



**DEPARTMENT OF THE ARMY**  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
69 DARLINGTON AVENUE  
WILMINGTON, NORTH CAROLINA 28403-1343

August 15, 2018

Regulatory Division

Re: NCIRT Review and USACE Approval of the Meadow Brook Stream Mitigation Plan; SAW-2017-01509; NCDMS Project # 100024

Mr. Tim Baumgartner  
North Carolina Division of Mitigation Services  
1652 Mail Service Center  
Raleigh, NC 27699-1652

Dear Mr. Baumgartner:

The purpose of this letter is to provide the North Carolina Division of Mitigation Services (NCDMS) with all comments generated by the North Carolina Interagency Review Team (NCIRT) during the 30-day comment period for the Meadow Brook Stream Mitigation Plan, which closed on July 16, 2018. These comments are attached for your review.

Based on our review of these comments, we have determined that no major concerns have been identified with the Draft Mitigation Plan, which is considered approved with this correspondence. However, several minor issues were identified, as described in the attached comment memo, which must be addressed in the Final Mitigation Plan.

The Final Mitigation Plan is to be submitted with the Preconstruction Notification (PCN) Application for Nationwide permit approval of the project along with a copy of this letter. Issues identified above must be addressed in the Final Mitigation Plan. All changes made to the Final Mitigation Plan should be summarized in an errata sheet included at the beginning of the document. If it is determined that the project does not require a Department of the Army permit, you must still provide a copy of the Final Mitigation Plan, along with a copy of this letter, to the appropriate USACE field office at least 30 days in advance of beginning construction of the project. Please note that this approval does not preclude the inclusion of permit conditions in the permit authorization for the project, particularly if issues mentioned above are not satisfactorily addressed. Additionally, this letter provides initial approval for the Mitigation Plan, but this does not guarantee that the project will generate the requested amount of mitigation credit. As you are aware, unforeseen issues may arise during construction or monitoring of the project that may require maintenance or reconstruction that may lead to reduced credit.

Thank you for your prompt attention to this matter, and if you have any questions regarding this letter, the mitigation plan review process, or the requirements of the Mitigation Rule, please call me at 919-413-6392.

Sincerely,

Kim Browning  
Mitigation Specialist

Enclosures

Electronic Copies Furnished:  
NCIRT Distribution List  
Paul Weisner, NCDMS



REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY**  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
69 DARLINGTON AVENUE  
WILMINGTON, NORTH CAROLINA 28403-1343

CESAW-RG/Browning

August 15, 2018

MEMORANDUM FOR RECORD

SUBJECT: Meadow Brook Stream Mitigation Project - NCIRT Comments during 30-day Mitigation Plan Review

PURPOSE: The comments listed below were posted to the NCDMS Mitigation Plan Review Portal during the 30-day comment period in accordance with Section 332.8(g) of the 2008 Mitigation Rule.

NCDMS Project Name: Meadow Brook Stream Mitigation Project, Yadkin County, NC

USACE AID#: SAW-2017-01509

NCDMS #: 100024

30-Day Comment Deadline: July 16, 2018

Mac Haupt, NCDWR, July 16, 2018:

1. Even though there are no wetland credits for this project, wetlands are a central component to this project's success. In order to effectively document two objectives (decrease drainage of wetlands and reconnect streams to the floodplain) in Table 9 (Goals and Objectives for the Meadow Brook Stream Restoration Project), DWR wants two groundwater recording gauges placed at the recommended locations, sta 16+50, 60 feet due south of meander bend, and 28+25, 20 feet from outside of the meander bend.
2. DWR likes the fact that random plots are being incorporated into the vegetation monitoring protocol. DWR recommends at least 4 permanent plots be located well within the wetland areas. Currently, it appears only two permanent plots occur well within the wetland areas.
3. DWR likes the fact that the toe ditch will be filled as well as another ditch which incorporates a wetland cell.
4. DWR has noted that many of the meander bends will be stabilized with only sod mats. While DWR believes these approaches can be effective, given the fact that much of the linear footage of the project will be with wetland areas, and the banks will be subject to lateral hydrologic pressure. That being the case, DWR recommends EPR replace the sod mat approach with their toe wood and geolift approach for the following stations: sta 12+50, sta 16+50, sta 21+50 and sta 28+00 to 28+50.

5. DWR likes the fact that EPR incorporated measurements of the SQT in their stream functional assessment and hopes that the tool will be run periodically throughout the monitoring period and at the end of the monitoring period.

Kim Browning, USACE, July 18, 2018:

1. Even though there are no wetland credits being sought, it is recommended that wetland gauges be installed and monitored in order to demonstrate no functional loss and/or acreage loss of wetlands with this project. The Table 6 NCWAM summary included will also help document this.
2. Please include a copy of the Jurisdictional Determination completed by William Elliott in the final plan. This JD is associated with the USACE AID SAW-2018-00041.
3. NLEB consultation with USFWS will need to be conducted prior to issuing the permit.
4. The Credit Release Schedule states that 15% of total credits are to be held for two bankfull events in separate years. This should read 4 bankfull events in separate years during the monitoring period, to coincide with Section 8.1 Performance Standards, and Oct. 24, 2016 Wilmington District Mitigation Guidance.
5. Section 8.1, please remove the word “majority” from the third, fourth, and fifth bullets regarding BHR and ER. It should read “...for all measured cross sections.”
6. Section 8.1, Entrenchment ration (ER) must be above 2.2 for all measured riffle cross-sections on a given reach (for C and E streams).
7. Section 7.5, please include a narrative on maintenance, if any, for the wetland treatment cell since it will be within the easement boundary. Additionally, since the marsh treatment areas are located within the stream buffers, the mitigation plan should include a performance standard for the marsh wetlands tied to vegetation success.

Kim Browning  
Mitigation Specialist  
Regulatory Division



Ecosystem Planning and Restoration, LLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606

Phone: (919) 388-0787  
www.eprusa.net

September 11, 2018

Harry Tsomides  
Project Manager  
North Carolina Department of Environmental Quality  
Division of Mitigation Services (NCDMS)  
Western DMS Field Office  
5 Ravenscroft Drive, Suite 102  
Asheville, NC 28801

**Subject: Mitigation Plan Report and Construction Plans  
Meadow Brook Stream Restoration Project  
Yadkin River Basin Cataloging Unit 03040101  
DMS Project ID #100024**

Dear Mr. Tsomides,

Ecosystem Planning and Restoration (EPR) has reviewed the comments of the Mitigation Plan and Preliminary Plans for the Meadow Brook Project provided by the NCIRT on August 15, 2018. The comments have been addressed as described below to create the Mitigation Plan Report and Construction Plans for the Meadow Brook Project. Comments from the NCIRT are provided on the following pages in italics with our responses immediately following the comment, according to the following format:

**Reviewer**

1. *NCIRT Comment*
  - o EPR Response

Please contact me at the above phone number or address with any questions.  
Sincerely,

A handwritten signature in black ink, appearing to read "Kevin Tweedy".

Kevin Tweedy, PE

Cc: Paul Wiesner, Western Regional Supervisor, NCDMS, Asheville, NC

## Mac Haupt, NCDWR, July 16, 2018

1. *Even though there are no wetland credits for this project, wetlands are a central component to this project's success. In order to effectively document two objectives (decrease drainage of wetlands and reconnect streams to the floodplain) in Table 9 (Goals and Objectives for the Meadow Brook Stream Restoration Project), DWR wants two groundwater recording gauges placed at the recommended locations, sta 16+50, 60 feet due south of meander bend, and 28+25, 20 feet from outside of the meander bend.*
  - Response: The decreased drainage of existing wetlands will be accomplished through filling in the existing ditches on-site and raising the stream bed. The performance criteria for the project objectives will be documented using the performance criteria laid out in Table 12. The following performance criteria was added to Table 12 to document the above-mentioned objectives: Documentation of hydrophytic vegetation within vegetation monitoring plots within planting Zone 2.  
Additionally, a PJD package was submitted to NCDWR and USACE on January 4th, 2018 and a Notification of Jurisdictional Determination was approved on April 17th, 2018. As mentioned in the comment, existing wetland condition was assessed using NCWAM and were found to be low functioning. Another PJD and NCWAM assessment will be performed at project close-out in order to demonstrate no net loss of function and/or acreage as a result of the stream restoration project, and to document functional uplift of the stream-wetland complex. Permanent and random vegetation plots will also document the success of hydrophytic vegetation throughout the conservation easement.
2. *DWR likes the fact that random plots are being incorporated into the vegetation monitoring protocol. DWR recommends at least 4 permanent plots be located well within the wetland areas. Currently, it appears only two permanent plots occur well within the wetland areas.*
  - Response: Figure 9 was revised as follows: the plot in between Meadow Brook Reach 1 and the UT, near the confluence was moved inside the wetland and the plot on the left bank of the UT was moved more within the existing wetland. This plot is within, but not well within the existing wetland area, but is expected to be well within wetland areas post-construction.
3. *DWR likes the fact that the toe ditch will be filled as well as another ditch which incorporates a wetland cell.*
  - Response: Comment does not require changes to the Mitigation Plan.
4. *DWR has noted that many of the meander bends will be stabilized with only sod mats. While DWR believes these approaches can be effective, given the fact that much of the linear footage of the project will be with wetland areas, and the banks will be subject to lateral hydrologic pressure. That being the case, DWR recommends EPR replace the sod mat approach with their toe wood and geolift approach for the following stations: sta 12+50, sta 16+50, sta 21+50 and sta 28+00 to 28+50.*
  - Response: Structures within wetlands have been evaluated to account for the potential lateral hydrologic pressure and EPR is confident in the placement and use of the techniques proposed. However, if during the construction of the project unforeseen site conditions arise that bring into question the use of the sod mats, EPR may replace the sod mats with toe wood or other structures as appropriate. Likewise, if there are problems observed with the sod mats during monitoring, EPR will repair or replace the structures as part of our contractual obligations with NCDMS.

5. *DWR likes the fact that EPR incorporated measurements of the SQT in their stream functional assessment and hopes that the tool will be run periodically throughout the monitoring period and at the end of the monitoring period.*
  - Response: Comment does not require changes to the Mitigation Plan.

**Kimberly Browning, USACE, July 18, 2018**

1. *Even though there are no wetland credits being sought, it is recommended that wetland gauges be installed and monitored in order to demonstrate no functional loss and/or acreage loss of wetlands with this project. The Table 6 NCWAM summary included will also help document this.*
  - Response: A PJD package was submitted to NCDWR and USACE on January 4th, 2018 and a Notification of Jurisdictional Determination was approved on April 17th, 2018. As mentioned in the comment, existing wetland condition was assessed using NCWAM and were found to be low functioning. Another PJD and NCWAM assessment will be performed at project close-out in order to demonstrate no net loss of function and/or acreage as a result of the stream restoration project, and to document functional uplift of the stream-wetland complex. Permanent and random vegetation plots will also document the success of hydrophytic vegetation throughout the conservation easement.
2. *Please include a copy of the Jurisdictional Determination completed by William Elliott in the final plan. This JD is associated with the USACE AID SAW-2018-00041.*
  - Response: The signed PJD is included in Appendix 3 of the resubmittal.
3. *NLEB consultation with USFWS will need to be conducted prior to issuing the permit.*
  - Response: Appendix 7 includes correspondence with FHWA and USFWS regarding the NLEB. A streamlined consultation form was sent to USFWS via e-mail from the FHWA on September 29, 2017. No response was received from the USFWS within 30 days, therefore, FHWA may consider its Section 7 obligations for the NLEB complete.
4. *The Credit Release Schedule states that 15% of total credits are to be held for two bankfull events in separate years. This should read 4 bankfull events in separate years during the monitoring period, to coincide with Section 8.1 Performance Standards, and Oct. 24, 2016 Wilmington District Mitigation Guidance.*
  - Response: Appendix 13 has been revised as requested.
5. *Section 8.1, please remove the word “majority” from the third, fourth, and fifth bullets regarding BHR and ER. It should read “....for all measured cross sections.”*
  - Response: Text has been revised as requested in Section 8.1 and Table 12.
6. *Section 8.1, Entrenchment ration (ER) must be above 2.2 for all measured riffle cross-sections on a given reach (for C and E streams).*
  - Response: Text has been revised as requested in Section 8.1 and Table 12.
7. *Section 7.5, please include a narrative on maintenance, if any, for the wetland treatment cell since it will be within the easement boundary. Additionally, since the marsh treatment areas are located within the stream buffers, the mitigation plan should include a performance standard for the marsh wetlands tied to vegetation success.*
  - Response: The following sentence was added to section 7.5. “No maintenance will be performed outside of the vegetation management to meet the performance standards outlined in section 8.” The proposed vegetative performance standards for the site should



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be sufficient to demonstrate vegetative success criteria in both the wetland and upland areas, especially as no credits resulting from wetland restoration or enhancement are proposed. In addition, a NCWAM assessment is proposed at project closeout, which is designed to show the functional uplift of wetlands on site due to the stream restoration actions performed as compared to the pre-construction NCWAM assessment completed as part of this mitigation plan.



# MITIGATION PLAN

## Meadow Brook Stream Restoration Project Yadkin County, North Carolina

NC DEQ Contract No. 7184  
DMS ID No. 100024  
USACE Action ID No. SAW-2018-00041  
RFP No. 16-006993

Yadkin River Basin  
HUC 03040101



Prepared for:



NC Department of Environmental Quality  
Division of Mitigation Services  
1652 Mail Service Center  
Raleigh, NC 27699-1652

September 2018

## MITIGATION PLAN

### Meadow Brook Stream Restoration Project

Yadkin County, North Carolina

NC DEQ Contract No. 7184

DMS ID No. 100024

USACE Action ID No. SAW-2018-00041

Yadkin River Basin

HUC 03040101

Prepared for:



NC Department of Environmental Quality  
Division of Mitigation Services  
1652 Mail Service Center  
Raleigh, NC 27699-1652

Prepared by:



Ecosystem Planning & Restoration, PLLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606

### Contributing Staff:

Kevin Tweedy, PE  
Sidney Jones, PE, CFM  
Amy James, PWS  
Tom Barrett, RF

## EXECUTIVE SUMMARY

The Meadow Brook Stream Restoration Project (Project; Site) is located in the South Deep Creek watershed of the Yadkin-Pee Dee River Basin, in NCDENR subbasin 03-07-02 and NCDMS targeted local watershed 03040101130020. The Project is located in Yadkin County off Marler Road, approximately 1-mile north of US 421 and 0.5 miles west of I-77 and will involve the restoration of streams heavily impacted by cattle and channelized to promote agricultural use. The restoration of the proposed streams and riparian buffers, as well as their permanent conservation, will ensure their protection from future growth and development in the Yadkin River basin.

The Project is comprised of two streams, known as Meadow Brook and an Unnamed Tributary (UT) to Meadow Brook. The project area consists of pastureland drained by the installation of ditches and the channelization of the streams. Despite the ditching, much of the project area consists of wetlands, although these are of degraded quality. By restoring the headwater streams, as well as their associated riparian riverine wetlands, the Project will likely improve the water quality of receiving waters and improve habitat for biota.

The proposed mitigation activities on Meadow Brook and the UT to Meadow Brook will provide an estimated 3,409 stream mitigation units (SMUs) within an 11.2-acre conservation easement. The headwater streams and wetlands proposed for restoration have been impacted by farming practices, past stream channelization, and direct cattle access.

### **This mitigation plan has been written in conformance with the requirements of the following:**

- Federal rule for compensatory mitigation project sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.8 paragraphs (c)(2) through (c)(14).
- NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010

**These documents govern North Carolina Division of Mitigation Services (NCDMS) operations and procedures for the delivery of compensatory mitigation.**

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## 1.0 PROJECT INTRODUCTION

Ecosystem Planning and Restoration, PLLC (EPR) is contracted with the NC Division of Mitigation Services (DMS) to provide SMUs in the Yadkin-Pee Dee River Basin (Cataloging Unit 03040101). The project is located in Yadkin County off Marler Road, approximately 1-mile north of US 421 and 0.5 miles west of I-77 (Figure 1). The project is within the NC Division of Water Resources (NCDWR) sub-basin 03-07-02 and the DMS targeted local watershed 03040101130020. The Project is in the Northern Inner Piedmont EPA Level IV ecoregion.

The Meadow Brook Stream Restoration Project (Project; Site) involves the restoration of two perennial UT's to South Deep Creek. The mainstem UT is called "Meadow Brook," and the smaller tributary is referred to as "UT to Meadow Brook" or "UT." Meadow Brook is broken into four reaches, while the UT has only one. The naming convention for the stream reaches and their locations within the project are illustrated in Figure 2. Both streams have sustained significant cattle damage and have been channelized to maximize cattle grazing activities. Restoration practices will involve raising the streambeds of the project streams and restoring them back to their historic locations along the fall of the valley, thereby restoring historic flow dynamics and a healthy headwater stream-wetland complex. Buffers in excess of 50 feet will be established along most reaches, and all work will be protected by a perpetual conservation easement.

Site mitigation activities, which will provide an estimated 3,409 SMUs within a 11.2-acre conservation easement include the following:

- Restoration of 3,279 linear feet of stream channels that have been straightened and channelized for agricultural purposes;
- Enhancement of 256 linear feet of stream channel that have been degraded by erosion and direct cattle access;
- Restoration of riparian buffers 50 feet in width or wider along most stream reaches; and
- Implementation of BMPs to remove cattle from the streams and riparian buffers.

In order to restore a healthy stream-wetland complex, the stream restoration will re-meander the previously channelized streams through the existing wetlands along the fall of the valley and restore woody vegetation along all stream reaches. In so doing, the Project will provide significant improvements to wetland connectivity and function within the riparian buffer. However, no credits are sought for the wetlands within the Site.

**Table 1. General Project Information.**

Project Information	
Project Name	Meadow Brook Stream Mitigation Project
County	Yadkin
Easement Area (acres)	11.2
Project Coordinates (latitude and longitude)	36° 08' 29" N, 80° 49' 08" W
Planted Acreage (acres of wood stems planted)	11.2

### 1.1 Property Ownership and Boundary

The Site will consist of portions of properties held by Colon, Grady, and Andy Shore. A perpetual conservation easement has been prepared that incorporates the results of this Mitigation Plan (Appendix 1). The conservation easement is depicted on a recordable plat, signed by the owner, that will be recorded in the Yadkin County Register of Deeds. The conservation easement boundary will be fenced with high tensile electric fencing and marked with monuments.

Three farm crossings are required to allow livestock and farm equipment to access fields and pastures on either side of the Site streams:

- 1) *The top of the UT to Meadow Brook* – this location will be constructed as a culverted stream crossing, sized appropriately for the watershed and fenced to provide permanent exclusion of livestock.
- 2) *Downstream of the confluence of the UT and Meadow Brook (between Reach 2 and Reach 3)* – this location will be constructed as a ford stream crossing, constructed to NRCS standards. The crossing is located just upstream of where the valley narrows in order to maintain as much continuity of the upstream stream-wetland complex as possible. The break in the proposed easement is 40 feet wide, but the crossing itself is only 20 feet in width. This type of crossing will provide for long-term stability, maintain fish passage, and will likely reduce potential maintenance costs, as compared to a culverted crossing for this size stream. The landowner has also requested that ford crossings be used for the larger creek system. This segment of Meadow Brook is also FEMA mapped, so a ford crossing will have less impact on the hydraulics of the system than a culverted crossing.
- 3) *Downstream end of Meadow Brook Reach 4* – this location will be constructed as a ford stream crossing, constructed to NRCS standards, for the same reasons provided above.

### 1.2 Utilities

There are no underground or overhead utilities within the conservation easement boundary. The Project begins where Meadow Brook exits the culvert under Marler Road; however, the project will not affect the culvert, which will remain in place in its current configuration once the project is complete. While an overhead utility line runs parallel to Marler Road, the conservation easement begins just outside of the existing 15-foot utility easement.

A hydraulic analysis was performed to ensure that the proposed conditions would not alter flooding upstream of the Marler Road culvert. While the tailwater slope will be lower in the proposed Meadow Brook Stream Mitigation Project (DMS #100024)



condition than it is in the existing condition, the culvert is headwater controlled for large flood events and the change in tailwater condition is not likely to impact flooding upstream.

### *1.3 Site Access*

All portions of the conservation easement are accessible via state-maintained Marler Road, which will provide perpetual access.

## 2.0 WATERSHED APPROACH AND SITE SELECTION

The South Deep Creek watershed (03040101130020), shown in Figure 3 is a moderately developed water supply watershed (WS-III) and a targeted local watershed (NCEEP, 2009). As such, the Project will provide numerous water quality and ecological benefits within the South Deep Creek and Yadkin River watersheds. Major goals for the Upper Yadkin Pee-Dee River Basin identified in the River Basin Restoration Priorities (RBRP) include:

- 1) Restoration of water quality and aquatic habitat in impaired stream segments;
- 2) Protection of high-resource value waters, including waters within water supply watersheds (WSW);
- 3) Continuation of existing watershed restoration and protection initiatives; and
- 4) Implementation of agricultural BMPs within high-priority rural sub-watersheds, especially with respect to limiting inputs of sediment, nutrients, and fecal coliform from active farming operations.

In addition to these larger watershed goals, water quality concerns from agricultural lands, animal operations, and disturbed buffers are specific concerns listed for South Deep Creek. The Yadkin Pee-Dee Basinwide Water Quality Plan (NCDWQ, 2008), considers South Deep Creek impaired by turbidity from agricultural pasturelands.

The Project will restore a healthy headwater stream-wetland complex in what is currently an active cattle pasture in a WS-III watershed that is 57% agricultural land use. The Project will restore riparian buffers at least 50 feet in width along most stream reaches and provide significant improvements to wetland connectivity and function within the riparian buffer. Agricultural BMPs will be implemented to remove the cattle from the streams, buffers, and wetlands to ensure these resources provide long-term stability and water quality improvements. The Project will continue existing water quality initiatives in the watershed and address each of the above-mentioned watershed goals by:

- Restoring aquatic habitats and stabilizing stream banks that are currently degraded by cattle access and bank erosion;
- Restoring riparian buffers and enhancing wetland function;
- Excluding cattle from the stream; and
- Installing a wetland treatment cell.

These goals are reflected in the project goals and objectives outlined in Section 5.0 of this report.

### 3.0 BASELINE AND EXISTING CONDITIONS

The Project is in a rural but developing area of western Yadkin County. Land use within the project watershed is comprised of 57% pasture lands, 26% deciduous forest lands, 6% developed open space, 4% evergreen forest, 3% mixed forest, and 3% herbaceous. The Project is impacted by farming practices, past stream channelization, and direct cattle access. According to landowner conversations, the streams on the property were straightened prior to the 1960's. The oldest historical aerial found for the site is from 1993 (Figure 4) and shows that the Site was already altered and has undergone minimal changes since then. Riparian buffers have been cleared along all stream reaches, and cattle can access the entire streamside area. Hoof shear and/or shear stresses have severely impacted the stream banks along the Project reaches, causing significant, on-going sedimentation to downstream waters.

While the Site is near to two main thoroughfares (I-77 and US Route 421), there are no foreseeable signs of impending land use changes or development pressure that would impact the Project's watershed. The conservation easement will eliminate potential for future development and/or agricultural use in the floodplain areas of the restored streams.

#### 3.1 Landscape Characteristics

The Project is in the Northern Inner Piedmont EPA Level IV ecoregion. The area gets 45 inches of annual average precipitation, which is evenly spread throughout the year. The valley of Meadow Brook and its UT are bounded by gently sloping, low hills. The Site is situated in a wide section of valley with narrow valleys immediately upstream (Figure 5). The lower portion of the Site transitions back to a narrow valley.

Figure 6 shows that the soils in the project area are primarily Dan River sandy loam in the floodplain, with Clifford sandy clay loam upslope. Clifford soil series consist of very deep, well drained soils formed from residuum weathered from felsic crystalline rock such as mica schist, gneiss, granite gneiss, mica gneiss, granodiorite, and granite. Clifford sandy clay loams are moderately eroded with slopes ranging from two to ten percent. Dan River sandy loam consists of very deep, well-drained soils found in Piedmont valleys, with slopes ranging from zero to three percent. Based on observed soil profiles and existing wetland areas, it is apparent that wetlands were once prevalent along the project stream reaches even though the soils are mapped by NRCS as non-hydric. NRCS soils are mapped at a coarse level and do not account for site-specific microtopography that supports the existing wetlands.

#### 3.2 Existing Vegetation

Vegetation throughout the Site is limited to mid-story and understory species, since no canopy coverage exists along the entire reach. Common plant species that are found in these two areas are described below. Photographs of the site can be found in Appendix 2.

The primary mid-story species found along Meadow Brook and its associated wetlands include Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), red maple (*Acer rubrum*), black willow (*Salix nigra*), Bradford pear (*Pyrus calleryana*), black cherry (*Prunus serotina*), tag alder (*Alnus serrulata*), elderberry (*Sambucus canadensis*), and silky dogwood (*Cornus amomum*). Understory

species include fescue (*Schedonorus* spp.), soft rush (*Juncus effusus*), goldenrod (*Solidago* spp.), blackberry (*Rubus* spp.), dog fennel (*Eupatorium capillifolium*), New York ironweed (*Vernonia noveboracensis*), and tearthumb (*Persicaria sagittata*).

Vegetation along the UT to Meadow Brook consists primarily of understory species with a few small trees, including fescue, dog fennel, blackberry, Chinese privet, and black willow.

### 3.3 Project Resources

EPR conducted investigations for jurisdictional waters of the U.S. on October 6, 2017. Wetlands were assessed using the U.S. Army Corps of Engineers (USACE) Routine On-site Determination Method. This method is defined by the 1987 Corps of Engineers Wetland Delineation Manual and the Eastern Mountains and Piedmont Regional Supplement. Potential jurisdictional wetlands were assessed using the USACE Wetland Determination Data Form and the NC Wetland Assessment Method (NCWAM). A copy of the wetland JD forms can be found in Appendix 3 and the NCWAM forms are in Appendix 4. Streams were assessed using the NCDWR Stream Identification Form and the USACE Stream Quality Assessment Worksheet. A copy of the NCDWR stream identification forms can be found in Appendix 5 and the USACE stream assessment forms are in Appendix 6. Two jurisdictional streams (Table 2) and four wetlands (Table 3) were delineated during the on-site investigations.

A Preliminary Jurisdictional Determination (PJD) package was submitted to the USACE on January 4, 2018. A site visit was conducted on January 24, 2018 to review the water resources delineated by EPR. The meeting was attended by William Elliott (USACE), Sue Homewood (NCDWR), Cidney Jones, (EPR) and Thomas Barrett (EPR). The PJD package and the notification of jurisdictional determination dated April 17<sup>th</sup>, 2018 are provided in Appendix 3.

**Table 2. Jurisdictional Stream Resources Within the Project Boundary.**

Reach Summary		
Reach	Meadow Brook	UT to Meadow Brook
Existing Length (LF)	2,404	396
Drainage area (acres)	1,088	371
Drainage area (sq. miles)	1.70	0.58
Valley slope (ft/ft)	0.005	0.008
EPR - NCDWR Stream Score	37.5	32.5
Perennial or Intermittent	P	P
NCDWR Classification	N/A	N/A
EPR - USACE Stream Quality Score	32 - 34	34
Rosgen Classification of Existing Conditions	E4	E4
Simon Evolutionary Stage	IV	IV
FEMA Zone Classification	AE	AE

**Table 3. Jurisdictional Wetland Resources Within the Project Boundary.**

Wetland Summary				
Wetland	A	B	C	D
<b>Size of Wetland (AC)</b>	2.9	2.2	0.8	0.1
<b>Wetland Type (non-riparian, riparian riverine, or riparian non-riverine)</b>	Riparian riverine	Riparian riverine	Riparian riverine	Riparian riverine
<b>Predominant Mapped Soil Series</b>	Dan River sandy loam	Dan River sandy loam	Dan River sandy loam/Clifford sandy clay loam	Dan River sandy loam
<b>Drainage Class</b>	Well-drained	Well-drained	Well-drained	Well-drained
<b>Soil Hydric Status</b>	Non-Hydric <sup>+</sup>	Non-Hydric <sup>+</sup>	Non-Hydric <sup>+</sup>	Non-Hydric <sup>+</sup>
<b>Source of Hydrology</b>	Groundwater, precipitation, runoff and overbank flooding	Groundwater, precipitation, runoff and overbank flooding	Groundwater, precipitation, runoff and overbank flooding	Groundwater, precipitation, runoff and overbank flooding
<b>Hydrologic Impairment</b>	Stream channelization and cattle access	Stream channelization and cattle access	Stream channelization and cattle access	Stream channelization and cattle access
<b>Native Vegetation Community</b>	Headwater Forest*	Headwater Forest*	Headwater Forest*	Headwater Forest*
<b>% Exotic Invasive Vegetation</b>	10	10	5	15

\* Wetland is categorized as a headwater forest by NCWAM but has been altered by clearing and grazing activities.

+ Jurisdictional wetlands were identified on soils mapped as non-hydric.

#### 4.0 FUNCTIONAL UPLIFT

*This section of the report is provided to document the existing and proposed functional conditions of the Project. While functional parameters are assessed and presented, the functional assessment used is not proposed for mitigation crediting or determining project success. Performance standards are provided in Section 8.*

In their current condition, the hydrologic resources on the Site are severely degraded. The most severe impairments present on the site are direct cattle access to streams and wetlands, past channelization, and the loss of riparian buffers. Functional uplift will come from restoring natural riparian vegetation, excluding livestock from all project streams, and restoring the project streams to a stable condition, connected to their adjacent floodplain wetlands. The exclusion of livestock will remove a direct source of nutrients, coliform, and sediment from the system. In-stream structures will ensure channel stability and improve aquatic habitat for native species. The use of primarily wood structures will further enhance aquatic habitat. Restored riparian buffers will provide additional stability, woody debris and detritus for aquatic organisms, shade, and diverse aquatic and terrestrial habitats that are appropriate for the ecoregion and landscape setting.

Based on field evaluations of the project stream reaches and proposed mitigation practices, functional ratings were developed for the existing and proposed conditions of the project reaches using the North Carolina Stream Quantification Tool Version 3.0 (SQT; Harman and Jones, 2017). The SQT follows the methodology and definitions described in Harman, et al. (2012). The functional uplift in each of the five functional categories of the stream functions pyramid were assessed using the function-based parameters and measurement methods listed in Table 4. Table 5 shows the SQT scores and proposed lift that could be achieved during the monitoring period. The SQT scores function-based parameters and functional categories on a scale of 0.00 to 1.00 where 0.00 to 0.30 represents conditions that are not functioning like a reference condition (shown in red), scores of 0.70 to 1.00 are functioning like a reference condition (shown in green), and scores falling in the middle of these ranges are functioning-at-risk (shown in yellow). The Quantification Tool worksheets from the SQT v3.0 are provided in Appendix 4.

The proposed restoration will lead to some small improvements in reach hydrology by changing adjacent land uses from pasture to riparian wetlands and filling ditches that drain to Meadow Brook Reach 1. Hydraulic functioning is assessed in the SQT using floodplain connectivity, which is largely functioning in the existing reaches. Meadow Brook Reach 1 is more incised than the other reaches and the hydraulic category is functioning-at-risk for this reach. The proposed restoration will establish bank height ratios near 1 and capture available lift in the SQT. Additionally, the proposed restoration will improve the channel hydraulics further to support a headwater wetland-stream complex, though these functional benefits are not captured in the SQT.

**Table 4. Function-Based Parameters and Measurement Methods Applied to Project Reaches.**

Functional Category	Function-Based Parameters	Measurement Methods
Hydrology	Reach Runoff	Curve Number Concentrated Flow Points
Hydraulics	Floodplain Connectivity	Bank Height Ratio Entrenchment Ratio
Geomorphology	Large Woody Debris	Large Woody Debris Index
	Lateral Stability	Dominant BEHI/NBS Percent Eroding Bank
	Riparian Vegetation	Canopy Cover Buffer Width Stem Density
	Bed Form Diversity	Pool Spacing Ratio Pool Depth Ratio Percent Riffle
	Plan Form	Sinuosity
Physicochemical	Bacteria	N/A
	Organic Matter	Percent Shredders
	Nitrogen	N/A
	Phosphorus	N/A
Biology	Macroinvertebrates	Biotic Index

**Table 5. Functional Category Summary for Project Reaches.**

Functional Category	Existing				Proposed Score
	MB R1	MB R2	MB R3 & 4*	UT	
Hydrology	0.31	0.60	0.73	0.50	0.50 – 0.73
Hydraulics	0.65	0.85	0.85	0.85	1.00
Geomorphology	0.14	0.12	0.36	0.14	0.70 – 1.00
Physicochemical	Assumed				Modest Lift Assumed
Biology					

\* Due to the short lengths and similar existing and proposed conditions, Meadow Brook Reaches 3 and 4 were treated as a single reach.

Existing geomorphology scores are low for all parameters assessed and much of the functional uplift is achieved in this functional category. Restoring the channels to their historic valley, raising the beds, and connecting them to the adjacent wetlands at lower flows will enhance riparian buffer and wetland functions. The proposed restoration will restore the plan form and bed form diversity parameters to a condition functioning like reference channels. Functional uplift will also be achieved by incorporating woody structures throughout the reach and planting a forested buffer that can serve as a source of large woody debris in the future. Additionally, lateral stability will be improved in the short term by removing the cattle and reducing shear stresses in the channel. As the proposed

riparian buffer is established, lateral stability should improve further and increase the resiliency of the restored channels.

The known impacts have provided an input of sediments, nutrients, and fecal coliform along with a loss of wetland function that is likely to have degraded macroinvertebrate and fish communities. These impacts, along with the quantified impairments to supporting functional categories, indicate that the physicochemical and biology functional categories are functioning-at-risk or not functioning at the Site. The stream restoration approach will reduce the input of sediment, nutrients, and fecal coliform to the stream channels by fencing out the cows, stabilizing the banks, and establishing a riparian buffer. Additionally, the restoration approach will lead to higher water table conditions that promote better denitrification of groundwater flowing to the stream channels. Forested wetland areas adjacent to the stream will promote increased plant uptake and retention of surface runoff before it reaches the stream channels, minimizing overland flow velocities while also encouraging nutrient removal processes. Due to the prevalence of agricultural land uses in the upstream watershed, the restoration is not expected to restore physicochemical and biology functioning to reference conditions in the stream channels; however, some level of functional uplift is expected.

No wetland credits are proposed for the Site, but the proposed design implements a stream-wetland complex as the most resilient and beneficial approach to restore the stream channels and ecological functions on the Site. To establish a baseline for wetland functions, NCWAM was used to assess the four wetlands at the Site. Due to the difficulty in determining the original wetland type prior to cattle and anthropogenic disturbances, all wetlands were assessed using both the Headwater Forest and Riverine Swamp Forest NCWAM wetland types. The functional ratings for each wetland are presented in Table 6. The NCWAM results pages are provided in Appendix 4. The proposed planting plan (provided in section 7.5 and Appendix 9) will protect large portions of the wetlands from cows and establish a wooded riparian buffer with canopy species, enhancing water quality and habitat functions throughout the conservation easement.

**Table 6. Summary of NCWAM Wetland Functional Ratings for Existing Conditions.**

	Wetlands and Functional Ratings <sup>1</sup>			
	WA	WB	WC	WD
Hydrology	Low (Medium)	Low	Low	High (Medium)
Water Quality	Low	Low	Low	Low
Habitat	Low	Low	Low	Low
Overall	Low	Low	Low	Low

<sup>1</sup> – Functional Ratings for the Headwater Forest assessments are presented in the table with the Riverine Swamp Forest ratings shown in parentheses if different.



## 5.0 REGULATORY CONSIDERATIONS

Regulatory considerations for the Site are shown in Table 7 and described in the following sections.

**Table 7. Summary of Regulatory Considerations.**

Regulatory Parameter	Applicable?	Resolved?	Supporting Docs.
Waters of the United States - Section 401/404	Yes	No	N/A
Endangered Species Act	Yes	Yes	Appendix 7
National Historic Preservation Act	Yes	Yes	Appendix 7
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No	Appendix 8
Essential Fisheries Habitat	No	N/A	N/A

### 5.1 401/404

There will be minor impacts to the wetlands onsite due to realignment of channel features, but restoration activities are anticipated to result in uplift to overall wetland function. Table 8 shows anticipated impacts to wetlands due to stream channel realignment, though there will be no net loss of wetland function on the site. A PJD package was submitted to NCDWR and USACE on January 4<sup>th</sup>, 2018 and a Notification of Jurisdictional Determination was approved on April 17<sup>th</sup>, 2018. Additionally, existing wetland condition was assessed using NCWAM and were found to be low functioning (see Table 6 in section 4.0 of this report). The wetland delineation forms are provided in Appendix 3. Another PJD and NCWAM assessment will be performed at project close-out to ensure that there is no net loss of wetland functions as a result of the stream restoration project, and to document functional uplift of the stream-wetland complex.

**Table 8. Wetland Impacts.**

	Wetland A	Wetland B	Wetland C	Wetland D
Acreage	0.30	0.23	0.08	0.01
Square Feet	13,080	10,125	3,645	414

Stream channel impacts will be due to restoration activities and relocation of the restored channels to their historic alignments. Construction activities will be conducted under a Nationwide Permit #27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities with the submittal and approval of a pre-construction notification.

### 5.2 *Categorical Exclusion for Biological and Historical Resources*

A Categorical Exclusion (CE) document for the Meadow Brook Stream Restoration Project was approved by the Federal Highway Administration (FHWA) on September 29, 2017 and is provided in Appendix 7. The CE document investigates the presence of threatened and endangered species and any historical resources that may occur within the Site.

### 5.2.1 Biological Resources

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C 1531 et seq.), defines protection for species with the Federal Classification of Threatened (T) or Endangered (E). An “Endangered Species” is defined as “any species which is in danger of extinction throughout all or a significant portion of its range” and a “Threatened Species” is defined as “any species which is likely to become an Endangered Species within the foreseeable future throughout all or a significant portion of its range” (16 U.S.C 1532).

EPR requested review and comment from the U.S. Fish and Wildlife Service (USFWS) on June 21, 2017, regarding the project’s potential impacts to threatened or endangered species. The USFWS did not provide any comment within the 45-day time frame. Additionally, a Northern Long-Eared Bat (NLEB) 4(d) Streamlined Consultation Form was approved by the FHWA on September 29, 2017 and sent to USFWS. The USFWS did not respond within the 30-day time frame and it is presumed that the requirements of Section 7 (a)(2) of the Endangered Species Act with respect to the NLEB are fulfilled for the project. The USFWS letter and NLEB Streamlined Consultation Form are included in the Categorical Exclusion document found in Appendix 7.

### 5.2.2 Historical Resources

The CE document investigates the occurrence of any historical resources protected under The National Historic Preservation Act (NHPA) of 1966. The NHPA, as amended (16 U.S.C. 470), defines the policy of historic preservation to protect, restore, and reuse districts, sites, structures, and objects significant in American history, architecture, and culture. Section 106 of the NHPA mandates that federal agencies account for the effect of an undertaking on any property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

EPR sent an email to the North Carolina State Historic Preservation Office (SHPO) on June 21, 2016, requesting review and comment for the potential of cultural resources potentially affected by the project. Following a review of the project, SHPO responded with a letter on July 19, 2017, and stated that “they were aware of no historic resources which would be affected by the project”. All correspondence with SHPO is included in the CE document found in Appendix 7.

### 5.3 FEMA Floodplain Compliance and Hydrologic Trespass

Upon review of the Federal Emergency Management Agency’s (FEMA) National Flood Insurance Program’s Digital Flood Insurance Rate Mapping (DFIRM) panel 3710486600J, effective May 18, 2009, Meadow Brook is mapped using limited detail methods, putting much of the easement within the 1 Percent Chance Annual Flooding Zone (Zone AE; Figure 7). Therefore, under the current regulations, work associated with this project is regulated and a Letter of Map Revision (LOMR) will be necessary to revise the floodplain mapping of Meadow Brook.

Based on the proposed design, a Conditional LOMR package is being prepared and will be submitted to FEMA prior to construction. The subsequent LOMR package will be submitted after construction is complete. The completed NCDMS Floodplain Requirements Checklist can be found in Appendix 8.

The FEMA model for Meadow Brook does not extend to Marler Road but a hydraulic analysis was performed to determine whether the proposed project would impact flooding upstream of this culvert. The Marler Road culvert is headwater controlled during the 100-year flood event and the difference in tailwater conditions does not impact the water surface elevation upstream of the culvert.

## 6.0 MITIGATION PROJECT GOALS AND OBJECTIVES

While the ultimate goal of the Project is to restore a self-sustaining headwater stream-wetland complex, more specific project goals and objectives were developed for the South Deep Creek Watershed based on the Upper Yadkin Pee-Dee RBRP (NCEEP, 2009) and Yadkin Pee-Dee River Basinwide Water Quality Plan (NCDWQ, 2008) and are provided in Table 9.

**Table 9. Goals and Objectives for the Meadow Brook Stream Restoration Project.**

Goals	Objectives
Reduce Sediment Inputs and Stream Turbidity	<ul style="list-style-type: none"> <li>▪ Stabilize eroding stream banks.</li> <li>▪ Install fencing to exclude livestock from project streams.</li> <li>▪ Reconnect streams to the floodplain at lower flows.</li> <li>▪ Restore woody riparian buffer vegetation.</li> </ul>
Reduce Nutrient Inputs	<ul style="list-style-type: none"> <li>▪ Decrease drainage of riparian wetlands.</li> <li>▪ Install a wetland treatment cell.</li> <li>▪ Reconnect streams to the floodplain at lower flows.</li> <li>▪ Restore woody riparian buffer vegetation.</li> <li>▪ Stabilize eroding stream banks.</li> </ul>
Reduce Fecal Coliform Inputs	<ul style="list-style-type: none"> <li>▪ Install fencing to exclude livestock from project streams.</li> <li>▪ Restore woody riparian buffer vegetation.</li> <li>▪ Reconnect streams to the floodplain at lower flows.</li> <li>▪ Install a wetland treatment cell.</li> </ul>
Restore / Enhance Degraded Riparian Buffers	<ul style="list-style-type: none"> <li>▪ Restore woody riparian buffer vegetation.</li> <li>▪ Protect min. 50-foot riparian buffers with a permanent conservation easement.</li> <li>▪ Decrease drainage of riparian wetlands.</li> <li>▪ Reconnect streams to the floodplain at lower flows.</li> <li>▪ Install fencing to exclude livestock from conservation easement.</li> </ul>
Protect High Resource Value Waters (including Water Supply classifications)	<ul style="list-style-type: none"> <li>▪ Restore woody riparian buffer vegetation.</li> <li>▪ Protect min. 50-foot riparian buffers with a permanent conservation easement.</li> <li>▪ Reconnect streams to the floodplain at lower flows.</li> <li>▪ Restore bed form diversity to improve habitat for native species.</li> <li>▪ Install a wetland treatment cell.</li> </ul>
Implement Agricultural BMPs in Agricultural Watersheds	<ul style="list-style-type: none"> <li>▪ Restore woody riparian buffer vegetation.</li> <li>▪ Protect min. 50-foot riparian buffers with a permanent conservation easement.</li> <li>▪ Install fencing to exclude livestock from project streams.</li> <li>▪ Install alternative watering systems for livestock.</li> <li>▪ Install a wetland treatment cell.</li> </ul>

The performance standards associated with these goals and objectives are covered in Section 8.0 of this report.

## 7.0 DESIGN APPROACH AND MITIGATION WORK PLAN

The Project involves the restoration of two perennial UT's to South Deep Creek, Meadow Brook and UT to Meadow Brook. Meadow Brook is broken into four reaches, while the UT has only one. Meadow Brook Reach 1 and Reach 2 share a similar design approach, as described in the following sections, but the drainage area increases significantly and therefore changes the design dimensions of these two reaches. The valley is narrower for the downstream reaches of Meadow Brook, leading to a difference in design criteria. Finally, due to the presence of bed rock, enhancement practices are utilized in Reach 4. The construction drawings provided in Appendix 9 describe the proposed construction methods including timing, sequence, and elevations of all pertinent features. Data characterizing the existing, proposed, and design morphological characteristics for each reach can be found in Appendix 4. The design approach for each reach is provided in the sections below. The naming convention and locations of the hydrologic assets on the Site are illustrated in Figure 8.

The rural Piedmont regional curve (Harman, 1999) was used to verify bankfull discharge and area on project streams. However, the dataset used to create the regional curve only contains two sites with drainage areas less than 2 square miles. Additionally, data collected in neighboring Surry county (provided in Appendix 4), indicates that the rural Piedmont regional curve may overestimate bankfull dimensions for sites with drainage areas less than 10 square miles.

