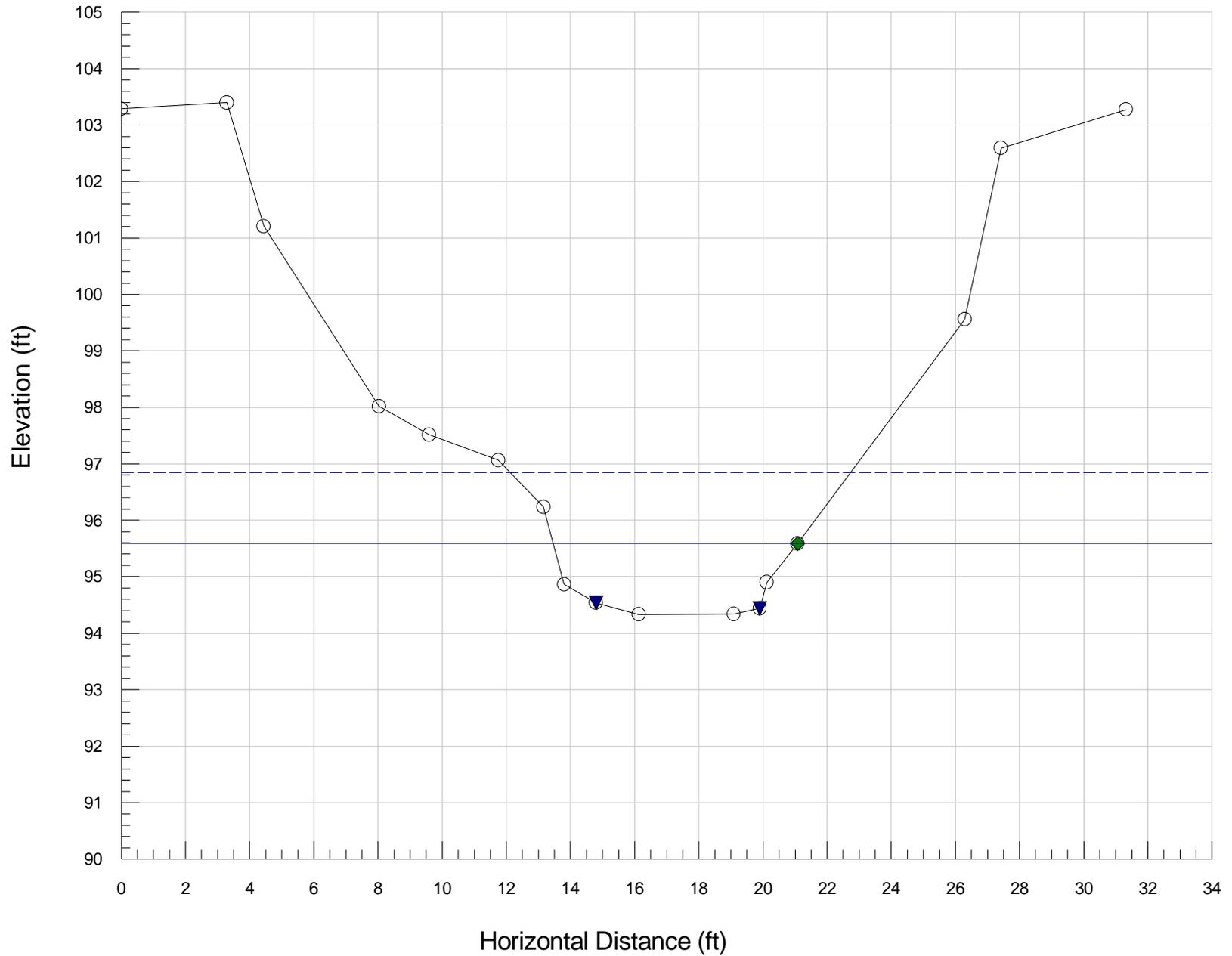
◆ Bankfull Indicators

▼ Water Surface Points

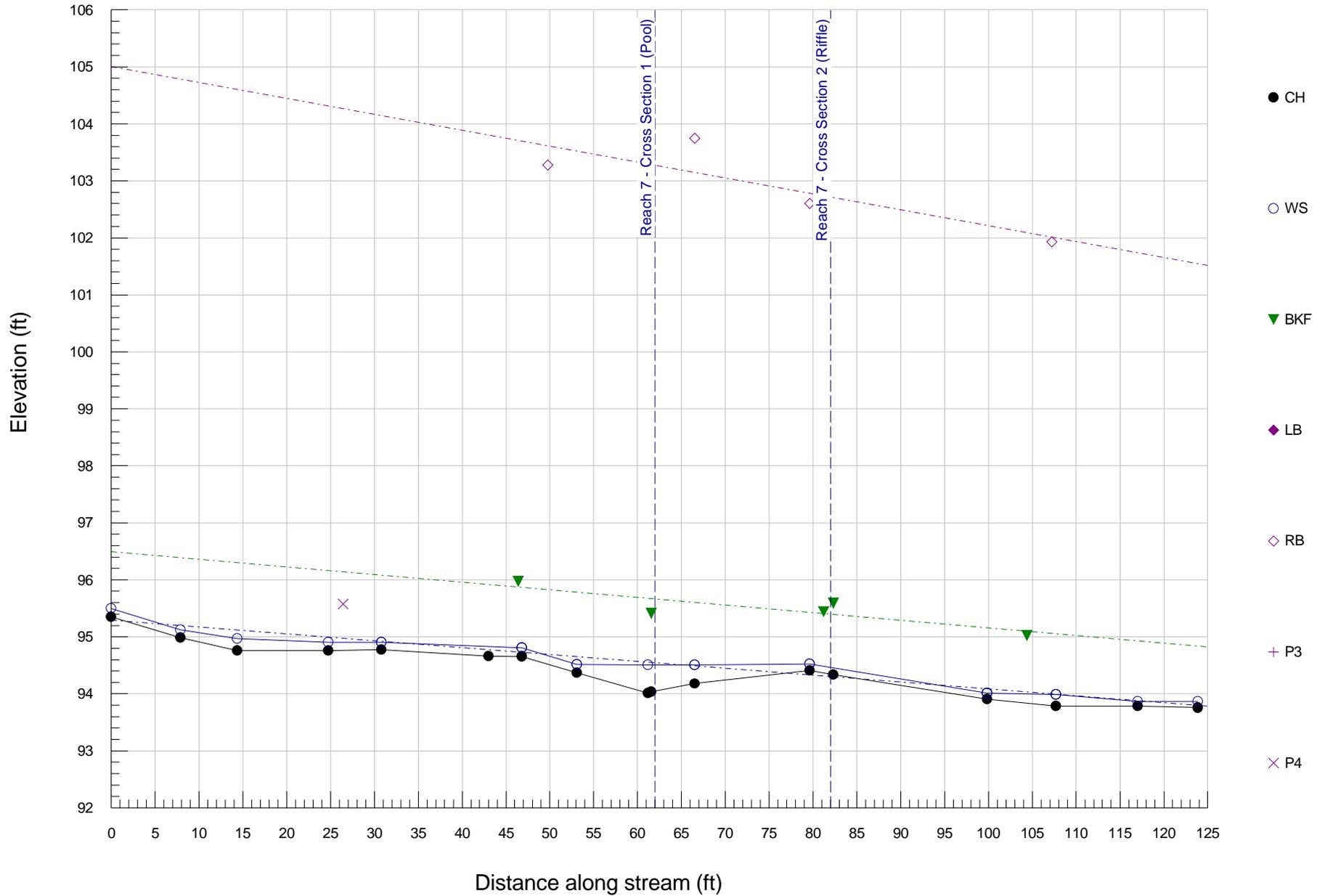
$wbkf = 7.61$

$Dbkf = 1.02$

$Abkf = 7.76$