Rather than relying on a single reference reach for design criteria, the design criteria applied to the Project are based on surveys of multiple reference reaches conducted in the past, published reference reach data, and on design criteria and monitoring data from past successful restoration projects performed throughout the Piedmont region of North Carolina. Specifically, reference data compiled and presented by Lowther (2008) for similar stream types, drainage areas, and slopes within the Piedmont of North Carolina were reviewed to evaluate appropriate ranges of sinuosity and pattern data. Lowther evaluated 19 reference reach streams across the Piedmont of North Carolina – our assessment focused on only the streams in the western portion of the presented data set that were closest to the project site. Since the ranges provided by this analysis were quite wide, EPR evaluated this reference information against past completed stream restoration projects that have performed well and have been tested by significant storm events. EPR staff has several successful projects similar to the Meadow Brook site that were restored over 15 years ago and have remained stable with incorporated wetland components. These include the Hanging Rock Creek Site in Avery County, the Mitchell River – Darnell Site in Surry County, and the Mitchell River – Kraft Site in Surry County. Each of these past projects have similar drainage areas to the design Meadow Brook stream reaches, similar slopes and bed conditions, and have been in place for over 15 years. The design criteria used for the Meadow Brook site relied heavily on lessons learned from these past projects. Regional curve data and design criteria are provided in the morphological tables provided in Appendix 10.

### 7.1 Meadow Brook Reach 1

Reach 1 begins at the culvert under Marler Road and ends at the confluence with the UT to Meadow Brook. The reach starts as an incised channel but becomes less so as it flows downstream towards Reach 2. Reach 1 will be restored to the fall of the valley which will require roughly 250 feet of Priority Level II restoration to tie into the historic valley downstream, while not impounding water

on the Marler Road culvert upstream. The depth of cut for this Priority II section is 2 feet or less. For the remainder of its length, Reach 1 will be restored using Priority Level I approaches, where the stream is re-meandered along its historic floodplain. The ditches within the project area will be plugged and partially to completely filled, depending on the availability of fill material and the location. Fill material will be developed from channel grading and bench excavation.

The restored stream channel will utilize wood structures, constructed riffles, and transplanted vegetation. Due to the size of the channel, its slope, and bed material there is no need for large boulder structures in this reach. In-stream structures will include log vanes and rollers to improve bed form diversity and provide refugia for aquatic organisms. A combination of toe-wood, rootwads, and transplants will also be used to stabilize outer bends and provide organic matter and refugia to the stream.

A Rosgen “C” type channel was selected as the design stream type for this reach. The expectation is that the design channels may narrow to form “E” or a lower width-to-depth ratio “C” channel within the first few years after restoration, due to herbaceous vegetation establishment along the banks, and the associated deposition of sediment. Table 10a provides a summary of existing and proposed stream morphological information and design criteria for Meadow Brook Reach 1. Detailed morphological tables are provided for all stream reaches in Appendix 10.

To ensure ample floodplain connectivity and promote a headwater stream-wetland complex, the channel hydraulics erred conservatively to design a channel that will see frequent overbank flooding and enhance the existing wetlands on site. While the slope is decreased for the proposed design, the increase in bankfull area was modest in order to ensure the channel would not be too large and result in degradation. These alterations resulted in the difference in bankfull discharge seen in Table 10a.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. While the upstream watershed is agricultural and eroding banks are present, the existing reach exhibits signs of degradation rather than aggradation. Sediment supply to the Site is expected to be transportable, since there is little evidence of aggradation within the Site. The shear stress and maximum particle size entrained were calculated and compared with the sub-pavement and pavement samples collected from the existing reach as shown in Table 10a. The proposed design will reduce the shear stresses observed in the existing condition that were leading to degradation while entraining particle size near the riffle  $d_{84}$  during a bankfull flow event. This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar stream systems. The full sediment transport analysis is provided in Appendix 4 along with the sub-pavement and pavement sample results.

**Table 10a. Morphology Table for Meadow Brook Reach 1.**

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	0.93			
Valley Width (feet)	50			
Channel/Reach Classification	-	Incised E4	C4	C4
Bankfull Width (feet)	7 – 25	7 - 20	14 – 17	13.8 – 15.7
Bankfull Mean Depth (feet)	0.9 – 2.3	0.8 – 2.2	0.8 – 1.7	1.1 – 1.6
Bankfull Area (ft <sup>2</sup> )	9 – 40	15 – 17	-	19.0
Bank Height Ratio	-	1.0 – 1.5	1.0 - 1.1	1.0
Entrenchment Ratio	-	6 – 33	> 2.2	12 – 33
Bankfull Shear Stress (lb/ft <sup>2</sup> )	-	1.0	-	0.3
Average Bankfull Velocity (fps)	0.8 – 25.6	4.8	< 4	2.5
Bankfull Discharge (cfs)	30 – 230	73	-	48
Water Surface Slope (ft/ft)	-	0.0050	-	0.0034
Sinuosity*	-	1.0	1.2 - 1.6	1.4
D16/ 35/ 50 /84/95/ di_pavement/ di_subpavement (mm)	-	10.2 / 17.4 / 24.7 / 77.1 / 160.1 / 256 / 160		

\* Note that the valley length has increased in the proposed alignment and impacts the proposed sinuosity.

**Table 10b. Morphology Table for Meadow Brook Reach 2.**

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	1.51			
Valley Width (feet)	200			
Channel/Reach Classification	-	E4	C4	C4
Bankfull Width (feet)	8.5 – 30	14.5	15.2 – 18.6	16.1 – 18.4
Bankfull Mean Depth (feet)	1.1 – 3.0	1.7	1.0 – 1.9	1.2 – 1.8
Bankfull Area (ft <sup>2</sup> )	13 – 53	24.0	-	23.0
Bank Height Ratio	-	1.2	1.0 - 1.1	1.0
Entrenchment Ratio	-	6.2	2.2 - 4.0	10.4 – 12.5
Bankfull Shear Stress (lb/ft <sup>2</sup> )	-	0.73	-	0.32
Average Bankfull Velocity (fps)	3.3 – 6.6	4.4	< 4	2.8
Bankfull Discharge (cfs)	43 – 350	100	-	64
Water Surface Slope (ft/ft)	-	0.0069	-	0.0038
Sinuosity	-	1.1	1.2 - 1.6	1.2
D16/ 35/ 50 /84/95/ di_pavement/ di_subpavement (mm)	-	10.2 / 17.4 / 24.7 / 77.1 / 160.1 / 256 / 160		

## 7.2 Meadow Brook Reach 2

Reach 2 starts at the confluence with the UT to Meadow Brook and ends at the break in the conservation easement for the ford crossing described in Section 1.1. While the restoration approach used for Reach 2 is similar to Reach 1, the additional drainage area from the UT to Meadow Brook leads to an increase in design dimensions. Reach 2 will continue the Priority Level I restoration approach from Reach 1, re-meandering the stream along its historic floodplain, through the existing wetlands in the low portion of the valley that runs south of the existing channel. Reach 2 will require Meadow Brook Stream Mitigation Project (DMS #100024)

roughly 210 feet of Priority Level II restoration to meet the natural constraints imposed at the beginning of Reach 3, where bedrock is present in the floodplain and a tributary enters Meadow Brook from the adjacent parcel. The depth of cut for this Priority II section is less than 0.5 foot up to station 31+13.00 in order to minimize impacts to the existing wetlands and less than 1 foot up to the ford crossing. Table 10b provides a summary of existing and proposed stream morphological information and design criteria for Meadow Brook Reach 2. Detailed morphological tables are provided for all stream reaches in Appendix 10.

### *7.3 Meadow Brook Reach 3 and Reach 4*

Reach 3 runs from the downstream end of the conservation easement break to design station 36+02, where existing bedrock seams and a pinched valley width alter the mitigation approach. Reach 4 runs from the end of Reach 3 to the end of the Project. The existing channel for Reach 3 and Reach 4 consists primarily of pool bed forms with short bedrock outcroppings serving as steps in the profile. Due to the lack of bed form diversity and presence of lateral instability, the reach is significantly degraded and would benefit from restoration activities. However, the work proposed on Reach 4 is constrained to enhancement approaches due to the pinched valley width and existing bedrock seams; however, Reach 3 allows for a restoration approach.

Reach 3 is designed as a Bc stream type that restores pattern where possible within a narrow valley to decrease the energy in the reach, increase lateral stability, and improve bed form diversity. Reach 3 consists of a combination of laying back the existing stream banks and a Priority Level II restoration approach. The Priority II section is 154 feet long and the depth of cut is less than 1 foot. Along Reach 4, the stream banks will be laid back and a bench will be constructed where possible to maximize available floodplain within the natural valley width.

Due to the short length and similar conditions in both reaches, one geomorphology table is provided for both Reach 3 and Reach 4 (Table 10c). Reach 3 will incorporate rock structures to provide bed form diversity and grade control. Log structures, toe-wood, and transplants will be incorporated throughout the reach to improve habitat, bed form diversity, and bank stability. The profile of Reach 4 will not be changed significantly; however, the stream dimension will be modified to promote stability and accommodate the bankfull flow, with larger flows spreading onto a bankfull bench and lower parts of the natural floodplain.



**Table 10c. Morphology Table for Meadow Brook Reach 3 and Reach 4.**

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	1.73			
Valley Width (feet)	70			
Channel/Reach Classification	-	E4	B4c	B4c
Bankfull Width (feet)	8.8 - 32	21	18 - 22	17.7 – 18.4
Bankfull Mean Depth (feet)	1.1 – 3.0	1.4	1.0 – 1.8	1.4 – 1.5
Bankfull Area (ft <sup>2</sup> )	15 – 60	24.4 – 29.9	-	26.0
Bank Height Ratio	-	1.2	1.0 - 1.1	1.0
Entrenchment Ratio	-	4.4	1.4 – 2.2	2.7 – 3.8
Bankfull Shear Stress (lb/ft <sup>2</sup> )	-	0.79	-	0.58
Average Bankfull Velocity (fps)	3.3 – 6.5	3.9	< 4	3.8
Bankfull Discharge (cfs)	50 – 400	132	-	99
Water Surface Slope (ft/ft)	-	0.0037	-	0.0066
Sinuosity	-	1.0	1.1 – 1.2	1.1
D16/ 35/ 50 /84/95/ di_pavement/ di_subpavement (mm)	-	Bedrock		

#### 7.4 UT to Meadow Brook

A culverted crossing for the UT will be installed between the property boundary and the beginning of the conservation easement, to allow access to adjacent fields once the restoration work is completed. Following the culverted crossing, the UT to Meadow Brook will be restored using a combination of Priority Level I and Level II practices. Since the stream enters the property as an incised channel, a Priority II section of restoration, approximately 180 feet in length, will be required to achieve a Priority I restoration for the lower portion of the reach that enters the Meadow Brook floodplain. The depth of cut for the Priority II segment is 1.5 feet or less. For the remainder of its length, the UT will be restored using Priority Level I approaches, where the stream is re-meandered along its historic floodplain.

The restored stream channel will utilize wood structures, constructed riffles, and transplanted vegetation. Due to the size of the channel, its slope, and bed material there is no need for large boulder structures in this reach. In-stream structures will include log vanes and rollers to improve bed form diversity and provide refugia for aquatic organisms. A combination of toe-wood, rootwads, and transplants will also be used to stabilize outer bends and provide organic matter and refugia to the stream.

The restored stream channel is designed as a C stream type that may develop into a stable E stream as riparian vegetation is established and the channel narrows. Table 10d provides a summary of existing and proposed stream morphological information and design criteria for the UT to Meadow Brook. Detailed morphological tables are provided for all stream reaches in Appendix 10.

A sediment transport analysis was performed to ensure that the stream restoration design creates a stable channel that does not aggrade or degrade over time. While the upstream watershed is agricultural and eroding banks are present, the existing reach exhibits signs of degradation rather

than aggradation. Sediment supply to the Site is expected to be transportable, since there is little evidence of aggradation within the Site. As shown in Table 10d, the proposed design will reduce the shear stresses observed in the existing condition that were leading to degradation while entraining particle size near the riffle d84 during a bankfull flow event. This analysis provides evidence that the stresses predicted for the design channels will be within the range of stable values calculated for similar streams. The full sediment transport analysis is provided in Appendix 4 along with the sub-pavement and pavement sample results.

**Table 10d. Morphology Table for UT to Meadow Brook.**

Parameter	Regional Curve	Existing	Design Criteria (Typical)	Proposed
Contributing Drainage Area (sq. mi.)	0.56			
Valley Width (feet)	188			
Channel/Reach Classification	-	E4	C4	C4
Bankfull Width (feet)	6 – 21	8	11.8 – 14.5	11.8 – 13.4
Bankfull Mean Depth (feet)	0.8 – 2.1	1.5	0.8 – 1.5	0.9 – 1.4
Bankfull Area (ft <sup>2</sup> )	7 – 30	11.4	-	14.0
Bank Height Ratio	-	1.2	1.0 - 1.1	1.0
Entrenchment Ratio	-	28	2.2 - 4.0	15
Bankfull Shear Stress (lb/ft <sup>2</sup> )	-	1.82	-	0.31
Average Bankfull Velocity (fps)	2.9 – 6.7	6.8	< 4	2.7
Bankfull Discharge (cfs)	20 – 200	77	-	37
Water Surface Slope (ft/ft)	-	0.0083	-	0.0047
Sinuosity*	-	1.0	1.2 - 1.6	1.4
D16/ 35/ 50 /84/95/ di_pavement/ di_subpavement (mm)	-	15.4 / 24.7 / 33.2 / 80.0 / 164.4 / 362 / 110		

\* Note that the valley length has increased in the proposed alignment and impacts the proposed sinuosity.

### 7.5 Wetland Treatment Cell

As part of the proposed Project, an additional area of degraded wetlands has been incorporated into the conservation easement and will provide additional filtration and treatment of agricultural runoff (Figure 8). In its current condition, there is a ditch feature that runs from a spring at the toe of the hillslope directly into the existing Meadow Brook. This ditch will be filled during restoration, forcing runoff that enters the wetland system from adjacent pasture land to diffuse and spread throughout the wetland area, providing reductions in sediment, nutrients, and coliform entering the restored stream system. The wetland treatment cell area is 0.56 acres, with a drainage area of approximately 12 acres that includes a feed barn and loafing area. No maintenance will be performed outside of the vegetation management to meet the performance standards outlined section 8.

### 7.6 Vegetation and Planting Plan

Species selection for re-vegetation of stream buffer areas will generally follow those suggested by Schafale and Weakley (1990) for Piedmont/Low Mountain Alluvial Forest and Schafale (2012) for Piedmont Alluvial Forest, as well as wetness tolerances cited in *WRP Technical Note VN-RS-4.1* (WRP

1997). The species list, site preparation, planting density, planting methods, and materials are detailed in the construction drawings and specifications included in Appendix 9.

The permanent seed mixture and tree species shown in Table 11 will be planted throughout the majority of the conservation easement to enhance and establish riparian wetlands (9.2 acres out of 11.2 acres). Where the easement includes the toe of the hillslopes (0.9 acres) upland seeding and tree species will be planted (species listed in Appendix 9). Tree species will be planted as bare-root seedlings at a density of 680 stems per acre. Species will be planted during the dormant season (November 15 – March 15) following the handling and installation procedures outlined on the plan sheets to achieve the vegetative success criteria outlined in Section 8.2.

An invasive species plan is included in Appendix 11.

**Table 11. Riparian Wetland Vegetation and Planting Plan.**

Scientific Name	Common Name	Percent Planted	Wetland Indicator Status
<b>Permanent Seeding</b>			
<i>Panicum virgatum</i>	Switchgrass	23%	FAC
<i>Elymus riparius</i>	Riverbank Wildrye	20%	FACW
<i>Panicum dichotomiflorum</i>	Smooth Panicgrass	14%	FACW
<i>Carex vulpinoidea</i>	Fox sedge	12%	OBL
<i>Panicum rigidulum</i>	Redtop Panicgrass	8%	FACW
<i>Dichanthelium clandestinum</i>	Deer-tongue	8%	FAC
<i>Bidens frondosa (or aristosa)</i>	Beggars Tick	7%	FACW
<i>Juncus effusus</i>	Soft Rush	4%	FACW
<i>Persicaria pensylvanica</i>	Pennsylvania smartweed	2%	FACW
<i>Sparganium americanum</i>	American Bur Reed	2%	OBL
<b>Vegetation</b>			
<i>Betula nigra</i>	River Birch	20%	FACW
<i>Celtis laevigata</i>	Sugarberry	5%	FACW
<i>Diospyros virginiana</i>	Persimmon	10%	FAC
<i>Fraxinus pennsylvanica</i>	Green Ash	10%	FACW
<i>Platanus occidentalis</i>	Sycamore	20%	FACW
<i>Quercus nigra</i>	Water Oak	10%	FAC
<i>Quercus phellos</i>	Willow Oak	15%	FAC
<i>Ulmus americana</i>	American Elm	10%	FACW

### 7.7 Miscellaneous

A Rosgen “C” type channel was selected as the design stream type for Meadow Brook Reach 1, Meadow Brook Reach 2, and the UT to Meadow Brook. The expectation is that the design channels will narrow to form “E” or lower width-to-depth ratio “C” channels following restoration, due to vegetation establishment along the banks, and the associated deposition of sediment. This process is expected to occur over the 5 to 10 years following restoration, before canopy shading becomes wide-spread across the site. As noted in the previous sections, excessive sediment supply is not

expected to be an issue at the Site; however, there is a sediment supply from upstream eroding banks that will allow for channel narrowing without aggradation.

The native species selected for establishment at the Site represent a range of growth rates and varying tolerances to shade and moisture. These range of characteristics were selected to ensure that the appropriate vegetation cover develops over life of the project.

### 7.8 *Project Risks and Uncertainties*

Listed below are identified project risks and uncertainties that have been evaluated in the development of design plans for the site, along with methods that have been/will be used to address these concerns.

- Land use development: There is potential for increased land development around the site in the future that could lead to additional runoff and changes to watershed hydrology.
  - Methods to Address: The project area has seen little development in recent years and it is unlikely that development will threaten the site in the foreseeable future. Restoration of the site to reconnect streams to their floodplains will reduce the likelihood of future degradation from watershed changes, as increased flows will spread over a wider floodplain. There is also little elevational fall across the Site so the risk of channel instability is low once vegetation is established. Grade control (in the form of constructed instream structures and natural bedrock outcrops) present across the restored site decrease the chances of future channel incision.
- Easement Encroachment: There is potential for landowner encroachment into the permanent conservation easement.
  - Methods to Address: EPR has had considerable discussions with the landowner regarding the project requirements and limitations of easement access and is confident that the landowner fully understands and will maintain the easement protections. The easement boundaries will be fenced and clearly marked per NCDMS requirements. Any encroachments that do occur will be remedied by EPR or the long-term steward to remedy any damage and provide any other corrections required by NCDMS and/or the IRT.
- Drought and Floods: There is potential for extreme climatic conditions during the monitoring period of the project.
  - Methods to Address: EPR will apply adaptive management techniques as necessary to meet the site performance criteria. Such adaptive management may include replanting, channel damage repair, irrigation, or other methods. If adaptive management activities are significant, additional monitoring may be required by the IRT.

- Beavers: Beaver activity was observed at the Site in 2016. While there was no evidence of recent beaver activity during recent assessments, there is potential for beavers to return to the site during the monitoring period of the project.
  - Methods to Address: EPR will take steps to trap and remove beaver if they return to the Site during the monitoring period.

## 8.0 PERFORMANCE STANDARDS

Performance criteria outlined in the *NCDMS Mitigation Plan Template* (ver. 06/2017), and *U.S. Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016), will be followed and are briefly outlined below. Monitoring information can be found in Section 9.0.

### 8.1 Restored Stream Channels

The required performance criteria for restored stream channels, per USACE Guidance are summarized briefly below:

- All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05.
- Continuous surface flow must be documented each year for at least 30 consecutive days.
- Bank height ratio (BHR) cannot exceed 1.2 for all measured cross sections on a given reach.
- Entrenchment ratio (ER) must be above 2.2 for all measured riffle cross-sections on a given reach (for C and E streams).
- BHR and ER should not change by more than 10% in any given year for all measured cross sections on a given reach.
- Must document occurrence of at least 4 bankfull events in separate years during the monitoring period.

### 8.2 Riparian Vegetation

The required performance criteria for planted riparian vegetation, per USACE Guidance are summarized below:

- Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 4; and a minimum of 210 stems per acre must be present at year 7.
- Trees must average 7 feet in height at year 5, and 10 feet in height at year 7.
- Planted and volunteer stems are counted, provided they are included in the approved planting list for the site.
- Any single species can only account for 50% of the required stems per monitoring plot

### 8.3 Compatibility with Project Goals

The required performance criteria described above, plus project-specific criteria, allow evaluation of whether the project goals have been met after the site has been completed. In Table 12, the Project objectives are listed, along with the performance criteria that will allow documentation of whether these objectives have been achieved. Fulfillment of these objectives will allow the Project to achieve the goals outlined in Section 6.0.

**Table 12. Project Objectives and Associated Performance Criteria**

Objective	Performance Criteria
Stabilize eroding stream banks	<ul style="list-style-type: none"> <li>• Geomorphic cross sections indicate stable sections over the monitoring period.</li> <li>• Visual inspection of fence installed to exclude cattle from the stream and riparian buffer, demonstrating no encroachment.</li> </ul>
Restore woody riparian vegetation	<ul style="list-style-type: none"> <li>• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.</li> </ul>
Reconnect streams to the floodplain at lower flows	<ul style="list-style-type: none"> <li>• Bank height ratio (BHR) cannot exceed 1.2 for all measured cross sections on a given reach.</li> <li>• Entrenchment ratio (ER) must be 2.2 or above for all measured riffle cross-sections on a given reach.</li> <li>• Documentation of hydrophytic vegetation within vegetation monitoring plots within planting Zone 2.</li> </ul>
Restore bed form diversity to improve habitat for native species	<ul style="list-style-type: none"> <li>• Geomorphic cross sections that document a variety of channel depths and forms.</li> <li>• Visual documentation of in-stream structure stability during annual monitoring.</li> </ul>
Decrease drainage of riparian wetlands*	<ul style="list-style-type: none"> <li>• A preliminary jurisdictional wetland determination (PJD) and NCWAM assessment completed after the monitoring period should show no net loss of wetland function on site as compared to a PJD and NCWAM completed prior to construction.</li> <li>• Documentation of hydrophytic vegetation within vegetation monitoring plots within planting Zone 2.</li> </ul>
Protect minimum 50 ft. riparian buffers with a permanent conservation easement	<ul style="list-style-type: none"> <li>• Recordation of a conservation easement meeting NCDMS guidelines.</li> </ul>
Install a wetland treatment cell	<ul style="list-style-type: none"> <li>• Visual inspection of filled ditch and flow patterns through wetland.</li> <li>• Vegetation success criteria of 260 native stems/acre in Year 5 and 210 native stems/acre in Year 7.</li> <li>• Documentation of hydrophytic vegetation in the vegetation plot located in wetland treatment cell.</li> </ul>
Install fencing to exclude livestock from project streams	<ul style="list-style-type: none"> <li>• Visual inspection of fence installed to exclude cattle from the stream and riparian buffer, demonstrating no encroachment.</li> </ul>
Install alternative watering systems for livestock	<ul style="list-style-type: none"> <li>• Visual inspection of fence installed to exclude cattle from the stream and riparian buffer, demonstrating no encroachment.</li> </ul>

\* While no wetland mitigation credits are proposed as part of this project, these performance standards are included to show no net loss of wetland function after project construction.

## 9.0 MONITORING PLAN

The monitoring plan for the Site will follow the guidance outlined in the *NCDMS Mitigation Plan Template* (ver. 06/2017), and *U.S. Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016). Monitoring data collected on the site will include reference photos, plant survival analyses, channel stability analyses, as well as any other data specifically required by permit conditions.

Monitoring will be conducted for a period of seven years, unless the USACE, in consultation with the IRT, agrees that monitoring may be terminated early. Early closure will only be provided through written approval from the USACE in consultation with the IRT. Annual monitoring reports will be submitted to the NCDMS no later than November 30 of each monitoring year.

The As-Built Baseline Monitoring Report Template (ver. 06/2017) will be used to document the baseline conditions and to prepare the as-built record drawings for the Site. As-built surveys will be conducted within 60 days after project implementation is completed (following planting and monitoring installations) to document the recently constructed features and conditions of the Site.

Annual monitoring data will be reported using the NCDMS Monitoring Report Template (ver. 06/2017). The monitoring report shall provide a project data chronology that will facilitate an understanding of project status and trends, population of DMS databases for analysis, and assist in decision making regarding project close-out.

While monitoring reports will be completed annually, not all monitoring reports will include the same information. All monitoring reports will include at least a brief narrative of site developments, a representative photo log, and a Current Condition Plan View (CCPV). Further monitoring measurements are detailed in the following sections.

### 9.1 Stream Monitoring

Stream monitoring will include monitoring of the hydrologic and geomorphic functions of Meadow Brook and the UT to Meadow Brook. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 13. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the project goals listed in Section 6.0. The proposed locations of monitored cross sections are shown in Figure 9.



**Table 13. Stream Monitoring Summary**

Parameter	Method	Schedule/ Frequency	Number/ Extent
Stream Profile	Full longitudinal survey	As-built only (unless otherwise required)	All restored and enhanced stream channels
Stream Dimension	Cross sections	Years 1, 2, 3, 5, and 7	10 cross sections on Meadow Brook 3 cross sections on UT to Meadow Brook
Channel Stability	Visual Assessment	Yearly	All restored stream channels
	Additional Cross sections	Yearly	Only if instability is documented during monitoring
Stream Hydrology	Pressure transducers Precipitation recorder Photos of flood indicators	Continuous recording through monitoring period	1 on Meadow Brook and 1 on UT to Meadow Brook

### 9.2 Riparian Vegetation Monitoring

Vegetation monitoring will evaluate the establishment of planted and volunteer vegetation across the site. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 14. Monitoring parameters follow USACE guidance but will also allow monitoring of parameters to document site performance related to the project goals listed in Section 6.0.

**Table 14. Riparian Vegetation Monitoring Summary.**

Parameter	Method	Schedule/ Frequency	Number/ Extent	Data Collected
Vegetation establishment and vigor	Permanent vegetation plots, 0.02 acre in size (minimum)	As-built, Years 1, 2, 3, 5, and 7	6 plots, spread across site	Species, height, location, planted vs. volunteer, and age.
	Annual random vegetation plots, 0.02 acre in size (minimum)	Between July 1 <sup>st</sup> and leaf drop	6 plots, randomly selected each year	Species, and height.

During quantitative vegetation sampling, sample plots (100 square meters, or 0.02 acre) will be installed within the site as per guidelines established by the Level 1 and 2 protocols in *CVS-DMS Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph. The proposed locations of permanent vegetation plots are shown in Figure 9.

### 9.3 *Visual Assessment Monitoring*

A visual assessment of the entire project will be conducted on an annual basis. The culmination of this data will be presented in the Current Condition Plan View (CCPV) with supporting documentation presented in the tables outlined by DMS's guidance titled *Annual Monitoring and Closeout Reporting Format, Data Requirements, and Content Guidance* dated February 2014. Specifically, problem areas of vegetation, in-stream structures, and channel migration will be noted and documented with photos. After DMS's review of the documentation, additional monitoring protocols may be required to ensure project success can be achieved.

## 10.0 ADAPTIVE MANAGEMENT PLAN

In the event the mitigation site or a specific component of the mitigation site fails to achieve the necessary performance standards as specified in the mitigation plan, the sponsor shall notify the members of the IRT and work with the IRT to develop contingency plans and remedial actions.

A maintenance plan is provided in Appendix 12, summarizing the types of issues that may arise during monitoring and how those issues would be addressed.

## **11.0 LONG-TERM MANAGEMENT PLAN**

The site will be transferred to the NCDEQ Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established.

The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

The Stewardship Program will periodically install signage to identify boundary markings, as needed. Any livestock or associated fencing or permanent crossings will be the responsibility of the owner of the underlying fee to maintain.

## 12.0 DETERMINATION OF CREDITS

Mitigation credits presented in Table 15a are projections based upon site design. Upon completion of site construction, the project components and credit data will be adjusted, if necessary, to be consistent with the as-built condition, and any changes will be described in the As-built Monitoring Report. The project proposes to provide stream credits derived from stream enhancement, stream restoration activities, and non-standard buffer widths as shown in Figures 8 and 10.

Descriptions of the stream restoration ratios are presented below in Tables 15a. Wetland assets are presented in Tables 15b; however, no wetland mitigation credits are proposed at this time. Table 15c presents the length and area summations by mitigation category and Table 15d shows the overall summary of assets. The proposed credit release schedule is provided in Appendix 13. Appendix 14 provides the Wilmington District Stream Buffer Credit Calculator spreadsheet and shapefiles.

Where possible, stream riparian buffers in excess of the minimum 50-foot have been restored along both banks for 11.2 protected acres (Figure 10). The methodology outlined in the Wilmington District Stream Buffer Credit Calculator (Updated 1/19/2018) was used to calculate additional buffer credits, however, the arc around the stream termini at the downstream extent of the project was removed from the ideal buffer area. Where the streams intersect project boundaries, there are short segments where it is not possible to meet the minimum buffer width. These occur along short stretches of bank (approximately 30 linear feet) at the end of Meadow Brook Reaches 2 and 4, as well as two longer stretches of bank at the beginning of Meadow Brook Reaches 1 and 3. The first of the longer stretches occurs at the beginning of Meadow Brook Reach 1, where the stream runs along a utility easement for approximately 80 linear feet in order to return the stream to the natural fall of the valley. The second occurs at the beginning of Meadow Brook Reach 3 where the property line limits the conservation easement for approximately 125 linear feet. While the adjacent property is currently wooded, it was not possible to purchase this land for the conservation easement.

**Table 15a. Meadow Brook Stream Restoration Project Streams Asset Table.**

Project Component	Existing Footage	Stationing	Mitigation Plan Footage	Restoration Level <sup>A</sup>	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits	Notes/ Comments
Meadow Brook R1	1,304	10+00 – 29+36	1,917	R	P1	1	1,917.0	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
Meadow Brook R2	327	29+36 -33+29	353	R	P2	1	353.0	
Meadow Brook R3	289	33+29 – 36+02	273	R	P2	1	273.0	
UT	396	10+00 – 17+03	676	R	P1	1	676.0	
Meadow Brook R4	283	36+02 – 38+62	218	EI	-	1.5	145.3	Habitat Structures, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
Net Change in Credit from Buffers	-	-	-	-	-	-	45.0	Wilmington District Stream Buffer Credit Calculator (Updated 1/19/2018)
<b>Total Assets Summary: 3,409.3 SMUs*</b>								

<sup>A</sup> R = Restoration, E= Enhancement

\* EPR is under contract with the Division of Mitigation Services to provide 3,400 Stream Mitigation Units. Any additional stream mitigation credits beyond the contracted amount will not be realized by EPR.

**Table 15b. Meadow Brook Wetland Rehabilitation Project Asset Table.**

Asset	Wetland Position and Hydro Type	Existing Acreage	Mitigation Plan Acreage*	Restoration Level*	Mitigation Ratio	Mitigation Credits	Notes/ Comments
Wetland A	RR	2.93	2.63	Rehab	N/A	0	Planted, excluded livestock, plugged ditches, and includes section of priority 2 reach.
Wetland B	RR	2.23	2.00	Rehab	N/A	0	
Wetland C	RR	0.82	0.74	Rehab	N/A	0	
Wetland D	RR	0.10	0.09	Rehab	N/A	0	Planted and excluded livestock.

\*Due to the addition of woody riparian vegetation, removal of cattle, and proposed stream bank-height ratios, the functionality of remaining wetlands will increase. The old stream channel may also provide opportunities for wetland re-establishment.

**Table 15c. Length and Area Summations by Mitigation Category.**

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)
		Riverine	Non-Riverine	
Restoration	3219			
Enhancement				
Enhancement I	218			
Enhancement II				
Rehabilitation		5.46		
Preservation				
High Quality Pres				

**Table 15d. Overall Assets Summary.**

Asset Category	Overall Credits
Stream	<b>3,409.3</b>
RP Wetland	<b>0.00</b>

### 13.0 FINANCIAL ASSURANCES

A statement regarding the financial assurances for the project can be found in Appendix 15.



#### **14.0 IRT ON-SITE MEETING**

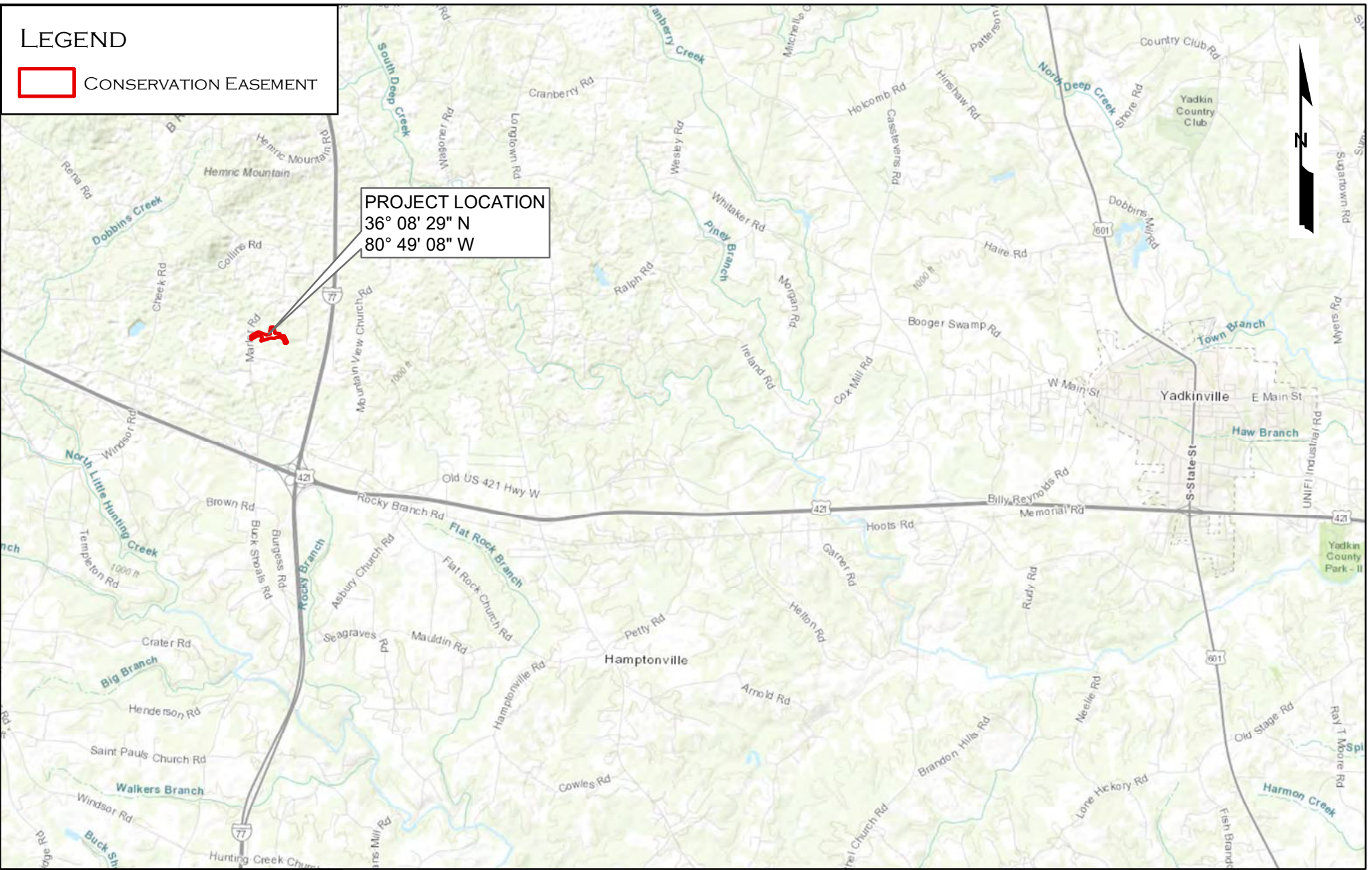
Representatives of the USACE, NC DEQ, NC WRC, NC DWS, and EPR attended an on-site meeting for the Meadow Brook Full Delivery Project on August 16, 2017. The meeting minutes were distributed on September 1, 2017 and can be found in Appendix 16.

## 15.0 REFERENCES

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LEGEND

 CONSERVATION EASEMENT



PROJECT LOCATION  
36° 08' 29" N  
80° 49' 08" W



MEADOW BROOK STREAM RESTORATION  
VICINITY MAP

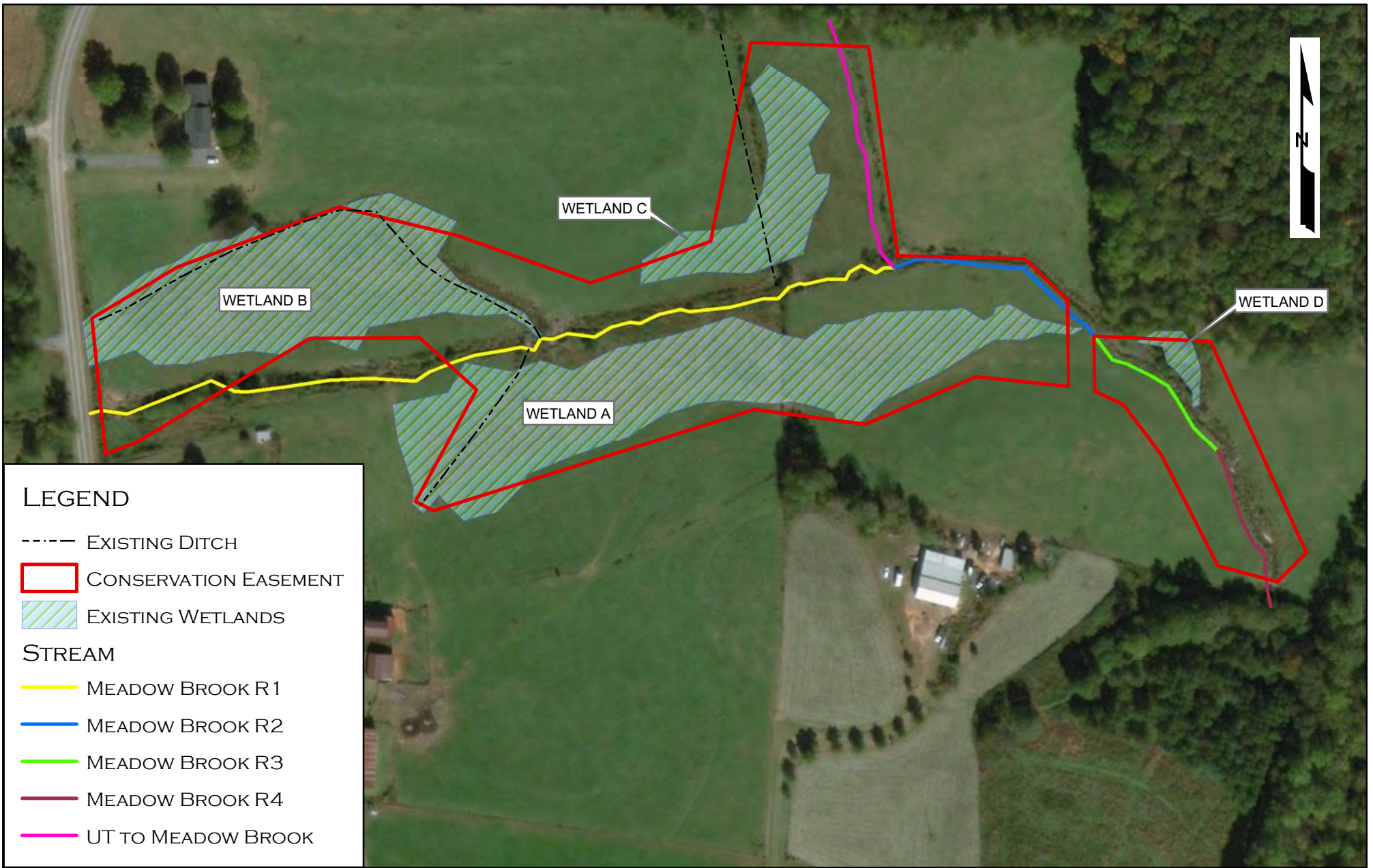
PREPARED FOR:  
NCDEQ  
DIVISION OF  
MITIGATION SERVICES

FIGURE 1

YADKIN COUNTY, NC

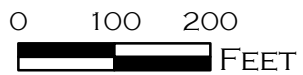


PREPARED BY:  
ECOSYSTEM  
PLANNING &  
RESTORATION



**LEGEND**

- EXISTING DITCH
  - CONSERVATION EASEMENT
  - EXISTING WETLANDS
- STREAM**
- MEADOW BROOK R1
  - MEADOW BROOK R2
  - MEADOW BROOK R3
  - MEADOW BROOK R4
  - UT TO MEADOW BROOK