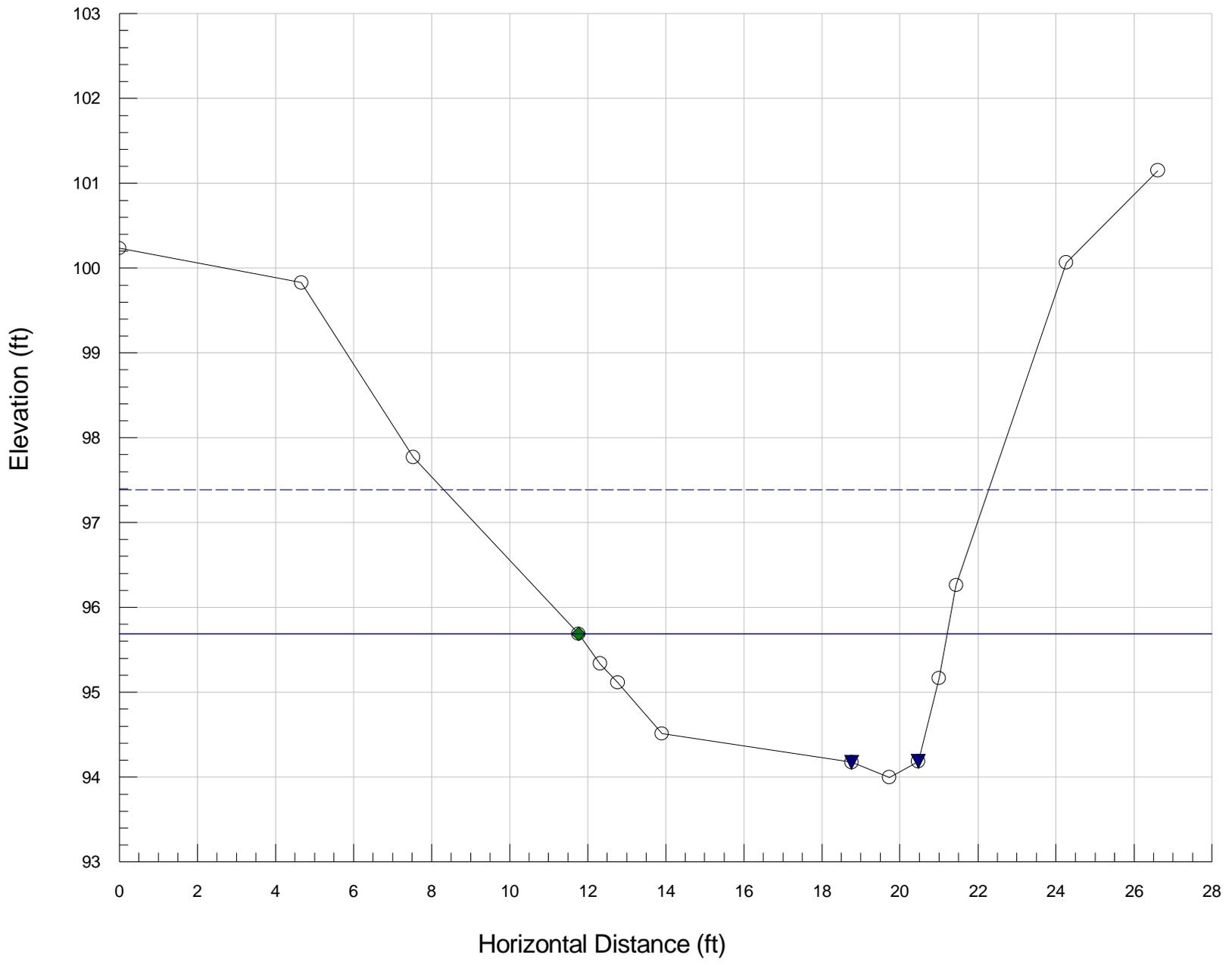


# Reach 7 - Profile



# Reach 8 - Cross Section 1 (Pool)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 9.44      Dbkf = 1.18      Abkf = 11.2



# Reach 8 - Cross Section 2 (Riffle)

○ Ground Points

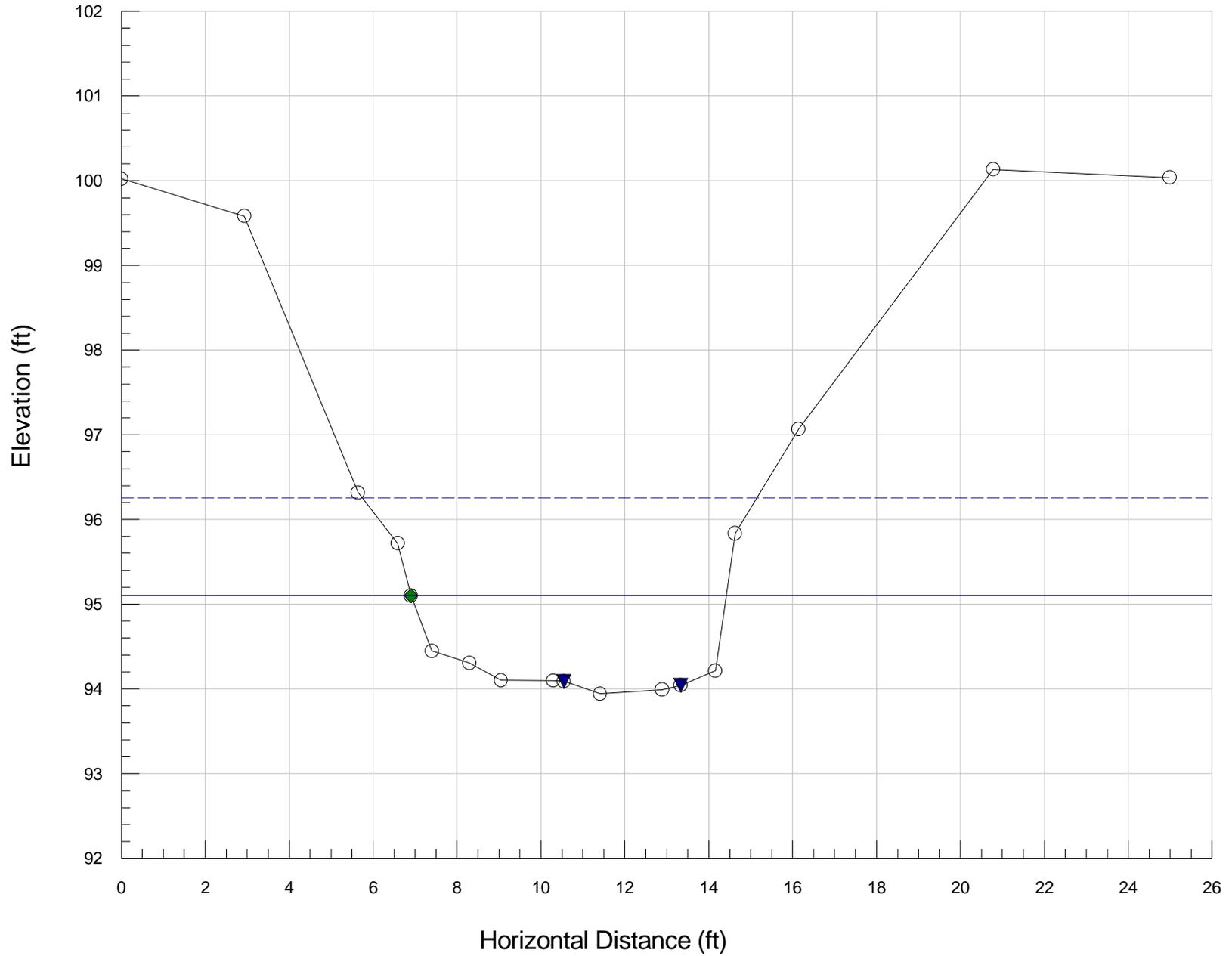
◆ Bankfull Indicators

▼ Water Surface Points

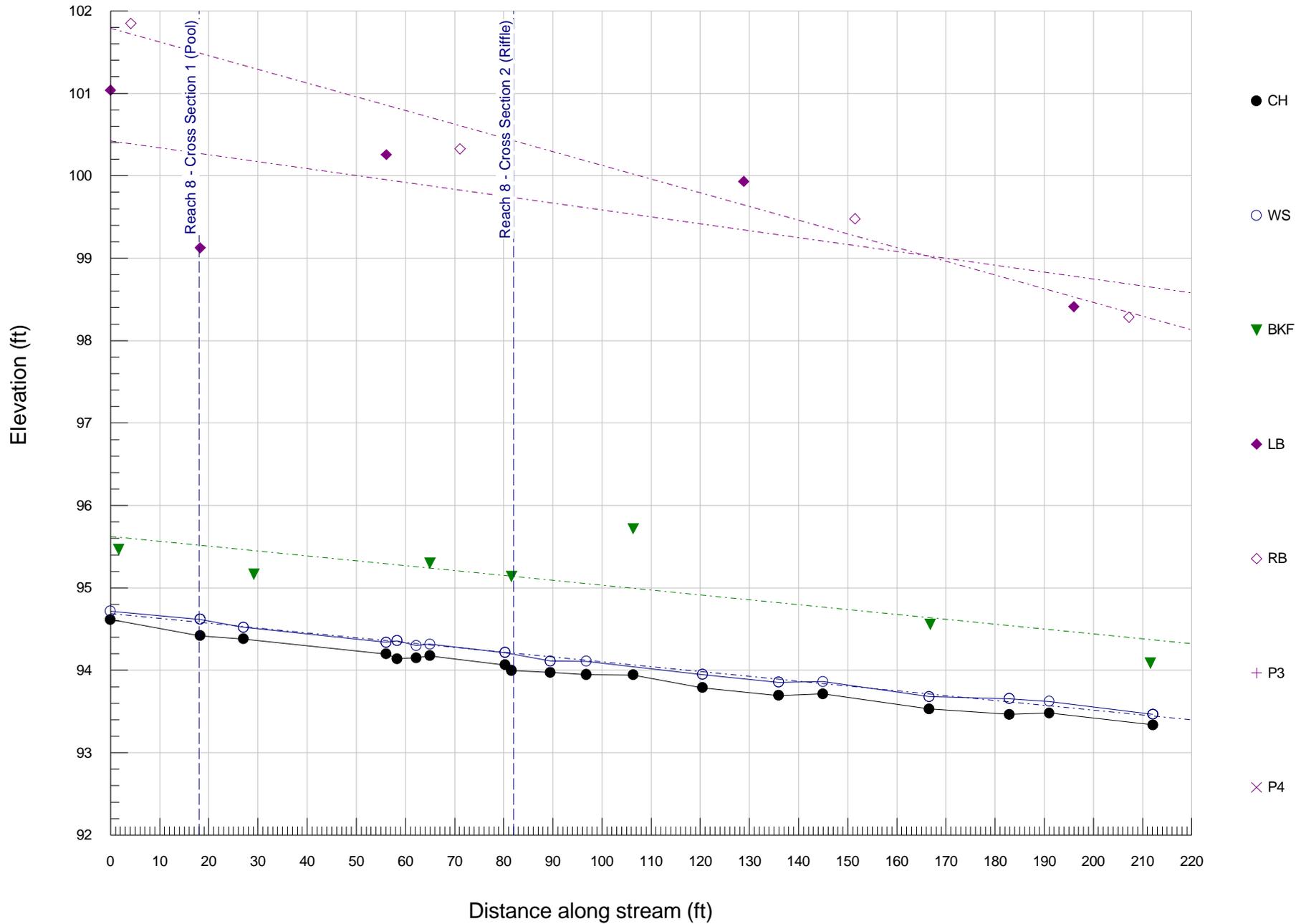
$wbkf = 7.52$

$Dbkf = .93$

$Abkf = 6.99$