**MEADOW BROOK STREAM RESTORATION**  
EXISTING CONDITION MAP




PREPARED FOR:  
NCDEQ  
DIVISION OF  
MITIGATION SERVICES

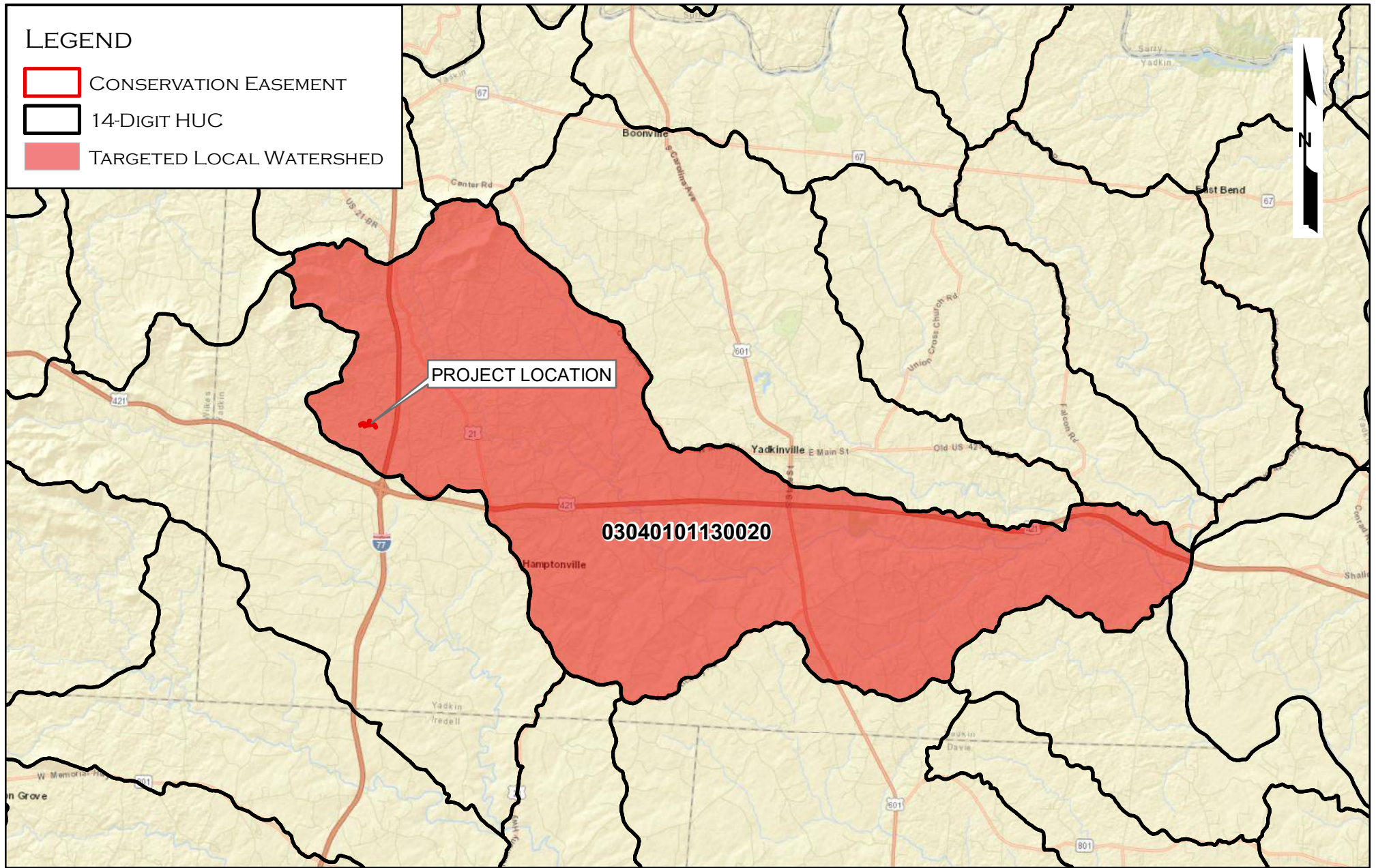
FIGURE 2

YADKIN COUNTY, NC



LEGEND

-  CONSERVATION EASEMENT
-  14-DIGIT HUC
-  TARGETED LOCAL WATERSHED



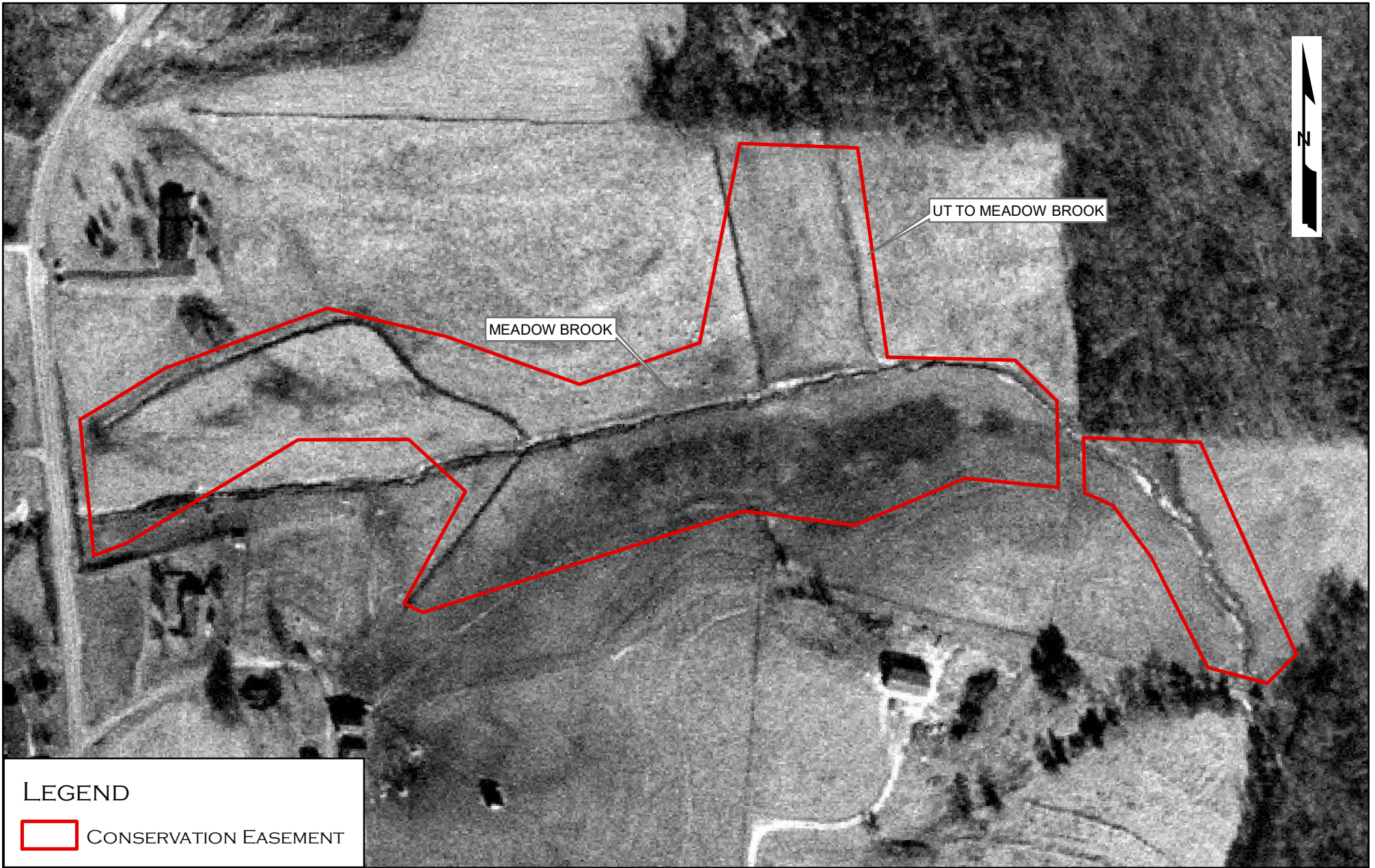
MEADOW BROOK STREAM RESTORATION  
HYDROLOGIC UNIT MAP

PREPARED FOR:  
NCDEQ  
DIVISION OF  
MITIGATION SERVICES

FIGURE 3


YADKIN COUNTY, NC

PREPARED BY:  
 ECOSYSTEM  
PLANNING &  
RESTORATION



**LEGEND**

 CONSERVATION EASEMENT

0 100 200  
 FEET

**MEADOW BROOK STREAM RESTORATION**  
 HISTORICAL AERIAL MAP  
 (1993)

PREPARED FOR:  
 NCDEQ  
 DIVISION OF  
 MITIGATION SERVICES

FIGURE 4

YADKIN COUNTY, NC

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION

# LEGEND

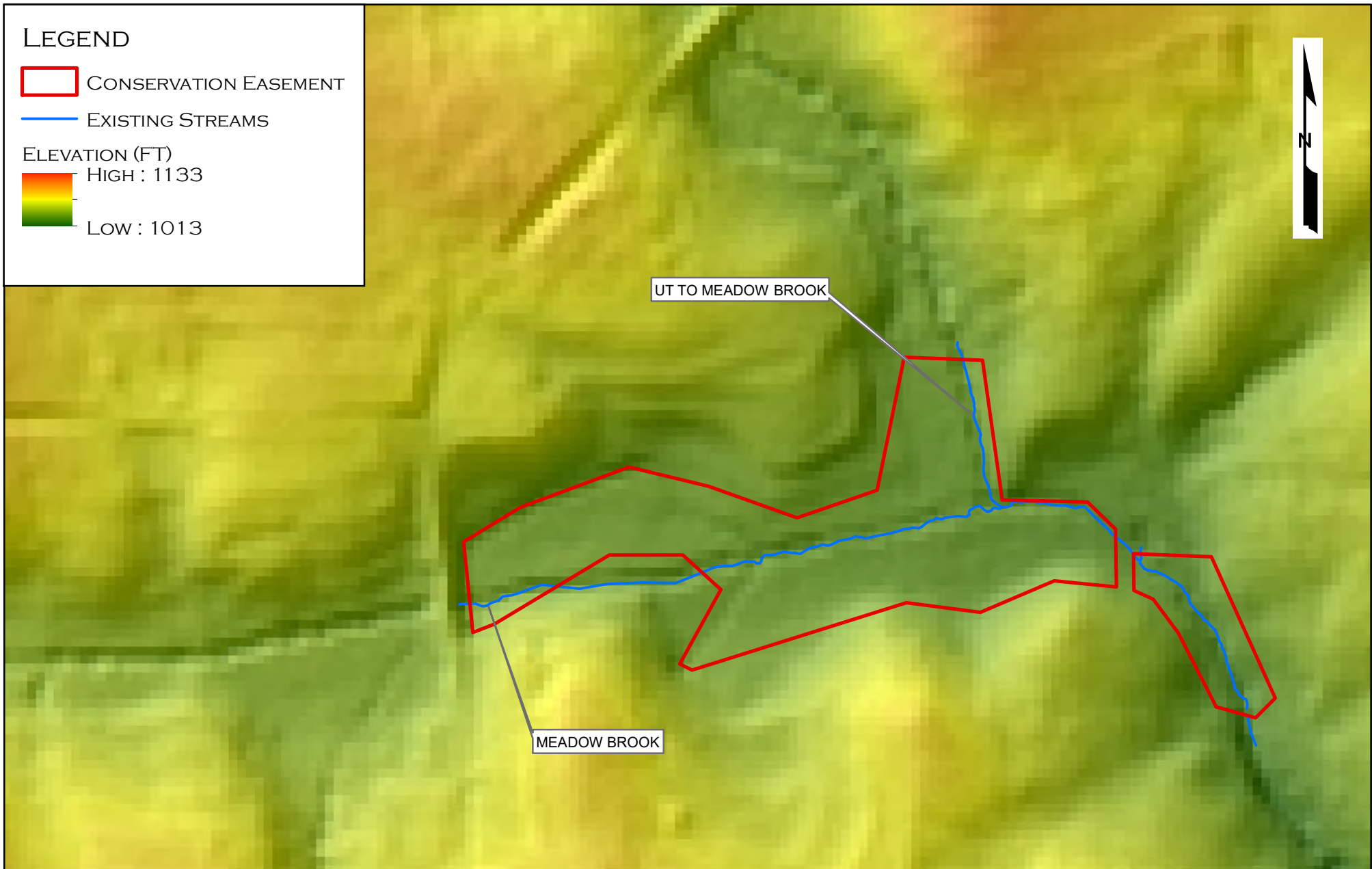
 CONSERVATION EASEMENT

 EXISTING STREAMS

ELEVATION (FT)

 HIGH : 1133

LOW : 1013



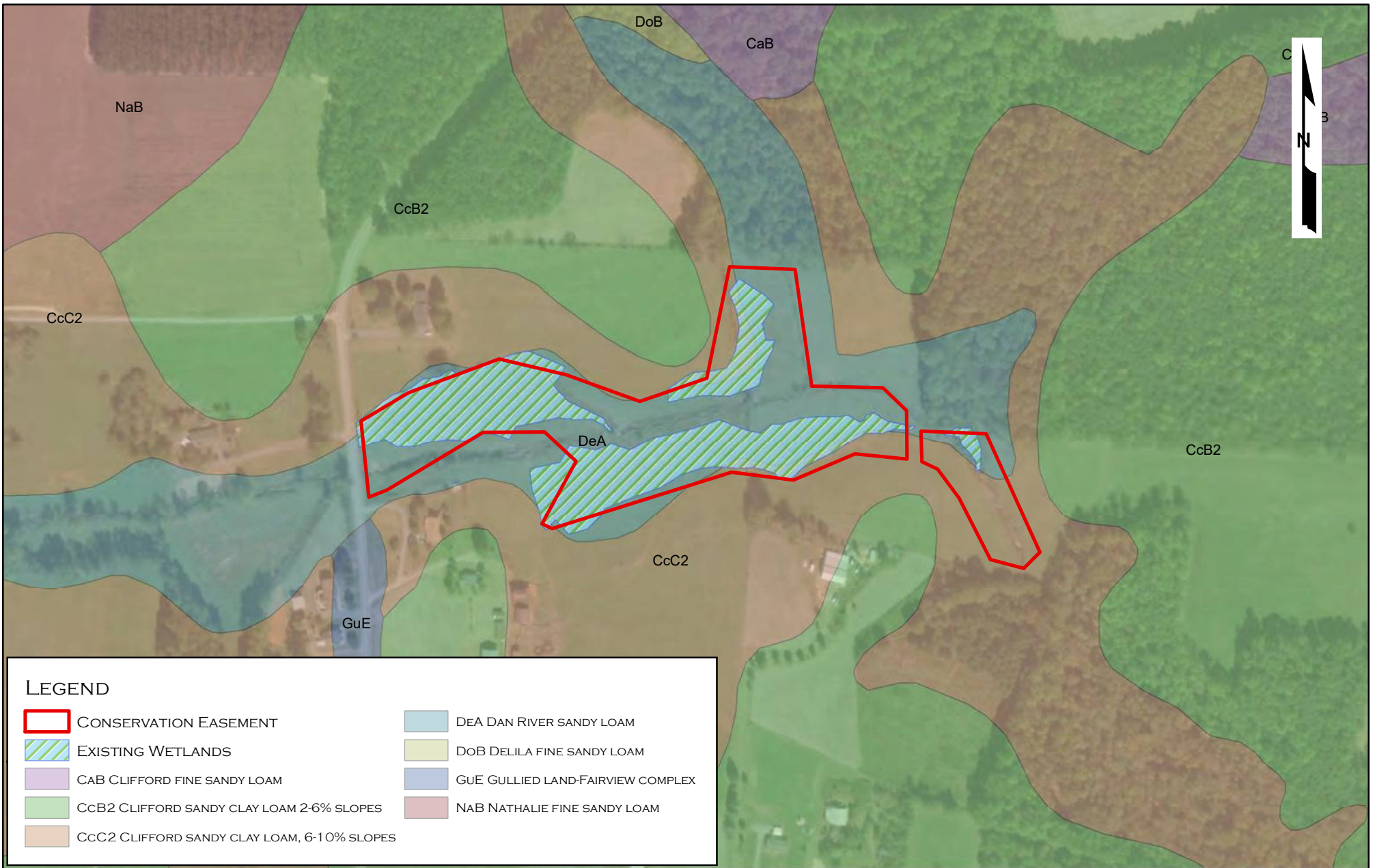
## MEADOW BROOK STREAM RESTORATION LIDAR MAP

PREPARED FOR:  
NCDEQ  
DIVISION OF  
MITIGATION SERVICES

FIGURE 5

YADKIN COUNTY, NC





**LEGEND**

- CONSERVATION EASEMENT
- EXISTING WETLANDS
- CAB CLIFFORD FINE SANDY LOAM
- CcB2 CLIFFORD SANDY CLAY LOAM 2-6% SLOPES
- CcC2 CLIFFORD SANDY CLAY LOAM, 6-10% SLOPES
- DEA DAN RIVER SANDY LOAM
- DOB DELILA FINE SANDY LOAM
- GU E GULLIED LAND-FAIRVIEW COMPLEX
- NAB NATHALIE FINE SANDY LOAM



**MEADOW BROOK STREAM RESTORATION**

SOILS MAP

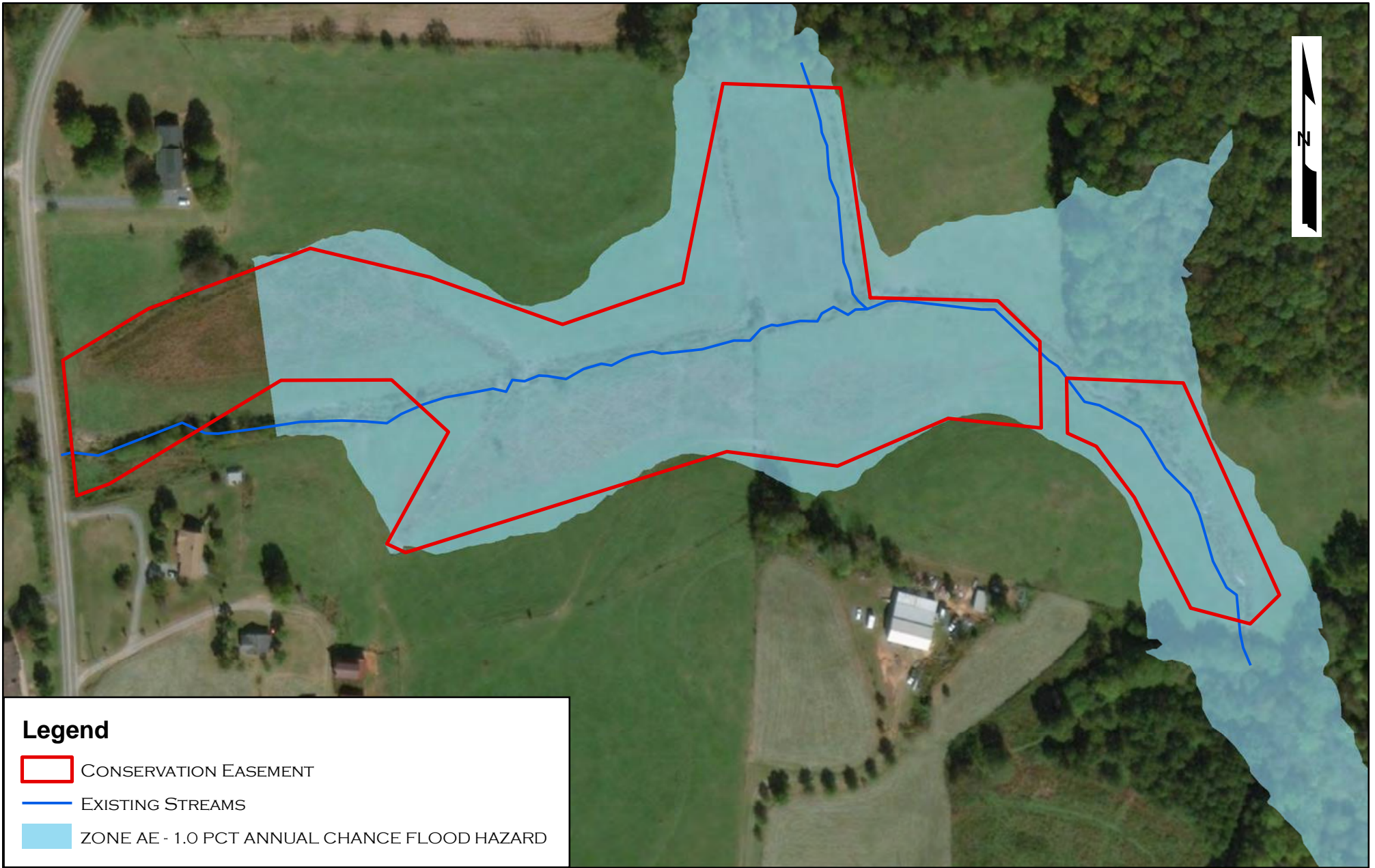
PREPARED FOR:  
 NCDEQ  
 DIVISION OF  
 MITIGATION SERVICES

FIGURE 6

YADKIN COUNTY, NC

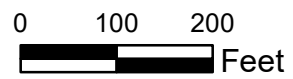






**Legend**

- CONSERVATION EASEMENT
- EXISTING STREAMS
- ZONE AE - 1.0 PCT ANNUAL CHANCE FLOOD HAZARD



**MEADOW BROOK STREAM RESTORATION**

FEMA FLOODPLAIN MAP

PREPARED FOR:  
 NCDEQ  
 DIVISION OF  
 MITIGATION SERVICES

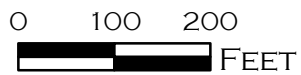
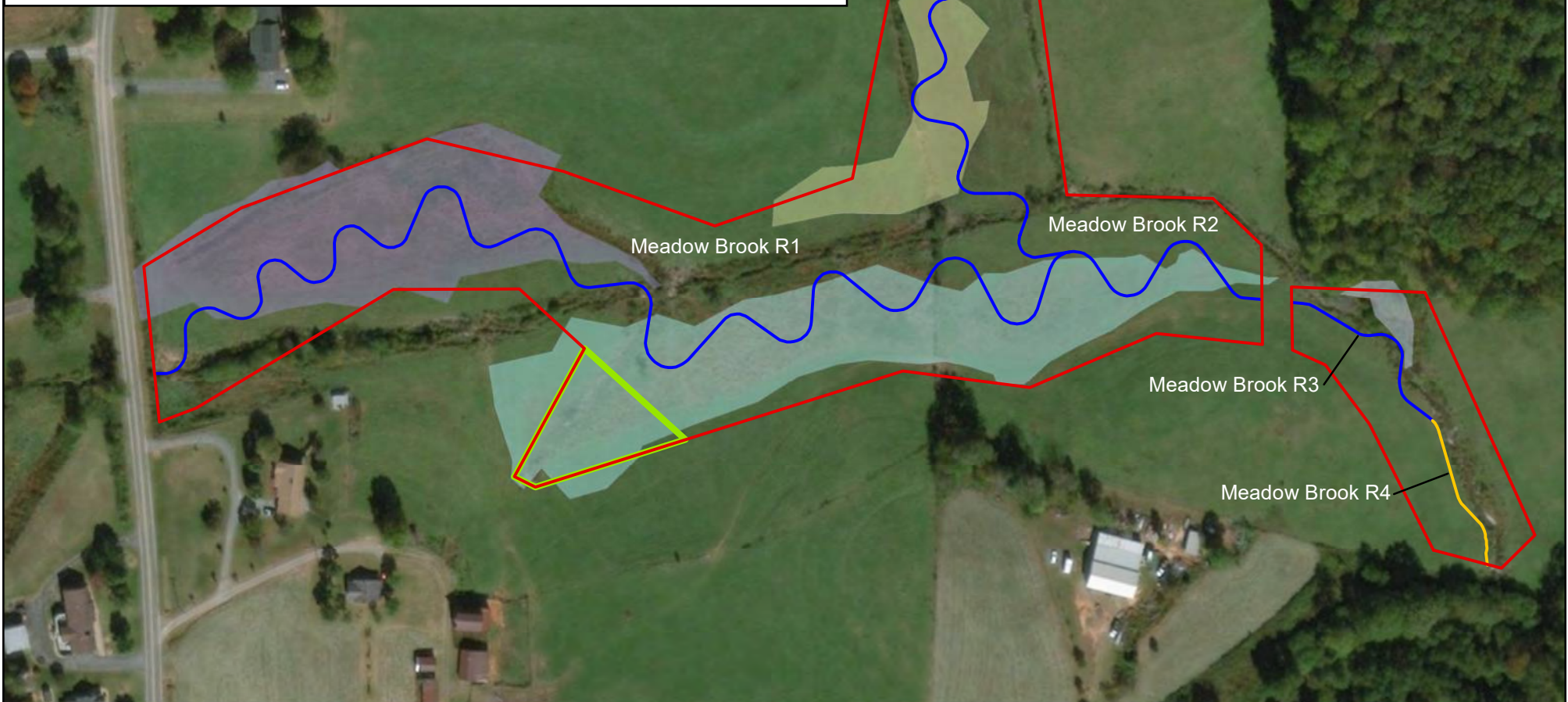
FIGURE 7

YADKIN COUNTY, NC



**LEGEND**

- CONSERVATION EASEMENT
- WETLAND TREATMENT CELL
- STREAM ASSETS**
- EI (1.5:1)
- R (1:1)
- WETLAND ASSETS (NO CREDIT)**
- WETLAND A (RR)
- WETLAND B (RR)
- WETLAND C (RR)
- WETLAND D (RR)



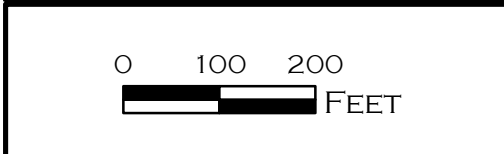
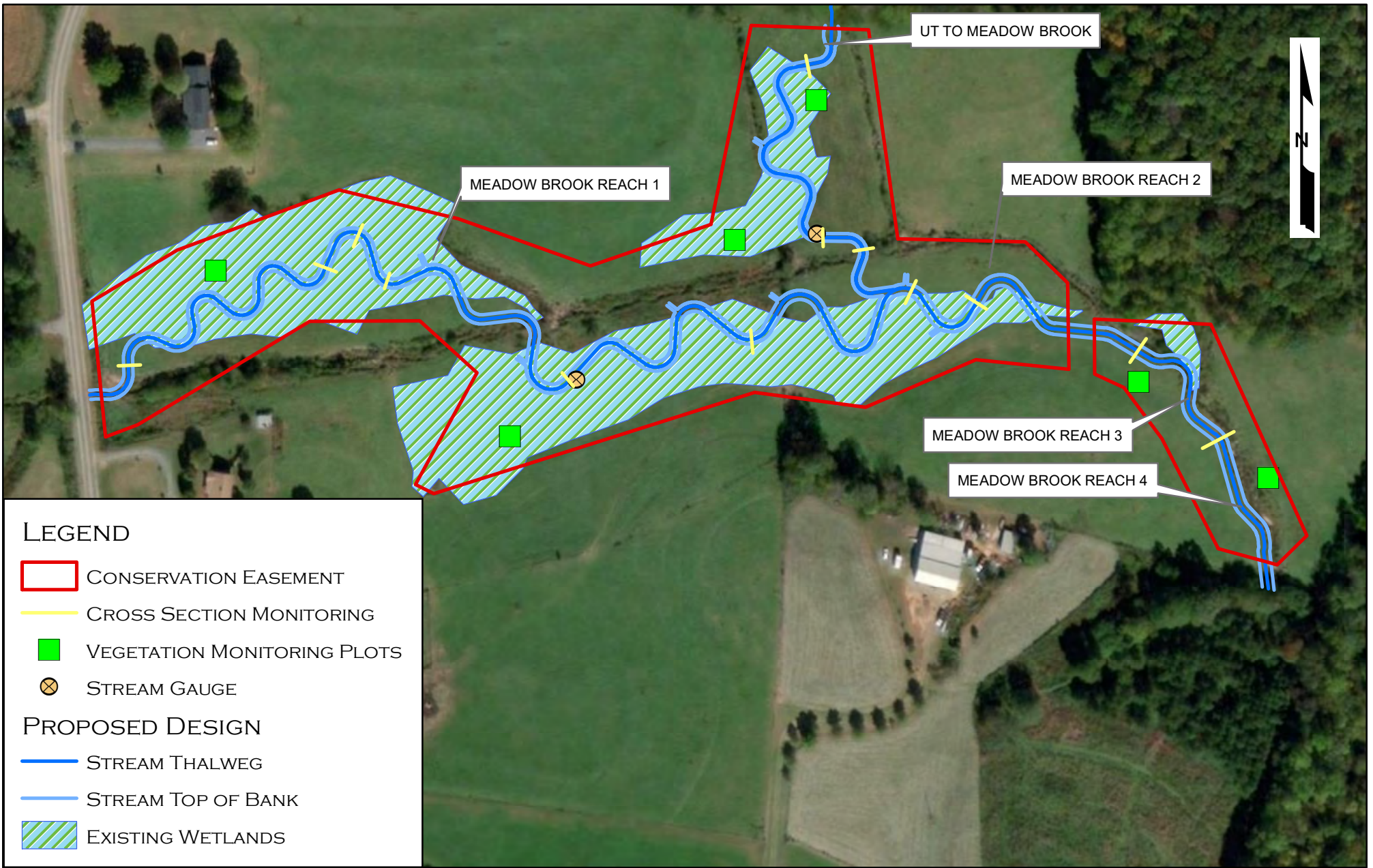
**MEADOW BROOK STREAM RESTORATION**  
ASSET MAP

PREPARED FOR:  
NCDEQ  
DIVISION OF  
MITIGATION SERVICES

FIGURE 8

YADKIN COUNTY, NC

PREPARED BY:  
ECOSYSTEM  
PLANNING &  
RESTORATION



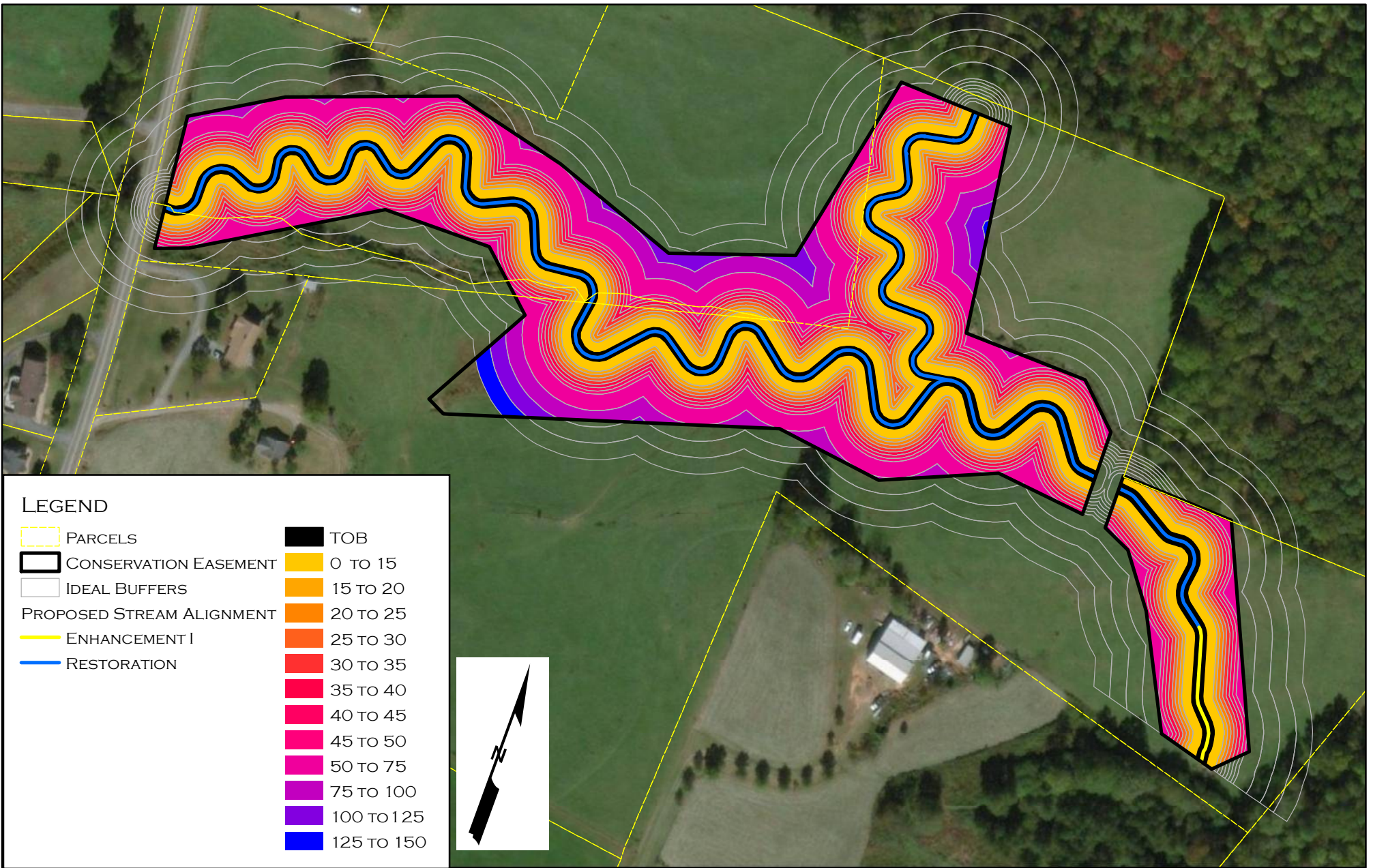
**MEADOW BROOK STREAM RESTORATION**  
PROPOSED MONITORING FEATURES

PREPARED FOR:  
NCDEQ  
DIVISION OF  
MITIGATION SERVICES

FIGURE 9

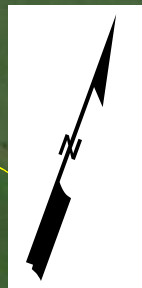
YADKIN COUNTY, NC

PREPARED BY:  
ECOSYSTEM  
PLANNING &  
RESTORATION  
EPR



**LEGEND**

- |                                  |            |
|----------------------------------|------------|
| PARCELS                          | TOB        |
| CONSERVATION EASEMENT            | 0 TO 15    |
| IDEAL BUFFERS                    | 15 TO 20   |
| <b>PROPOSED STREAM ALIGNMENT</b> | 20 TO 25   |
| ENHANCEMENT I                    | 25 TO 30   |
| RESTORATION                      | 30 TO 35   |
|                                  | 35 TO 40   |
|                                  | 40 TO 45   |
|                                  | 45 TO 50   |
|                                  | 50 TO 75   |
|                                  | 75 TO 100  |
|                                  | 100 TO 125 |
|                                  | 125 TO 150 |



0 100 200  
 Feet

**MEADOW BROOK STREAM RESTORATION**

RIPARIAN BUFFER ZONES MAP

PREPARED FOR:  
 NCDEQ  
 DIVISION OF  
 MITIGATION SERVICES

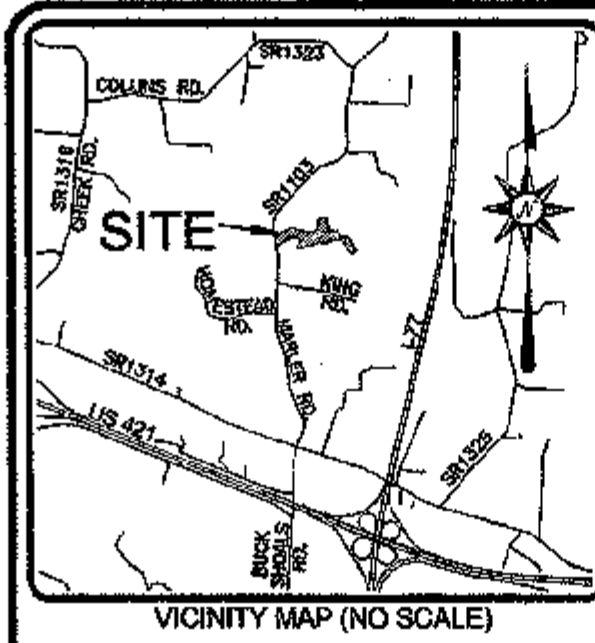
FIGURE 10

YADKIN COUNTY, NC

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION

# **Appendix 1**

## **SITE PROTECTION INSTRUMENT**



REVIEW OFFICER CERTIFICATION

STATE OF NORTH CAROLINA COUNTY OF YADKIN. REVIEW OFFICER OF YADKIN COUNTY, CERTIFY THAT THIS MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED, MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING FOR WHICH THE REVIEW OFFICER HAS RESPONSIBILITY AS PROVIDED BY LAW.

REVIEW OFFICER DATE

I, ELISABETH G. TURNER, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK 12, PAGE 349); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION SHOWN ON THE FACE OF THIS MAP, THAT THE TRAVERSE RATIO OF PRECISION IS 1:10,000; THAT THE GLOBAL POSITIONING SYSTEM (GPS) SURVEY PERFORMED TO ESTABLISH THE GRID TIE FOR THE TRAVERSE USED THE FOLLOWING INFORMATION:

- (1) CLASS OF SURVEY: CLASS AA
(2) POSITIONAL ACCURACY AT 95% CONFIDENCE LEVEL: HORIZONTAL = 0.078 USFT, VERTICAL = 0.108 USFT
(3) TYPE OF GPS FIELD PROCEDURE: REAL-TIME KINEMATICS (RTK)
(4) DATES OF SURVEY: AUG-SEPT, 2017
(5) DATUM/EPOCH: NAD83 (2011) 2017
(6) PUBLISHED/FIXED CONTROL USE: SITE GPS CONTROL POINT #2 NORTHERING=873,425.64 USFT, EASTING=1,462,330.93 USFT, ELEV=1,047.97 USFT
(7) GEOID MODEL: GEOID12b
(8) COMBINED GRID FACTOR: 0.99994832
(9) UNITS: US FEET

THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 28th DAY OF MARCH, 2018.

Signature of Elisabeth G. Turner, Professional Land Surveyor # L-4440, with official seal.

I, ELISABETH G. TURNER, PROFESSIONAL LAND SURVEYOR # L-4440, CERTIFY TO ONE OR MORE OF THE FOLLOWING AS INDICATED:

X 4. THAT THIS PLAT IS OF A SURVEY OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION.

Signature of Elisabeth G. Turner, P.L.S. #L-4440

GENERAL NOTES:

- 1. ALL DISTANCES SHOWN ARE HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED.
2. THE BASIS OF BEARINGS IS NCGS STATE PLANE GRID COORDINATES NAD83(2011) DATUM.
3. THE AREA SHOWN HEREON WAS COMPUTED USING THE COORDINATE COMPUTATION METHOD.
4. THE PURPOSE OF THIS PLAT IS TO SERVE AS A REFERENCE FOR THE CREATION OF A CONSERVATION EASEMENT. THIS PLAT IS NOT A BOUNDARY SURVEY. THE LAND PARCELS AND THEIR BOUNDARIES AFFECTED BY THIS CONSERVATION EASEMENT ARE NOT CHANGED BY THIS PLAT.
5. EASEMENT CORNERS MONUMENTED WITH 5/8" REBAR AND CAPPED WITH 3-1/4" ALUMINUM CAPS.
6. LINES NOT SURVEYED ARE SHOWN AS DASHED LINES AND WERE TAKEN FROM INFORMATION REFERENCED ON THE FACE OF THIS PLAT.
7. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND THEREFORE MAY NOT SHOW ALL ENCUMBRANCES UPON THE SUBJECT PROPERTY. A LICENSED ATTORNEY-AT-LAW SHOULD BE CONSULTED REGARDING CORRECT OWNERSHIP, WIDTH, AND LOCATION OF EASEMENTS AND OTHER TITLE QUESTIONS REVEALED BY A TITLE EXAMINATION. THE SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR ENCUMBRANCES, RESTRICTIVE COVENANTS, EASEMENTS OF RECORD, OWNERSHIP, TITLE EVIDENCE, OR OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE EXAMINATION MAY DISCLOSE.
8. SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS, AND/OR ENCUMBRANCES THAT MAY AFFECT THE PROPERTY(S).
9. THE A PORTION OF THE SUBJECT PROPERTY IS LOCATED IN A DESIGNATED FEMA FLOOD HAZARD ZONE PER FIRM MAP #3710486600J EFFECTIVE DATE MAY 18, 2009.
10. ENVIRONMENTAL AND SUBSURFACE CONDITIONS WERE NOT EXAMINED AS PART OF THIS SURVEY.
11. THE EXISTENCE OR NON-EXISTENCE OF WETLANDS ON THE SUBJECT PROPERTY HAS NOT BEEN DETERMINED BY THIS SURVEY.
12. UTILITIES ARE SHOWN WHERE ABOVE GROUND APPURTENANCES WERE VISIBLE AND ADJACENT TO CONSERVATION EASEMENT.
13. THE STATE OF NORTH CAROLINA, ITS EMPLOYEES AND AGENTS, SUCCESSORS AND ASSIGNS, ARE GRANTED AND CONVEYED A PERPETUAL RIGHT OF ACCESS TO THE EASEMENT AREA OVER THE PROPERTY AT REASONABLE TIMES TO UNDERTAKE ANY ACTIVITIES TO RESTORE, CONSTRUCT, MAINTAIN, ENHANCE, AND MONITOR THE STREAM, WETLAND AND ANY OTHER RIPARIAN RESOURCES IN THE EASEMENT AREA, IN ACCORDANCE WITH THE RESTORATION ACTIVITIES OR A LONG-TERM MANAGEMENT PLAN AS DESCRIBED IN SECTION III-A OF THE DEED RECORDED CONTEMPORANEOUSLY WITH THIS PLAT. PREFERRED ACCESS ROUTES ARE SHOWN HEREON IN APPROXIMATE LOCATIONS.

RECORDED IN PLAT BOOK 12 PAGE 349

CERTIFICATE OF OWNERSHIP AND DEDICATION

I (WE) HEREBY CERTIFY THAT I (WE) ARE THE OWNER(S) OF THE PROPERTY AS SHOWN AND DESCRIBED HEREON. I (WE) HEREBY ACCEPT AND ADOPT THIS RECORDED PLAT AND CONSERVATION EASEMENT WITH MY (OUR) FREE CONSENT AND DEDICATE, GRANT, AND CONVEY ALL EASEMENTS, RIGHT-OF-WAYS, AND ACCESS ROADS TO PUBLIC AND/OR PRIVATE USE AS NOTED HEREIN.

Signatures of Grady M. Shore, Ora E. Shore, Steve Andrew Shore, Ervin G. Shore, Louise R. Shore, and Colon A. Shore with dates.

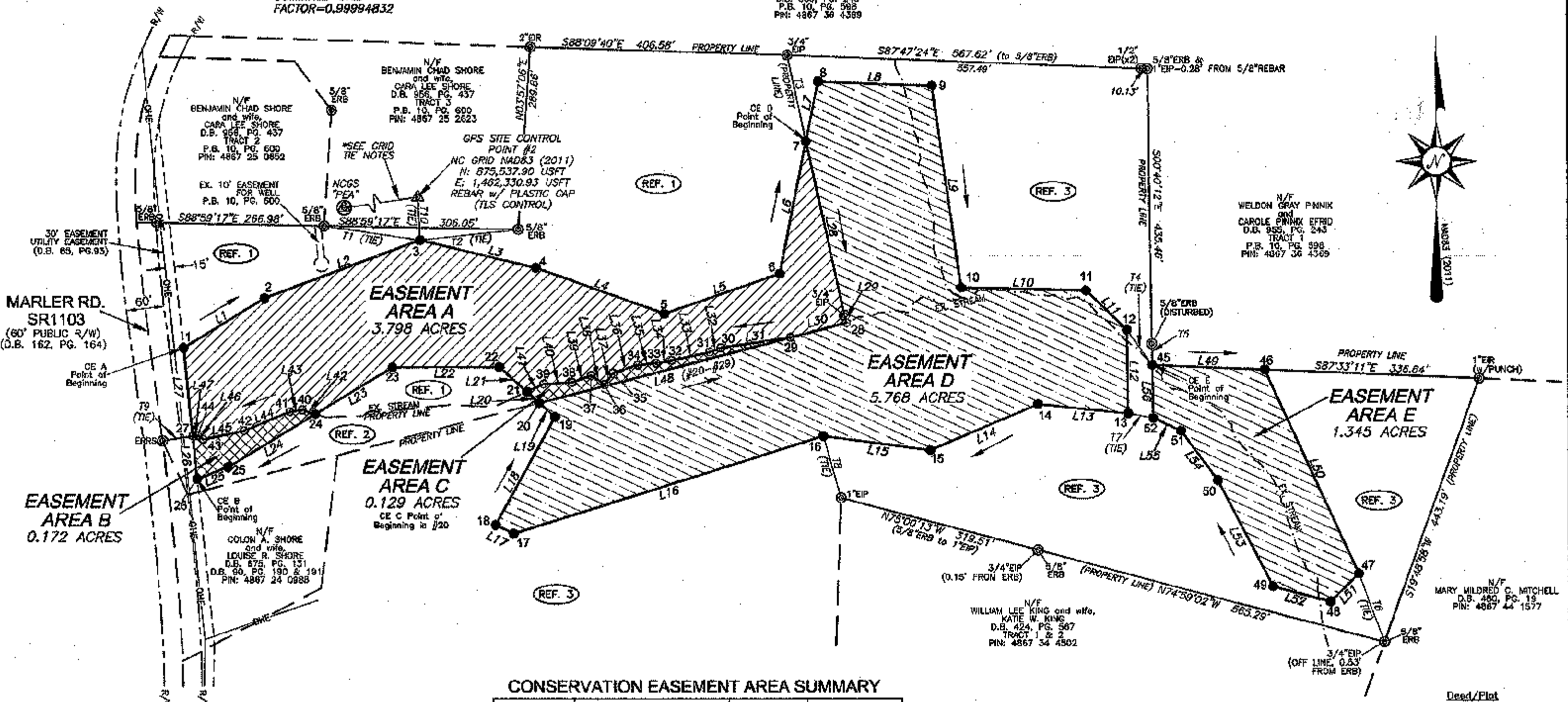
GRID TIE NOTES:

NCGS "PEA" NAD83 (2011) NC GRID NAD83 (2011) N: 873,425.64 USFT E: 1,447,555.79 USFT

NCGS "PEA" TO GPS SITE CONTROL POINT #2 N 81°51'31" E 14,926.14' GROUND (14,925.37' GRID) COMBINED GRID FACTOR = 0.99994832

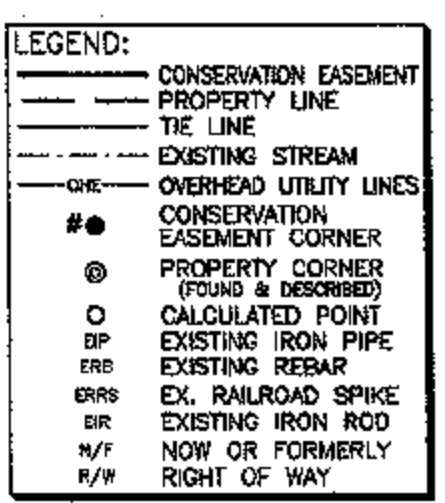
Table with 3 columns: LINE, BEARING, DISTANCE. Contains line tables for various survey lines (L1 through L56).

CONSERVATION EASEMENT COORDINATE TABLE (US FT) with columns for Northing, Easting, and coordinates for various points.

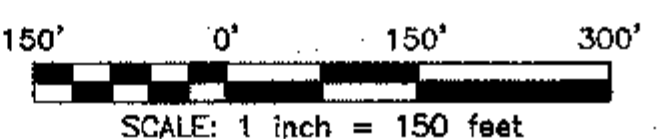


CONSERVATION EASEMENT AREA SUMMARY

Table summarizing easement areas: REF. 1 (3.798 acres), REF. 2 (0.129 acres), REF. 3 (5.768 acres), and Easement Area E (1.345 acres). Total area is 11.212 acres.