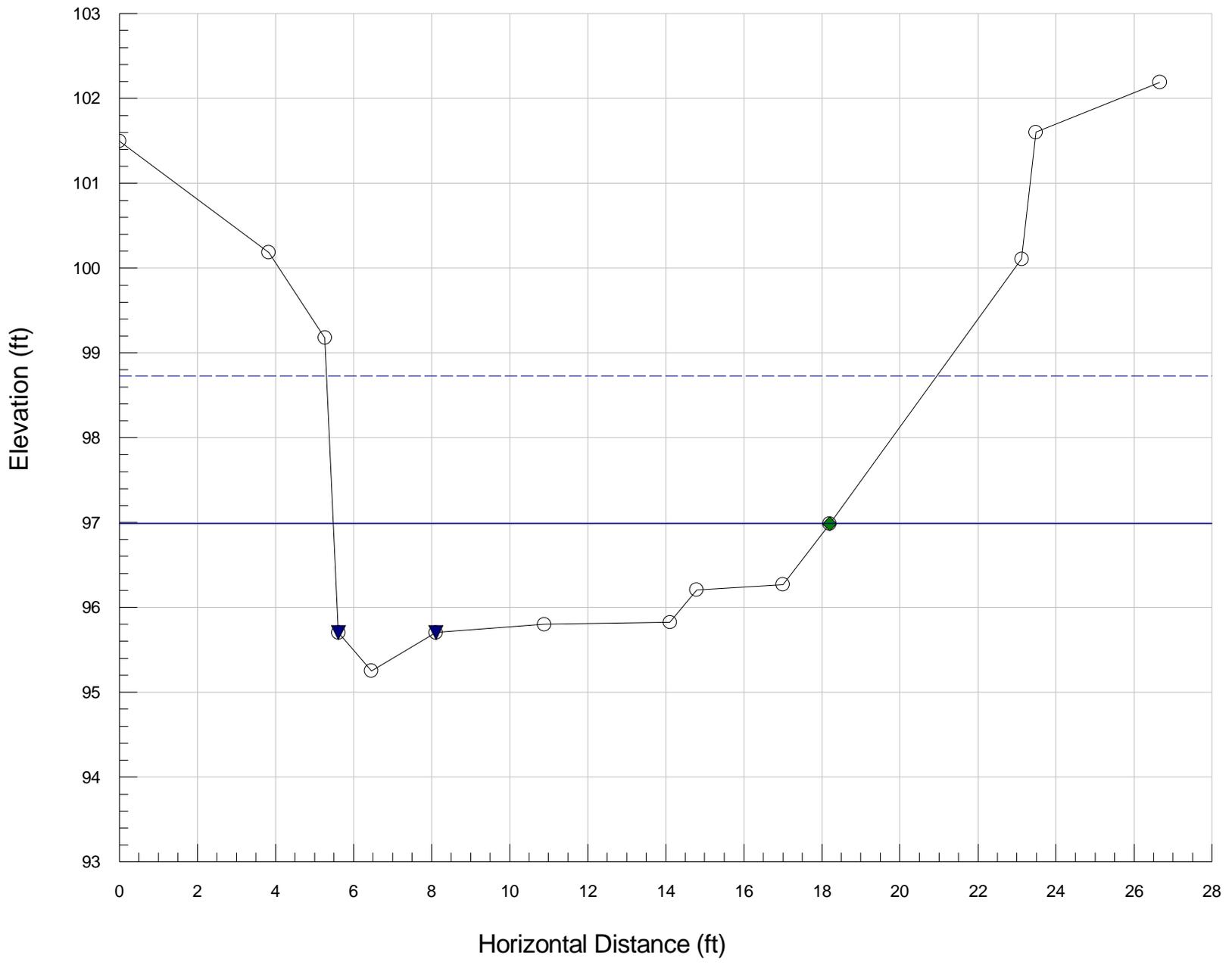


# Reach 8 - Profile



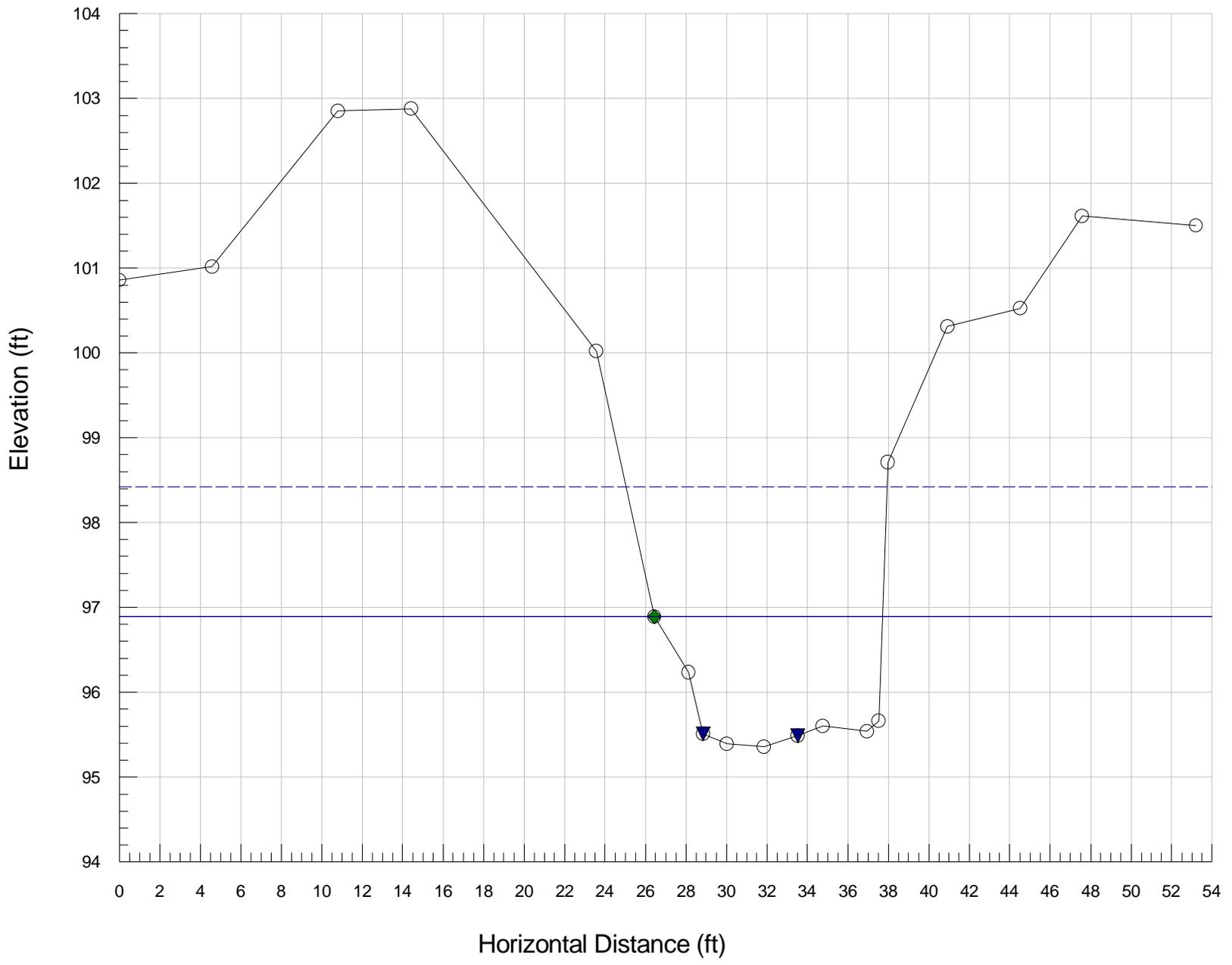
# Reach 9 - Cross Section 1 (Pool)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 12.7      Dbkf = 1.09      Abkf = 13.8