Deed/Plat References: D.B. 65, Pg. 93; D.B. 80, Pg. 424; D.B. 90, Pg. 190; D.B. 90, Pg. 191; D.B. 112, Pg. 99; D.B. 162, Pg. 164; D.B. 238, Pg. 336; D.B. 424, Pg. 567; D.B. 434, Pg. 360; D.B. 442, Pg. 834; D.B. 480, Pg. 19; D.B. 675, Pg. 131; D.B. 851, Pg. 491; D.B. 855, Pg. 243; D.B. 956, Pg. 437; D.B. 1174, Pg. 498; P.B. 1, Pg. 141A; P.B. 7, Pg. 237; P.B. 10, Pg. 549; P.B. 10, Pg. 598; P.B. 10, Pg. 600



TURNER LAND SURVEYING logo and contact info: P.O. BOX 148 SWANNANOVA, NC 28778 P-0702 (919)-827-0745 www.turnerlandsurveying.com

CONSERVATION EASEMENT FOR THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES (SPO FILE# 99-Z and 99-AA; DMS PROJECT# 100024) PROJECT NAME: MEADOW BROOK MITIGATION SITE PARCEL #'s: 115541, 154240, & 115542

CAD FILE: MEADOW BROOK\_CE\_F SCALE: 1"=150' SHEET 1 of 1

## **Appendix 2**

### **SITE PHOTOGRAPHS**



Beginning of Meadow Brook (R1) at large culvert under Marler Road. Cattle access to the stream is located at the bottom of the photo.



Vertical banks on the downstream portion of R1. Channel incision and toe scour are visible.



Upstream portion of R1. Note Chinese privet along the right bank.



Trampled stream banks from cattle entering R1 along with a highly degraded riparian buffer.





Confluence of existing ditch (closest to Marler Rd.)  
and R1.



View of wetland A on south side of R1, looking  
back towards Marler Rd.



Confluence of existing ditch just west of UT to  
Meadow Brook with R1. Notice trampling in  
foreground.



Confluence of UT1 and Meadow Brook. Primary  
cattle access and loafing area. Channel has no  
riparian buffer and sandy, eroding, vertical banks  
are visible.



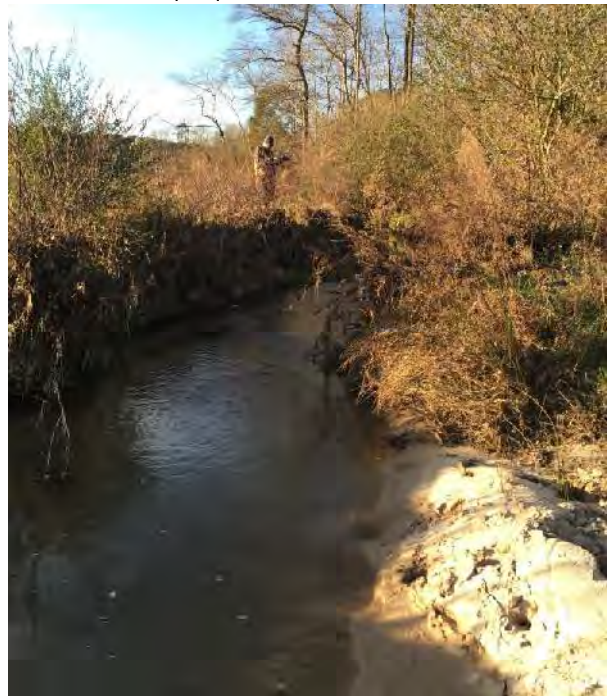
View of UT1 looking upstream.



View of UT1 at property line, location of  
proposed culvert.



Start of R2 looking upstream towards Meadow  
Brook's confluence with UT1.



Upstream portion of Meadow Brook Reach 3  
with vertical bank and heavy sand deposits.



Vertical bank on the downstream portion of R3.  
Channel incision and mass wasting are visible.



Vertical bank in the middle of R3. Channel  
incision and toe scour are visible.



Downstream boundary of the project.



View of Meadow Brook beyond the  
downstream limit of the project.

## **Appendix 3**

### **WETLAND JD FORMS**

**U.S. ARMY CORPS OF ENGINEERS**  
**WILMINGTON DISTRICT**

Action Id. SAW-2018-00041 County: Yadkin U.S.G.S. Quad: NC- Elkin South

**NOTIFICATION OF JURISDICTIONAL DETERMINATION**

Property Owner: Andy Shore,  
Address: 3920 Baptist Church Rd  
Booneville, NC 27011  
Telephone Number: 336-244-0381  
E-mail:

Size (acres)	<u>24</u>	Nearest Town	<u>Hamptonville</u>
Nearest Waterway	<u>UT to South Deep Creek</u>	River Basin	<u>Upper Pee Dee</u>
USGS HUC	<u>03040101</u>	Coordinates	Latitude: <u>36.14142</u> Longitude: <u>-80.819539</u>

Location description: The project is located at 1332 Marier Rd. Hamptonville, North Carolina

**Indicate Which of the Following Apply:**

**A. Preliminary Determination**

- There appear to be **waters including wetlands**, on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters including wetlands**, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated 1/24/2018. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.
- There appear to be **waters including wetlands**, on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the **waters including wetlands**, have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the **waters including wetlands**, at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters including wetlands**, on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

**B. Approved Determination**

- There are Navigable Waters of the United States within the above described project area/property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are **waters including wetlands**, on the above described project area/property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- We recommend you have the **waters including wetlands**, on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.
- The **waters including wetlands**, on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated DATE. We strongly

**SAW-2018-00041**

suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

The **waters including wetlands**, have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on **DATE**. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **William Elliott at 828-271-7980 ext 4224 or william.a.elliott**.

**C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 4/17/2018.**

**D. Remarks: None.**

**E. Attention USDA Program Participants**

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

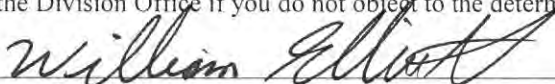
**F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)**

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers  
South Atlantic Division  
Attn: Jason Steele, Review Officer  
60 Forsyth Street SW, Room 10M15  
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **Not applicable**.

\*\*It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.\*\*

Corps Regulatory Official: William Elliott 

Date of JD: **4/17/2018** Expiration Date of JD: **Not applicable**

**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND  
REQUEST FOR APPEAL**

Applicant: <b>Andy Shore,</b>	File Number: <b>SAW-2018-00041</b>	Date: <b>04/10/2018</b>
Attached is:	See Section below	
<input type="checkbox"/> INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A	
<input type="checkbox"/> PROFFERED PERMIT (Standard Permit or Letter of permission)	B	
<input type="checkbox"/> PERMIT DENIAL	C	
<input type="checkbox"/> APPROVED JURISDICTIONAL DETERMINATION	D	
<input checked="" type="checkbox"/> PRELIMINARY JURISDICTIONAL DETERMINATION	E	

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at or <http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx> or the Corps regulations at 33 CFR Part 331.

**A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.**

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT: You may accept or appeal the permit**

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SAW-2018-00041**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at [http://corpsmapu.usace.army.mil/cm\\_apex/f?p=136:4:0](http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0)

Copy furnished:

Agent: **Ecosystem Planning & Restoration**  
**Kevin Tweedy**  
Address: **559 Jones Franklin Road Suite 150**  
**Raleigh, NC 27606**  
Telephone Number: **919-388-0787**  
E-mail: **ktweedv@eprusa.net**



**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:  
**District Engineer, Wilmington Regulatory Division**  
**Attn: William Elliott**  
**Asheville Regulatory Office**  
**U.S Army Corps of Engineers**  
**151 Patton Avenue, Room 208**  
**Asheville, North Carolina 28801**

If you only have questions regarding the appeal process you may also contact:  
Mr. Jason Steele, Administrative Appeal Review Officer  
CESAD-PDO  
U.S. Army Corps of Engineers, South Atlantic Division  
60 Forsyth Street, Room 10M15  
Atlanta, Georgia 30303-8801  
Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

<hr/> Signature of appellant or agent.	Date:	Telephone number:
---	-------	-------------------

*For appeals on Initial Proffered Permits send this form to:*

**District Engineer, Wilmington Regulatory Division, Attn: William Elliott, 69 Darlington Avenue, Wilmington, North Carolina 28403**

*For Permit denials, Proffered Permits and Approved Jurisdictional Determinations send this form to:*

**Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801**  
**Phone: (404) 562-5137**

**PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM**

**BACKGROUND INFORMATION**

**A. REPORT COMPLETION DATE FOR PJD:** 04/10/2018

**B. NAME AND ADDRESS OF PERSON REQUESTING PJD:** Andy Shore, Kevin Tweedy, 559 Jones Franklin Road, Suite 150 Raleigh, NC 27011

**C. DISTRICT OFFICE, FILE NAME, AND NUMBER:** Wilmington District, Meadow Brook Stream Restoration, SAW-2018-00041

**D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:** The project is located at 1332 Marier Rd. Hamptonville, North Carolina

**(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)**

State: NC County: Yadkin City: Hamptonville

Center coordinates of site (lat/long in degree decimal format): Latitude: 36.14142 Longitude: -80.819539

Universal Transverse Mercator: 17S

Name of nearest waterbody: UT to South Deep Creek

**E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**

Office (Desk) Determination. Date: 4/10/2018

Field Determination. Date(s):1/24/2018

**TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.**

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable)	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
WA	36.141145	-80.819117	2.9 ac	Wetland	404
WB	36.141514	-80.821227	2.2 ac	Wetland	404
WC	36.141941	-80.818792	0.8 ac	Wetland	404
WD	36.141288	-80.820136	0.1 ac	Wetland	404
SA Meadow Brook	36.141263	-80.820136	2404 lf	Non Wetland	404
SB (UT)	36.142149	-80.818277	396 lf	Non Wetland	404


- 1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.
- 2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre- construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there "*may be*" waters of the U.S. and/or that there "*may be*" navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

**SUPPORTING DATA. Data reviewed for PJD (check all that apply)**

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:  
Map: \_\_\_\_\_
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - Office concurs with data sheets/delineation report.
  - Office does not concur with data sheets/delineation report. Rationale: \_\_\_\_\_
- Data sheets prepared by the Corps: \_\_\_\_\_
- Corps navigable waters' study: \_\_\_\_\_
- U.S. Geological Survey Hydrologic Atlas: \_\_\_\_\_
- USGS NHD data.
- USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: Elkin South NC 1:12,000 \_\_\_\_\_
- Natural Resources Conservation Service Soil Survey. Citation: USDA Web Soil Survey \_\_\_\_\_
- National wetlands inventory map(s). Cite name: \_\_\_\_\_
- State/local wetland inventory map(s): \_\_\_\_\_
- FEMA/FIRM maps: \_\_\_\_\_
- 100-year Floodplain Elevation is: \_\_\_\_\_ (National Geodetic Vertical Datum of 1929)
- Photographs:  Aerial (Name & Date): \_\_\_\_\_  
or  Other (Name & Date): \_\_\_\_\_
- Previous determination(s). File no. and date of response letter: \_\_\_\_\_
- Other information (please specify): \_\_\_\_\_

**IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.**

William Elliott   
Signature and date of Regulatory  
staff member completing PJD  
4/17/2018

\_\_\_\_\_  
Signature and date of person requesting PJD  
(REQUIRED, unless obtaining the signature is  
impracticable)<sup>1</sup>

<sup>1</sup> Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

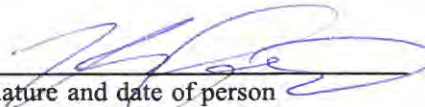
**SUPPORTING DATA. Data reviewed for PJD (check all that apply)**

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:  
Map: \_\_\_\_\_
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - Office concurs with data sheets/delineation report.
  - Office does not concur with data sheets/delineation report. Rationale: \_\_\_\_\_
- Data sheets prepared by the Corps: \_\_\_\_\_
- Corps navigable waters' study: \_\_\_\_\_
- U.S. Geological Survey Hydrologic Atlas: \_\_\_\_\_
  - USGS NHD data.
  - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: Elkin South NC 1:12,000
- Natural Resources Conservation Service Soil Survey. Citation: USDA Web Soil Survey
- National wetlands inventory map(s). Cite name: \_\_\_\_\_
- State/local wetland inventory map(s): \_\_\_\_\_
- FEMA/FIRM maps: \_\_\_\_\_
- 100-year Floodplain Elevation is: \_\_\_\_\_ (National Geodetic Vertical Datum of 1929)
- Photographs:  Aerial (Name & Date): 2010 NCDOT Digital Ortho  
or  Other (Name & Date): \_\_\_\_\_
- Previous determination(s). File no. and date of response letter: \_\_\_\_\_
- Other information (please specify): \_\_\_\_\_

**IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.**

\_\_\_\_\_  
Signature and date of Regulatory  
staff member completing PJD

 12/6/17  
\_\_\_\_\_  
Signature and date of person  
requesting PJD (REQUIRED,  
unless obtaining the signature  
is impracticable)<sup>1</sup>

<sup>1</sup> Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.



- LEGEND**
- JURISDICTIONAL STREAMS
  - JURISDICTIONAL WETLANDS
  - STUDY AREA
  - PARCELS

RESOURCE ID	TYPE OF RESOURCE	AREA OR LENGTH
WA	WETLAND	2.9 AC
WB	WETLAND	2.2 AC
WC	WETLAND	0.8 AC
WD	WETLAND	0.1 AC
SA (MEADOW BROOK)	NON-WETLAND	2,404 LF
SB	NON-WETLAND	396 LF

1:2,400 1 inch = 200 feet



**MEADOW BROOK SITE**  
 JURISDICTIONAL FEATURES MAP (OVERVIEW)

FIGURE 3

YADKIN COUNTY, NC



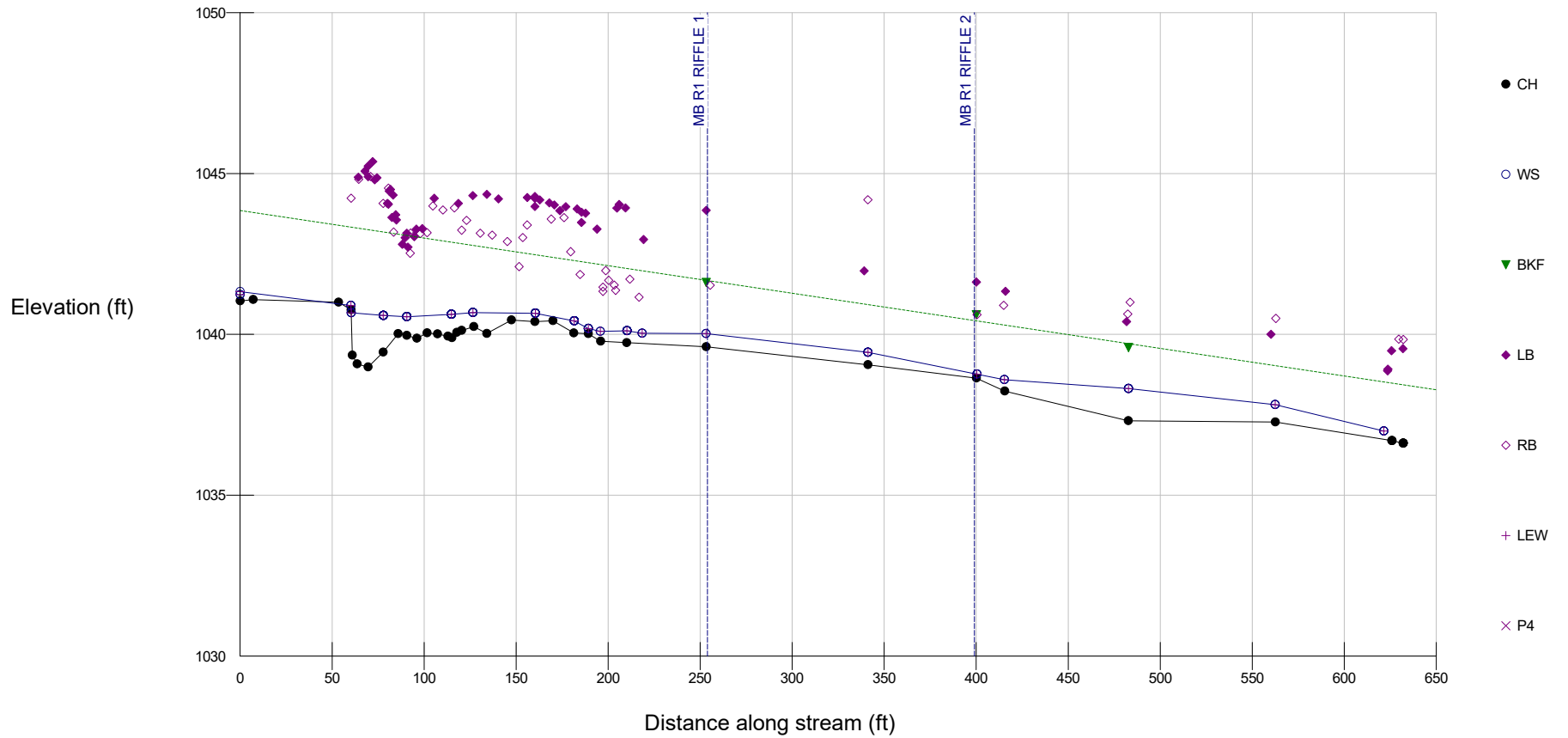
PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION

DATE:  
 JANUARY 24, 2018

# Appendix 4

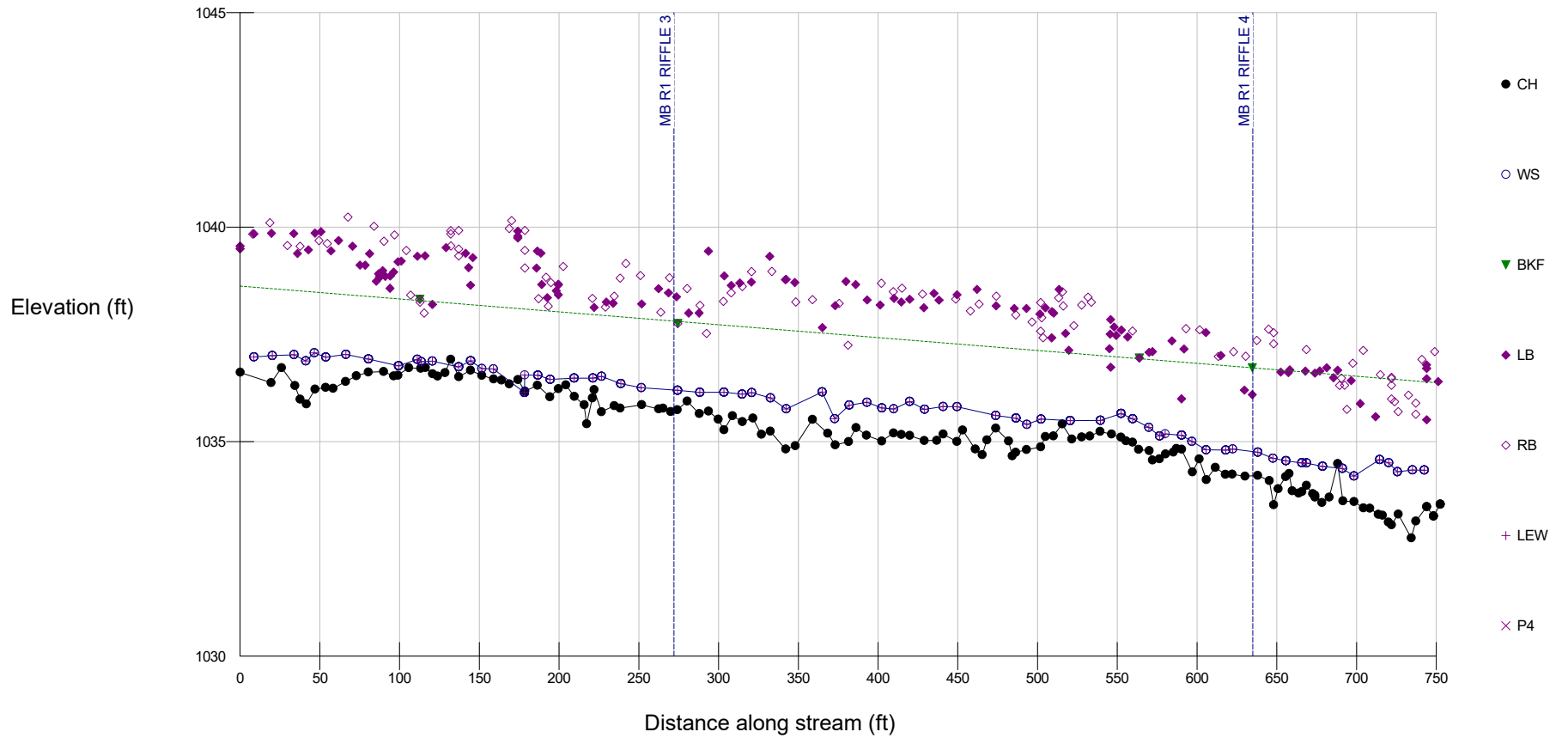
## ASSESSMENT DATA

# MEADOW BROOK REACH 1 PROFILE - PART 1

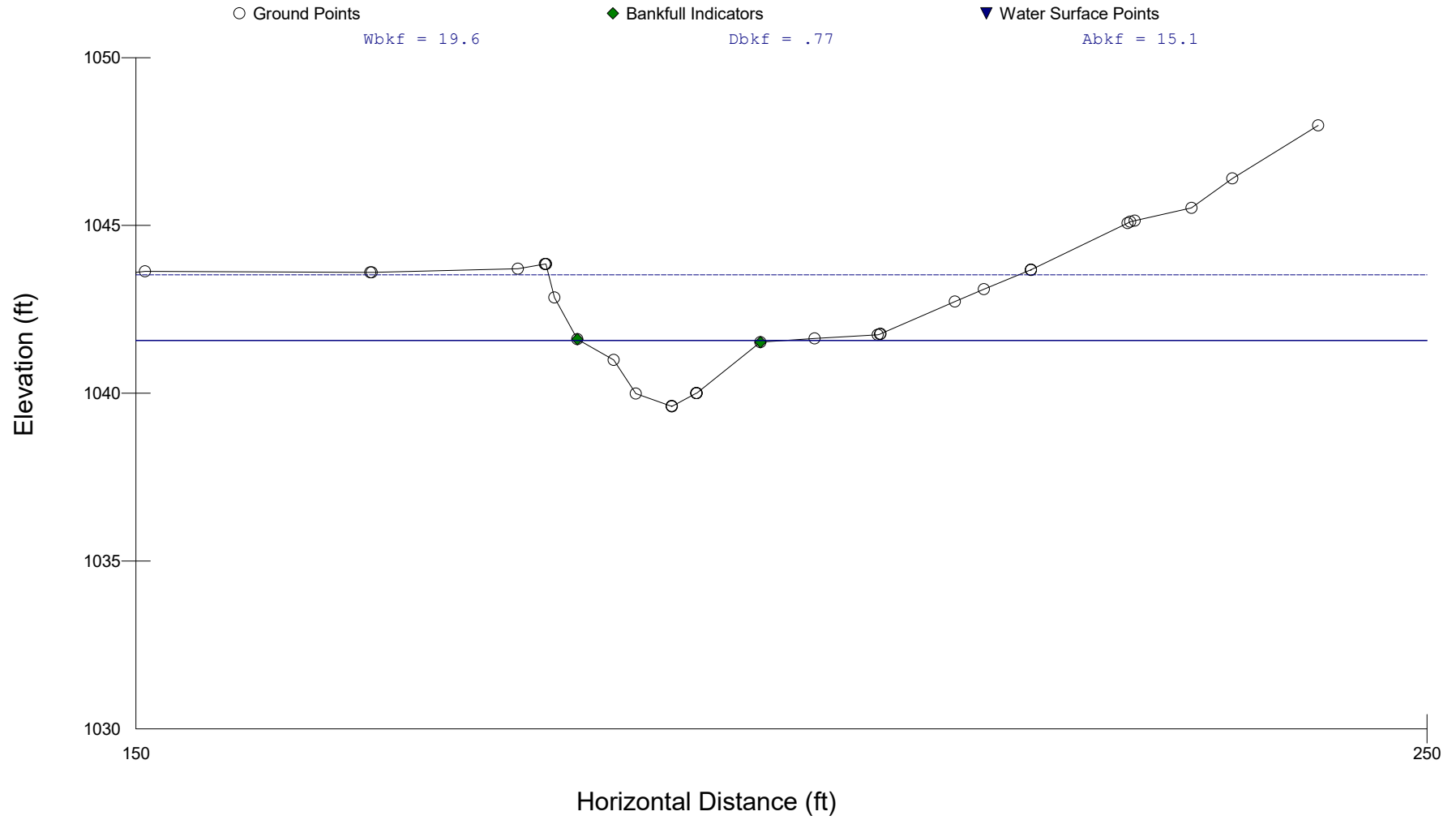




# MEADOW BROOK REACH 1 PROFILE PART 2



# MEADOW BROOK R1 RIFFLE 1



RIVERMORPH CROSS SECTION SUMMARY

-----  
 River Name: Meadow Brook  
 Reach Name: Reach 1  
 Cross Section Name: MB R1 RIFFLE 1  
 Survey Date: 09/27/2017  
 -----

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1043.82	
12.26	0	1042.74	
14.93	0	1042.19	
16.54	0	1041.62	
21.57	0	1041.58	
23.68	0	1041.51	
26.14	0	1041.59	
31.24	0	1041.7	
31.5	0	1041.97	
33.42	0	1042.25	
46.61	0	1042.26	
57.32	0	1042.29	
72.58	0	1042.18	
81.64	0	1042.06	
89.43	0	1042.03	
101.63	0	1041.97	
116.16	0	1042.22	
125.01	0	1042.41	
149.58	0	1043.58	
150.71	0	1043.63	
168.15	0	1043.6	
168.26	0	1043.6	
179.59	0	1043.71	
181.68	0	1043.85	
181.73	0	1043.85	
181.76	0	1043.85	
182.41	0	1042.85	
184.19	0	1041.61	BKF
187.01	0	1040.99	
188.72	0	1039.99	
191.5	0	1039.61	TW
191.5	0	1039.62	
191.51	0	1039.61	
193.4	0	1040	
193.41	0	1040	
193.42	0	1040	
193.43	0	1040	
198.37	0	1041.52	BKF
202.56	0	1041.63	
207.46	0	1041.74	
207.63	0	1041.76	
207.68	0	1041.77	
213.43	0	1042.73	
215.67	0	1043.1	
219.32	0	1043.68	
219.32	0	1043.67	
219.33	0	1043.68	

226.8	0	1045.07
227.01	0	1045.11
227.35	0	1045.14
231.75	0	1045.52
234.92	0	1046.4
241.56	0	1047.98

-----  
Cross Sectional Geometry  
-----

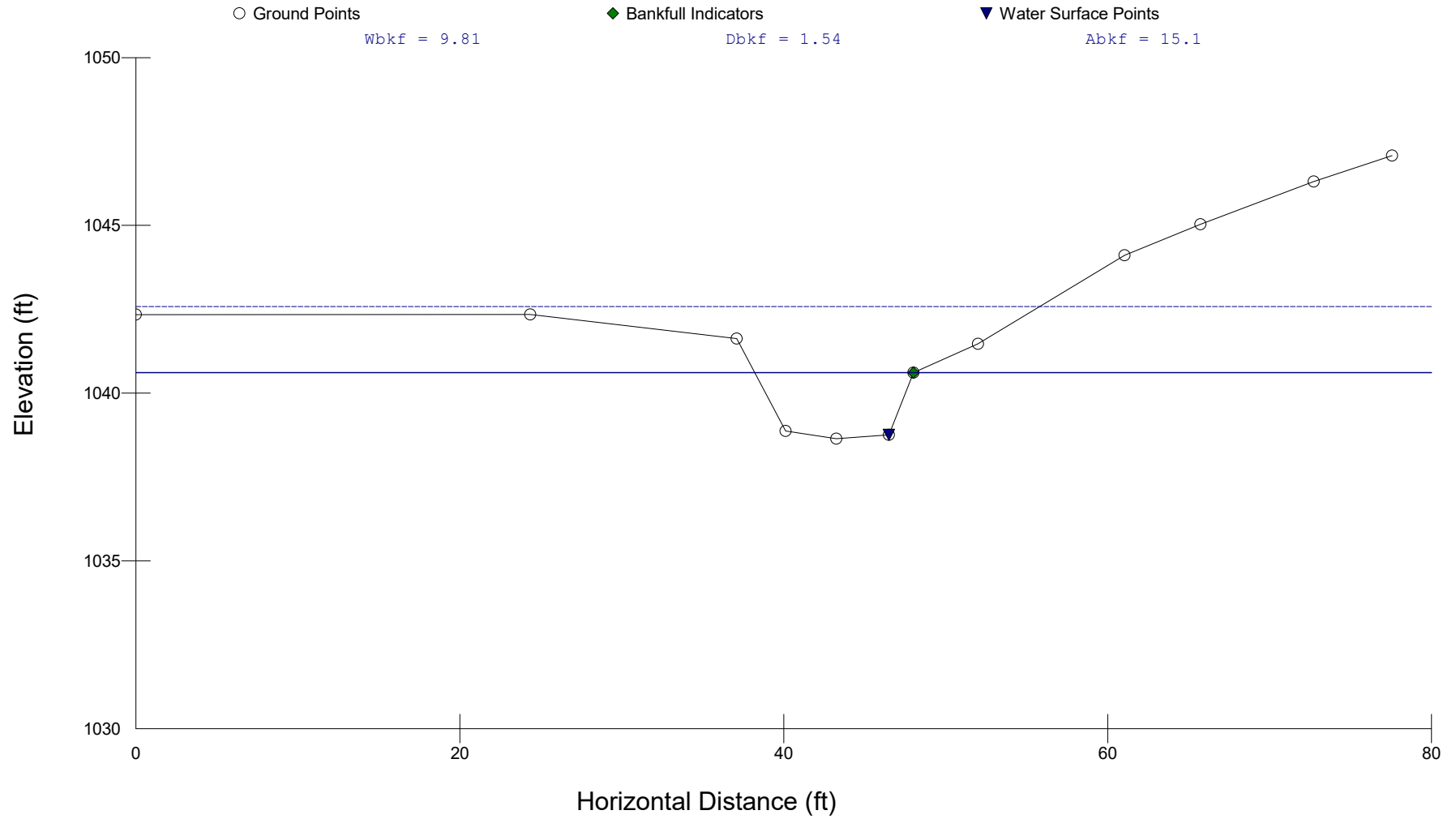
	Channel	Left	Right
Floodprone Elevation (ft)	1043.53	1043.53	1043.53
Bankfull Elevation (ft)	1041.57	1041.57	1041.57
Floodprone width (ft)	181.65	-----	-----
Bankfull width (ft)	19.56	170.45	7.95
Entrenchment Ratio	9.29	-----	-----
Mean Depth (ft)	0.77	0.79	0.74
Maximum Depth (ft)	1.96	1.96	1.79
width/Depth Ratio	25.4	215.38	10.74
Bankfull Area (sq ft)	15.09	9.18	5.91
Wetted Perimeter (ft)	20.2	13.79	9.99
Hydraulic Radius (ft)	0.75	0.67	0.59
Begin BKF Station	21.87	21.87	192.32
End BKF Station	200.27	192.32	200.27

-----  
Entrainment Calculations  
-----

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

# Meadow Brook R1 Riffle 2



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Reach 1  
 Cross Section Name: MB R1 RIFFLE 2  
 Survey Date: 02/19/2018

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1042.341	
24.35	0	1042.344	
37.09	0	1041.626	LB
40.11	0	1038.87	
43.25	0	1038.64	TW
46.49	0	1038.755	LEW
48.01	0	1040.609	BKF
51.99	0	1041.468	
61.05	0	1044.109	
65.73	0	1045.034	
72.72	0	1046.307	
77.56	0	1047.081	

Cross Sectional Geometry

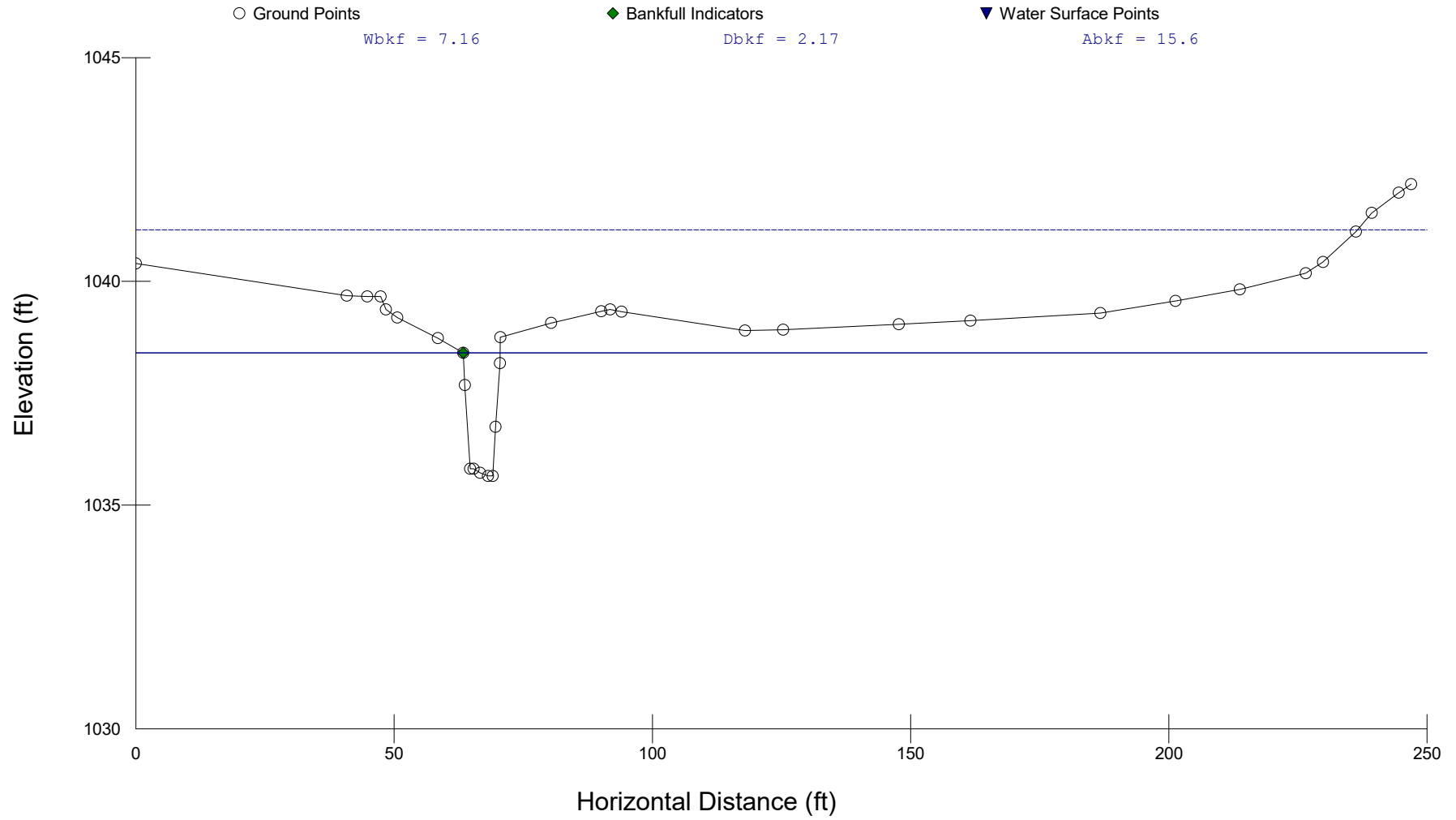
	Channel	Left	Right
Floodprone Elevation (ft)	1042.58	1042.58	1042.58
Bankfull Elevation (ft)	1040.61	1040.61	1040.61
Floodprone Width (ft)	55.8	-----	-----
Bankfull width (ft)	9.81	4.91	4.9
Entrenchment Ratio	5.69	-----	-----
Mean Depth (ft)	1.54	1.47	1.61
Maximum Depth (ft)	1.97	1.96	1.97
Width/Depth Ratio	6.37	3.34	3.04
Bankfull Area (sq ft)	15.09	7.21	7.88
Wetted Perimeter (ft)	11.37	7.55	7.74
Hydraulic Radius (ft)	1.33	0.95	1.02
Begin BKF Station	38.2	38.2	43.11
End BKF Station	48.01	43.11	48.01

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left side	Right side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

# MEADOW BROOK R1 RIFFLE 3



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Reach 1  
 Cross Section Name: MB R1 RIFFLE 3  
 Survey Date: 09/27/2017

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1040.4	
40.82	0	1039.68	
44.81	0	1039.66	
47.39	0	1039.66	
48.43	0	1039.37	
50.62	0	1039.19	
58.49	0	1038.73	
63.37	0	1038.4	BKF
63.68	0	1037.68	
64.71	0	1035.81	
65.39	0	1035.81	
66.65	0	1035.72	
68.18	0	1035.65	
69.09	0	1035.65	
69.63	0	1036.75	
70.51	0	1038.17	
70.56	0	1038.75	
80.42	0	1039.07	
90.11	0	1039.33	
91.82	0	1039.37	
94.05	0	1039.32	
117.93	0	1038.9	
125.34	0	1038.92	
147.74	0	1039.04	
161.59	0	1039.12	
186.73	0	1039.29	
201.3	0	1039.56	
213.76	0	1039.82	
226.5	0	1040.18	
229.84	0	1040.43	
236.22	0	1041.11	
239.3	0	1041.53	
244.51	0	1041.98	
246.9	0	1042.17	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1041.15	1041.15	1041.15
Bankfull Elevation (ft)	1038.4	1038.4	1038.4
Floodprone width (ft)	236.51	-----	-----
Bankfull width (ft)	7.16	3.58	3.58
Entrenchment Ratio	33.03	-----	-----
Mean Depth (ft)	2.17	2.15	2.2



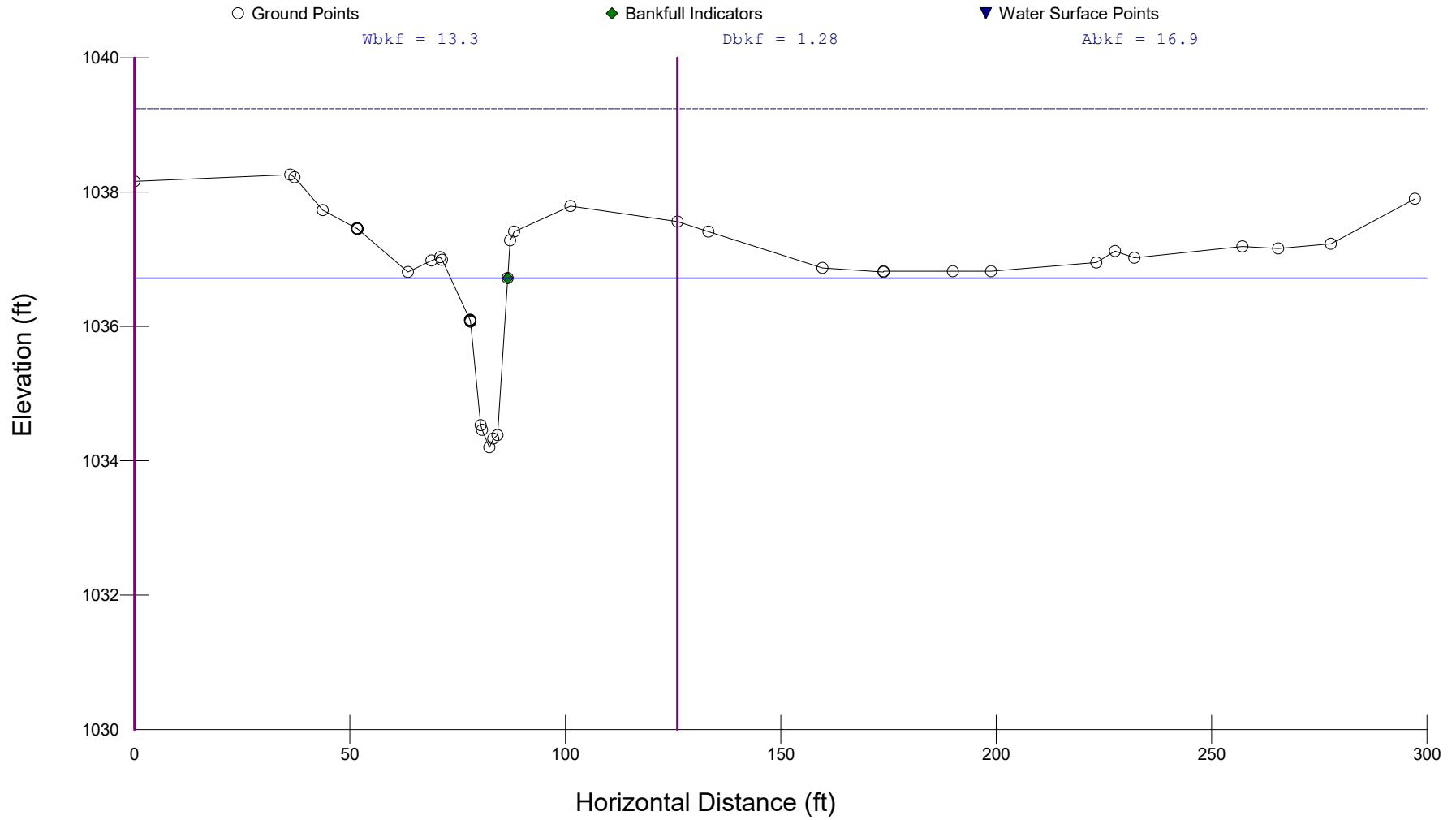
Maximum Depth (ft)	2.75	2.69	2.75
Width/Depth Ratio	3.3	1.66	1.63
Bankfull Area (sq ft)	15.57	7.7	7.87
Wetted Perimeter (ft)	10.43	7.86	7.96
Hydraulic Radius (ft)	1.49	0.98	0.99
Begin BKF Station	63.37	63.37	66.95
End BKF Station	70.53	66.95	70.53

-----  
Entrainment Calculations  
-----

Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left side	Right side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

# Meadow Brook Reach 1 Riffle 4



RIVERMORPH CROSS SECTION SUMMARY

-----  
 River Name: Meadow Brook  
 Reach Name: Reach 1  
 Cross Section Name: MB R1 RIFFLE 4  
 Survey Date: 10/23/2017  
 -----

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1038.16	
36.16	0	1038.26	
37.17	0	1038.22	
43.71	0	1037.73	
51.59	0	1037.46	
51.71	0	1037.46	
51.72	0	1037.45	
51.81	0	1037.45	
63.48	0	1036.81	
68.92	0	1036.98	
70.97	0	1037.03	
71.41	0	1036.99	
77.88	0	1036.1	
77.92	0	1036.09	
77.93	0	1036.09	
77.95	0	1036.08	
77.99	0	1036.07	
80.36	0	1034.53	
80.7	0	1034.46	
82.4	0	1034.2	
83.26	0	1034.33	
84.28	0	1034.38	
86.63	0	1036.72	BKF
87.19	0	1037.28	
88.13	0	1037.41	
101.2	0	1037.79	
126.03	0	1037.56	
133.24	0	1037.41	
159.68	0	1036.87	
173.85	0	1036.81	
173.89	0	1036.82	
189.97	0	1036.82	
198.83	0	1036.82	
223.25	0	1036.95	
227.6	0	1037.12	
232.07	0	1037.02	
257.14	0	1037.19	
265.45	0	1037.16	
277.66	0	1037.23	
297.21	0	1037.9	