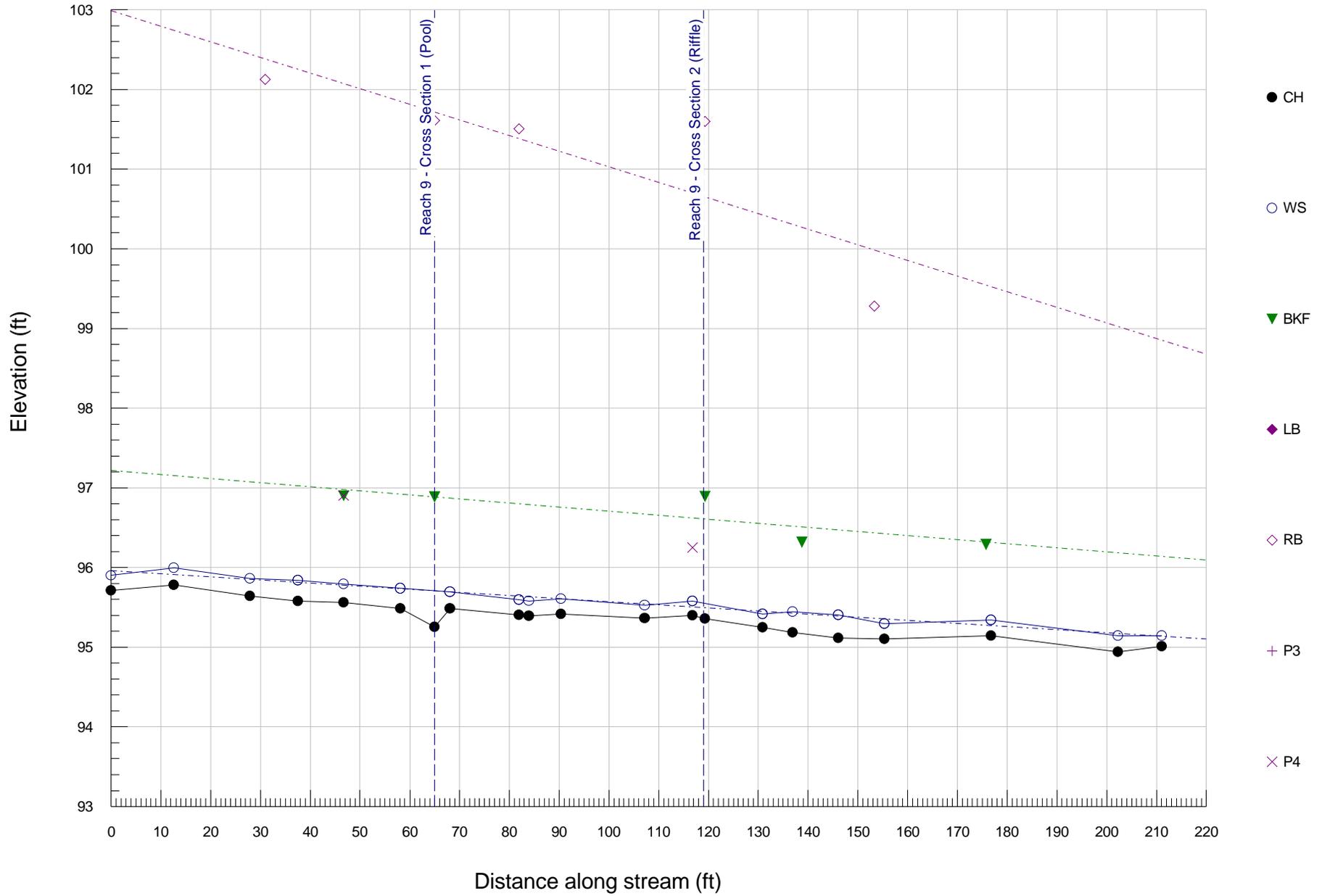


# Reach 9 - Cross Section 2 (Riffle)

○ Ground Points      ◆ Bankfull Indicators      ▼ Water Surface Points  
wbkf = 11.3      dbkf = 1.21      abkf = 13.6



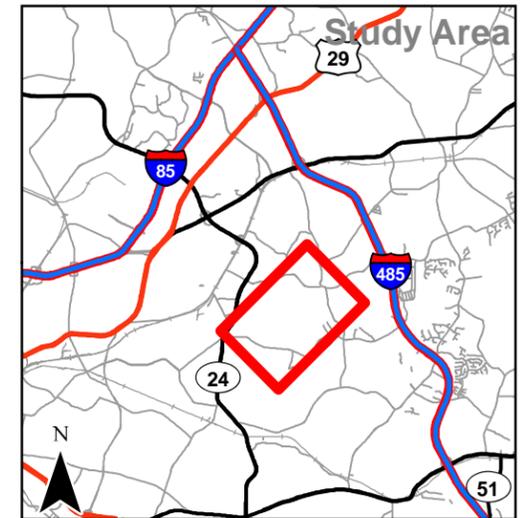
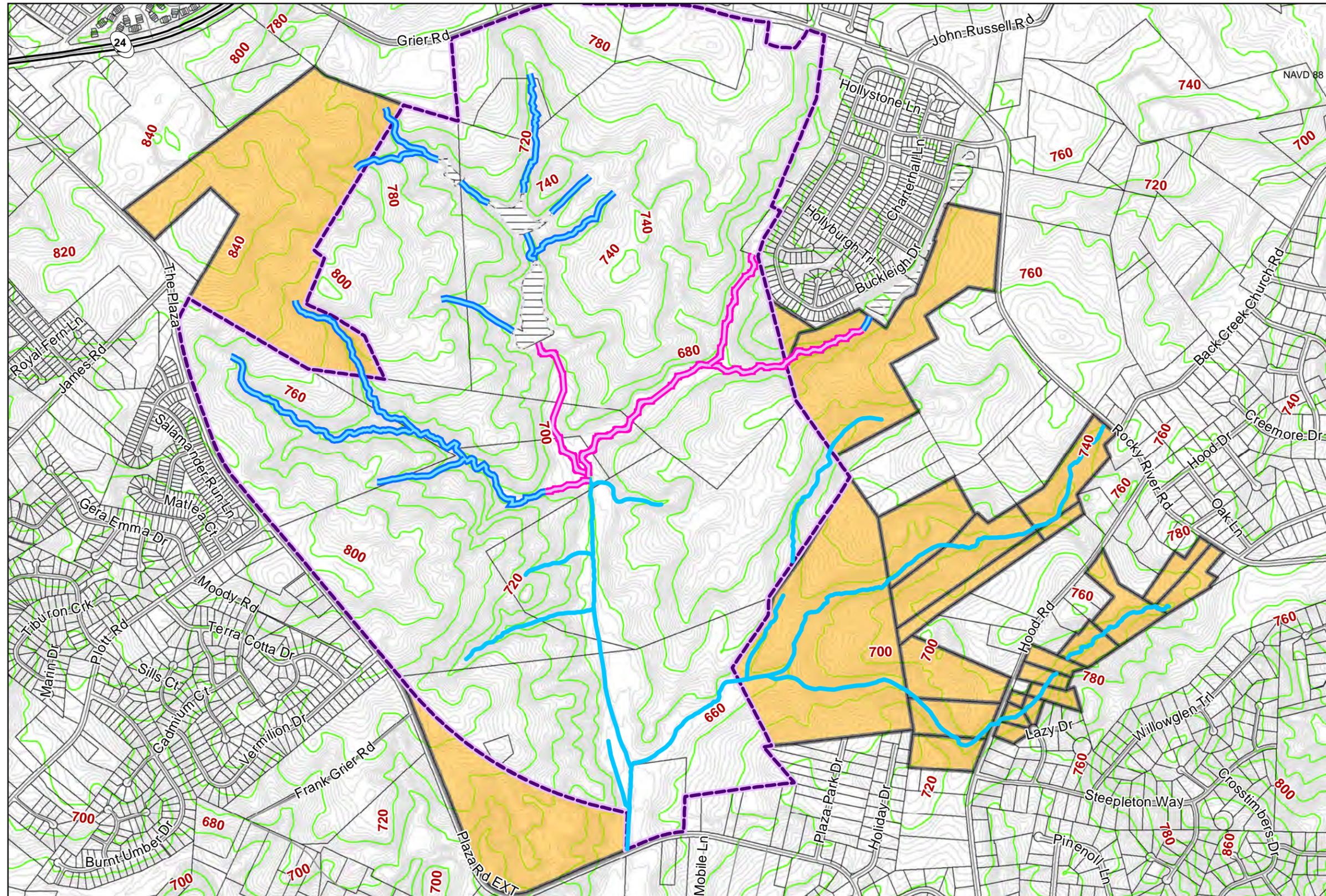
# Reach 9 - Profile