-----  
 Cross sectional Geometry  
 -----

Channel Left Right

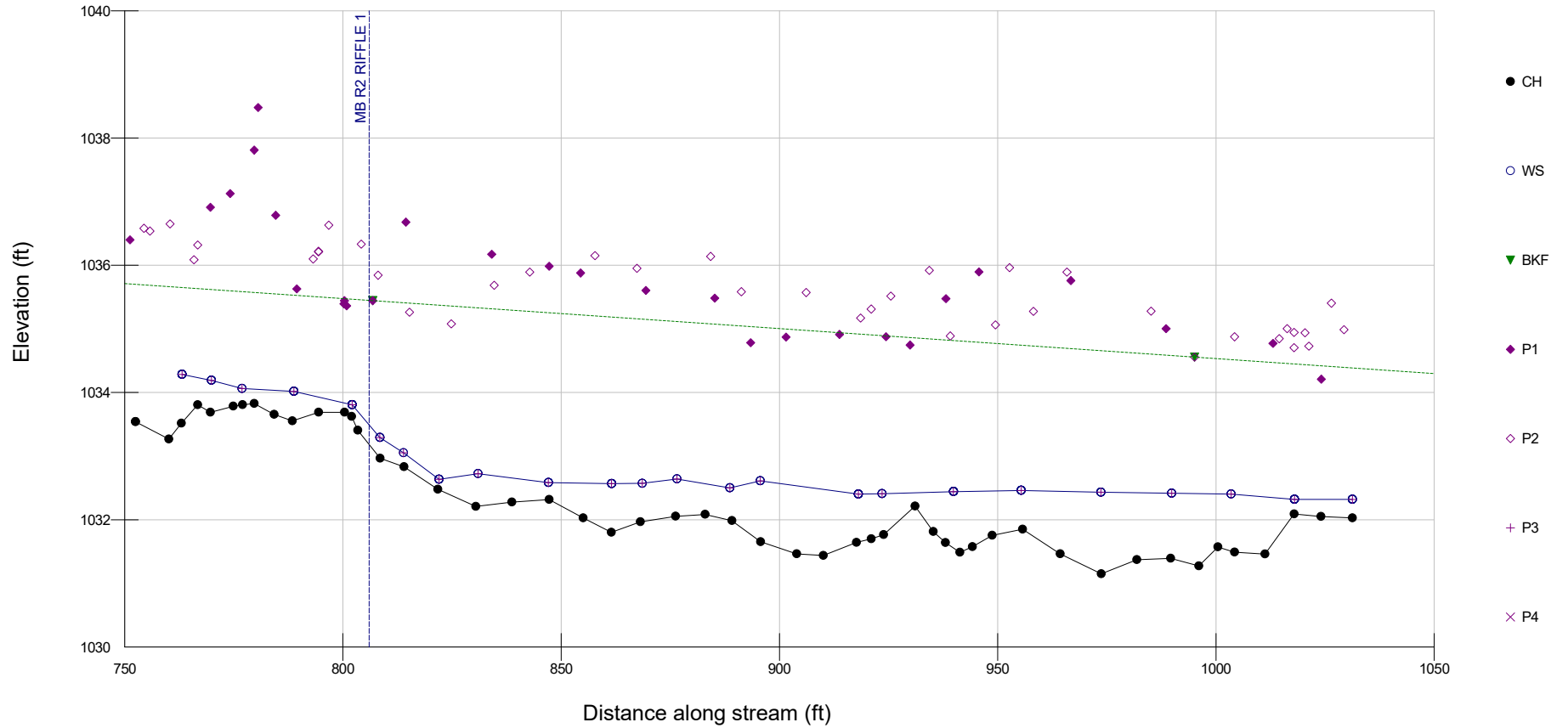
Floodprone Elevation (ft)	1039.24	1039.24	1039.24
Bankfull Elevation (ft)	1036.72	1036.72	1036.72
Floodprone width (ft)	297.21	-----	-----
Bankfull width (ft)	13.26	6.63	6.63
Entrenchment Ratio	22.42	-----	-----
Mean Depth (ft)	1.28	0.62	1.94
Maximum Depth (ft)	2.52	1.96	2.52
Width/Depth Ratio	10.36	10.75	3.42
Bankfull Area (sq ft)	16.93	4.09	12.84
Wetted Perimeter (ft)	14.77	9.02	9.66
Hydraulic Radius (ft)	1.15	0.45	1.33
Begin BKF Station	73.37	73.37	80
End BKF Station	86.63	80	86.63

-----  
 Entrainment Calculations  
 -----

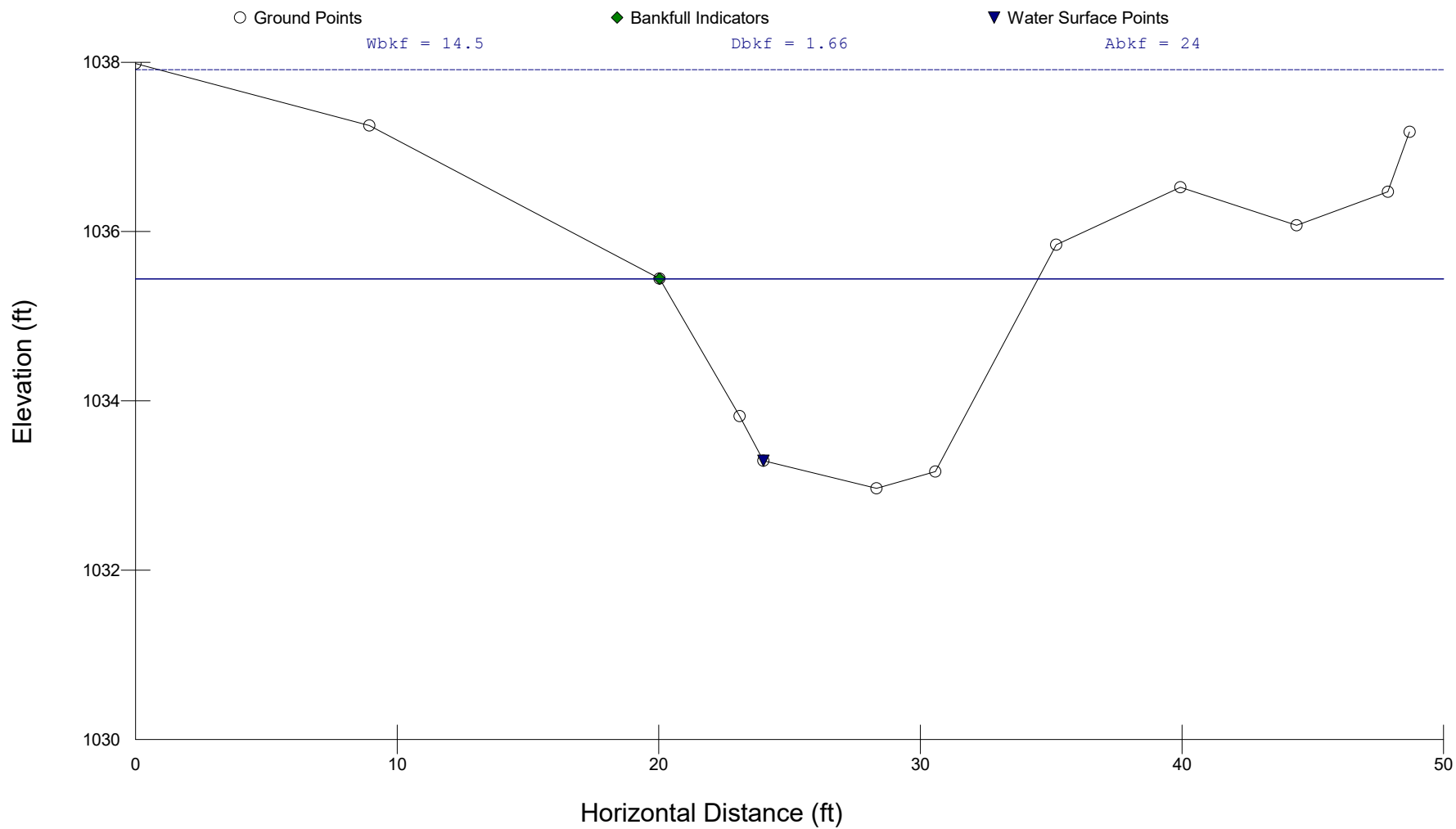
Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left Side	Right Side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

# MEADOW BROOK REACH 2 PROFILE



# MB R2 RIFFLE 1



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Reach 12  
 Cross Section Name: MB R2 RIFFLE 1  
 Survey Date: 02/19/2018

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1037.984	
8.94	0	1037.252	
20.03	0	1035.444	BKF
23.09	0	1033.82	
24	0	1033.292	LEW
28.32	0	1032.967	TW
30.57	0	1033.164	
35.19	0	1035.843	RB
39.94	0	1036.522	
44.38	0	1036.073	
47.87	0	1036.47	
48.7	0	1037.178	

Cross Sectional Geometry

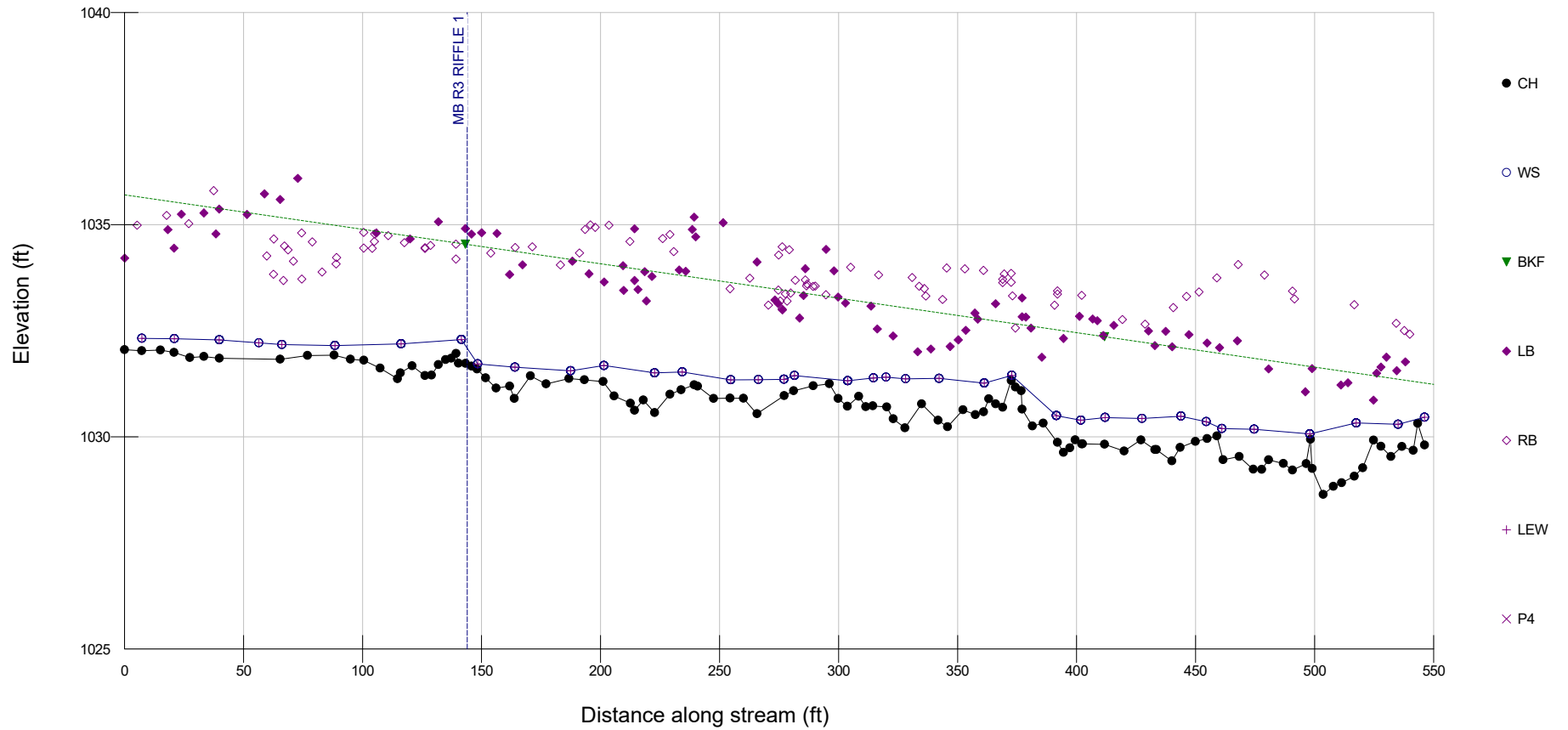
	Channel	Left	Right
Floodprone Elevation (ft)	1037.91	1037.91	1037.91
Bankfull Elevation (ft)	1035.44	1035.44	1035.44
Floodprone width (ft)	47.83	-----	-----
Bankfull width (ft)	14.46	7.23	7.23
Entrenchment Ratio	3.31	-----	-----
Mean Depth (ft)	1.66	1.61	1.71
Maximum Depth (ft)	2.47	2.39	2.47
Width/Depth Ratio	8.71	4.5	4.23
Bankfull Area (sq ft)	23.98	11.61	12.36
Wetted Perimeter (ft)	15.64	10.18	10.24
Hydraulic Radius (ft)	1.53	1.14	1.21
Begin BKF Station	20.04	20.04	27.27
End BKF Station	34.5	27.27	34.5

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve

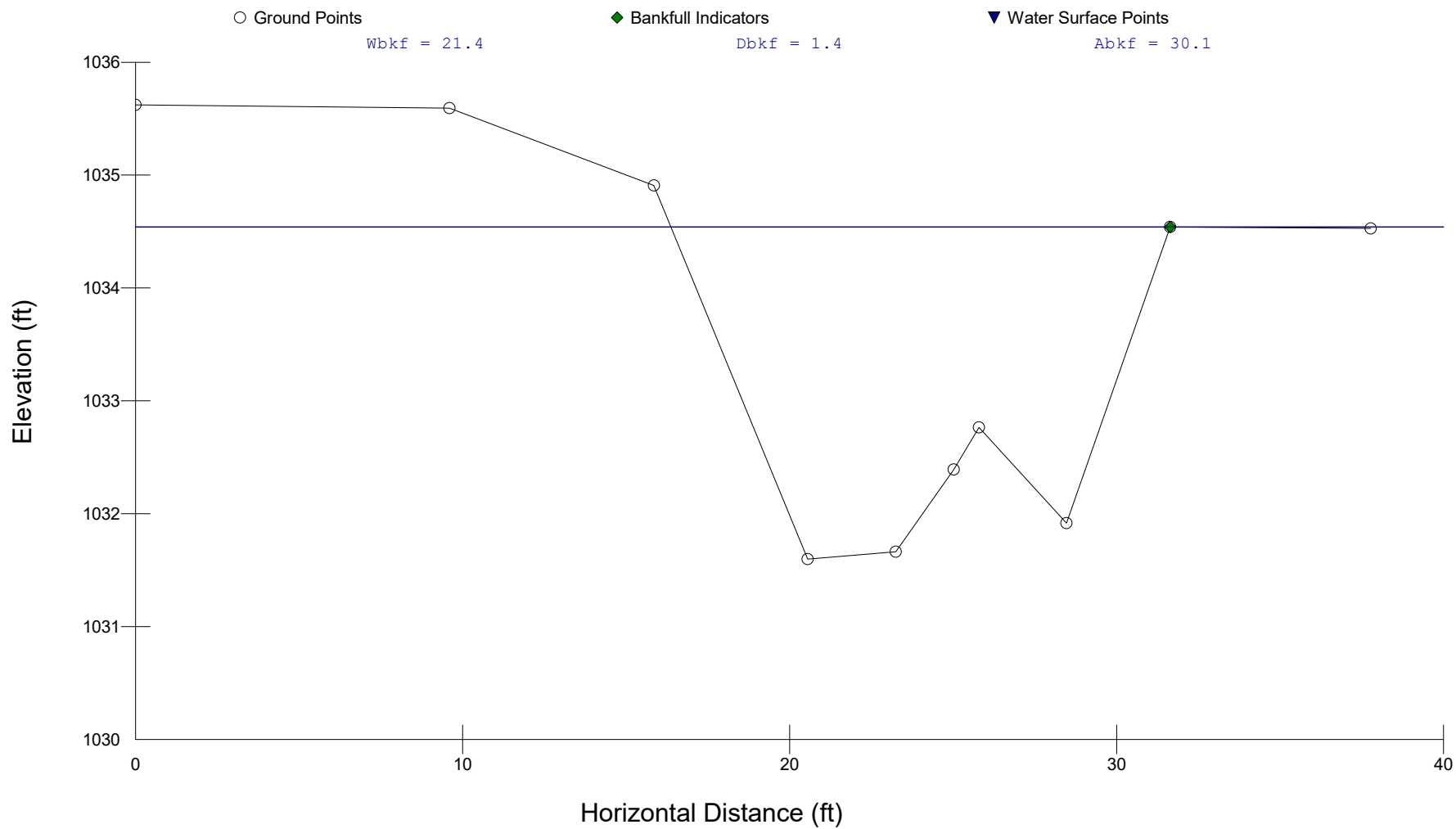
	Channel	Left side	Right side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

# MEADOW BROOK REACH 3 PROFILE





# MB R3 RIFFLE 1



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Reach 3  
 Cross Section Name: MB R3 RIFFLE 1  
 Survey Date: ~~02/19/2018~~

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1035.623	
9.6	0	1035.594	
15.85	0	1034.908	LB
20.55	0	1031.597	
23.25	0	1031.663	TW
25.02	0	1032.391	
25.79	0	1032.765	
28.47	0	1031.916	
31.64	0	1034.54	BKF
37.77	0	1034.527	

Cross Sectional Geometry

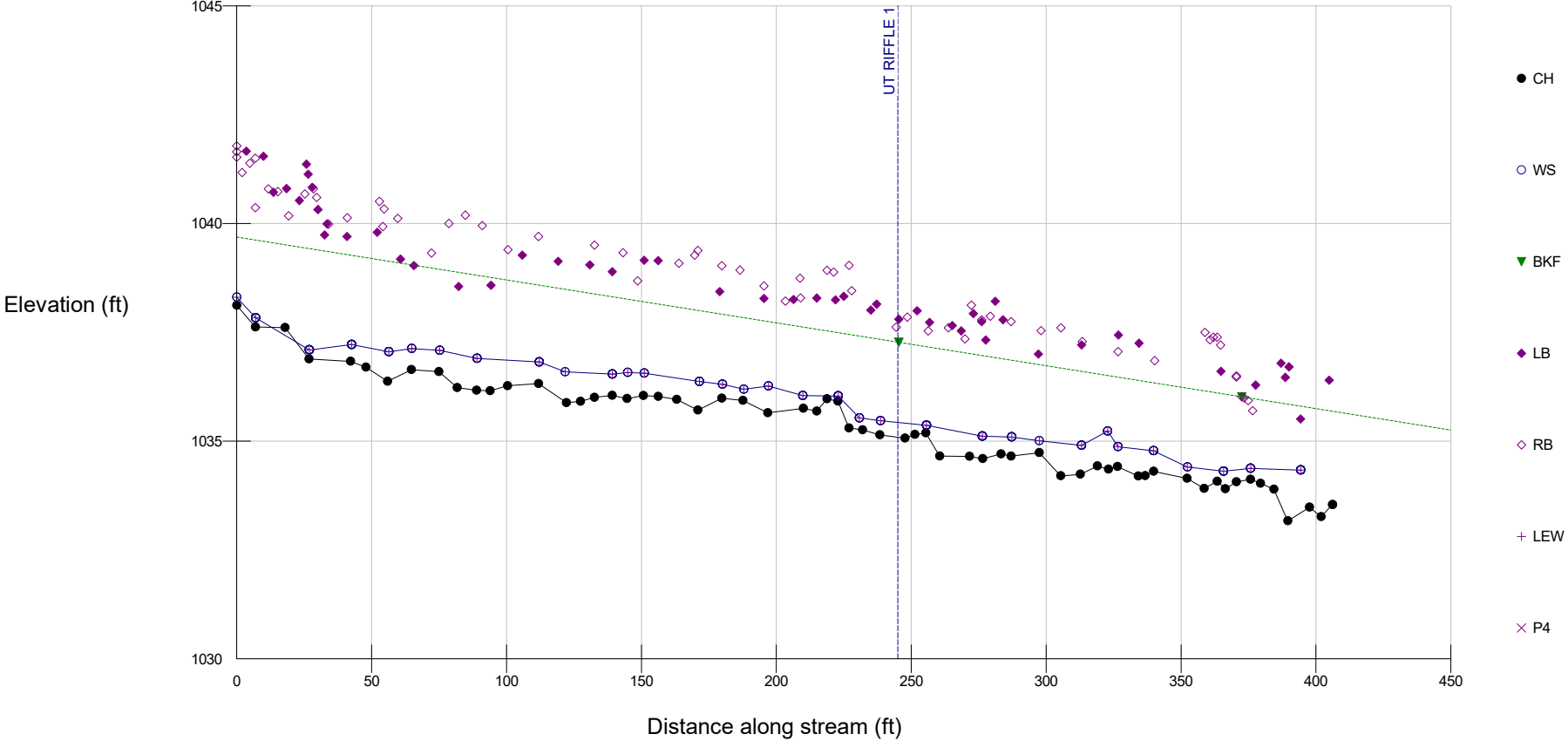
	Channel	Left	Right
Floodprone Elevation (ft)	1037.48	1037.48	1037.48
Bankfull Elevation (ft)	1034.54	1034.54	1034.54
Floodprone width (ft)	37.77	-----	-----
Bankfull width (ft)	21.4	10.7	10.7
Entrenchment Ratio	1.77	-----	-----
Mean Depth (ft)	1.4	2.1	0.71
Maximum Depth (ft)	2.94	2.94	2.62
Width/Depth Ratio	15.29	5.09	15.07
Bankfull Area (sq ft)	30.06	22.49	7.56
Wetted Perimeter (ft)	23.65	14.1	13.91
Hydraulic Radius (ft)	1.27	1.59	0.54
Begin BKF Station	16.37	16.37	27.07
End BKF Station	37.77	27.07	37.77

Entrainment Calculations

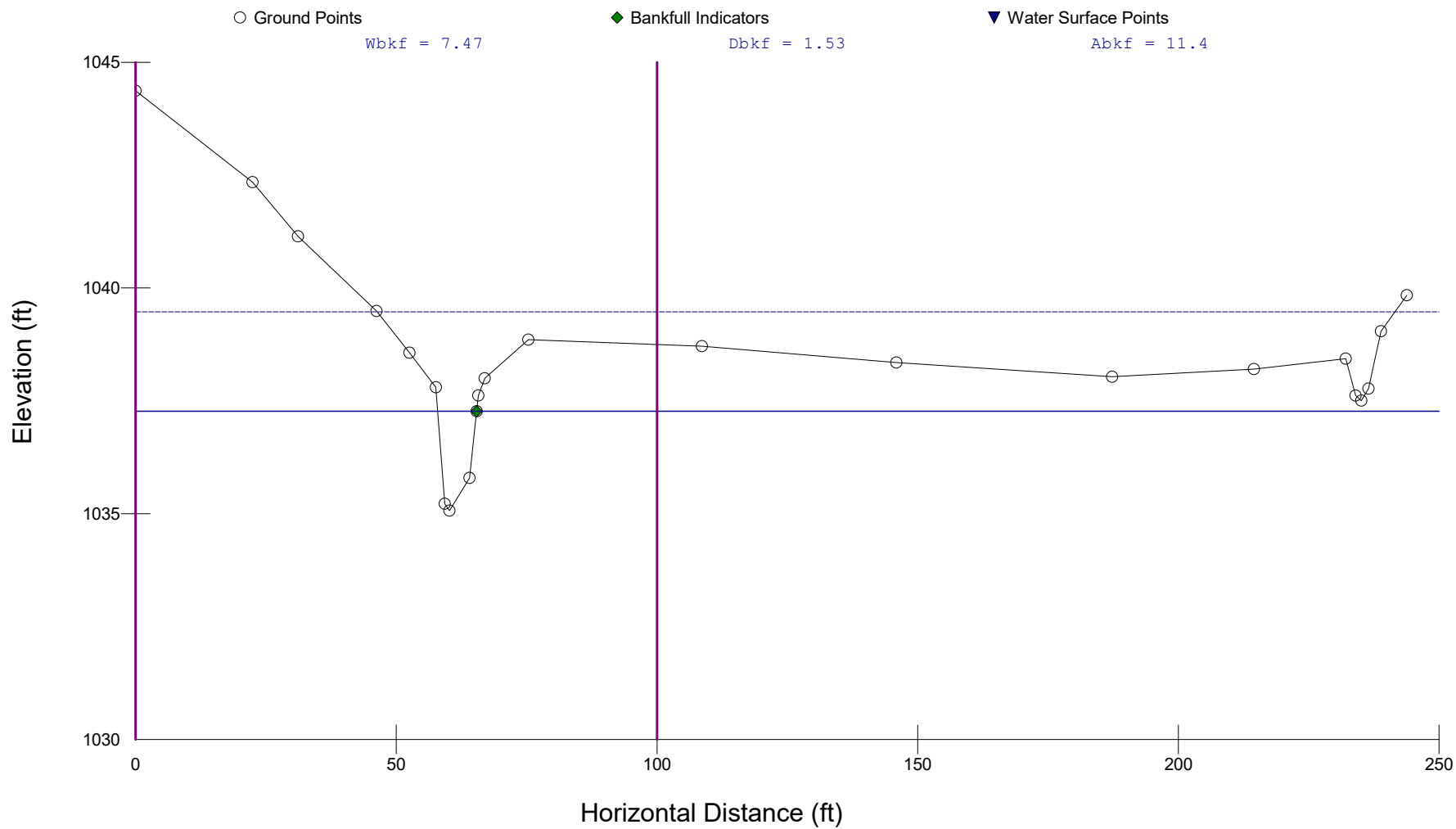
Entrainment Formula: Rosgen Modified Shields Curve

	Channel	Left side	Right side
Slope	0	0	0
Shear Stress (lb/sq ft)			
Movable Particle (mm)			

### UT TO MEADOW BROOK EXISTING PROFILE



# UT RIFFLE 1



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook UT  
 Reach Name: Reach 1  
 Cross Section Name: UT RIFFLE 1  
 Survey Date: 02/19/2018

Cross Section Data Entry

BM Elevation: 0 ft  
 Backsight Rod Reading: 0 ft

TAPE	FS	ELEV	NOTE
0	0	1044.37	
22.42	0	1042.342	
31.16	0	1041.144	
46.22	0	1039.488	
52.55	0	1038.566	
57.59	0	1037.801	LB
59.3	0	1035.219	
60.21	0	1035.068	TW
64.07	0	1035.793	
65.41	0	1037.27	BKF
65.76	0	1037.617	RB
66.96	0	1037.998	
75.34	0	1038.854	
108.61	0	1038.709	
145.91	0	1038.348	
187.29	0	1038.033	
214.5	0	1038.203	
232.1	0	1038.433	
233.98	0	1037.616	
235.07	0	1037.504	
236.45	0	1037.77	
238.85	0	1039.04	
243.8	0	1039.837	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	1039.47	1039.47	1039.47
Bankfull Elevation (ft)	1037.27	1037.27	1037.27
Floodprone width (ft)	195.2	-----	-----
Bankfull width (ft)	7.47	3.8	3.67
Entrenchment Ratio	26.14	-----	-----
Mean Depth (ft)	1.53	1.71	1.35
Maximum Depth (ft)	2.2	2.2	1.91
Width/Depth Ratio	4.88	2.23	2.72
Bankfull Area (sq ft)	11.42	6.48	4.94
Wetted Perimeter (ft)	9.3	6.85	6.28
Hydraulic Radius (ft)	1.23	0.95	0.79
Begin BKF Station	57.94	57.94	61.74
End BKF Station	65.41	61.74	65.41

Entrainment Calculations

While the survey collected in September 2017 included cross sections, these were not necessarily at riffle features. The existing channel is an incised E channel with limited bankfull indicators so the initial bankfull analysis from the proposal was checked against the survey data collected. These notes relate the previously collected cross sections (provided on the following pages) to the surveyed profile and cross sections (provided on the preceding pages).

- **Cross Section 1 – Riffle** corresponds to the survey XS Meadow Brook R1 Riffle 2 at station 399 of Meadow Brook Reach 1 Profile Part 1.
- **Meadow Brook Cross Section 2 – Riffle** corresponds to the survey the survey XS Meadow Brook R2 Riffle 1 at station 806 of Meadow Brook Reach 2 Profile. These cross sections are from roughly the same location but the field data cross section is more detailed than the surveyed cross section and therefore was used as the representative riffle for Meadow Brook Reach 2.
- **Cross Section 3 – Riffle** falls at station 412 of Meadow Brook Reach 3 Profile which appears to be in a pool, a new cross section was cut from the survey at station 144 of Meadow Brook Reach 3 Profile to represent riffle dimensions.
- **Cross Section 1 – Riffle – Trib** corresponds to the survey XS UT Riffle 1 at station 245 of the UT Profile. These cross sections are from roughly the same location but the field data cross section is more detailed than the surveyed cross section.

### Cross Section 1 - Riffle

○ Ground Points

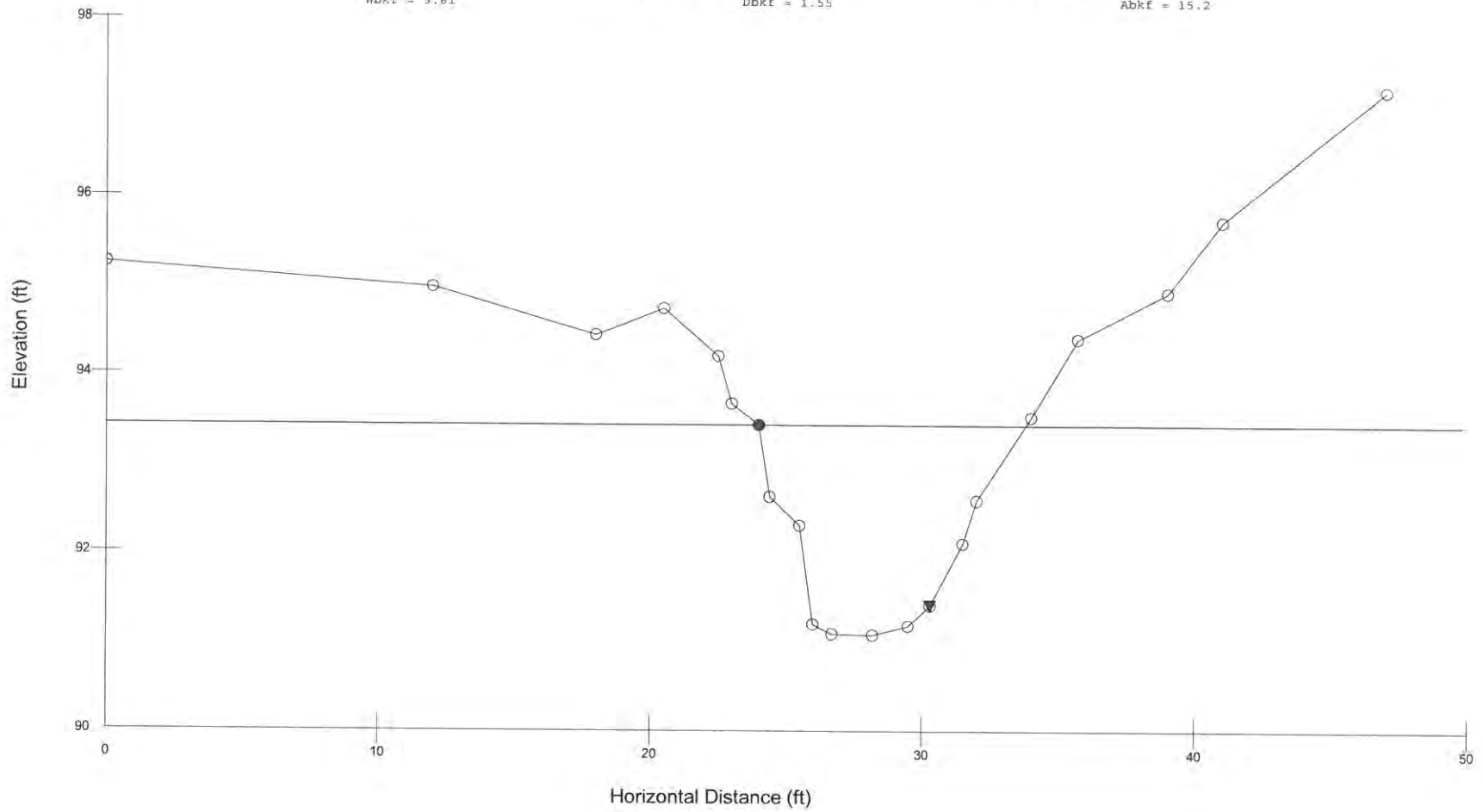
$Wbkf = 9.81$

◆ Bankfull Indicators

$Dbkf = 1.55$

▼ Water Surface Points

$Abkf = 15.2$



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Meadow Brook  
 Cross Section Name: Cross Section 1 - Riffle  
 Survey Date: 01/06/2016

Cross Section Data Entry

BM Elevation: 100 ft  
 Backsight Rod Reading: 1 ft

TAPE	FS	ELEV	NOTE
0	5.75	95.25	
12	6.02	94.98	
18	6.56	94.44	
20.5	6.26	94.74	LB
22.5	6.8	94.2	
23	7.34	93.66	
24	7.58	93.42	BKF
24.4	8.38	92.62	"FIELD CALL BKF"
25.5	8.7	92.3	
26	9.81	91.19	GRND
26.7	9.92	91.08	
28.2	9.93	91.07	
29.5	9.83	91.17	
30.3	9.6	91.4	REW
31.5	8.9	92.1	
32	8.42	92.58	"FIELD CALL BKF"
34	7.49	93.51	
35.7	6.6	94.4	RB
39	6.08	94.92	
41	5.28	95.72	
47	3.8	97.2	

Cross Sectional Geometry

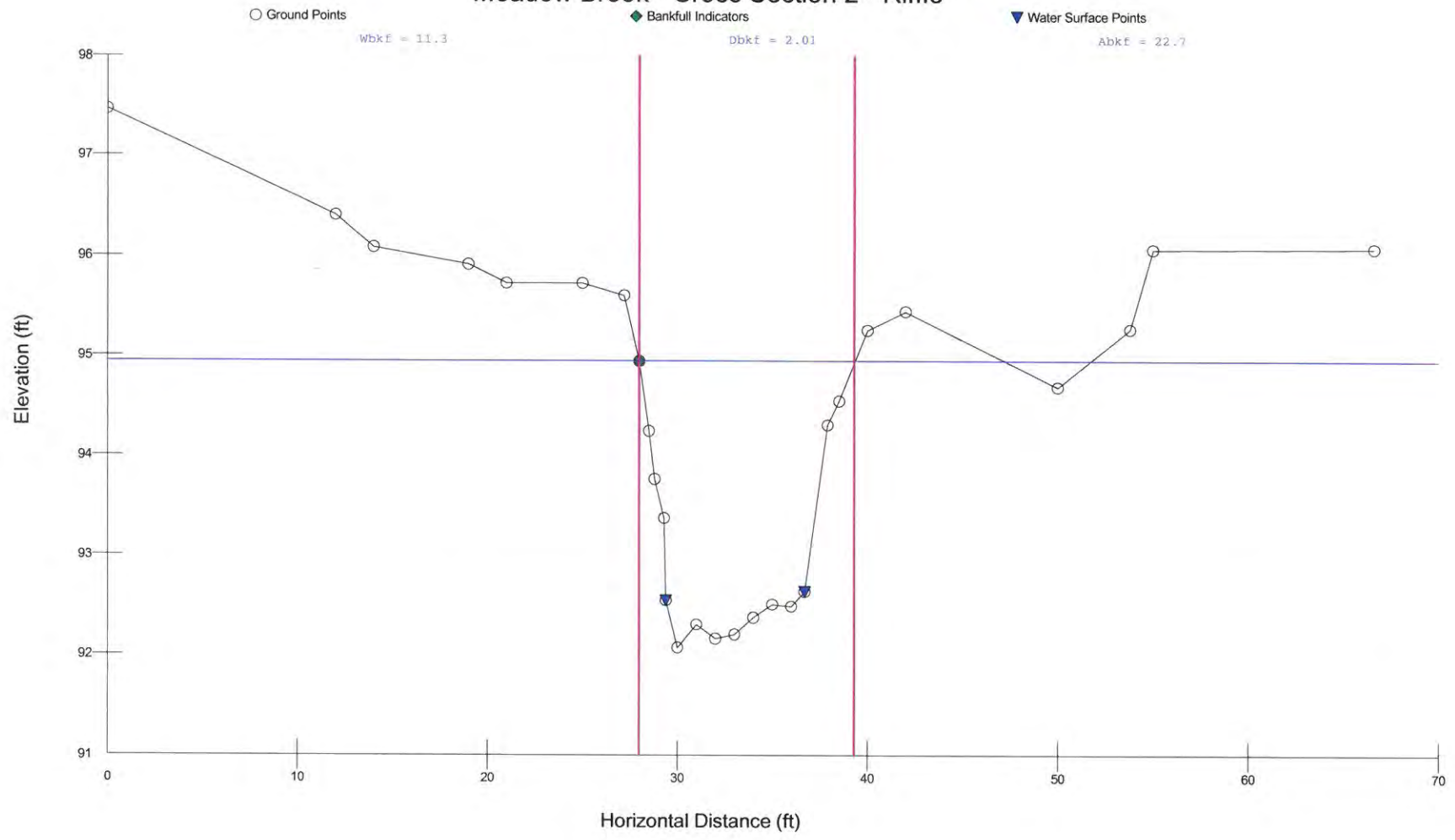
	Channel	Left	Right
Floodprone Elevation (ft)	95.77	95.77	95.77
Bankfull Elevation (ft)	93.42	93.42	93.42
Floodprone width (ft)	41.2	-----	-----
Bankfull width (ft)	9.81	4.26	5.55
Entrenchment Ratio	4.2	-----	-----
Mean Depth (ft)	1.55	1.72	1.42
Maximum Depth (ft)	2.35	2.35	2.35
Width/Depth Ratio	6.33	2.48	3.91
Bankfull Area (sq ft)	15.17	7.31	7.86
Wetted Perimeter (ft)	11.68	7.87	8.5
Hydraulic Radius (ft)	1.3	0.93	0.93
Begin BKF Station	24	24	28.26
End BKF Station	33.81	28.26	33.81

Entrainment Calculations

Entrainment Formula: Rosgen Modified Shields Curve



# Meadow Brook - Cross Section 2 - Riffle



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Meadow Brook  
 Cross Section Name: Cross Section 2 - Riffle  
 Survey Date: 01/06/2016

Cross Section Data Entry

BM Elevation: 100 ft  
 Backsight Rod Reading: 1 ft

TAPE	FS	ELEV	NOTE
0	3.54	97.46	LEP
12	4.6	96.4	
14	4.92	96.08	
19	5.09	95.91	
21	5.28	95.72	
25	5.28	95.72	
27.2	5.4	95.6	LB
28	6.06	94.94	BKF
28.5	6.76	94.24	
28.8	7.24	93.76	"FIELD CALL BKF"
29.3	7.63	93.37	
29.4	8.46	92.54	LEW
30	8.93	92.07	
31	8.7	92.3	
32	8.84	92.16	
33	8.8	92.2	
34	8.63	92.37	
35	8.5	92.5	
36	8.52	92.48	
36.7	8.37	92.63	REW
37.9	6.7	94.3	"FIELD BKF CALL"
38.5	6.46	94.54	
40	5.75	95.25	
42	5.56	95.44	RB
50	6.32	94.68	
53.8	5.74	95.26	
55	4.94	96.06	
66.6	4.93	96.07	REP

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	97.81	97.81	97.81
Bankfull Elevation (ft)	94.94	94.94	94.94
Floodprone width (ft)	66.6	-----	-----
Bankfull width (ft)	11.3	5.16	6.14
Entrenchment Ratio	5.89	-----	-----
Mean Depth (ft)	2.01	2.25	1.81
Maximum Depth (ft)	2.87	2.87	2.71
Width/Depth Ratio	5.62	2.3	3.39
Bankfull Area (sq ft)	22.68	11.59	11.09
wetted Perimeter (ft)	14.04	9.57	9.9
Hydraulic Radius (ft)	1.61	1.21	1.12
Begin BKF Station	28	28	33.16

### Cross Section 3 - Riffle

○ Ground Points

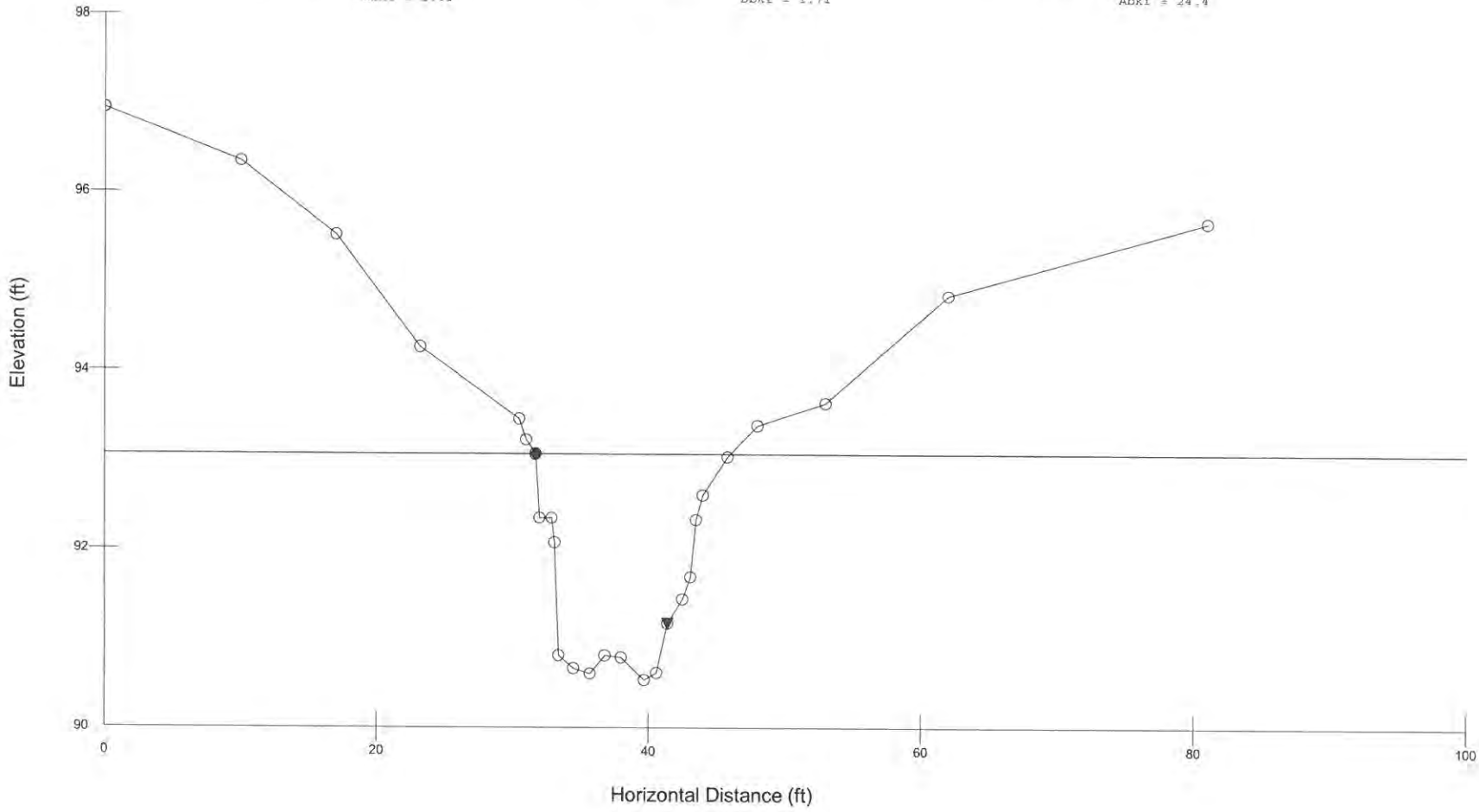
Wbkf = 14.3

◆ Bankfull Indicators

Dbkf = 1.71

▼ Water Surface Points

Abkf = 24.4



RIVERMORPH CROSS SECTION SUMMARY

River Name: Meadow Brook  
 Reach Name: Meadow Brook  
 Cross Section Name: Cross Section 3 - Riffle  
 Survey Date: 01/06/2016

Cross Section Data Entry

BM Elevation: 100 ft  
 Backsight Rod Reading: 1 ft

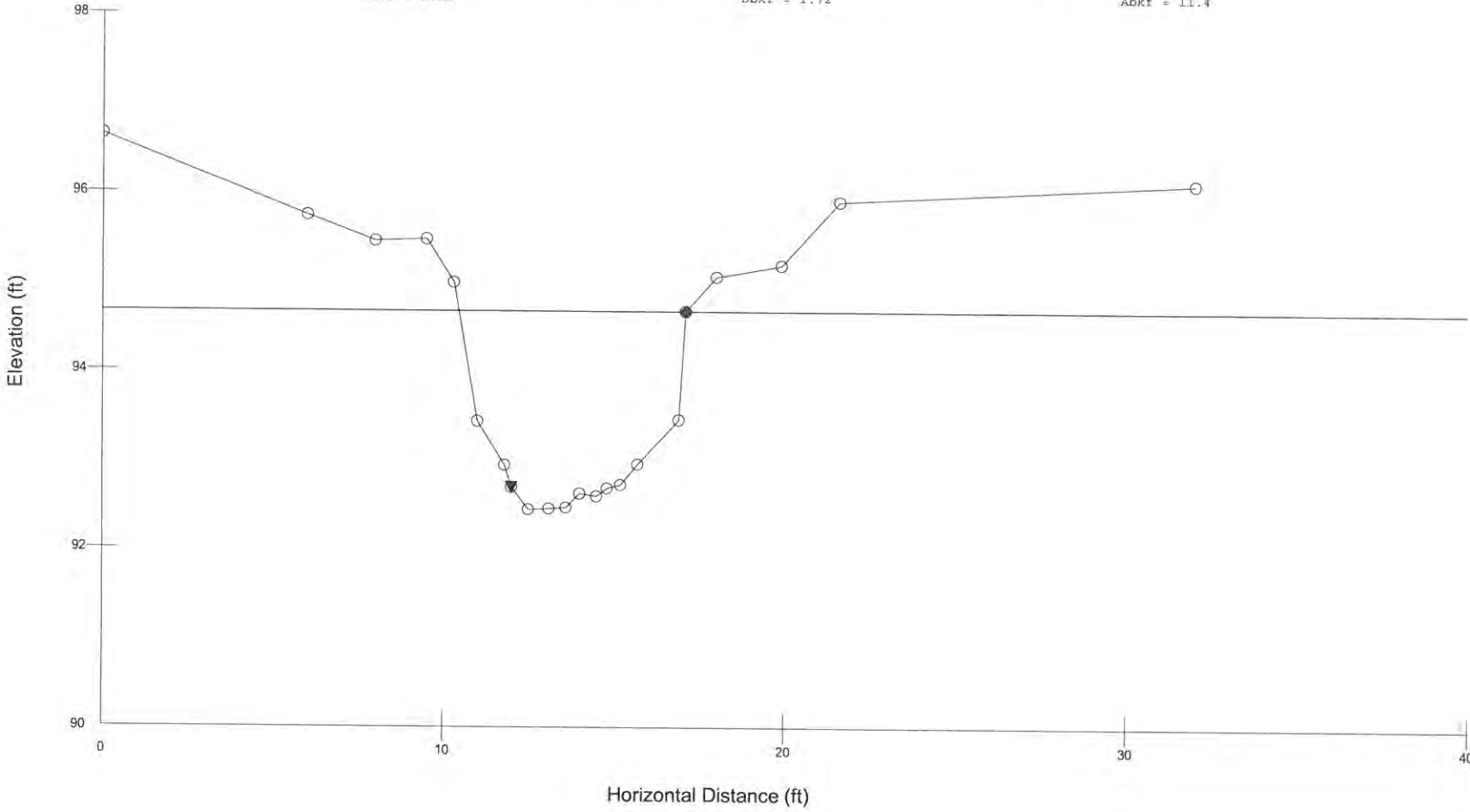
TAPE	FS	ELEV	NOTE
0	4.06	96.94	
10	4.66	96.34	
17	5.48	95.52	
23.2	6.74	94.26	
30.5	7.54	93.46	LB
31	7.77	93.23	
31.7	7.93	93.07	BKF
32	8.65	92.35	"FIELD CALL BKF"
32.9	8.65	92.35	
33.1	8.93	92.07	
33.4	10.2	90.8	STRMBED
34.5	10.34	90.66	
35.7	10.4	90.6	
36.8	10.2	90.8	
38	10.22	90.78	
39.7	10.47	90.53	TW
40.6	10.39	90.61	
41.4	9.84	91.16	REW
42.5	9.57	91.43	
43.1	9.32	91.68	
43.5	8.67	92.33	"FIELD CALL BKF"
44	8.39	92.61	
45.8	7.96	93.04	
48	7.61	93.39	RB
53	7.36	93.64	
62	6.16	94.84	
81	5.34	95.66	REP

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	95.61	95.61	95.61
Bankfull Elevation (ft)	93.07	93.07	93.07
Floodprone width (ft)	63.61	-----	-----
Bankfull width (ft)	14.29	6.51	7.78
Entrenchment Ratio	4.45	-----	-----
Mean Depth (ft)	1.71	1.96	1.5
Maximum Depth (ft)	2.54	2.47	2.54
Width/Depth Ratio	8.36	3.32	5.19
Bankfull Area (sq ft)	24.4	12.75	11.65
Wetted Perimeter (ft)	16.71	10.49	10.86
Hydraulic Radius (ft)	1.46	1.22	1.07
Begin BKF Station	31.7	31.7	38.21
End BKF Station	45.99	38.21	45.99

### Cross Section 1 - Riffle - Trib

○ Ground Points      Wbkf = 6.66      ◆ Bankfull Indicators      Dbkf = 1.72      ▼ Water Surface Points      Abkf = 11.4



RIVERMORPH CROSS SECTION SUMMARY

River Name: Tributary to Meadow Brook  
 Reach Name: Tributary to Meadow Brook  
 Cross Section Name: Cross Section 1 - Riffle  
 Survey Date: 01/08/2016

Cross Section Data Entry

BM Elevation: 100 ft  
 Backsight Rod Reading: 1 ft

TAPE	FS	ELEV	NOTE
0	4.36	96.64	
6	5.26	95.74	
8	5.55	95.45	
9.5	5.53	95.47	LB
10.3	6.02	94.98	
11	7.57	93.43	"FIELD CALL BKF"
11.8	8.06	92.94	
12	8.31	92.69	LEW
12.5	8.56	92.44	TW
13.1	8.55	92.45	
13.6	8.54	92.46	
14	8.38	92.62	
14.5	8.41	92.59	
14.8	8.32	92.68	
15.2	8.28	92.72	
15.7	8.05	92.95	
16.9	7.55	93.45	"FIELD CALL BKF"
17.1	6.34	94.66	BKF
18	5.95	95.05	RB
19.9	5.82	95.18	
21.6	5.1	95.9	
32	4.9	96.1	

Cross Sectional Geometry

	Channel	Left	Right
Floodprone Elevation (ft)	96.88	96.88	96.88
Bankfull Elevation (ft)	94.66	94.66	94.66
Floodprone width (ft)	32	-----	-----
Bankfull width (ft)	6.66	3.5	3.16
Entrenchment Ratio	4.81	-----	-----
Mean Depth (ft)	1.72	1.74	1.69
Maximum Depth (ft)	2.22	2.22	2.07
Width/Depth Ratio	3.87	2.01	1.87
Bankfull Area (sq ft)	11.42	6.09	5.33
Wetted Perimeter (ft)	8.99	6.7	6.42
Hydraulic Radius (ft)	1.27	0.91	0.83
Begin BKF Station	10.44	10.44	13.94
End BKF Station	17.1	13.94	17.1

Entrainment Calculations

Site Information and Performance Standard Stratification	
Project Name:	Meadow Brook
Reach ID:	MB Reach 1
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	E
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	0.93
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	1304
Proposed Stream Length (ft):	1936
Stream Slope (%):	0.34
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	
Data Collection Season:	
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Existing Condition Score (ECS)	0.22
Proposed Condition Score (PCS)	0.45
Change in Functional Condition (PCS - ECS)	0.23
Percent Condition Change	105%
Existing Stream Length (ft)	1304
Proposed Stream Length (ft)	1936
Additional Stream Length (ft)	632
Existing Functional Foot Score (FFS)	287
Proposed Functional Foot Score (FFS)	871
Proposed FFS - Existing FFS	584
Functional Change (%)	204%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	287
Proposed Stream FFS + Proposed BMP FFS	871
Total Proposed FFS - Total Existing FFS	584
Functional Change (%)	203%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology		
	Reach Runoff	0.31	0.51
Hydraulics	Floodplain Connectivity	0.65	1.00
	Large Woody Debris	0.00	0.29
Geomorphology	Lateral Stability	0.10	1.00
	Riparian Vegetation	0.00	0.54
	Bed Material		
	Bed Form Diversity	0.60	0.91
	Plan Form	0.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
Biology	Phosphorus		
	Macros		
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	ECS	PCS	Functional Change
Hydrology	0.31	0.51	0.20
Hydraulics	0.65	1.00	0.35
Geomorphology	0.14	0.75	0.61
Physicochemical			
Biology			

Site Information and Performance Standard Stratification	
Project Name:	Meadow Brook
Reach ID:	MB Reach 2
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	E
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	1.5
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	350
Proposed Stream Length (ft):	393
Stream Slope (%):	0.38
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Existing Condition Score (ECS)	0.31
Proposed Condition Score (PCS)	0.47
Change in Functional Condition (PCS - ECS)	0.16
Percent Condition Change	52%
Existing Stream Length (ft)	350
Proposed Stream Length (ft)	393
Additional Stream Length (ft)	43
Existing Functional Foot Score (FFS)	109
Proposed Functional Foot Score (FFS)	185
Proposed FFS - Existing FFS	76
Functional Change (%)	70%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	109
Proposed Stream FFS + Proposed BMP FFS	185
Total Proposed FFS - Total Existing FFS	76
Functional Change (%)	70%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology		
	Reach Runoff	0.60	0.63
Hydraulics	Floodplain Connectivity	0.85	1.00
	Large Woody Debris	0.00	0.11
Geomorphology	Lateral Stability	0.22	1.00
	Riparian Vegetation	0.00	0.49
	Bed Material		
	Bed Form Diversity	0.32	0.89
	Plan Form	0.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
Biology	Phosphorus		
	Macros		
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	ECS	PCS	Functional Change
Hydrology	0.60	0.63	0.03
Hydraulics	0.85	1.00	0.15
Geomorphology	0.11	0.70	0.59
Physicochemical			
Biology			



Site Information and Performance Standard Stratification	
Project Name:	Meadow Brook
Reach ID:	MB Reach 3 & 4
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	E
Proposed Stream Type:	Bc
Region:	Piedmont
Drainage Area (sqmi):	1.7
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	523
Proposed Stream Length (ft):	533
Stream Slope (%):	0.66
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	
Data Collection Season:	Winter/Spring
Valley Type:	Colluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Existing Condition Score (ECS)	0.39
Proposed Condition Score (PCS)	0.49
Change in Functional Condition (PCS - ECS)	0.10
Percent Condition Change	26%
Existing Stream Length (ft)	523
Proposed Stream Length (ft)	533
Additional Stream Length (ft)	10
Existing Functional Foot Score (FFS)	204
Proposed Functional Foot Score (FFS)	261
Proposed FFS - Existing FFS	57
Functional Change (%)	28%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	204
Proposed Stream FFS + Proposed BMP FFS	261
Total Proposed FFS - Total Existing FFS	57
Functional Change (%)	28%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology		
	Reach Runoff	0.73	0.73
Hydraulics	Floodplain Connectivity	0.85	1.00
	Large Woody Debris	0.00	0.11
Geomorphology	Lateral Stability	0.29	1.00
	Riparian Vegetation	0.20	0.61
	Bed Material		
	Bed Form Diversity	0.33	0.77
	Plan Form	1.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
Biology	Phosphorus		
	Macros		
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	ECS	PCS	Functional Change
Hydrology	0.73	0.73	0.00
Hydraulics	0.85	1.00	0.15
Geomorphology	0.36	0.70	0.34
Physicochemical			
Biology			

Site Information and Performance Standard Stratification	
Project Name:	Meadow Brook
Reach ID:	UT to MB
Restoration Potential:	Level 3 - Geomorphology
Existing Stream Type:	E
Proposed Stream Type:	C
Region:	Piedmont
Drainage Area (sqmi):	0.57
Proposed Bed Material:	Gravel
Existing Stream Length (ft):	396
Proposed Stream Length (ft):	703
Stream Slope (%):	0.48
Flow Type:	Perennial
River Basin:	Yadkin-PeeDee
Stream Temperature:	
Data Collection Season:	Winter/Spring
Valley Type:	Unconfined Alluvial

Notes
1. Users input values that are highlighted based on restoration potential
2. Users select values from a pull-down menu
3. Leave values blank for field values that were not measured

FUNCTIONAL CHANGE SUMMARY	
Existing Condition Score (ECS)	0.30
Proposed Condition Score (PCS)	0.47
Change in Functional Condition (PCS - ECS)	0.17
Percent Condition Change	57%
Existing Stream Length (ft)	396
Proposed Stream Length (ft)	703
Additional Stream Length (ft)	307
Existing Functional Foot Score (FFS)	119
Proposed Functional Foot Score (FFS)	330
Proposed FFS - Existing FFS	212
Functional Change (%)	178%

BMP FUNCTIONAL CHANGE SUMMARY	
Existing BMP Functional Feet Score (FFS)	0
Proposed BMP Functional Feet Score (FFS)	0
Proposed BMP FFS - Existing BMP FFS	0
Functional Change (%)	

FUNCTIONAL FEET (FF) SUMMARY	
Existing Stream FFS + Existing BMP FFS	119
Proposed Stream FFS + Proposed BMP FFS	330
Total Proposed FFS - Total Existing FFS	211
Functional Change (%)	177%

FUNCTION BASED PARAMETERS SUMMARY			
Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology		
	Reach Runoff	0.50	0.57
Hydraulics	Floodplain Connectivity	0.85	1.00
	Large Woody Debris	0.00	0.36
Geomorphology	Lateral Stability	0.05	1.00
	Riparian Vegetation	0.00	0.52
	Bed Material		
	Bed Form Diversity	0.67	0.98
	Plan Form	0.00	1.00
Physicochemical	Temperature		
	Bacteria		
	Organic Matter		
	Nitrogen		
Biology	Phosphorus		
	Macros		
	Fish		

FUNCTIONAL CATEGORY REPORT CARD			
Functional Category	ECS	PCS	Functional Change
Hydrology	0.50	0.57	0.07
Hydraulics	0.85	1.00	0.15
Geomorphology	0.14	0.77	0.63
Physicochemical			
Biology			

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WA Date of Assessment 10/6/17  
 Wetland Type Headwater Forest Assessor Name/Organization T. Barrett

Notes on Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) NO  
 Wetland is intensively managed (Y/N) \_\_\_\_\_  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) \_\_\_\_\_  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>LOW</b>	
		Condition	<b>LOW</b>	
Water Quality	Pathogen Change	Condition	<b>MEDIUM</b>	
		Condition/Opportunity	<b>MEDIUM</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Particulate Change	Condition	<b>LOW</b>	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
		Physical Change	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	<b>LOW</b>	
	Landscape Patch Structure	Condition	<b>LOW</b>	
	Vegetation Composition	Condition	<b>LOW</b>	

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>LOW</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WB Date of Assessment 10/6/17  
 Wetland Type Headwater Forest Assessor Name/Organization T. Barrett

Notes on Field Assessment Form (Y/N) NO  
 Presence of regulatory considerations (Y/N) NO  
 Wetland is intensively managed (Y/N) YES  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) \_\_\_\_\_  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>LOW</b>
		Condition	<b>LOW</b>
Water Quality	Pathogen Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>MEDIUM</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Particulate Change	Condition	<b>LOW</b>
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>MEDIUM</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Physical Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>LOW</b>
	Landscape Patch Structure	Condition	<b>LOW</b>
	Vegetation Composition	Condition	<b>LOW</b>

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>LOW</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WC Date of Assessment 10/6/17  
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 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>LOW</b>	
		Condition	<b>LOW</b>	
Water Quality	Pathogen Change	Condition	<b>LOW</b>	
		Condition/Opportunity	<b>LOW</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Particulate Change	Condition	<b>LOW</b>	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
		Physical Change	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	<b>LOW</b>	
	Landscape Patch Structure	Condition	<b>LOW</b>	
	Vegetation Composition	Condition	<b>LOW</b>	

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>LOW</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WD Date of Assessment 10/6/17  
 Wetland Type Headwater Forest Assessor Name/Organization T. Barrett

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 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) \_\_\_\_\_  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>MEDIUM</b>	
		Condition	<b>HIGH</b>	
Water Quality	Pathogen Change	Condition	<b>MEDIUM</b>	
		Condition/Opportunity	<b>MEDIUM</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Particulate Change	Condition	<b>MEDIUM</b>	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
		Physical Change	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	<b>LOW</b>	
	Landscape Patch Structure	Condition	<b>LOW</b>	
	Vegetation Composition	Condition	<b>LOW</b>	

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>HIGH</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WA Date of Assessment 10/6/17  
 Wetland Type Riverine Swamp Forest Assessor Name/Organization T. Barrett

Notes on Field Assessment Form (Y/N) NO  
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 Assessment area is substantially altered by beaver (Y/N) \_\_\_\_\_  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>LOW</b>	
		Condition	<b>HIGH</b>	
Water Quality	Pathogen Change	Condition	<b>LOW</b>	
		Condition/Opportunity	<b>LOW</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Particulate Change	Condition	<b>LOW</b>	
		Condition/Opportunity	<b>LOW</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Soluble Change	Condition	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
		Physical Change	Condition	<b>MEDIUM</b>
			Condition/Opportunity	<b>MEDIUM</b>
			Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	<b>LOW</b>	
	Landscape Patch Structure	Condition	<b>LOW</b>	
	Vegetation Composition	Condition	<b>LOW</b>	

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>MEDIUM</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

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 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>LOW</b>
		Condition	<b>LOW</b>
Water Quality	Pathogen Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Particulate Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Soluble Change	Condition	<b>MEDIUM</b>
		Condition/Opportunity	<b>MEDIUM</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Physical Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>LOW</b>
	Landscape Patch Structure	Condition	<b>LOW</b>
	Vegetation Composition	Condition	<b>LOW</b>

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>LOW</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW



**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

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 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>LOW</b>
		Condition	<b>LOW</b>
Water Quality	Pathogen Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Particulate Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Soluble Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
	Physical Change	Condition	<b>LOW</b>
		Condition/Opportunity	<b>LOW</b>
		Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	<b>LOW</b>
	Landscape Patch Structure	Condition	<b>LOW</b>
	Vegetation Composition	Condition	<b>LOW</b>

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>LOW</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

**Overall Wetland Rating** LOW

**NC WAM Wetland Rating Sheet  
Accompanies User Manual Version 5.0**

Wetland Site Name WD Date of Assessment 10/6/17  
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 Wetland is intensively managed (Y/N) NO  
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES  
 Assessment area is substantially altered by beaver (Y/N) \_\_\_\_\_  
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) \_\_\_\_\_  
 Assessment area is on a coastal island (Y/N) \_\_\_\_\_

**Sub-function Rating Summary**

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	<b>MEDIUM</b>	
		Condition	<b>MEDIUM</b>	
Water Quality	Pathogen Change	Condition	<b>MEDIUM</b>	
		Condition/Opportunity	<b>MEDIUM</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Particulate Change	Condition	<b>MEDIUM</b>	
		Condition/Opportunity	<b>MEDIUM</b>	
		Opportunity Presence (Y/N)	<b>NO</b>	
	Soluble Change	Condition	Condition	<b>LOW</b>
			Condition/Opportunity	<b>LOW</b>
			Opportunity Presence (Y/N)	<b>NO</b>
		Physical Change	Condition	<b>MEDIUM</b>
			Condition/Opportunity	<b>MEDIUM</b>
			Opportunity Presence (Y/N)	<b>NO</b>
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	<b>LOW</b>	
	Landscape Patch Structure	Condition	<b>LOW</b>	
	Vegetation Composition	Condition	<b>LOW</b>	

**Function Rating Summary**

Function	Metrics	Rating
Hydrology	Condition	<b>MEDIUM</b>
Water Quality	Condition	<b>LOW</b>
	Condition/Opportunity	<b>LOW</b>
	Opportunity Presence (Y/N)	<b>NO</b>
Habitat	Condition	<b>LOW</b>

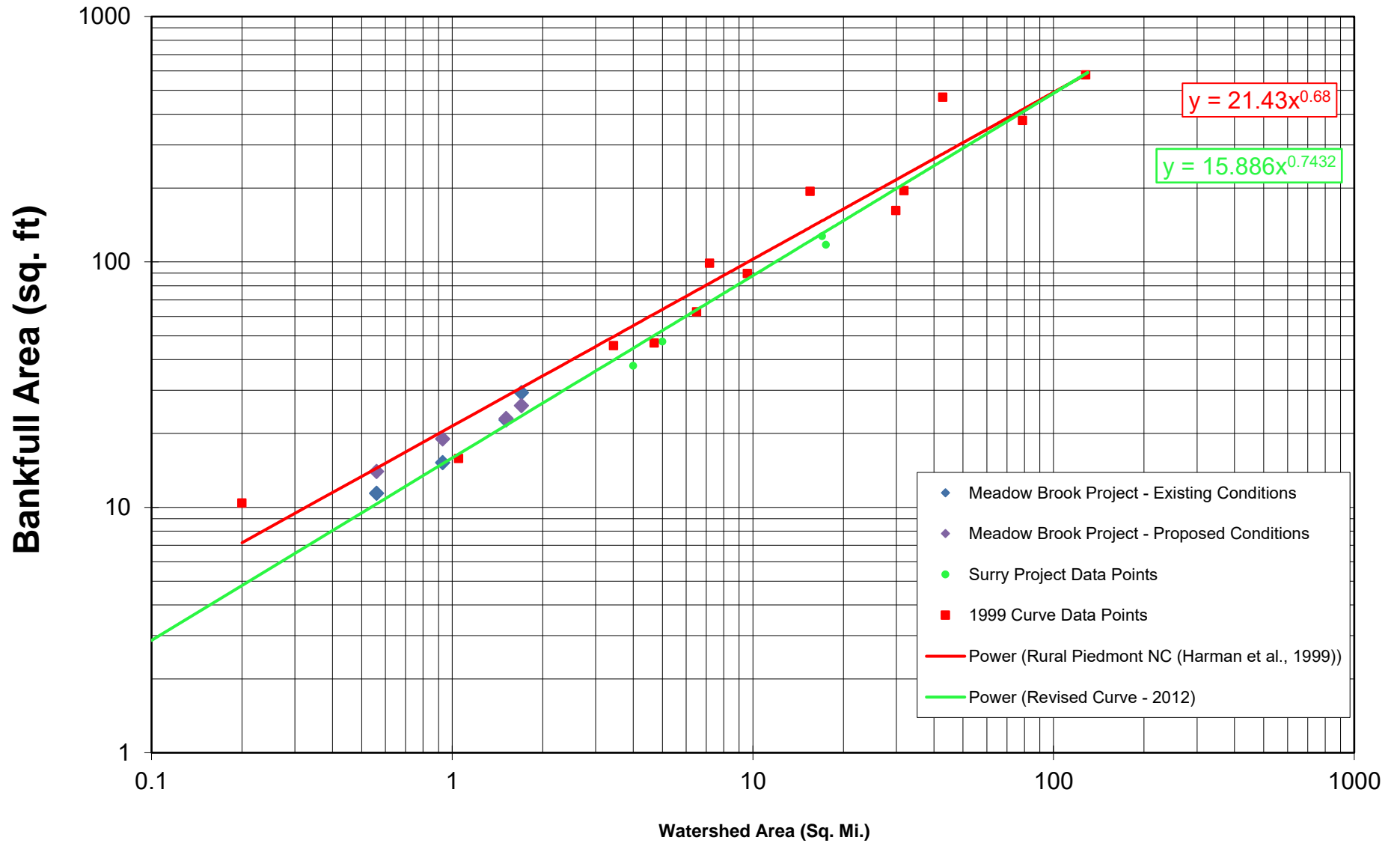
**Overall Wetland Rating** LOW

**BANKFULL AREA REGIONAL CURVE DATA  
MEADOW BROOK STREAM RESTORATION PROJECT**

Drainage Area (Sq.Mi.)	X-Sectional Area (SF)	Reference
0.2	10.4	Harman, W.H. et al. 1999. Bankfull Hydraulic Geometry Relationships for North Carolina Streams. AWRA Wildland Hydrology Symposium Proceedings. Edited by: D.S. Olsen and J.P. Potyondy . AWRA Summer Symposium. Bozeman, MT.
1.05	15.8	
3.44	45.6	
4.7	46.7	
6.5	62.5	
7.18	98.8	
9.6	89.6	
15.5	194	
29.9	162	
31.8	195	
42.8	469	
78.8	377	
128	578	
4	37.7	
5	47.3	
17	127.2	
17.5	117.4	
0.93	15.2	Meadow Brook Stream Restoration Project Existing Conditions
1.51	22.7	
1.7	29.3	
0.56	11.4	Meadow Brook Stream Restoration Project Proposed Conditions
0.93	19	
1.51	23	
1.7	26	
0.56	14	

# BANKFULL AREA

## Regional Curve for Bankfull Characteristics in Rural Piedmont, NC



## RIVERMORPH PARTICLE SUMMARY

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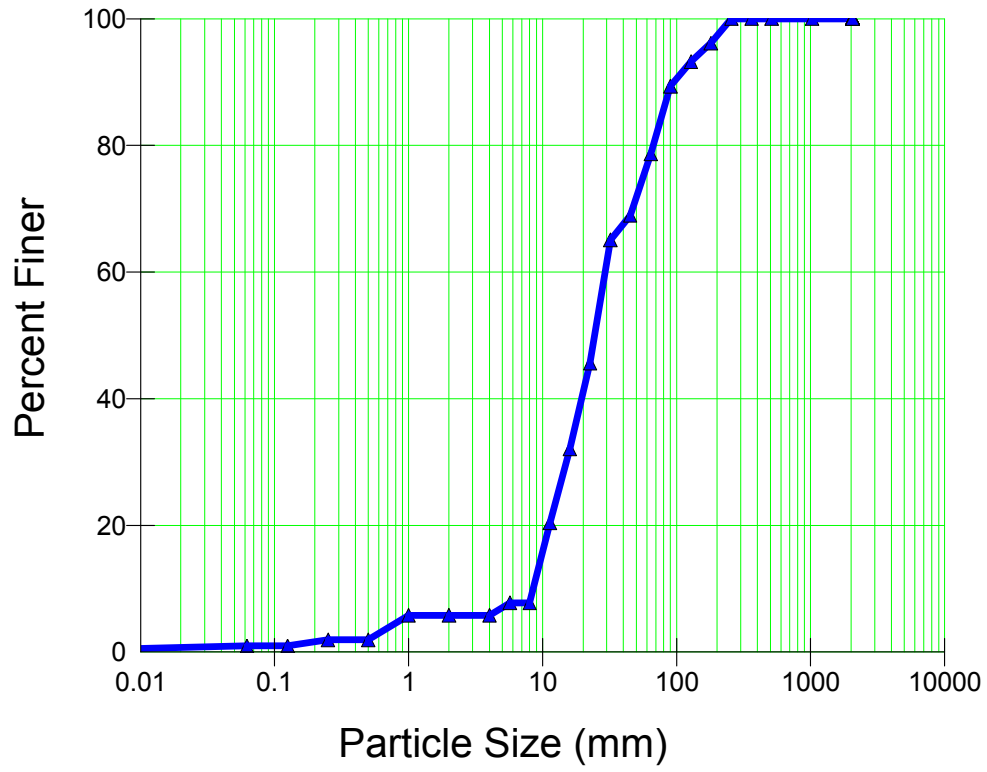
River Name: Meadow Brook  
 Reach Name: Meadow Brook  
 Sample Name: Riffle  
 Survey Date: 01/06/2016

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Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	0.97	0.97
0.062 - 0.125	0	0.00	0.97
0.125 - 0.25	1	0.97	1.94
0.25 - 0.50	0	0.00	1.94
0.50 - 1.0	4	3.88	5.83
1.0 - 2.0	0	0.00	5.83
2.0 - 4.0	0	0.00	5.83
4.0 - 5.7	2	1.94	7.77
5.7 - 8.0	0	0.00	7.77
8.0 - 11.3	13	12.62	20.39
11.3 - 16.0	12	11.65	32.04
16.0 - 22.6	14	13.59	45.63
22.6 - 32.0	20	19.42	65.05
32 - 45	4	3.88	68.93
45 - 64	10	9.71	78.64
64 - 90	11	10.68	89.32
90 - 128	4	3.88	93.20
128 - 180	3	2.91	96.12
180 - 256	4	3.88	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	10.15		
D35 (mm)	17.44		
D50 (mm)	24.72		
D84 (mm)	77.05		
D95 (mm)	160.05		
D100 (mm)	256		
Silt/Clay (%)	0.97		
Sand (%)	4.86		
Gravel (%)	72.81		
Cobble (%)	21.36		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 103.

# Riffle



## RIVERMORPH PARTICLE SUMMARY

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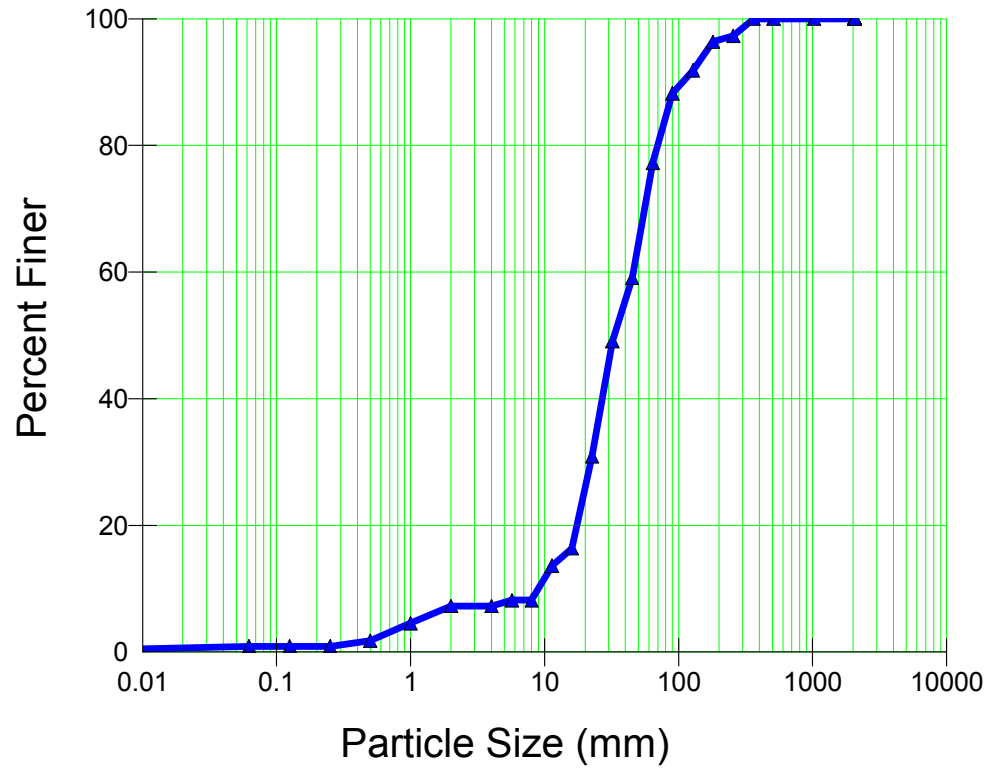
River Name: Tributary to Meadow Brook  
 Reach Name: Tributary to Meadow Brook  
 Sample Name: Riffle  
 Survey Date: 01/06/2016

-----

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	0.91	0.91
0.062 - 0.125	0	0.00	0.91
0.125 - 0.25	0	0.00	0.91
0.25 - 0.50	1	0.91	1.82
0.50 - 1.0	3	2.73	4.55
1.0 - 2.0	3	2.73	7.27
2.0 - 4.0	0	0.00	7.27
4.0 - 5.7	1	0.91	8.18
5.7 - 8.0	0	0.00	8.18
8.0 - 11.3	6	5.45	13.64
11.3 - 16.0	3	2.73	16.36
16.0 - 22.6	16	14.55	30.91
22.6 - 32.0	20	18.18	49.09
32 - 45	11	10.00	59.09
45 - 64	20	18.18	77.27
64 - 90	12	10.91	88.18
90 - 128	4	3.64	91.82
128 - 180	5	4.55	96.36
180 - 256	1	0.91	97.27
256 - 362	3	2.73	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	15.38		
D35 (mm)	24.71		
D50 (mm)	33.18		
D84 (mm)	80.04		
D95 (mm)	164.42		
D100 (mm)	362		
Silt/Clay (%)	0.91		
Sand (%)	6.36		
Gravel (%)	70		
Cobble (%)	20		
Boulder (%)	2.73		
Bedrock (%)	0		

Total Particles = 110.

# Riffle





RIVERMORPH PARTICLE SUMMARY

-----  
 River Name: Meadow Brook  
 Reach Name: Meadow Brook  
 Sample Name: Subpavement  
 Survey Date: 01/19/2016  
 -----

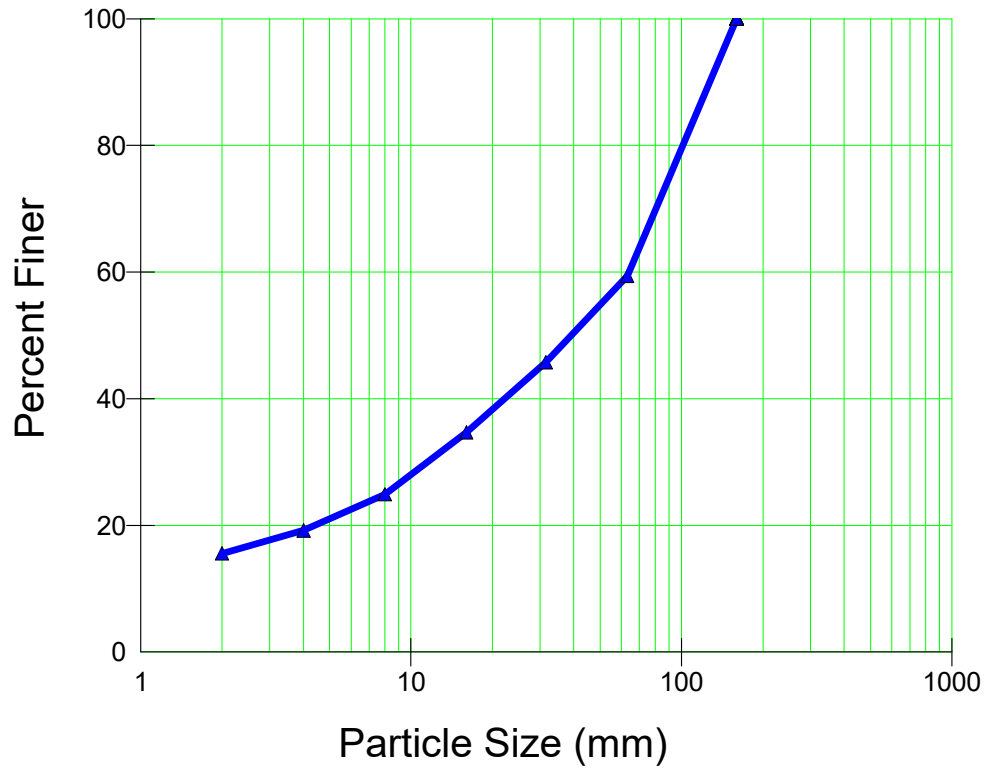
SIEVE (mm)	NET WT
63	2.33
31.5	3.47
16	2.81
8	2.48
4	1.45
2	0.92
PAN	3.96
D16 (mm)	2.23
D35 (mm)	16.46
D50 (mm)	41.35
D84 (mm)	121.79
D95 (mm)	148.06
D100 (mm)	160
Silt/Clay (%)	0
Sand (%)	15.58
Gravel (%)	44.49
Cobble (%)	39.93
Boulder (%)	0
Bedrock (%)	0

Total weight = 25.4100.

Largest Surface Particles:

	Size(mm)	weight
Particle 1:	160	5.05
Particle 2:	120	2.94

# Subpavement



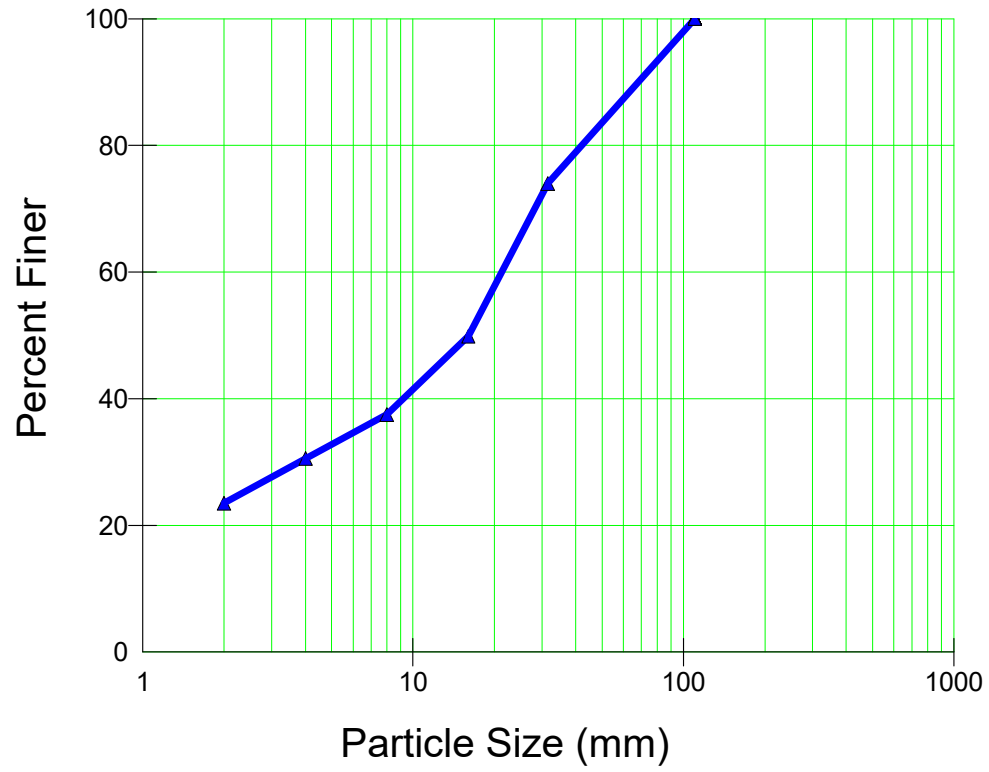
## RIVERMORPH PARTICLE SUMMARY

-----  
River Name: Tributary to Meadow Brook  
Reach Name: Tributary to Meadow Brook  
Sample Name: UT to Meadow Brook Subpavement  
Survey Date: 01/19/2016  
-----

SIEVE (mm)	NET WT
31.5	2.02
16	4.28
8	2.2
4	1.24
2	1.25
PAN	4.18
D16 (mm)	0
D35 (mm)	6.56
D50 (mm)	16.07
D84 (mm)	61.77
D95 (mm)	94.93
D100 (mm)	110
Silt/Clay (%)	0
Sand (%)	23.51
Gravel (%)	65.21
Cobble (%)	11.28
Boulder (%)	0
Bedrock (%)	0

Total weight = 17.7800.

# UT to Meadow Brook Subpavement



**SEDIMENT ENTRAINMENT CALCULATIONS  
MEADOW BROOK STREAM RESTORATION PROJECT**

	Stream Reach	Slope (ft/ft)	Bankfull Area (SF)	Hydraulic Radius (ft)	Design Discharge (CFS)	Shear (lb/SF)	Power (lb/s)	Velocity (ft/s)	Unit Power (lb/ft-s)	Particle Size Entrained (mm)	Riffle d84 (mm)	Subpavement Max (mm)
<b>Existing</b>	Meadow Brook Reach 1	0.0120	15.2	1.28	73	1.0	55	4.8	4.6	243	77	160
	Meadow Brook Reach 2	0.0070	22.7	1.67	100	0.7	43	4.4	3.2	186		
	Meadow Brook Reach 3	0.0080	30.1	1.24	116	0.6	58	3.9	2.4	158	bed rock	
	UT	0.0200	11.4	1.46	77	1.8	97	6.8	12.4	459	80	53
<b>Proposed</b>	Meadow Brook Reach 1	0.0034	19.0	1.25	48	0.3	10	2.5	0.7	68	77	160
	Meadow Brook Reach 2	0.0038	23.0	1.32	64	0.3	15	2.8	0.9	81		
	Meadow Brook Reach 3	0.0066	26.0	1.40	99	0.6	41	3.8	2.2	148	bed rock	
	UT	0.0047	14.0	1.07	37	0.3	11	2.7	0.8	81	80	53

# **Appendix 5**

## **NCDWR STREAM IDENTIFICATION FORMS**

SA  
"Meadow Brook"

NC DWQ Stream Identification Form Version 4.11

Date: 10/6/13	Project/Site: Meadow Brook Stream Restoration	Latitude: 36.141263
Evaluator: R. Lepsic	County: Yadkin	Longitude: -80.820136
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 37.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other Elkin South e.g. Quad Name:

A. Geomorphology (Subtotal = 19)

	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	<u>0</u>	1	2	3
9. Grade control	0	0.5	1	<u>1.5</u>
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10)

12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	<u>1.5</u>	1	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	1	<u>1.5</u>
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 8.5)

18. Fibrous roots in streambed	<u>3</u>	2	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Few caddis and minnows and frogs

Sketch:

58  
 UT to "Meadow Brook"

NC DWQ Stream Identification Form Version 4.11

Date: 10/6/17	Project/Site: Meadow Brook Stream Restoration	Latitude: 36.142149
Evaluator: R. Lapsie	County: Yadkin	Longitude: -80.818277
Total Points: Stream is at least intermittent if $\geq 19$ or perennial if $\geq 30^*$ 32.5	Stream Determination (circle one) Ephemeral Intermittent <b>Perennial</b>	Other Elkin South e.g. Quad Name:

A. Geomorphology (Subtotal = 15)	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 8)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Few water lilies, fish and a frog

Sketch:



# Appendix 6

## USACE STREAM QUALITY ASSESSMENT WORKSHEETS

**STREAM QUALITY ASSESSMENT WORKSHEET****Provide the following information for the stream reach under assessment:**

1. Applicant's name: EPR 2. Evaluator's name: Erin Bennett  
 3. Date of evaluation: 10/6/17 4. Time of evaluation: 1:09 pm  
 5. Name of stream: UT to South Deep Creek (SA-R2) 6. River basin: Yadkin-Pee Dee  
 7. Approximate drainage area: 0.98 mi<sup>2</sup> 8. Stream order: 1<sup>st</sup>  
 9. Length of reach evaluated: 1,286 ft. 10. County: Yadkin  
 11. Site coordinates (if known): prefer in decimal degrees. 12. Subdivision name (if any): N/A  
 Latitude (ex. 34.872312): 36.14098889 Longitude (ex. -77.556611): -80.82194444

Method location determined (circle):  GPS  Topo Sheet  Ortho (Aerial) Photo/GIS  Other GIS  Other \_\_\_\_\_  
 13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):  
Morler Rd.

14. Proposed channel work (if any): Restoration15. Recent weather conditions: Sunny + dry16. Site conditions at time of visit: Sunny + dry

17. Identify any special waterway classifications known:  Section 10  Tidal Waters  Essential Fisheries Habitat  
 Trout Waters  Outstanding Resource Waters  Nutrient Sensitive Waters  Water Supply Watershed III (I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES  NO  If yes, estimate the water surface area: \_\_\_\_\_19. Does channel appear on USGS quad map?  YES  NO 20. Does channel appear on USDA Soil Survey?  YES  NO

21. Estimated watershed land use: 7 % Residential 1 % Commercial 0 % Industrial 59 % Agricultural  
32 % Forested 0 % Cleared / Logged 1 % Other (shrubland)

22. Bankfull width: 10.6' 23. Bank height (from bed to top of bank): 3.3'24. Channel slope down center of stream:  Flat (0 to 2%)  Gentle (2 to 4%)  Moderate (4 to 10%)  Steep (>10%)25. Channel sinuosity:  Straight  Occasional bends  Frequent meander  Very sinuous  Braided channel

**Instructions for completion of worksheet (located on page 2):** Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 34 Comments: \_\_\_\_\_Evaluator's Signature [Signature] Date 10/31/17

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

## STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	<b>Presence of flow / persistent pools in stream</b> (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	<b>Evidence of past human alteration</b> (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	2
	3	<b>Riparian zone</b> (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	1
	4	<b>Evidence of nutrient or chemical discharges</b> (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	0
	5	<b>Groundwater discharge</b> (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	3
	6	<b>Presence of adjacent floodplain</b> (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	1
	7	<b>Entrenchment / floodplain access</b> (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	1
	8	<b>Presence of adjacent wetlands</b> (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	4
	9	<b>Channel sinuosity</b> (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	1
	10	<b>Sediment input</b> (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	1
	11	<b>Size &amp; diversity of channel bed substrate</b> (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	1
STABILITY	12	<b>Evidence of channel incision or widening</b> (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	0
	13	<b>Presence of major bank failures</b> (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	<b>Root depth and density on banks</b> (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	<b>Impact by agriculture, livestock, or timber production</b> (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	0
HABITAT	16	<b>Presence of riffle-pool/ripple-pool complexes</b> (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	1
	17	<b>Habitat complexity</b> (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	2
	18	<b>Canopy coverage over streambed</b> (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	2
	19	<b>Substrate embeddedness</b> (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	1
BIOLOGY	20	<b>Presence of stream invertebrates</b> (see page 4) (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	1
	21	<b>Presence of amphibians</b> (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	22	<b>Presence of fish</b> (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	23	<b>Evidence of wildlife use</b> (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	2
<b>Total Points Possible</b>			100	100	100	
<b>TOTAL SCORE</b> (also enter on first page)						<b>34</b>

\* These characteristics are not assessed in coastal streams.