# Appendix 9

**Figure 1**  
Studied Streams

# Reedy Creek Feasibility Study

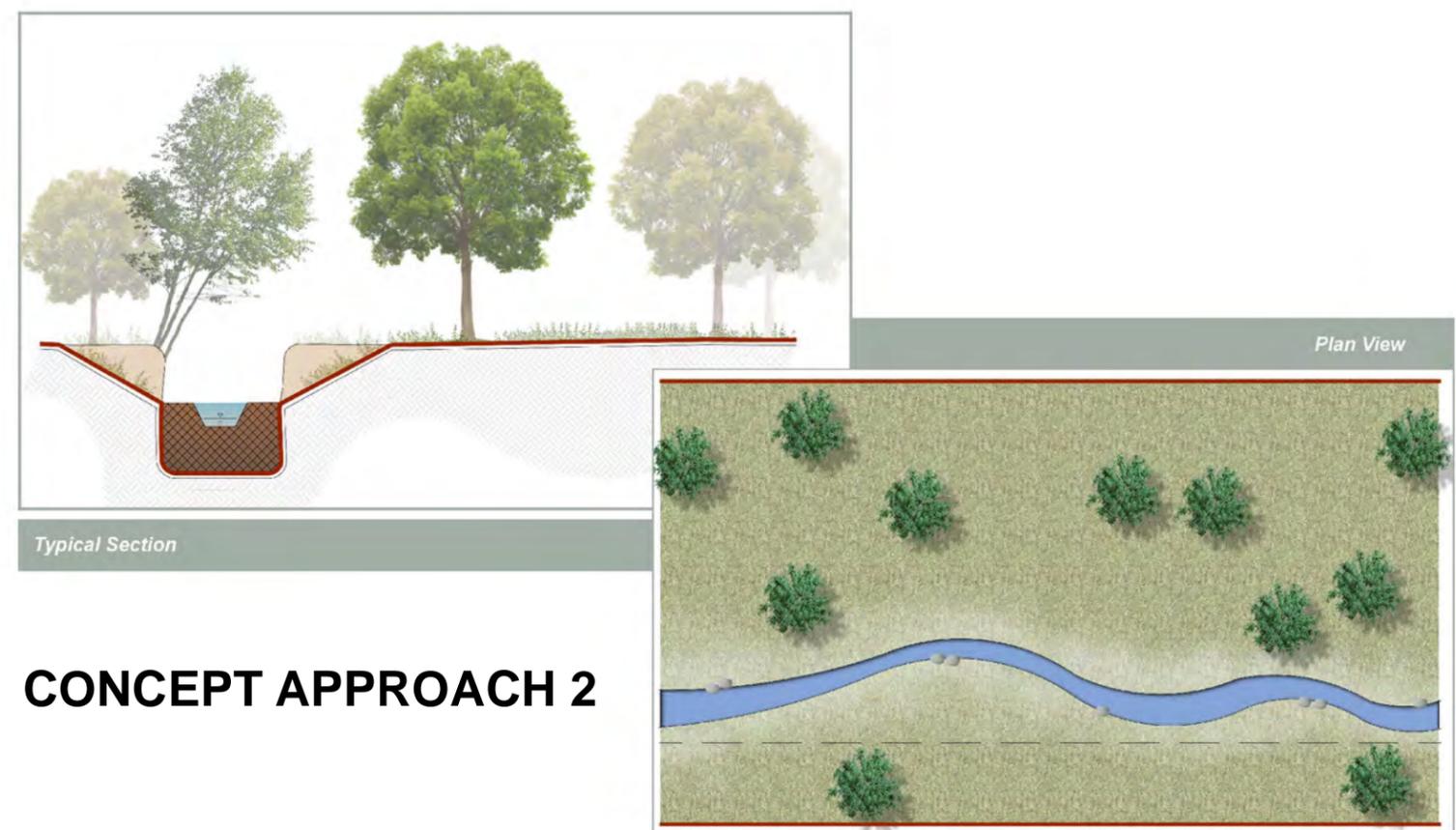
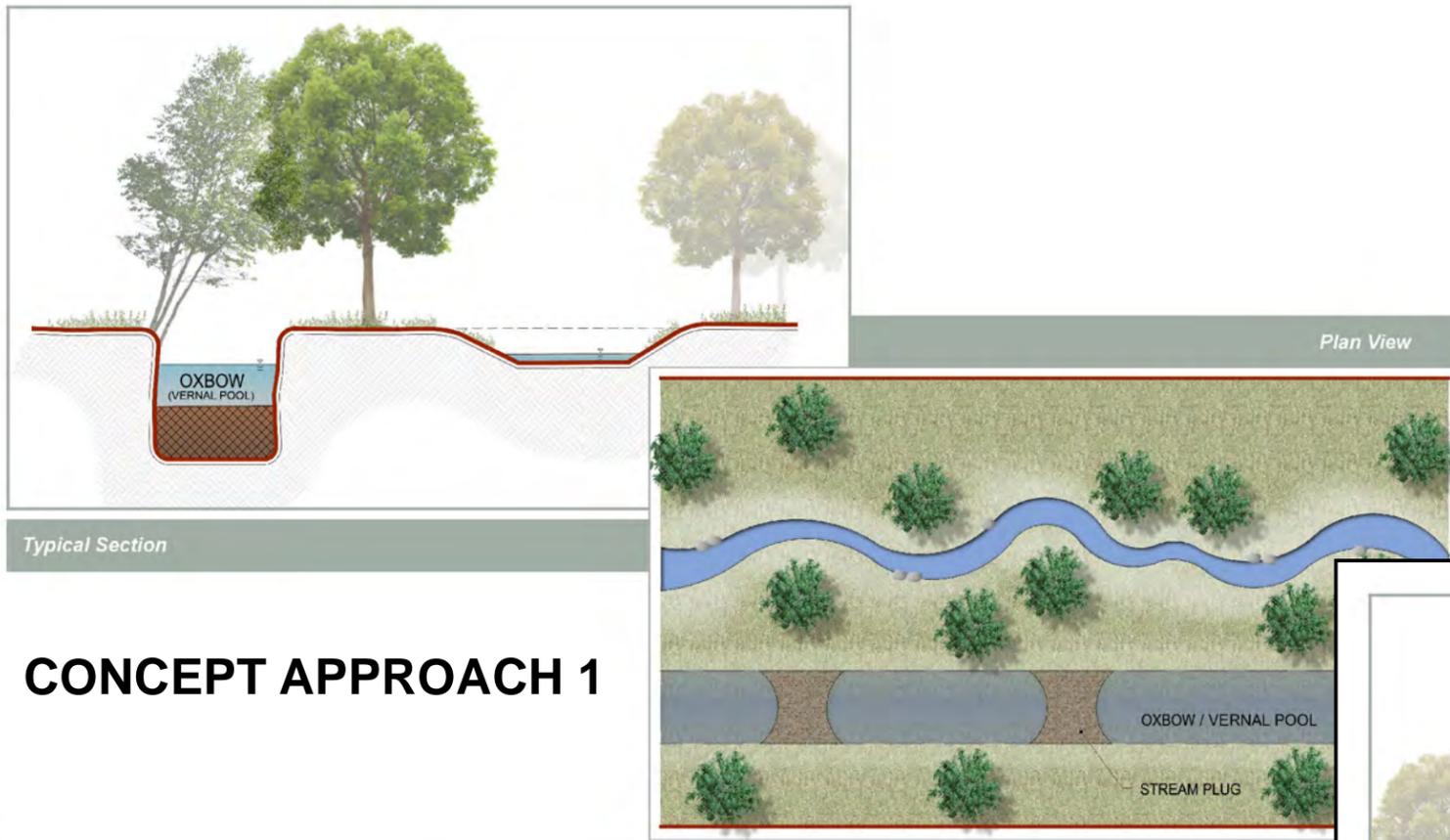


**Legend**

- Reedy Creek Nature Preserve
- Potential Additional Parcels
- Impounded Areas
- Proposed Stream Restoration
- Proposed Stream Preservation
- In Progress (Stream)



**Figure 2**  
Concept Restoration Approaches



NTS



## Preservation Reaches



## Restoration Reaches



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**Reedy Creek Stream Restoration and  
Watershed Enhancement Project  
November 22, 2011 – 10:00 a.m.  
On-Site @ Reedy Creek Nature Preserve and Park**

**Attendees:**

- Jarrod Karl - Charlotte Mecklenburg Storm Water Services (CMSWS)
- William Harris – CMSWS
- Steve Kichefsky – U.S. Army Corp of Engineers (USACE)
- Alan Johnson – N.C. Division of Water Quality (NC DWQ)
- Will Wilhelm – Kimley-Horn and Associates, Inc. (KHA)

**Meeting Purpose:**

The purpose of the meeting was to field review the proposed Reedy Creek restoration site and get USACE and DWQ's opinion on the site as a candidate for restoration and/or enhancement and inclusion into the City's Umbrella Mitigation Bank.