**STREAM QUALITY ASSESSMENT WORKSHEET****Provide the following information for the stream reach under assessment:**

1. Applicant's name: EPR 2. Evaluator's name: Erin Bennett  
 3. Date of evaluation: 10/6/17 4. Time of evaluation: 1:30 pm  
 5. Name of stream: UT to S. Deep Creek - SA/R2 6. River basin: Yadkin-Pee Dee  
 7. Approximate drainage area: 1.7m<sup>2</sup> 8. Stream order: 2  
 9. Length of reach evaluated: 762 ft. 10. County: Yadkin  
 11. Site coordinates (if known): prefer in decimal degrees. 12. Subdivision name (if any): N/A  
 Latitude (ex. 34.872312): 36.14164167 Longitude (ex. -77.556611): -80.81805556  
 Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other \_\_\_\_\_  
 13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):  
Marler Rd.  
 14. Proposed channel work (if any): restoration/enhancement  
 15. Recent weather conditions: Sunny, dry  
 16. Site conditions at time of visit: Sunny, dry  
 17. Identify any special waterway classifications known:  Section 10  Tidal Waters  Essential Fisheries Habitat  
 Trout Waters  Outstanding Resource Waters  Nutrient Sensitive Waters  Water Supply Watershed III (I-IV)  
 18. Is there a pond or lake located upstream of the evaluation point? YES  NO  If yes, estimate the water surface area: \_\_\_\_\_  
 19. Does channel appear on USGS quad map?  YES  NO 20. Does channel appear on USDA Soil Survey?  YES  NO  
 21. Estimated watershed land use: 7 % Residential 1 % Commercial 0 % Industrial 59 % Agricultural  
32 % Forested 0 % Cleared / Logged 1 % Other (shrubland)  
 22. Bankfull width: 11.3' 23. Bank height (from bed to top of bank): 3.4'  
 24. Channel slope down center of stream:  Flat (0 to 2%)  Gentle (2 to 4%)  Moderate (4 to 10%)  Steep (>10%)  
 25. Channel sinuosity:  Straight  Occasional bends  Frequent meander  Very sinuous  Braided channel

**Instructions for completion of worksheet (located on page 2):** Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 32 Comments: \_\_\_\_\_

Evaluator's Signature [Signature] Date 10/31/17

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

## STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
<b>PHYSICAL</b>	1	<b>Presence of flow / persistent pools in stream</b> (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	<b>Evidence of past human alteration</b> (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	2
	3	<b>Riparian zone</b> (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	0
	4	<b>Evidence of nutrient or chemical discharges</b> (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	0
	5	<b>Groundwater discharge</b> (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	3
	6	<b>Presence of adjacent floodplain</b> (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	1
	7	<b>Entrenchment / floodplain access</b> (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	1
	8	<b>Presence of adjacent wetlands</b> (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	4
	9	<b>Channel sinuosity</b> (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	1
	10	<b>Sediment input</b> (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	1
	11	<b>Size &amp; diversity of channel bed substrate</b> (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
<b>STABILITY</b>	12	<b>Evidence of channel incision or widening</b> (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	0
	13	<b>Presence of major bank failures</b> (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	<b>Root depth and density on banks</b> (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	1
	15	<b>Impact by agriculture, livestock, or timber production</b> (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	0
<b>HABITAT</b>	16	<b>Presence of riffle-pool/ripple-pool complexes</b> (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	1
	17	<b>Habitat complexity</b> (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	2
	18	<b>Canopy coverage over streambed</b> (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	1
	19	<b>Substrate embeddedness</b> (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	1
<b>BIOLOGY</b>	20	<b>Presence of stream invertebrates</b> (see page 4) (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	1
	21	<b>Presence of amphibians</b> (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	22	<b>Presence of fish</b> (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	23	<b>Evidence of wildlife use</b> (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	2
<b>Total Points Possible</b>			100	100	100	
<b>TOTAL SCORE</b> (also enter on first page)						32

\* These characteristics are not assessed in coastal streams.

**STREAM QUALITY ASSESSMENT WORKSHEET**

Provide the following information for the stream reach under assessment:

1. Applicant's name: EPR 2. Evaluator's name: Erin Bennett  
 3. Date of evaluation: 10/6/17 4. Time of evaluation: 2pm  
 5. Name of stream: UT to S. Deep Creek - SB 6. River basin: Yadkin-Pee Dee  
 7. Approximate drainage area: 0.6 mi<sup>2</sup> 8. Stream order: 1st  
 9. Length of reach evaluated: 364 ft. 10. County: Yadkin  
 11. Site coordinates (if known): prefer in decimal degrees. 12. Subdivision name (if any): N/A  
 Latitude (ex. 34.872312): 36.1426556 Longitude (ex. -77.556611): -80.8183337  
 Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other \_\_\_\_\_  
 13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):  
Marker Rd.  
 14. Proposed channel work (if any): restoration/enhancement  
 15. Recent weather conditions: Sunny, dry  
 16. Site conditions at time of visit: Sunny, dry  
 17. Identify any special waterway classifications known: \_\_\_ Section 10 \_\_\_ Tidal Waters \_\_\_ Essential Fisheries Habitat  
 \_\_\_ Trout Waters \_\_\_ Outstanding Resource Waters \_\_\_ Nutrient Sensitive Waters X Water Supply Watershed III (I-IV)  
 18. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area: \_\_\_\_\_  
 19. Does channel appear on USGS quad map? (YES) NO 20. Does channel appear on USDA Soil Survey? (YES) NO  
 21. Estimated watershed land use: 6 % Residential 1 % Commercial 0 % Industrial 59 % Agricultural  
32 % Forested 0 % Cleared / Logged 1 % Other (Shrubland)  
 22. Bankfull width: 6.7' 23. Bank height (from bed to top of bank): 2.6'  
 24. Channel slope down center of stream: X Flat (0 to 2%) \_\_\_ Gentle (2 to 4%) \_\_\_ Moderate (4 to 10%) \_\_\_ Steep (>10%)  
 25. Channel sinuosity: X Straight \_\_\_ Occasional bends \_\_\_ Frequent meander \_\_\_ Very sinuous \_\_\_ Braided channel

**Instructions for completion of worksheet (located on page 2):** Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 34 Comments: \_\_\_\_\_

Evaluator's Signature [Signature] Date 10/31/17

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

## STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
<b>PHYSICAL</b>	1	<b>Presence of flow / persistent pools in stream</b> (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	<b>Evidence of past human alteration</b> (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	2
	3	<b>Riparian zone</b> (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	<b>Evidence of nutrient or chemical discharges</b> (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	0
	5	<b>Groundwater discharge</b> (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	3
	6	<b>Presence of adjacent floodplain</b> (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	1
	7	<b>Entrenchment / floodplain access</b> (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	1
	8	<b>Presence of adjacent wetlands</b> (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	4
	9	<b>Channel sinuosity</b> (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	1
	10	<b>Sediment input</b> (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	1
	11	<b>Size &amp; diversity of channel bed substrate</b> (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	1
<b>STABILITY</b>	12	<b>Evidence of channel incision or widening</b> (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	0
	13	<b>Presence of major bank failures</b> (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	<b>Root depth and density on banks</b> (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	<b>Impact by agriculture, livestock, or timber production</b> (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	0
<b>HABITAT</b>	16	<b>Presence of riffle-pool/ripple-pool complexes</b> (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	1
	17	<b>Habitat complexity</b> (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	2
	18	<b>Canopy coverage over streambed</b> (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	1
	19	<b>Substrate embeddedness</b> (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	1
<b>BIOLOGY</b>	20	<b>Presence of stream invertebrates</b> (see page 4) (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	1
	21	<b>Presence of amphibians</b> (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	22	<b>Presence of fish</b> (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	23	<b>Evidence of wildlife use</b> (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	2
<b>Total Points Possible</b>			100	100	100	
<b>TOTAL SCORE</b> (also enter on first page)						<b>34</b>

\* These characteristics are not assessed in coastal streams.

## **Appendix 7**

### **APPROVED FHWA CATEGORICAL EXCLUSION REPORT**





Ecosystem Planning and Restoration, LLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606

Phone: (919) 388-0787  
www.eprusa.net

September 28, 2017

Harry Tsomides  
Project Manager  
North Carolina Department of Environmental Quality  
Division of Mitigation Services (NCDMS)  
Western DMS Field Office  
5 Ravenscroft Drive, Suite 102  
Asheville, NC 28801

**RE: Meadow Brook Stream Restoration  
Yadkin County, North Carolina  
NCDMS Project # 100024**

Dear Mr. Tsomides,

Attached is the Categorical Exclusion Form for NCDMS Projects (Version 1.4) and associated supporting documentation. The following is a brief discussion of applicable regulations and associated coordination with the subject agencies, as appropriate.

**Comprehensive Environmental Resources, Compensation and Liability Act**

The June 2, 2017 EDR report did not identify any known or potential hazardous waste sites within or adjacent to the project area.

**National Historic Preservation Act (Section 106)**

The North Carolina Department of Natural and Cultural Resources, State Historic Preservation Office (NCSHPO) did not identify historic resources that would be affected by the project. The July 19, 2017 correspondence from NCSHPO is attached.

**Uniform Relocation Assistance and Real Property Acquisition Policies Act**

Page 1 Paragraph 5 of the attached executed Option to Purchase Conservation Easement informed the property owners that the acquiring entity does not have condemnation authority and that fair market value is being offered for the easement.

**Endangered Species Act, Fish and Wildlife Coordination Act, and Migratory Bird Treaty Act**

The US Fish and Wildlife Service (USFWS) was contacted June 21, 2017 requesting a response within 45 days (correspondence attached). No response was received.



---

A Northern Long-Eared Bat (NLEB) 4(d) Rule Streamlined Consultation Form and figures are attached for the FHWA to send to the USFWS. In the previous letter to the USFWS, dated June 21, 2017, the biological conclusion regarding the NLEB was that the project would have “No Effect” on the NLEB habitat because the project area has no trees suitable for roosting and is unlikely foraging habitat. However, further review of the site identified a few large trees just outside of the proposed easement area that may be affected by the project, and the foraging habitat for the NLEB covers a wide range of land uses; therefore, the biological conclusion was revised “May Affect.”

The North Carolina Wildlife Resources Commission (NCWRC) did not identify any federally or state protected species within or adjacent to the project area. NCWRC recommends establishing a native riparian buffer and minimizing sedimentation from construction practices. These recommendations will be incorporated in the project design. The July 11, 2017 correspondence from NCWRC is attached.

**Farmland Protection Policy Act**

The completed NRCS Form AD-1006 is attached.

Please contact me at the above phone number or address with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kevin Tweedy', is placed above the typed name.

Kevin Tweedy, PE


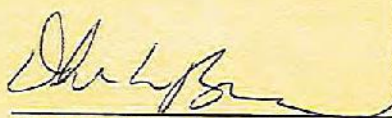
Cc:

Paul Wiesner, Western Regional Supervisor, NCDMS, Asheville, NC

Appendix A

**Categorical Exclusion Form for NC Division of Mitigation Services  
Projects  
Version 1.4**

**Note: Only Appendix A should to be submitted (along with any supporting documentation) as the environmental document.**

Part 1: General Project Information	
Project Name:	Meadow Brook Stream Restoration
County Name:	Yadkin County
NCDMS Number:	100024
Project Sponsor:	Ecosystem Planning and Restoration, PLLC
Project Contact Name:	Kevin Tweedy, PE
Project Contact Address:	559 Jones Franklin Road, Suite 150, Raleigh NC 27606
Project Contact E-mail:	ktweedy@eprusa.net
NCDMS Project Manager:	Harry Tsomides
Project Description	
The project will involve the restoration of two unnamed tributaries to South Deep Creek, both of which have significant cattle damage and have been channelized. Restoration practices will involve raising the streambeds of the project streams and restoring them back to their historic locations.	
For Official Use Only	
Reviewed By:	
<u>6/2/2017</u>	
Date	NCDMS Project Manager
Conditional Approved By:	
_____	_____
Date	For Division Administrator FHWA
<input type="checkbox"/> Check this box if there are outstanding issues	
Final Approval By:	
<u>9-29-17</u>	
Date	For Division Administrator FHWA

Part 2: All Projects Regulation/Question		Response
<b>Coastal Zone Management Act (CZMA)</b>		
1. Is the project located in a CAMA county?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Has a CAMA permit been secured?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has NCDCCM agreed that the project is consistent with the NC Coastal Management Program?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)</b>		
1. Is this a "full-delivery" project?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Is there an approved hazardous mitigation plan?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>National Historic Preservation Act (Section 106)</b>		
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Does the project affect such properties and does the SHPO/THPO concur?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. If the effects are adverse, have they been resolved?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)</b>		
1. Is this a "full-delivery" project?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Does the project require the acquisition of real estate?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Was the property acquisition completed prior to the intent to use federal funds?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

<b>Part 3: Ground-Disturbing Activities Regulation/Question</b>		<b>Response</b>
<b>American Indian Religious Freedom Act (AIRFA)</b>		
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is the site of religious importance to American Indians?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Have the effects of the project on this site been considered?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Antiquities Act (AA)</b>		
1. Is the project located on Federal lands?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Archaeological Resources Protection Act (ARPA)</b>		
1. Is the project located on federal or Indian lands (reservation)?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be a loss or destruction of archaeological resources?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Endangered Species Act (ESA)</b>		
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Is Designated Critical Habitat or suitable habitat present for listed species?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
4. Is the project "likely to adversely affect" the specie and/or "likely to adversely modify" Designated Critical Habitat?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

<b>Executive Order 13007 (Indian Sacred Sites)</b>	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Farmland Protection Policy Act (FPPA)</b>	
1. Will real estate be acquired?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b>Fish and Wildlife Coordination Act (FWCA)</b>	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS and the NCWRC been consulted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
<b>Land and Water Conservation Fund Act (Section 6(f))</b>	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the NPS approved of the conversion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)</b>	
1. Is the project located in an estuarine system?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is suitable habitat present for EFH-protected species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Will the project adversely affect EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Has consultation with NOAA-Fisheries occurred?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Migratory Bird Treaty Act (MBTA)</b>	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Have the USFWS recommendations been incorporated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<b>Wilderness Act</b>	
1. Is the project in a Wilderness area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

# **EDR REPORT**

**Meadow Brook**

Marler Road

Hamptonville, NC 27020

Inquiry Number: 4954878.2s

June 02, 2017

# The EDR Radius Map™ Report with GeoCheck®



6 Armstrong Road, 4th floor  
Shelton, CT 06484  
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 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

### TARGET PROPERTY INFORMATION

#### ADDRESS

MARLER ROAD  
HAMPTONVILLE, NC 27020

#### COORDINATES

Latitude (North): 36.1414220 - 36° 8' 29.11"  
Longitude (West): 80.8195390 - 80° 49' 10.34"  
Universal Transverse Mercator: Zone 17  
UTM X (Meters): 516235.8  
UTM Y (Meters): 3999448.5  
Elevation: 1056 ft. above sea level

### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 5947711 ELKIN SOUTH, NC  
Version Date: 2013

### AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from: 20140524, 20140617  
Source: USDA

MAPPED SITES SUMMARY

Target Property Address:  
MARLER ROAD  
HAMPTONVILLE, NC 27020

Click on Map ID to see full detail.

<u>MAP ID</u>	<u>SITE NAME</u>	<u>ADDRESS</u>	<u>DATABASE ACRONYMS</u>	<u>RELATIVE ELEVATION</u>	<u>DIST (ft. &amp; mi.) DIRECTION</u>
---------------	------------------	----------------	--------------------------	---------------------------	---------------------------------------

NO MAPPED SITES FOUND

# EXECUTIVE SUMMARY

## TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

## 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  
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***

FEDERAL FACILITY..... Federal Facility Site Information listing  
SEMS..... Superfund Enterprise Management System

### ***Federal CERCLIS NFRAP site list***

SEMS-ARCHIVE..... Superfund Enterprise Management System Archive

### ***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***

LUCIS..... Land Use Control Information System  
US ENG CONTROLS..... Engineering Controls Sites List

## EXECUTIVE SUMMARY

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 - equivalent CERCLIS**

SHWS..... Inactive Hazardous Sites Inventory

### **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..... Regional UST Database

LAST..... Leaking Aboveground Storage Tanks

INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

LUST TRUST..... State Trust Fund Database

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

FEMA UST..... Underground Storage Tank Listing

UST..... Petroleum Underground Storage Tank Database

AST..... AST Database

INDIAN UST..... Underground Storage Tanks on Indian Land

### **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**

INDIAN VCP..... Voluntary Cleanup Priority Listing

VCP..... Responsible Party Voluntary Action Sites

### **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**

HIST LF..... Solid Waste Facility Listing

## EXECUTIVE SUMMARY

SWRCY.....	Recycling Center Listing
INDIAN ODI.....	Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9.....	Torres Martinez Reservation Illegal Dump Site Locations
ODI.....	Open Dump Inventory
IHS OPEN DUMPS.....	Open Dumps on Indian Land

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

US HIST CDL.....	Delisted National Clandestine Laboratory Register
US CDL.....	National Clandestine Laboratory Register

### **Local Land Records**

LIENS 2.....	CERCLA Lien Information
--------------	-------------------------

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

HMIRS.....	Hazardous Materials Information Reporting System
SPILLS.....	Spills Incident Listing
IMD.....	Incident Management Database
SPILLS 90.....	SPILLS 90 data from FirstSearch
SPILLS 80.....	SPILLS 80 data from FirstSearch

### **Other Ascertainable Records**

RCRA NonGen / NLR.....	RCRA - Non Generators / No Longer Regulated
FUDS.....	Formerly Used Defense Sites
DOD.....	Department of Defense Sites
SCRD DRYCLEANERS.....	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR.....	Financial Assurance Information
EPA WATCH LIST.....	EPA WATCH LIST
2020 COR ACTION.....	2020 Corrective Action Program List
TSCA.....	Toxic Substances Control Act
TRIS.....	Toxic Chemical Release Inventory System
SSTS.....	Section 7 Tracking Systems
ROD.....	Records Of Decision
RMP.....	Risk Management Plans
RAATS.....	RCRA Administrative Action Tracking System
PRP.....	Potentially Responsible Parties
PADS.....	PCB Activity Database System
ICIS.....	Integrated Compliance Information System
FTTS.....	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS.....	Material Licensing Tracking System
COAL ASH DOE.....	Steam-Electric Plant Operation Data
COAL ASH EPA.....	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER.....	PCB Transformer Registration Database
RADINFO.....	Radiation Information Database
HIST FTTS.....	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS.....	Incident and Accident Data
CONSENT.....	Superfund (CERCLA) Consent Decrees
INDIAN RESERV.....	Indian Reservations
FUSRAP.....	Formerly Utilized Sites Remedial Action Program
UMTRA.....	Uranium Mill Tailings Sites
LEAD SMELTERS.....	Lead Smelter Sites

## EXECUTIVE SUMMARY

US AIRS.....	Aerometric Information Retrieval System Facility Subsystem
US MINES.....	Mines Master Index File
ABANDONED MINES.....	Abandoned Mines
FINDS.....	Facility Index System/Facility Registry System
DOCKET HWC.....	Hazardous Waste Compliance Docket Listing
UXO.....	Unexploded Ordnance Sites
ECHO.....	Enforcement & Compliance History Information
FUELS PROGRAM.....	EPA Fuels Program Registered Listing
COAL ASH.....	Coal Ash Disposal Sites
DRYCLEANERS.....	Drycleaning Sites
Financial Assurance.....	Financial Assurance Information Listing
NPDES.....	NPDES Facility Location Listing
UIC.....	Underground Injection Wells Listing

### EDR HIGH RISK HISTORICAL RECORDS

#### *EDR Exclusive Records*

EDR MGP.....	EDR Proprietary Manufactured Gas Plants
EDR Hist Auto.....	EDR Exclusive Historic Gas Stations
EDR Hist Cleaner.....	EDR Exclusive Historic Dry Cleaners

### EDR RECOVERED GOVERNMENT ARCHIVES

#### *Exclusive Recovered Govt. Archives*

RGA HWS.....	Recovered Government Archive State Hazardous Waste Facilities List
RGA LF.....	Recovered Government Archive Solid Waste Facilities List
RGA LUST.....	Recovered Government Archive Leaking Underground Storage Tank

### SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were not identified.

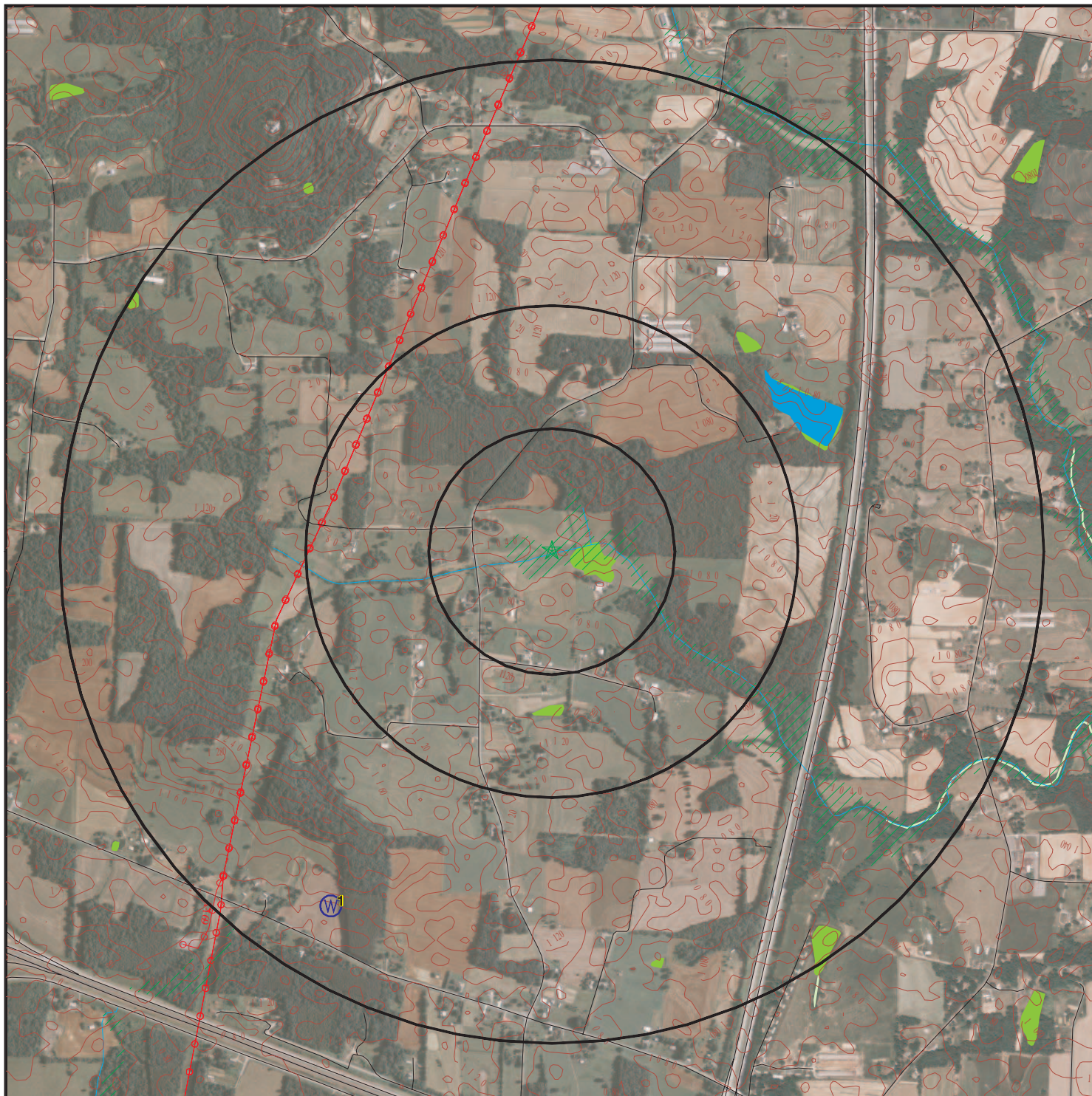
Unmappable (orphan) sites are not considered in the foregoing analysis.

## EXECUTIVE SUMMARY

There were no unmapped sites in this report.



# OVERVIEW MAP - 4954878.2S



- ★ 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
- 🔌 Power transmission lines
- 🌊 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.

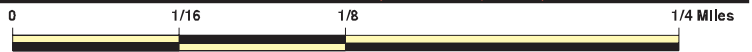
SITE NAME: Meadow Brook  
 ADDRESS: Marler Road  
 Hamptonville NC 27020  
 LAT/LONG: 36.141422 / 80.819539

CLIENT: Ecosystem Planning and Restoration  
 CONTACT: Robert Lepsic  
 INQUIRY #: 4954878.2s  
 DATE: June 02, 2017 11:10 am

# DETAIL MAP - 4954878.2S



- ★ 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
- 🌊 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: Meadow Brook  
 ADDRESS: Marler Road  
 Hamptonville NC 27020  
 LAT/LONG: 36.141422 / 80.819539

CLIENT: Ecosystem Planning and Restoration  
 CONTACT: Robert Lepsic  
 INQUIRY #: 4954878.2s  
 DATE: June 02, 2017 11:12 am

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
<b>STANDARD ENVIRONMENTAL RECORDS</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>								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
<b><i>Federal CERCLIS NFRAP site list</i></b>								
SEMS-ARCHIVE	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>								
LUCIS	0.500		0	0	0	NR	NR	0
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	0	NR	0
<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	0	NR	NR	0

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LAST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0
<b>State and tribal registered storage tank lists</b>								
FEMA UST	0.250		0	0	NR	NR	NR	0
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
<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>								
INDIAN VCP	0.500		0	0	0	NR	NR	0
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>								
HIST LF	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
<b>Local Lists of Hazardous waste / Contaminated Sites</b>								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
<b>Local Land Records</b>								
LIENS 2	TP		NR	NR	NR	NR	NR	0
<b>Records of Emergency Release Reports</b>								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
<b>Other Ascertainable Records</b>								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0

## MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.500		0	0	0	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0

### EDR HIGH RISK HISTORICAL RECORDS

#### *EDR Exclusive Records*

EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0

### EDR RECOVERED GOVERNMENT ARCHIVES

#### *Exclusive Recovered Govt. Archives*

RGA HWS	TP		NR	NR	NR	NR	NR	0
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## MAP FINDINGS SUMMARY

<u>Database</u>	<u>Search Distance (Miles)</u>	<u>Target Property</u>	<u>&lt; 1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>&gt; 1</u>	<u>Total Plotted</u>
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	0	0	0	0	0	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

NO SITES FOUND

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
------	--------	-----------	--------------	-----	-------------

NO SITES FOUND



# 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: 04/05/2017	Source: EPA
Date Data Arrived at EDR: 04/21/2017	Telephone: N/A
Date Made Active in Reports: 05/12/2017	Last EDR Contact: 04/21/2017
Number of Days to Update: 21	Next Scheduled EDR Contact: 07/17/2017
	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: 04/05/2017	Source: EPA
Date Data Arrived at EDR: 04/21/2017	Telephone: N/A
Date Made Active in Reports: 05/12/2017	Last EDR Contact: 04/21/2017
Number of Days to Update: 21	Next Scheduled EDR Contact: 07/17/2017
	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: 08/15/2011
Number of Days to Update: 56	Next Scheduled EDR Contact: 11/28/2011
	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: 04/05/2017	Source: EPA
Date Data Arrived at EDR: 04/21/2017	Telephone: N/A
Date Made Active in Reports: 05/12/2017	Last EDR Contact: 04/21/2017
Number of Days to Update: 21	Next Scheduled EDR Contact: 07/17/2017
	Data Release Frequency: Quarterly

## ***Federal CERCLIS list***

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 Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/05/2017	Telephone: 703-603-8704
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 04/07/2017
Number of Days to Update: 92	Next Scheduled EDR Contact: 07/17/2017
	Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list 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). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/07/2017	Source: EPA
Date Data Arrived at EDR: 04/19/2017	Telephone: 800-424-9346
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/21/2017
Number of Days to Update: 16	Next Scheduled EDR Contact: 07/31/2017
	Data Release Frequency: Quarterly

## ***Federal CERCLIS NFRAP site list***

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS 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 the 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. The 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 potential NPL site.

Date of Government Version: 02/07/2017	Source: EPA
Date Data Arrived at EDR: 04/19/2017	Telephone: 800-424-9346
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/25/2017
Number of Days to Update: 16	Next Scheduled EDR Contact: 07/31/2017
	Data Release Frequency: Quarterly

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

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/12/2016	Source: EPA
Date Data Arrived at EDR: 12/28/2016	Telephone: 800-424-9346
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 05/02/2017
Number of Days to Update: 44	Next Scheduled EDR Contact: 04/10/2017
	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: 12/12/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/28/2016	Telephone: (404) 562-8651
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 05/02/2017
Number of Days to Update: 44	Next Scheduled EDR Contact: 04/10/2017
	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: 12/12/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/28/2016	Telephone: (404) 562-8651
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 05/02/2017
Number of Days to Update: 44	Next Scheduled EDR Contact: 04/10/2017
	Data Release Frequency: Quarterly

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## 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: 12/12/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/28/2016	Telephone: (404) 562-8651
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 05/02/2017
Number of Days to Update: 44	Next Scheduled EDR Contact: 04/10/2017
	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: 12/12/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 12/28/2016	Telephone: (404) 562-8651
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 05/02/2017
Number of Days to Update: 44	Next Scheduled EDR Contact: 04/10/2017
	Data Release Frequency: Varies

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

### 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: 12/28/2016	Source: Department of the Navy
Date Data Arrived at EDR: 01/04/2017	Telephone: 843-820-7326
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 05/15/2017
Number of Days to Update: 93	Next Scheduled EDR Contact: 08/28/2017
	Data Release Frequency: Varies

### 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: 11/15/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/29/2016	Telephone: 703-603-0695
Date Made Active in Reports: 02/03/2017	Last EDR Contact: 05/31/2017
Number of Days to Update: 66	Next Scheduled EDR Contact: 09/11/2017
	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: 11/15/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/29/2016	Telephone: 703-603-0695
Date Made Active in Reports: 02/03/2017	Last EDR Contact: 05/31/2017
Number of Days to Update: 66	Next Scheduled EDR Contact: 09/11/2017
	Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## **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: 09/26/2016

Date Data Arrived at EDR: 09/29/2016

Date Made Active in Reports: 11/11/2016

Number of Days to Update: 43

Source: National Response Center, United States Coast Guard

Telephone: 202-267-2180

Last EDR Contact: 03/29/2017

Next Scheduled EDR Contact: 07/10/2017

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: 08/09/2011

Date Data Arrived at EDR: 11/08/2011

Date Made Active in Reports: 12/05/2011

Number of Days to Update: 27

Source: North Carolina Center for Geographic Information and Analysis

Telephone: 919-754-6580

Last EDR Contact: 04/27/2017

Next Scheduled EDR Contact: 08/07/2017

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: 10/07/2016

Date Data Arrived at EDR: 12/15/2016

Date Made Active in Reports: 03/06/2017

Number of Days to Update: 81

Source: Department of Environment, Health and Natural Resources

Telephone: 919-508-8400

Last EDR Contact: 03/15/2017

Next Scheduled EDR Contact: 06/26/2017

Data Release Frequency: Quarterly

## **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: 11/17/2016

Date Data Arrived at EDR: 12/28/2016

Date Made Active in Reports: 03/08/2017

Number of Days to Update: 70

Source: Department of Environment and Natural Resources

Telephone: 919-733-0692

Last EDR Contact: 03/31/2017

Next Scheduled EDR Contact: 07/10/2017

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: 08/08/2016

Date Data Arrived at EDR: 01/17/2017

Date Made Active in Reports: 03/08/2017

Number of Days to Update: 50

Source: Department of Environment & Natural Resources

Telephone: 919-733-4996

Last EDR Contact: 04/14/2017

Next Scheduled EDR Contact: 07/24/2017

Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## ***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: 11/07/2016	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 11/09/2016	Telephone: 919-733-1308
Date Made Active in Reports: 03/06/2017	Last EDR Contact: 05/10/2017
Number of Days to Update: 117	Next Scheduled EDR Contact: 08/21/2017
	Data Release Frequency: Quarterly

### **LAST: Leaking Aboveground Storage Tanks**

A listing of leaking aboveground storage tank site locations.

Date of Government Version: 10/07/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 11/09/2016	Telephone: 877-623-6748
Date Made Active in Reports: 03/06/2017	Last EDR Contact: 05/10/2017
Number of Days to Update: 117	Next Scheduled EDR Contact: 08/21/2017
	Data Release Frequency: Quarterly

### **INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land**

Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 11/14/2016	Source: EPA, Region 5
Date Data Arrived at EDR: 01/26/2017	Telephone: 312-886-7439
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Varies

### **INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land**

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/07/2016	Source: EPA Region 10
Date Data Arrived at EDR: 01/26/2017	Telephone: 206-553-2857
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Quarterly

### **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: 10/06/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/26/2017	Telephone: 415-972-3372
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Quarterly

### **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: 10/17/2016	Source: EPA Region 8
Date Data Arrived at EDR: 01/26/2017	Telephone: 303-312-6271
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Quarterly

### **INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land**

LUSTs on Indian land in Iowa, Kansas, and Nebraska

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/01/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 7  
Telephone: 913-551-7003  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
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: 10/01/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 6  
Telephone: 214-665-6597  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Varies

**INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land**  
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/14/2016  
Date Data Arrived at EDR: 01/27/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 98

Source: EPA Region 4  
Telephone: 404-562-8677  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Semi-Annually

**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: 11/14/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 1  
Telephone: 617-918-1313  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Varies

**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: 01/06/2017  
Date Data Arrived at EDR: 01/12/2017  
Date Made Active in Reports: 03/06/2017  
Number of Days to Update: 53

Source: Department of Environment and Natural Resources  
Telephone: 919-733-1315  
Last EDR Contact: 04/12/2017  
Next Scheduled EDR Contact: 07/31/2017  
Data Release Frequency: Semi-Annually

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

**FEMA UST: Underground Storage Tank Listing**

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010  
Date Data Arrived at EDR: 02/16/2010  
Date Made Active in Reports: 04/12/2010  
Number of Days to Update: 55

Source: FEMA  
Telephone: 202-646-5797  
Last EDR Contact: 04/11/2017  
Next Scheduled EDR Contact: 07/24/2017  
Data Release Frequency: Varies

**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.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/30/2016  
Date Data Arrived at EDR: 11/09/2016  
Date Made Active in Reports: 03/06/2017  
Number of Days to Update: 117

Source: Department of Environment and Natural Resources  
Telephone: 919-733-1308  
Last EDR Contact: 05/10/2017  
Next Scheduled EDR Contact: 08/21/2017  
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: 09/26/2016  
Date Data Arrived at EDR: 12/30/2016  
Date Made Active in Reports: 03/06/2017  
Number of Days to Update: 66

Source: Department of Environment and Natural Resources  
Telephone: 919-715-6183  
Last EDR Contact: 03/20/2017  
Next Scheduled EDR Contact: 07/03/2017  
Data Release Frequency: Semi-Annually

## 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: 10/07/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 10  
Telephone: 206-553-2857  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Quarterly

## 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: 10/06/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 9  
Telephone: 415-972-3368  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Quarterly

## 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: 10/17/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 8  
Telephone: 303-312-6137  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Quarterly

## 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: 09/01/2016  
Date Data Arrived at EDR: 01/26/2017  
Date Made Active in Reports: 05/05/2017  
Number of Days to Update: 99

Source: EPA Region 7  
Telephone: 913-551-7003  
Last EDR Contact: 04/28/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: Varies

## 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).



# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 01/14/2017	Source: EPA Region 5
Date Data Arrived at EDR: 01/26/2017	Telephone: 312-886-6136
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	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: 10/01/2016	Source: EPA Region 6
Date Data Arrived at EDR: 01/26/2017	Telephone: 214-665-7591
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Semi-Annually

## 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: 10/14/2016	Source: EPA Region 4
Date Data Arrived at EDR: 01/27/2017	Telephone: 404-562-9424
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 98	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Semi-Annually

## 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: 11/14/2016	Source: EPA, Region 1
Date Data Arrived at EDR: 01/26/2017	Telephone: 617-918-1313
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 04/28/2017
Number of Days to Update: 99	Next Scheduled EDR Contact: 08/07/2017
	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: 10/07/2016	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 12/15/2016	Telephone: 919-508-8400
Date Made Active in Reports: 03/06/2017	Last EDR Contact: 03/15/2017
Number of Days to Update: 81	Next Scheduled EDR Contact: 06/26/2017
	Data Release Frequency: Quarterly

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

### VCP: Responsible Party Voluntary Action Sites

Responsible Party Voluntary Action site locations.

Date of Government Version: 10/07/2016	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 12/15/2016	Telephone: 919-508-8400
Date Made Active in Reports: 03/08/2017	Last EDR Contact: 03/15/2017
Number of Days to Update: 83	Next Scheduled EDR Contact: 06/26/2017
	Data Release Frequency: Semi-Annually

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## 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: 07/27/2015	Source: EPA, Region 1
Date Data Arrived at EDR: 09/29/2015	Telephone: 617-918-1102
Date Made Active in Reports: 02/18/2016	Last EDR Contact: 03/27/2017
Number of Days to Update: 142	Next Scheduled EDR Contact: 07/10/2017
	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

### **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: 01/03/2017	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 01/06/2017	Telephone: 919-733-4996
Date Made Active in Reports: 03/06/2017	Last EDR Contact: 04/05/2017
Number of Days to Update: 59	Next Scheduled EDR Contact: 07/17/2017
	Data Release Frequency: Varies

### **ADDITIONAL ENVIRONMENTAL RECORDS**

#### **Local Brownfield lists**

#### US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/02/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/02/2017	Telephone: 202-566-2777
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 03/02/2017
Number of Days to Update: 36	Next Scheduled EDR Contact: 07/03/2017
	Data Release Frequency: Semi-Annually

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

#### SWRCY: Recycling Center Listing

A listing of recycling center locations.

Date of Government Version: 11/30/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 12/05/2016	Telephone: 919-707-8137
Date Made Active in Reports: 03/08/2017	Last EDR Contact: 05/01/2017
Number of Days to Update: 93	Next Scheduled EDR Contact: 08/14/2017
	Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

HIST LF: Solid Waste Facility Listing  
A listing of solid waste facilities.

Date of Government Version: 11/06/2006  
Date Data Arrived at EDR: 02/13/2007  
Date Made Active in Reports: 03/02/2007  
Number of Days to Update: 17

Source: Department of Environment & Natural Resources  
Telephone: 919-733-0692  
Last EDR Contact: 01/19/2009  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: No Update Planned

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  
Date Data Arrived at EDR: 12/03/2007  
Date Made Active in Reports: 01/24/2008  
Number of Days to Update: 52

Source: Environmental Protection Agency  
Telephone: 703-308-8245  
Last EDR Contact: 05/01/2017  
Next Scheduled EDR Contact: 08/14/2017  
Data Release Frequency: Varies

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  
Date Data Arrived at EDR: 05/07/2009  
Date Made Active in Reports: 09/21/2009  
Number of Days to Update: 137

Source: EPA, Region 9  
Telephone: 415-947-4219  
Last EDR Contact: 04/24/2017  
Next Scheduled EDR Contact: 08/07/2017  
Data Release Frequency: No Update Planned

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  
Date Data Arrived at EDR: 08/09/2004  
Date Made Active in Reports: 09/17/2004  
Number of Days to Update: 39

Source: Environmental Protection Agency  
Telephone: 800-424-9346  
Last EDR Contact: 06/09/2004  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land

A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014  
Date Data Arrived at EDR: 08/06/2014  
Date Made Active in Reports: 01/29/2015  
Number of Days to Update: 176

Source: Department of Health & Human Services, Indian Health Service  
Telephone: 301-443-1452  
Last EDR Contact: 05/05/2017  
Next Scheduled EDR Contact: 08/14/2017  
Data Release Frequency: Varies

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

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 09/30/2016  
Date Data Arrived at EDR: 01/05/2017  
Date Made Active in Reports: 02/10/2017  
Number of Days to Update: 36

Source: Drug Enforcement Administration  
Telephone: 202-307-1000  
Last EDR Contact: 02/28/2017  
Next Scheduled EDR Contact: 06/12/2017  
Data Release Frequency: No Update Planned

# 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: 09/30/2016	Source: Drug Enforcement Administration
Date Data Arrived at EDR: 12/05/2016	Telephone: 202-307-1000
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 05/31/2017
Number of Days to Update: 67	Next Scheduled EDR Contact: 09/11/2017
	Data Release Frequency: Quarterly

## 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: 02/18/2014	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/18/2014	Telephone: 202-564-6023
Date Made Active in Reports: 04/24/2014	Last EDR Contact: 04/21/2017
Number of Days to Update: 37	Next Scheduled EDR Contact: 08/07/2017
	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: 12/28/2016	Source: U.S. Department of Transportation
Date Data Arrived at EDR: 12/28/2016	Telephone: 202-366-4555
Date Made Active in Reports: 02/03/2017	Last EDR Contact: 03/29/2017
Number of Days to Update: 37	Next Scheduled EDR Contact: 07/10/2017
	Data Release Frequency: Annually

### SPILLS: Spills Incident Listing

A listing spills, hazardous material releases, sanitary sewer overflows, wastewater treatment plant bypasses and upsets, citizen complaints, and any other environmental emergency calls reported to the agency.

Date of Government Version: 12/14/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 12/16/2016	Telephone: 919-807-6308
Date Made Active in Reports: 03/08/2017	Last EDR Contact: 03/13/2017
Number of Days to Update: 82	Next Scheduled EDR Contact: 06/26/2017
	Data Release Frequency: Varies

### IMD: Incident Management Database

Groundwater and/or soil contamination incidents

Date of Government Version: 07/21/2006	Source: Department of Environment and Natural Resources
Date Data Arrived at EDR: 08/01/2006	Telephone: 919-733-3221
Date Made Active in Reports: 08/23/2006	Last EDR Contact: 07/01/2011
Number of Days to Update: 22	Next Scheduled EDR Contact: 10/17/2011
	Data Release Frequency: No Update Planned

### SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/27/2012  
Date Data Arrived at EDR: 01/03/2013  
Date Made Active in Reports: 03/06/2013  
Number of Days to Update: 62

Source: FirstSearch  
Telephone: N/A  
Last EDR Contact: 01/03/2013  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: No Update Planned

## SPILLS 80: SPILLS80 data from FirstSearch

Spills 80 includes those spill and release records available from FirstSearch databases prior to 1990. Typically, they may include chemical, oil and/or hazardous substance spills recorded before 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 80.