**Project Site and Field Walk:**

The site contains five stream reaches that have potential for restoration – See attached figure. During the meeting the field team walked to upper reach 5 (proposed as a reference) to gain visual perspective on the reference stable state stream system. The group then walked to lower Reach 2 and Reach 1 both proposed for restoration. The group then walked up to the outlet of Dragonfly Pond which is the start of the proposed restoration area on Reach 2. The team then drove around to the Buckleigh neighborhood and walked to Reach 3 in the Park/Nature Preserve. Reach 4 and lower Reach 5 were not field reviewed. KHA stated that Reach 4 is in a very similar impaired condition to Reach 3 and the lower ~500 feet of Reach 5 is in a similar impaired condition as lower Reach 1 and 2.

**Comments on the Site:**

Overall USACE and NC DWQ agreed the site had mitigation potential based on this cursory field review and that the City could proceed forward with a Site Specific Mitigation Plan (SSMP). The following comments were made about each reach.

Reach 5

- The group agreed that the upper portions of Reach 5 was a stable reach and provided a good reference.
  - o KHA also noted that the upper sections of Reach 2 above the ponds are also stable and could also be used as reference.

Reach 1

- Agencies agreed that this reach is visually the most impaired they saw in the park.
- NC DWQ expressed concern that if priority one restoration (i.e. raising the stream bed 6-8 feet) is used, would ground water respond .
  - o CMSWS pointed out that similar projects in the County (i.e. Edwards Branch Phase III) where priority one was used, the ground water has responded favorably and stream base flow returned almost immediately to the newly constructed channel.
  - o KHA pointed out that it will be important to plug the old channel to prevent it from being a drain which could pull down ground water.

- KHA also pointed out that some initial soil borings were done and those would be reviewed in more detail as it relates to existing and proposed groundwater stream base flow hydrology.
- All parties agreed that additional investigation and analysis will need to be performed and documented in the SSMP.

### Reach 2

- All parties agreed that this stream segment is entrenched (i.e. has abandoned its historic floodplain) with bank heights over six feet.
- NC DWQ noted some areas of stable banks among the vertical eroding banks.
  - KHA noted that although there are some short segments where the bank has sloughed in and have become temporarily stable the overall reach is unstable and still actively eroding.
  - City noted that the stream lacked habitat/bed form diversity (i.e. no riffle and pools).
- All agreed the outlet of Dragonfly Pond provided a good starting point and the elevated invert elevation of the outlet pipes allowed for an opportunity to raise the stream bed up.
- The group also noted some relic gabion baskets and/or Reno mattress downstream of the pond outlet. The group agreed that this area could be improved.

### Reach 3

- The group agreed this reach is incised/entrenched with vertical eroding banks.
- USACE and NC DWQ asked about storm water inputs from the neighborhood into reach 3 and 4.
  - The City stated that a portion of the neighborhood drains to a wet pond on Reach 4.
  - KHA stated that a priority one restoration would allow the existing stream segments around stormwater inputs to be converted into pocket BMPs to provide treatment prior to the stormwater reaching the relocated priority one restored stream.

The meeting adjourned at approximately 12:15 pm. The Agencies supported the City further pursuing this site as a potential mitigation project. However, the above comments or concerns raised will need to be addressed in future submittals.

These minutes of the meeting between staffs of CMSWS, USACE, NC DWQ, and KHA represents KHA's understanding of the issues discussed. Please review these minutes carefully, and advise the undersigned of any corrections or additions within 21 days.

---

William R. Wilhelm, P.E., CFM, CPESC

Date: November 29, 2011



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Coordination Meeting For:  
Reedy Creek Stream Restoration  
February 3, 2012, 9:00 am  
Meeting Minutes

Attendees:

Amy Bice (Charlotte-Mecklenburg Storm Water Services (CMSWS))  
Jarrod Karl (CMSWS)  
William Harris (CMSWS),  
Chris Matthews (Mecklenburg County Park and Recreation Department (P&R))  
Michael Kirschman (P&R)  
Will Wilhelm (Kimley-Horn and Associates, Inc. (KHA))  
Jason Diaz (KHA)

This meeting occurred so that CMSWS and KHA could explain the potential proposed stream restoration project in the Reedy Creek Nature Preserve and Park. The meeting focused on communicating the potential project limits and overall goals.

Chris Matthews began the meeting with a brief introduction to the project, explaining that stream restoration is proposed for the degraded stream reaches within the park/nature preserve boundary. The City has performed a detailed feasibility study on the streams and wetlands within the project area and potential restoration alternatives. The restoration would seek to improve water quality, aquatic and terrestrial habitat, and aesthetics while minimizing the impact to the park users.

In order for the project to move forward, Park and Recreation would need to provide a conservation easement or similar agreement to allow CMSWS to build, monitor, and maintain the restoration project. This agreement would also need to provide long term protection/conservation of the restored reaches and riparian corridors. If P&R is agreeable, CMSWS would move forward with the planning and design of the proposed reaches inside P&R properties.

If P&R participates in this restoration project, CMSWS will contact the several adjacent property owners (WSOC Television, Grier, and Hodges) to look to expand the project. However, if these owners chose not to participate the project would still continue forward because the stream reaches in Reedy Creek Nature Preserve and Park are of sufficient length to be a stand-alone project. P&R indicated that they have long term interest in these adjacent parcels and would like to work with CMSWS to potentially purchase the entire parcels. P&R discussed that they have previously reached out to these owners without success.

KHA gave an overview of the potential project and the feasibility study that was prepared for the City. KHA explained how there were some really "nice" stable reaches within the nature preserve and some very degraded reaches. This project will look to make improvements only to the degraded reaches - see

attached Figure. KHA further explained how the degraded streams' water quality and habitat have been reduced by accelerated erosion and sediment input.

It was also noted that as part of the feasibility study, KHA looked at potential constraints such as access, construction phasing, timing, endangered species, existing vegetation, and historic sites. The constraints will dictate the design and construction of the project.

CMSWS noted that the US Army Corps of Engineers and NC Division of Water Quality have been to the site and have given positive feedback on the potential restoration project.

Other items that were discussed include:

- Reedy Creek is in the process of becoming a State Nature Preserve.
  - The City and P&R will work with Real Estate Services to understand potentially stacking conservation easement or other agreements on the nature preserve stream corridors.
  - Language for access, maintenance, and the restoration work may need to be written into the State's easement agreement.
- P&R expressed an interest in expanding the project area to include Reedy Creek to their southern border. The City will add this segment into planning phase if the project moves forward.
- Grading a subtle bank on abandoned channel sections for amphibian access to vernal pool areas.
- The existing pedestrian bridges should be incorporated into the design.
  - The new bridges are fiberglass and 8 feet wide.
  - These bridges will be surveyed. Avoidance and protection of the bridges will be incorporated into the planning and design.
- The BMP pond on the adjacent CMS property is not functioning properly and is causing sediment issues at Slider Pond. CMSWS will check in on the requirements for the BMP and ask CMS to properly operate and maintain this device.
- The P&R Director and park Citizen Advisory Council will have to approve the project prior to getting a commitment for P&R to participate.
  - Chris Matthews will facilitate an internal informal meeting with the Director.
  - CMSWS and KHA may be required to present to the park/preserve Citizen Advisory Council. The presentation should be 10-15 minutes long and should address what the project is, why we need it, where we are with the project, and the benefits (including biology and biodiversity) of the project. P&R stated that they would tentatively add this to the regularly scheduled meeting the 2nd week in May.
  - P&R stated that Park and Recreation Council (PRC) may not need to be involved.
- Access, marketing, and education through social media, mailers, and/or signage will be a critical component for park users prior to, during, and after construction if the project moves forward.
- CMSWS to investigate viability of Slider and Dragonfly Ponds as potential pond improvement projects.

These minutes of the meeting between staffs of CMSWS and KHA represents KHA's understanding of the issues discussed. Please review these minutes carefully, and advise the undersigned of any corrections or additions within 14 days of the date below.

Date: February 22, 2012

A handwritten signature in black ink, appearing to read "Jason Claudio-Diaz". The signature is written in a cursive style with a large initial "J".

---

Jason Claudio-Diaz, P.E., CFM

Diaz, Jason

---

From: Karl, Jarrod <jkarl@ci.charlotte.nc.us>  
Sent: Friday, June 22, 2012 11:17 AM  
To: Harris, William  
Cc: Diaz, Jason; Wilhelm, Will  
Subject: FW: Reedy Creek Part II

FYI...

---

From: Johnson, Alan [<mailto:alan.johnson@ncdenr.gov>]  
Sent: Thursday, June 21, 2012 5:11 PM  
To: Jones, Amanda D SAW; Karl, Jarrod  
Subject: Reedy Creek Part II

As with most streams in the Charlotte area, all channels observed were "incised" and over widen. However, the banks along the channels were relatively stable, but there were areas of notable erosion (under cut trees/root wads, etc). Pools were nonexistent, except in eddies created by logs and debris. But, fish/minnows were observed in the channel. The area along the channels was well wooded, but no large trees were observed. The large trees tend to range from 6"-10" in diameter with a nice understory of smaller saplings and shrubs. We noted the upper end of reach 7 and observed the reference reach and the obvious 6 ft head cut. Of course we don't know how quickly the head is moving. My thoughts:

- 1) Diameter of tree size to save should be reduce from the typical 10" to 12" diameter. If the larger tree diameter guide is used, shading and trees will be nonexistent.
- 2) Priority 1 may be the best option. There is an onsite "reference".
- 3) Enhancement should mostly (strive to be) within the channel (inner berms/benches). An effort should be made to retain 50% of the bank, where minimal impact occurs that protects the riparian corridor. This may be alternating stream bank/channel shaping. This is a conceptual thought.
- 4) Habitat uplift (pool creation, woody debris) should be relatively easy to attain in the with enhancement. Grade control should be similar. The biggest question is reducing erosion of the stream bank.

Thanks  
Alan

Alan Johnson - [Alan.Johnson@ncdenr.gov](mailto:Alan.Johnson@ncdenr.gov)  
North Carolina Dept. of Environment & Natural Resources  
Div. of Water Quality  
610 E. Center Ave., Suite 301  
Mooresville, NC 28115  
Ph: (704) 663-1699 Fax: (704) 663-6040

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties unless the content is exempt by statute or other regulation.

Diaz, Jason

---

From: Karl, Jarrod <jkarl@ci.charlotte.nc.us>  
Sent: Friday, June 22, 2012 11:18 AM  
To: Harris, William  
Cc: Diaz, Jason; Wilhelm, Will  
Subject: FW: Reedy Creek #2

FYI...

---

From: Johnson, Alan [<mailto:alan.johnson@ncdenr.gov>]  
Sent: Friday, June 22, 2012 8:47 AM  
To: Karl, Jarrod; Jones, Amanda D SAW  
Subject: Reedy Creek #2

One more thought:

What would be the issue if the project is enhancement, if the project was limited to mostly in stream structures to create pools/areas for habitat as well as localized areas of heavy channel work that might facilitate a reduction in stream velocity. Also, breaching the berms sporadically along the channel.

Alan Johnson - [Alan.Johnson@ncdenr.gov](mailto:Alan.Johnson@ncdenr.gov)  
North Carolina Dept. of Environment & Natural Resources  
Div. of Water Quality  
610 E. Center Ave., Suite 301  
Mooresville, NC 28115  
Ph: (704) 663-1699 Fax: (704) 663-6040

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Diaz, Jason

---

To: Karl, Jarrod  
Subject: RE: Reedy Creek Feasibility Study Area

From: Jones, Amanda D SAW [<mailto:Amanda.D.Jones@usace.army.mil>]  
Sent: Tuesday, June 26, 2012 12:21 PM  
To: Karl, Jarrod  
Cc: Johnson, Alan ([alan.johnson@ncdenr.gov](mailto:alan.johnson@ncdenr.gov))  
Subject: Reedy Creek Feasibility Study Area

Below are my comments in response to our 06/21/12 field walk. Please let me know if there can be anything done in the near future to address comment #4.

In general, the site is a large contiguous, forested, headwater system which is very rare for proposed bank projects. Stream channels are incised, sand bed, with moderately eroding banks and no access to floodplain. The buffer is providing great canopy cover even though larger trees (>15 inches) are mostly absent. There also doesn't appear to be an invasive/exotic species problem in the buffer. The area is proposed for inclusion into the bank and is in the early planning stages. Please consider/address the comments below as you move forward:

1. Justification needs to be provided as to why this area should be considered a candidate for preservation credit given its current status as a park. What are the developmental threats/pressures to this area, what protection does it receive currently as a park and how those protections could be changed. What would be the protections afforded by inclusion into the bank and how those are different from its current park status.
2. Buffers: Limited buffer disturbance with this project will be crucial for approval to move forward. Tree surveys for dbh's smaller than 12" will likely be required and detailed plans showing tree disturbance should be provided early on in planning with stringent contract oversight during construction. We recommend re-planting with larger caliper trees/shrubs. We also recommend that wider buffers should be acquired (greater than 50') since there are no constraints and the buffer is a contiguous/undisturbed forest for the most part.
3. We support a Priority 1 design given the available floodplain, lack of constraints, current state of stream channels, and concerns over vegetation disturbance. Any design should incorporate woody structures and minimize the use of rock due to the size and natural substrate of the existing stream channels.
4. There is a reference headwater stream and wetland system located on the site (Reach 7) which should be considered during design. We would also recommend that immediate action be taken to stop the existing headcut from moving further upstream and impacting this reference site. Only minimal in-stream would be required which would preserve this as a reference reach for the future regardless if/when this project moves forward.
5. Wetland E: high quality wetland area and reference reach. Any design should not impact this area. Also recommend conducting NCWAM assessments on existing wetlands which will likely be mandatory in the future.
6. Title opinions: I strongly recommend that title opinions/searches be conducted as soon as possible versus waiting until after design/bank approval. The value of this site as a potential bank site is tied to how relatively undisturbed it is for a piedmont, urban headwater forest. Any future easements/rows that may be present will affect the site's preservation value and ultimately overall credit generation.
7. In-stream macroinvertebrates: As noted on-site, portions of streams have scored high in the upstream reaches versus poor for downstream reaches. Considerations and further discussions should be had regarding how uplifts in this area will be tracked/monitored.
8. The request for the revised jurisdictional determination needs to include one overall map that shows jurisdictional areas from the November 2011 submittal/approval, the areas added from the May 2012 submittal, and any jd areas associated with the sewer line annexation project. We recommend that these areas be surveyed.

*Amanda Jones*  
*Regulatory Project Manager*  
*US Army Corps of Engineers*  
*Asheville Regulatory Field Office*  
*151 Patton Avenue, Room 208*  
*Asheville, NC 28801-5006*  
*office: (828)-271-7980 x.231*  
*fax: (828)-281-8120*  
*web: <http://www.saw.usace.army.mil/wetlands>*