Date of Government Version: 06/14/2001  
Date Data Arrived at EDR: 01/03/2013  
Date Made Active in Reports: 03/06/2013  
Number of Days to Update: 62

Source: FirstSearch  
Telephone: N/A  
Last EDR Contact: 01/03/2013  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: No Update Planned

## Other Ascertainable Records

### RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

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: 12/12/2016  
Date Data Arrived at EDR: 12/28/2016  
Date Made Active in Reports: 02/10/2017  
Number of Days to Update: 44

Source: Environmental Protection Agency  
Telephone: (404) 562-8651  
Last EDR Contact: 05/02/2017  
Next Scheduled EDR Contact: 04/10/2017  
Data Release Frequency: Varies

### 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: 01/31/2015  
Date Data Arrived at EDR: 07/08/2015  
Date Made Active in Reports: 10/13/2015  
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers  
Telephone: 202-528-4285  
Last EDR Contact: 02/24/2017  
Next Scheduled EDR Contact: 06/05/2017  
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  
Date Data Arrived at EDR: 11/10/2006  
Date Made Active in Reports: 01/11/2007  
Number of Days to Update: 62

Source: USGS  
Telephone: 888-275-8747  
Last EDR Contact: 04/14/2017  
Next Scheduled EDR Contact: 07/24/2017  
Data Release Frequency: Semi-Annually

### 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  
Date Data Arrived at EDR: 02/06/2006  
Date Made Active in Reports: 01/11/2007  
Number of Days to Update: 339

Source: U.S. Geological Survey  
Telephone: 888-275-8747  
Last EDR Contact: 04/14/2017  
Next Scheduled EDR Contact: 07/24/2017  
Data Release Frequency: N/A

## GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

### 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: 01/01/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/03/2017	Telephone: 615-532-8599
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 05/19/2017
Number of Days to Update: 63	Next Scheduled EDR Contact: 08/28/2017
	Data Release Frequency: Varies

### US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 02/13/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/15/2017	Telephone: 202-566-1917
Date Made Active in Reports: 05/12/2017	Last EDR Contact: 05/17/2017
Number of Days to Update: 86	Next Scheduled EDR Contact: 08/28/2017
	Data Release Frequency: Quarterly

### EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/21/2014	Telephone: 617-520-3000
Date Made Active in Reports: 06/17/2014	Last EDR Contact: 05/08/2017
Number of Days to Update: 88	Next Scheduled EDR Contact: 08/21/2017
	Data Release Frequency: Quarterly

### 2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/03/2015	Telephone: 703-308-4044
Date Made Active in Reports: 03/09/2015	Last EDR Contact: 05/05/2017
Number of Days to Update: 6	Next Scheduled EDR Contact: 08/21/2017
	Data Release Frequency: Varies

### 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: 12/31/2012	Source: EPA
Date Data Arrived at EDR: 01/15/2015	Telephone: 202-260-5521
Date Made Active in Reports: 01/29/2015	Last EDR Contact: 03/24/2017
Number of Days to Update: 14	Next Scheduled EDR Contact: 07/03/2017
	Data Release Frequency: Every 4 Years

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## 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: 12/31/2014	Source: EPA
Date Data Arrived at EDR: 11/24/2015	Telephone: 202-566-0250
Date Made Active in Reports: 04/05/2016	Last EDR Contact: 05/26/2017
Number of Days to Update: 133	Next Scheduled EDR Contact: 09/04/2017
	Data Release Frequency: Annually

## 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: 04/26/2017
Number of Days to Update: 77	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Annually

## 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: 11/25/2013	Source: EPA
Date Data Arrived at EDR: 12/12/2013	Telephone: 703-416-0223
Date Made Active in Reports: 02/24/2014	Last EDR Contact: 03/06/2017
Number of Days to Update: 74	Next Scheduled EDR Contact: 06/19/2017
	Data Release Frequency: Annually

## RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 02/01/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 02/09/2017	Telephone: 202-564-8600
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 04/21/2017
Number of Days to Update: 57	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Varies

## 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

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013	Source: EPA
Date Data Arrived at EDR: 10/17/2014	Telephone: 202-564-6023
Date Made Active in Reports: 10/20/2014	Last EDR Contact: 05/09/2017
Number of Days to Update: 3	Next Scheduled EDR Contact: 08/21/2017
	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: 01/20/2016	Source: EPA
Date Data Arrived at EDR: 04/28/2016	Telephone: 202-566-0500
Date Made Active in Reports: 09/02/2016	Last EDR Contact: 04/10/2017
Number of Days to Update: 127	Next Scheduled EDR Contact: 07/24/2017
	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: 11/18/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 11/23/2016	Telephone: 202-564-2501
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 04/10/2017
Number of Days to Update: 79	Next Scheduled EDR Contact: 07/24/2017
	Data Release Frequency: Quarterly

## 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: 05/19/2017
Number of Days to Update: 25	Next Scheduled EDR Contact: 09/04/2017
	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: 05/19/2017
Number of Days to Update: 25	Next Scheduled EDR Contact: 09/04/2017
	Data Release Frequency: Quarterly

## 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: 08/30/2016	Source: Nuclear Regulatory Commission
Date Data Arrived at EDR: 09/08/2016	Telephone: 301-415-7169
Date Made Active in Reports: 10/21/2016	Last EDR Contact: 05/08/2017
Number of Days to Update: 43	Next Scheduled EDR Contact: 08/21/2017
	Data Release Frequency: Quarterly



# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## COAL ASH DOE: Steam-Electric Plant 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: 03/06/2017
Number of Days to Update: 76	Next Scheduled EDR Contact: 06/19/2017
	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: 07/01/2014	Source: Environmental Protection Agency
Date Data Arrived at EDR: 09/10/2014	Telephone: N/A
Date Made Active in Reports: 10/20/2014	Last EDR Contact: 03/06/2017
Number of Days to Update: 40	Next Scheduled EDR Contact: 06/19/2017
	Data Release Frequency: Varies

## PCB TRANSFORMER: PCB Transformer Registration Database

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

Date of Government Version: 02/01/2011	Source: Environmental Protection Agency
Date Data Arrived at EDR: 10/19/2011	Telephone: 202-566-0517
Date Made Active in Reports: 01/10/2012	Last EDR Contact: 04/28/2017
Number of Days to Update: 83	Next Scheduled EDR Contact: 08/07/2017
	Data Release Frequency: Varies

## 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: 01/04/2017	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/06/2017	Telephone: 202-343-9775
Date Made Active in Reports: 02/10/2017	Last EDR Contact: 04/06/2017
Number of Days to Update: 35	Next Scheduled EDR Contact: 07/17/2017
	Data Release Frequency: Quarterly

## 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.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/19/2006  
Date Data Arrived at EDR: 03/01/2007  
Date Made Active in Reports: 04/10/2007  
Number of Days to Update: 40

Source: Environmental Protection Agency  
Telephone: 202-564-2501  
Last EDR Contact: 12/17/2008  
Next Scheduled EDR Contact: 03/17/2008  
Data Release Frequency: No Update Planned

## DOT OPS: Incident and Accident Data

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

Date of Government Version: 07/31/2012  
Date Data Arrived at EDR: 08/07/2012  
Date Made Active in Reports: 09/18/2012  
Number of Days to Update: 42

Source: Department of Transportation, Office of Pipeline Safety  
Telephone: 202-366-4595  
Last EDR Contact: 05/02/2017  
Next Scheduled EDR Contact: 08/14/2017  
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: 09/30/2016  
Date Data Arrived at EDR: 11/18/2016  
Date Made Active in Reports: 02/03/2017  
Number of Days to Update: 77

Source: Department of Justice, Consent Decree Library  
Telephone: Varies  
Last EDR Contact: 03/27/2017  
Next Scheduled EDR Contact: 07/10/2017  
Data Release Frequency: Varies

## 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: 12/31/2013  
Date Data Arrived at EDR: 02/24/2015  
Date Made Active in Reports: 09/30/2015  
Number of Days to Update: 218

Source: EPA/NTIS  
Telephone: 800-424-9346  
Last EDR Contact: 05/26/2017  
Next Scheduled EDR Contact: 09/04/2017  
Data Release Frequency: Biennially

## 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: 12/31/2014  
Date Data Arrived at EDR: 07/14/2015  
Date Made Active in Reports: 01/10/2017  
Number of Days to Update: 546

Source: USGS  
Telephone: 202-208-3710  
Last EDR Contact: 04/14/2017  
Next Scheduled EDR Contact: 07/24/2017  
Data Release Frequency: Semi-Annually

## FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016  
Date Data Arrived at EDR: 12/27/2016  
Date Made Active in Reports: 02/17/2017  
Number of Days to Update: 52

Source: Department of Energy  
Telephone: 202-586-3559  
Last EDR Contact: 05/05/2017  
Next Scheduled EDR Contact: 08/21/2017  
Data Release Frequency: Varies

## 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.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/14/2010  
Date Data Arrived at EDR: 10/07/2011  
Date Made Active in Reports: 03/01/2012  
Number of Days to Update: 146

Source: Department of Energy  
Telephone: 505-845-0011  
Last EDR Contact: 05/22/2017  
Next Scheduled EDR Contact: 09/04/2017  
Data Release Frequency: Varies

## LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 12/05/2016  
Date Data Arrived at EDR: 01/05/2017  
Date Made Active in Reports: 02/10/2017  
Number of Days to Update: 36

Source: Environmental Protection Agency  
Telephone: 703-603-8787  
Last EDR Contact: 04/21/2017  
Next Scheduled EDR Contact: 07/17/2017  
Data Release Frequency: Varies

## LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001  
Date Data Arrived at EDR: 10/27/2010  
Date Made Active in Reports: 12/02/2010  
Number of Days to Update: 36

Source: American Journal of Public Health  
Telephone: 703-305-6451  
Last EDR Contact: 12/02/2009  
Next Scheduled EDR Contact: N/A  
Data Release Frequency: No Update Planned

## US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016  
Date Data Arrived at EDR: 10/26/2016  
Date Made Active in Reports: 02/03/2017  
Number of Days to Update: 100

Source: EPA  
Telephone: 202-564-2496  
Last EDR Contact: 03/07/2017  
Next Scheduled EDR Contact: 07/10/2017  
Data Release Frequency: Annually

## US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016  
Date Data Arrived at EDR: 10/26/2016  
Date Made Active in Reports: 02/03/2017  
Number of Days to Update: 100

Source: EPA  
Telephone: 202-564-2496  
Last EDR Contact: 03/07/2017  
Next Scheduled EDR Contact: 04/10/2017  
Data Release Frequency: Annually

## US 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: 02/08/2017  
Date Data Arrived at EDR: 02/28/2017  
Date Made Active in Reports: 04/07/2017  
Number of Days to Update: 38

Source: Department of Labor, Mine Safety and Health Administration  
Telephone: 303-231-5959  
Last EDR Contact: 05/31/2017  
Next Scheduled EDR Contact: 09/11/2017  
Data Release Frequency: Semi-Annually

## US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/05/2005  
Date Data Arrived at EDR: 02/29/2008  
Date Made Active in Reports: 04/18/2008  
Number of Days to Update: 49

Source: USGS  
Telephone: 703-648-7709  
Last EDR Contact: 05/31/2017  
Next Scheduled EDR Contact: 09/11/2017  
Data Release Frequency: Varies

## US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011  
Date Data Arrived at EDR: 06/08/2011  
Date Made Active in Reports: 09/13/2011  
Number of Days to Update: 97

Source: USGS  
Telephone: 703-648-7709  
Last EDR Contact: 03/03/2017  
Next Scheduled EDR Contact: 06/12/2017  
Data Release Frequency: Varies

## ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/14/2017  
Date Data Arrived at EDR: 03/17/2017  
Date Made Active in Reports: 04/07/2017  
Number of Days to Update: 21

Source: Department of Interior  
Telephone: 202-208-2609  
Last EDR Contact: 03/13/2017  
Next Scheduled EDR Contact: 06/26/2017  
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: 04/04/2017  
Date Data Arrived at EDR: 04/07/2017  
Date Made Active in Reports: 05/12/2017  
Number of Days to Update: 35

Source: EPA  
Telephone: (404) 562-9900  
Last EDR Contact: 04/07/2017  
Next Scheduled EDR Contact: 06/19/2017  
Data Release Frequency: Quarterly

## ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 03/19/2017  
Date Data Arrived at EDR: 03/21/2017  
Date Made Active in Reports: 05/12/2017  
Number of Days to Update: 52

Source: Environmental Protection Agency  
Telephone: 202-564-2280  
Last EDR Contact: 03/21/2017  
Next Scheduled EDR Contact: 07/03/2017  
Data Release Frequency: Quarterly

## DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016  
Date Data Arrived at EDR: 06/03/2016  
Date Made Active in Reports: 09/02/2016  
Number of Days to Update: 91

Source: Environmental Protection Agency  
Telephone: 202-564-0527  
Last EDR Contact: 05/24/2017  
Next Scheduled EDR Contact: 09/11/2017  
Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015	Source: Department of Defense
Date Data Arrived at EDR: 01/29/2016	Telephone: 571-373-0407
Date Made Active in Reports: 04/05/2016	Last EDR Contact: 05/22/2017
Number of Days to Update: 67	Next Scheduled EDR Contact: 07/31/2017
	Data Release Frequency: Varies

## FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/22/2017	Source: EPA
Date Data Arrived at EDR: 02/22/2017	Telephone: 800-385-6164
Date Made Active in Reports: 05/12/2017	Last EDR Contact: 05/24/2017
Number of Days to Update: 79	Next Scheduled EDR Contact: 09/04/2017
	Data Release Frequency: Quarterly

## 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: 12/14/2015	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 02/23/2016	Telephone: 919-807-6359
Date Made Active in Reports: 05/18/2016	Last EDR Contact: 05/15/2017
Number of Days to Update: 85	Next Scheduled EDR Contact: 08/14/2017
	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: 06/07/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 06/22/2016	Telephone: 919-508-8400
Date Made Active in Reports: 09/01/2016	Last EDR Contact: 03/24/2017
Number of Days to Update: 71	Next Scheduled EDR Contact: 07/03/2017
	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: 09/30/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 11/09/2016	Telephone: 919-733-1322
Date Made Active in Reports: 03/06/2017	Last EDR Contact: 05/10/2017
Number of Days to Update: 117	Next Scheduled EDR Contact: 08/21/2017
	Data Release Frequency: Quarterly

## 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: 10/02/2012	Source: Department of Environmental & Natural Resources
Date Data Arrived at EDR: 10/03/2012	Telephone: 919-508-8496
Date Made Active in Reports: 10/26/2012	Last EDR Contact: 03/27/2017
Number of Days to Update: 23	Next Scheduled EDR Contact: 07/10/2017
	Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## Financial Assurance 3: Financial Assurance Information Hazardous waste financial assurance information.

Date of Government Version: 09/14/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 09/16/2016	Telephone: 919-707-8222
Date Made Active in Reports: 10/05/2016	Last EDR Contact: 03/13/2017
Number of Days to Update: 19	Next Scheduled EDR Contact: 06/26/2017
	Data Release Frequency: Varies

## NPDES: NPDES Facility Location Listing

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

Date of Government Version: 02/17/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 02/19/2016	Telephone: 919-733-7015
Date Made Active in Reports: 05/03/2016	Last EDR Contact: 05/29/2017
Number of Days to Update: 74	Next Scheduled EDR Contact: 08/14/2017
	Data Release Frequency: Varies

## UIC: Underground Injection Wells Listing

A listing of uncerground injection wells locations.

Date of Government Version: 12/07/2016	Source: Department of Environment & Natural Resources
Date Data Arrived at EDR: 12/09/2016	Telephone: 919-807-6412
Date Made Active in Reports: 03/08/2017	Last EDR Contact: 03/06/2017
Number of Days to Update: 89	Next Scheduled EDR Contact: 06/19/2017
	Data Release Frequency: Varies

## EDR HIGH RISK HISTORICAL RECORDS

### ***EDR Exclusive Records***

#### EDR MGP: 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	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

#### EDR Hist Auto: EDR Exclusive 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. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## EDR Hist Cleaner: EDR Exclusive 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. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

## EDR RECOVERED GOVERNMENT ARCHIVES

### *Exclusive Recovered Govt. Archives*

#### RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 12/24/2013	Last EDR Contact: 06/01/2012
Number of Days to Update: 176	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

#### RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 01/13/2014	Last EDR Contact: 06/01/2012
Number of Days to Update: 196	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

#### RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environment, Health and Natural Resources in North Carolina.

Date of Government Version: N/A	Source: Department of Environment, Health and Natural Resources
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 12/20/2013	Last EDR Contact: 06/01/2012
Number of Days to Update: 172	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

## 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.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## 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: 07/30/2013  
Date Data Arrived at EDR: 08/19/2013  
Date Made Active in Reports: 10/03/2013  
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection  
Telephone: 860-424-3375  
Last EDR Contact: 05/15/2017  
Next Scheduled EDR Contact: 08/28/2017  
Data Release Frequency: No Update Planned

## NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015  
Date Data Arrived at EDR: 09/29/2016  
Date Made Active in Reports: 01/03/2017  
Number of Days to Update: 96

Source: Department of Environmental Protection  
Telephone: N/A  
Last EDR Contact: 04/11/2017  
Next Scheduled EDR Contact: 07/24/2017  
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: 01/30/2017  
Date Data Arrived at EDR: 02/01/2017  
Date Made Active in Reports: 02/13/2017  
Number of Days to Update: 12

Source: Department of Environmental Conservation  
Telephone: 518-402-8651  
Last EDR Contact: 05/03/2017  
Next Scheduled EDR Contact: 08/14/2017  
Data Release Frequency: Annually

## PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015  
Date Data Arrived at EDR: 07/22/2016  
Date Made Active in Reports: 11/22/2016  
Number of Days to Update: 123

Source: Department of Environmental Protection  
Telephone: 717-783-8990  
Last EDR Contact: 04/18/2017  
Next Scheduled EDR Contact: 07/31/2017  
Data Release Frequency: Annually

## RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2013  
Date Data Arrived at EDR: 06/19/2015  
Date Made Active in Reports: 07/15/2015  
Number of Days to Update: 26

Source: Department of Environmental Management  
Telephone: 401-222-2797  
Last EDR Contact: 05/22/2017  
Next Scheduled EDR Contact: 09/04/2017  
Data Release Frequency: Annually

## WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2015  
Date Data Arrived at EDR: 04/14/2016  
Date Made Active in Reports: 06/03/2016  
Number of Days to Update: 50

Source: Department of Natural Resources  
Telephone: N/A  
Last EDR Contact: 03/13/2017  
Next Scheduled EDR Contact: 06/26/2017  
Data Release Frequency: Annually

## Oil/Gas Pipelines

Source: PennWell Corporation

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

## Electric Power Transmission Line Data

Source: PennWell Corporation

This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.



## GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

**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 was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

**NWI:** National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

### State Wetlands Data: Wetland Inventory

Source: US Fish & Wildlife Service

Telephone: 703-358-2171

### Current USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## STREET AND ADDRESS INFORMATION

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

### **TARGET PROPERTY ADDRESS**

MEADOW BROOK  
MARLER ROAD  
HAMPTONVILLE, NC 27020

### **TARGET PROPERTY COORDINATES**

Latitude (North):	36.141422 - 36° 8' 29.12"
Longitude (West):	80.819539 - 80° 49' 10.34"
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	516235.8
UTM Y (Meters):	3999448.5
Elevation:	1056 ft. above sea level

### **USGS TOPOGRAPHIC MAP**

Target Property Map:	5947711 ELKIN SOUTH, NC
Version Date:	2013

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 principal 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).

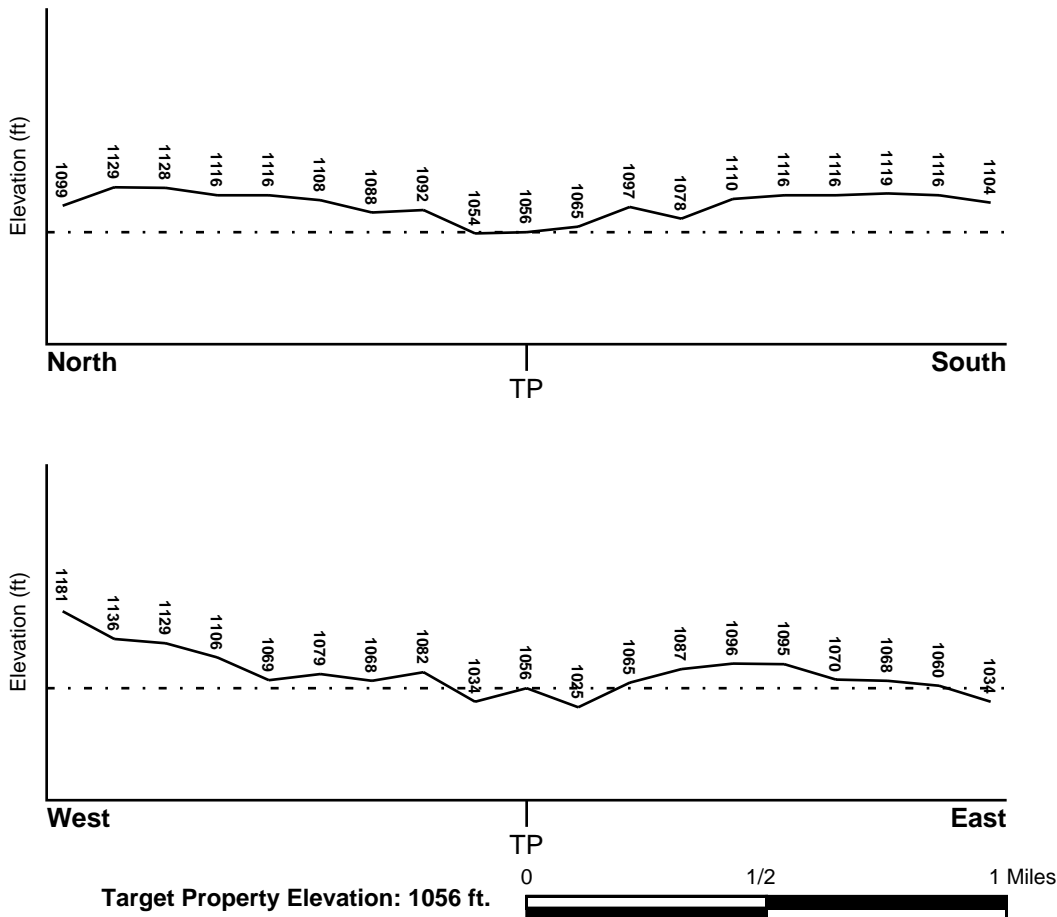
## TOPOGRAPHIC INFORMATION

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 ESE

## 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>Flood Plain Panel at Target Property</u>	<u>FEMA Source Type</u>
3710486600J	FEMA FIRM Flood data
<u>Additional Panels in search area:</u>	<u>FEMA Source Type</u>
3710486800J	FEMA FIRM Flood data
3710484600K	FEMA FIRM Flood data

## **NATIONAL WETLAND INVENTORY**

<u>NWI Quad at Target Property</u>	<u>NWI Electronic Data Coverage</u>
ELKIN SOUTH	YES - refer to the Overview Map and Detail Map

## 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>
Not Reported		

# 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: Ordovician  
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).

## 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. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

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. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Permeability Rate (in/hr)	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	7 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: 2.00 Min: 0.60	Max: 6.50 Min: 4.50
2	7 inches	11 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: 2.00 Min: 0.60	Max: 5.50 Min: 4.50
3	11 inches	50 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Elastic silt.	Max: 2.00 Min: 0.60	Max: 5.50 Min: 4.50
4	50 inches	75 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

### OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinator soil types may appear within the general area of target property.

Soil Surface Textures: sandy loam  
loam  
clay loam  
silt loam  
very channery - silt loam  
gravelly - sandy loam

Surficial Soil Types: sandy loam  
loam  
clay loam  
silt loam  
very channery - silt loam  
gravelly - sandy loam

Shallow Soil Types: sandy clay  
silt loam  
silty clay loam  
clay  
very channery - silt loam  
loam

Deeper Soil Types: silty clay loam  
weathered bedrock  
fine sandy loam  
unweathered bedrock  
sandy clay loam

# 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>
1	USGS40000894107	1/2 - 1 Mile SSW

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

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

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>
No Wells Found		

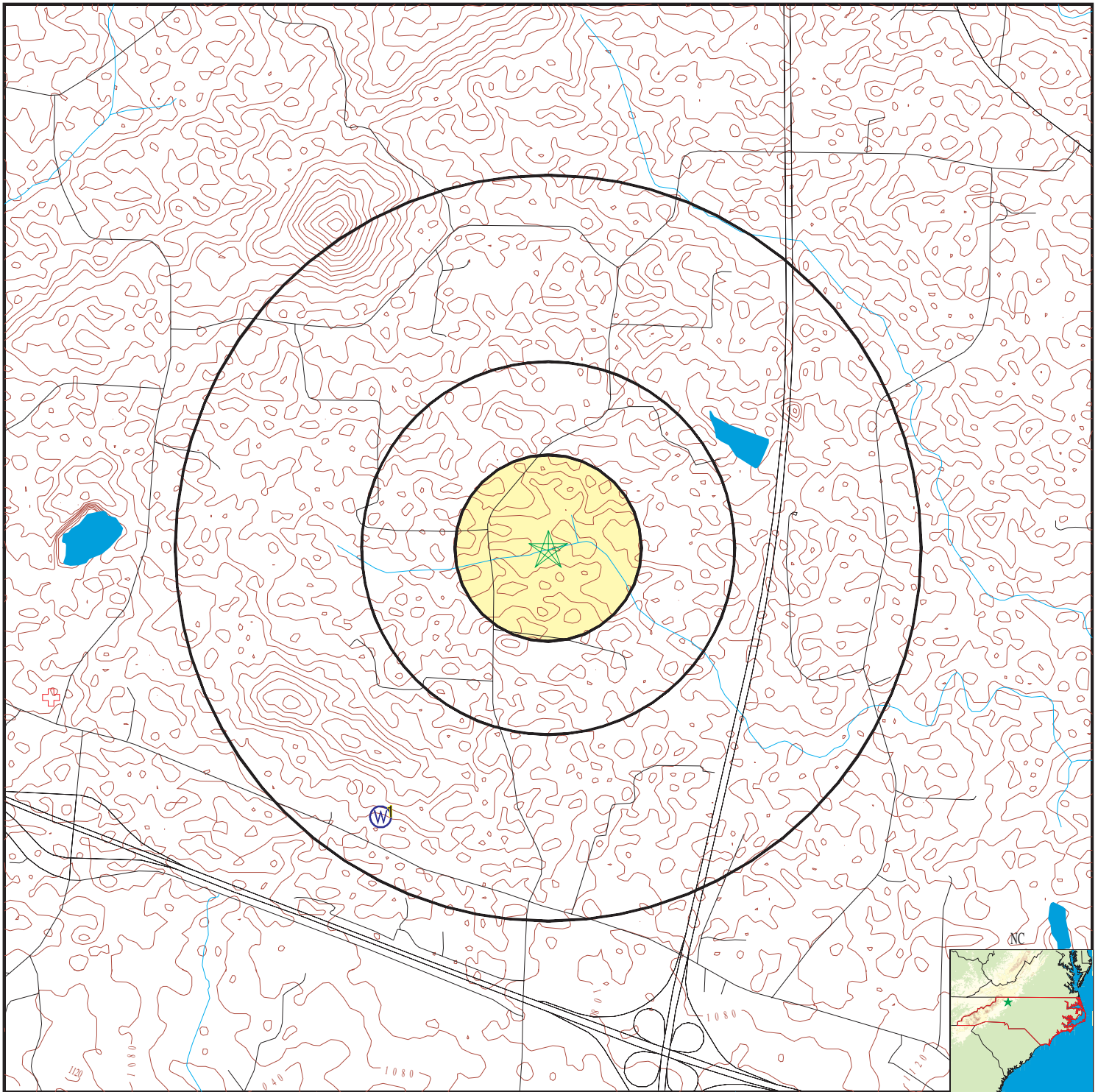
## OTHER STATE DATABASE INFORMATION

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

<u>ID</u>	<u>Class</u>
NC50009230	Plants



# PHYSICAL SETTING SOURCE MAP - 4954878.2s



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

SITE NAME: Meadow Brook  
 ADDRESS: Marler Road  
 Hamptonville NC 27020  
 LAT/LONG: 36.141422 / 80.819539

CLIENT: Ecosystem Planning and Restoration  
 CONTACT: Robert Lepsic  
 INQUIRY #: 4954878.2s  
 DATE: June 02, 2017 11:13 am

## GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID  
 Direction  
 Distance  
 Elevation

Database      EDR ID Number

<b>1</b> <b>SSW</b> <b>1/2 - 1 Mile</b> <b>Higher</b>	<b>FED USGS</b>	<b>USGS40000894107</b>
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Org. Identifier:	USGS-NC		
Formal name:	USGS North Carolina Water Science Center		
Monloc Identifier:	USGS-360751080494001		
Monloc name:	YD-G65O-3		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.1309679
Longitude:	-80.82757	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Piedmont and Blue Ridge crystalline-rock aquifers		
Formation type:	Felsic Metaigneous Rock		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	203
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID  
Direction  
Distance

Database EDR ID Number

---

GIS ID:  
Classification by Type:  
Occurrence Status:

42438  
Plants  
Historic, no evidence of destruction

NC\_NHEO NC50009230

# 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
7	2.29	0.6	7.1

Federal EPA Radon Zone for YADKIN County: 2

- 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: 27020

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.700 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.

### Current USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

## HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

### State Wetlands Data: Wetland Inventory

Source: US Fish & Wildlife Service

Telephone: 703-358-2171

## 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 Service (NRCS)

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 Service (NRCS)

Telephone: 800-672-5559

SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, 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

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

### STREET AND ADDRESS INFORMATION

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Meadow Brook

Marler Road

Hamptonville, NC 27020

Inquiry Number: 4954878.3

June 02, 2017

## Certified Sanborn® Map Report



6 Armstrong Road, 4th floor  
Shelton, CT 06484  
Toll Free: 800.352.0050  
[www.edrnet.com](http://www.edrnet.com)



# Certified Sanborn® Map Report

06/02/17

**Site Name:**

Meadow Brook  
Marler Road  
Hamptonville, NC 27020  
EDR Inquiry # 4954878.3

**Client Name:**

Ecosystem Planning and Restoration  
559 Jones Franklin Rd Ste 150  
RALEIGH, NC 27606  
Contact: Robert Lepsic



The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Ecosystem Planning and Restoration were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting [www.edrnet.com/sanborn](http://www.edrnet.com/sanborn).

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

## Certified Sanborn Results:

**Certification #** 54CF-46FC-8B18

**PO #** NA

**Project** Meadow Brook

### 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.



Sanborn® Library search results

Certification #: 54CF-46FC-8B18

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

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

*The Sanborn Library LLC Since 1866™*

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# **NCSHPO RESPONSE**



**North Carolina Department of Natural and Cultural Resources**  
**State Historic Preservation Office**

Ramona M. Bartos, Administrator

Governor Roy Cooper  
Secretary Susi H. Hamilton

Office of Archives and History  
Deputy Secretary Kevin Cherry

July 19, 2017

Mr. Kevin Tweedy  
Ecosystem Planning and Restoration, LLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606  
ktweedy@eprusa.net

Re: Meadow Brook Stream Restoration, Yadkin County, ER 17-1231

Dear Mr. Tweedy:

Thank you for your letter of June 21, 2017, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or [renee.gledhill-earley@ncdcr.gov](mailto:renee.gledhill-earley@ncdcr.gov). In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

Ramona M. Bartos

**OPTION TO PURCHASE CONSERVATION  
EASEMENT**

## OPTION TO PURCHASE CONSERVATION EASEMENT

**THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the "Option")** is made and entered into this 27<sup>th</sup> day of January, 2017 (the "Effective Date"), by and among Colon A. Shore (the "Grantor"), and **ECOSYSTEM PLANNING AND RESTORATION, LLC**, a limited liability company with offices at 559 Jones Franklin Road, Suite 150, Raleigh, North Carolina 27606 ("EPR").

### WITNESSETH:

WHEREAS, Grantor is the owner of that certain real property located in Yadkin County, North Carolina, containing 27.6 acres, more or less, having Parcel No. 486700258016 and being more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the "Property"); and

WHEREAS, Grantor has agreed to convey to EPR, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the "Easement"), over the Property in accordance with the terms of this Option; and

WHEREAS, EPR is interested in acquiring the Easement in order to develop and construct a full delivery wetland and/or stream mitigation project over the lands covered by the Easement (the "Work") in conjunction with requests for proposals issued by the Division of Mitigation Services within the North Carolina Department of Environmental Quality ("DEQ"), and EPR has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, EPR hereby notifies Grantor that: (i) EPR believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 5(a) together with the value of the environmental improvements to be made to the Easement by EPR in performing the Work on the Easement; and (ii) EPR does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of One Hundred Dollars (\$100.00) (the "Option Deposit") and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Grantor hereby grants unto EPR, its successors and assigns, including a third-party designated by EPR qualified to be the grantee of a conservation easement under N.C.G.S. §121-35, the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire eighteen (18) months after the Effective Date (the "Term"), unless extended by the parties, in writing.

**EXHIBIT A**

**DESCRIPTION OF PROPERTY**

INSERT EXHIBIT THAT  
GRAPHICALLY SHOWS THE  
PARENT PARCEL THAT  
CONTAINS THE EASEMENT,  
ALONG WITH THE PARCEL  
PIN NUMBER.



This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

**Legend**

 Parcel



EXHIBIT A

**SHORE PROPERTY**  
PROPERTY MAP

YADKIN COUNTY, NC

PREPARED BY:  

 ECOSYSTEM  
 PLANNING &  
 RESTORATION  
 EPR

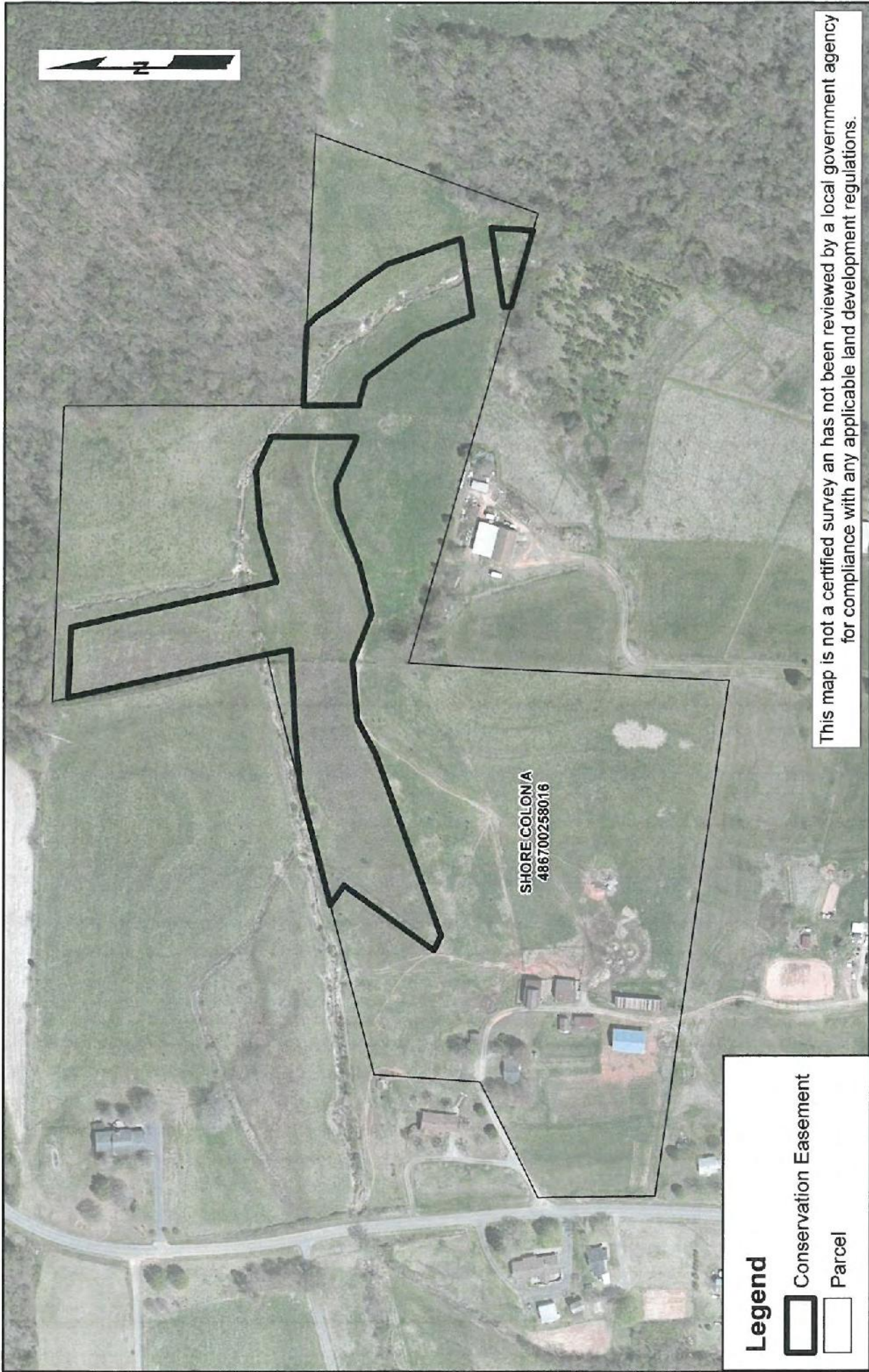
DATE:  
 JANUARY 2017

**EXHIBIT B**

**DESCRIPTION OF EASEMENT**



INSERT EXHIBIT THAT  
GRAPHICALLY SHOWS THE  
PROPOSED EASEMENT  
BOUNDARIES.

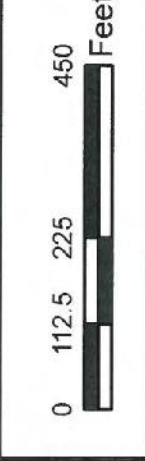




This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

**Legend**

-  Conservation Easement
-  Parcel



**SHORE PROPERTY**  
PROPERTY MAP

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION

EXHIBIT B

YADKIN COUNTY, NC

DATE:  
JANUARY 2017

## EXHIBIT C

### SCOPE OF WORK

**Property:** Colon A. Shore  
**County:** Yadkin  
**Type of Work Proposed:** Stream Restoration

EPR will provide the following services as part of the proposed work:

**Task 1** - EPR will conduct an environmental screening to identify/survey potential protected species, archaeological sites, historical architecture structures, contamination, etc. of the site.

**Task 2** - EPR will develop a surveyed plat of the proposed conservation easement, and will execute and record the easement with the Grantor.

**Task 3** – EPR will develop a site-specific restoration and/or mitigation plan for the project, including design plans that describe the work to be performed. Required permits from local, state, and federal agencies will be obtained.

**Task 4** – EPR will secure a contractor to construct the restoration/mitigation project as designed.

**Task 5** – EPR will secure a contractor to plant the site to native vegetation species, and will install any necessary monitoring devices, plots, or other required monitoring equipment.

**Tasks 6** – EPR will develop a baseline monitoring report that describes and documents the condition of the site after construction.

**Tasks 7 through 13** – EPR will conduct annual monitoring activities to document the condition of the site and to ensure the site is performing as designed and planned. Maintenance activities will be performed on an as-needed basis to ensure compliance.

**EXHIBIT D**

**Memorandum Recording**

FILED  
YADKIN COUNTY NC  
ARIC WILHELM  
REGISTER OF DEEDS  
FILED Jan 27, 2017  
AT 11:21:41 am  
BOOK 01202  
START PAGE 0243  
END PAGE 0246  
INSTRUMENT # 00331  
EXCISE TAX (None)

Prepared by and Return:

WARD EHS  
559 JONES FRANKLIN RD - SUITE 150  
RALEIGH, NC 27606

### MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

**THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT** ("Memorandum") is made and entered into this 27<sup>th</sup> day of JANUARY, 2017, by and between COLON SOURCE (the "Grantor") and **ECOSYSTEM PLANNING AND RESTORATION, LLC**, a limited liability corporation with offices at 559 Jones Franklin Road, Raleigh, NC 27606 ("EPR").

**WHEREAS**, Grantor and EPR have entered into a certain Option to Purchase Conservation Easement (the "Option") dated 27<sup>th</sup> JANUARY 2017, pursuant to which Grantor granted to EPR, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Yadkin County, North Carolina, which property is more particularly described on the attached Exhibit B (the "Property"); and

**WHEREAS**, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

**NOW, THEREFORE**, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on 27<sup>th</sup> JANUARY 2017 and shall expire on 27<sup>th</sup> JULY 2018
2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.
3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Colin Shore

Print Name: Colin Shore

Title: Land owner

STATE OF North Carolina

COUNTY OF Wake

I, a Notary Public of the County and State aforesaid, certify that Colin Shore personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: driver license

This the 27 day of January, 2017.



Christa E Morrison

Official Signature of Notary Public

Christa E Morrison

Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]

**ECOSYSTEM PLANNING AND RESTORATION, LLC**, a limited liability company

By: [Signature]

Print Name: Kevin Tweedy

Title: Vice President

STATE OF North Carolina

COUNTY OF Wake

I, Christa E Morrison, the undersigned Notary Public of the County and State aforesaid, certify that Kevin L Tweedy personally appeared before me this day, acknowledging to me that he is Vice President of Ecosystem Planning and Restoration, LLC, a limited liability company and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the principal's identity in the form of driver license.

This the 25 day of January, 2017.

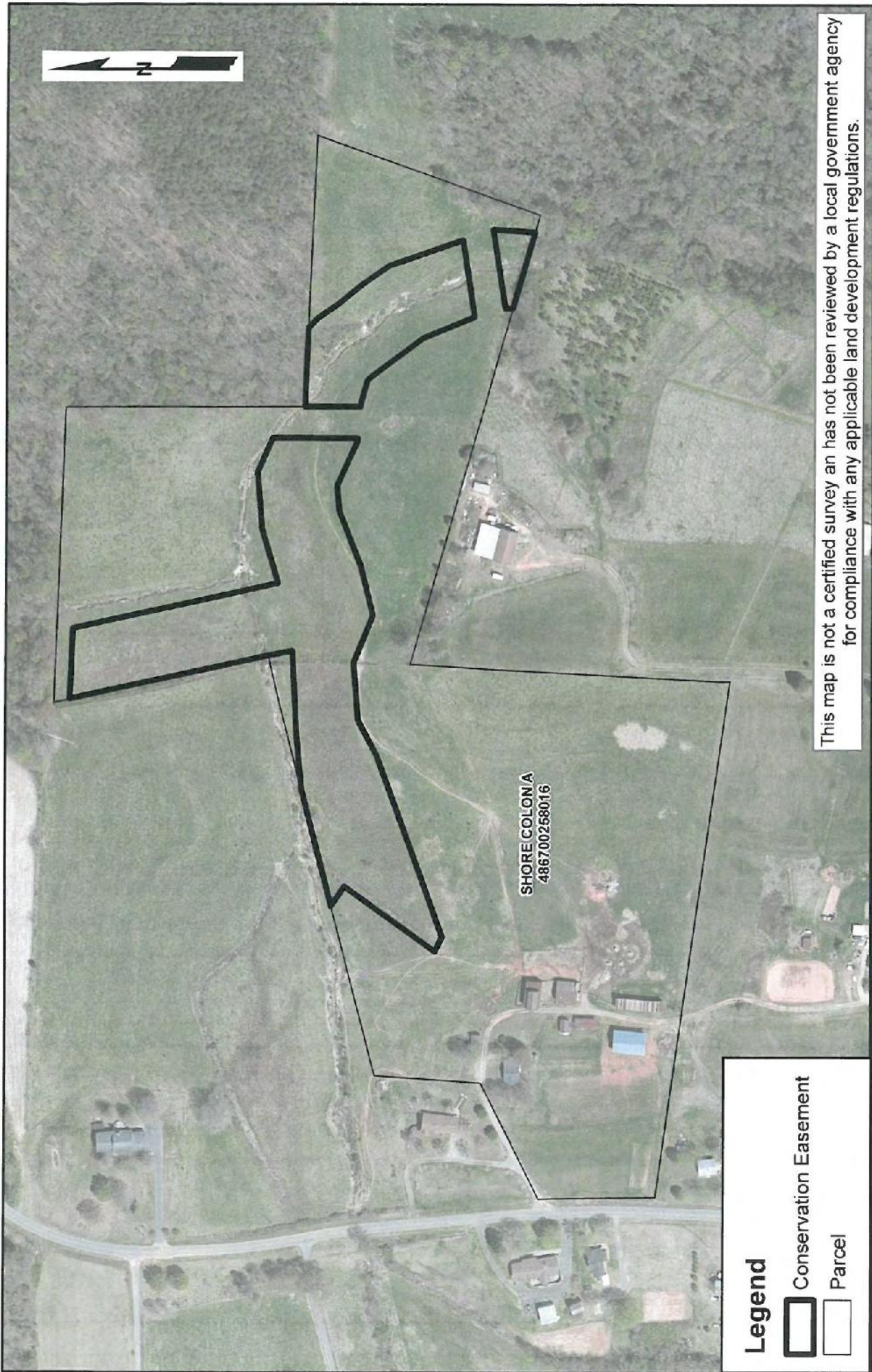


My Commission Expires: 3-31-21

Christa E Morrison  
Official Signature Notary Public

Christa E Morrison  
Printed or Typed Name of Notary

[AFFIX NOTARIAL STAMP-SEAL]



This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

**Legend**

-  Conservation Easement
-  Parcel

0 112.5 225 450 Feet

**SHORE PROPERTY**  
PROPERTY MAP

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION

EXHIBIT B

YADKIN COUNTY, NC

DATE:  
JANUARY 2017

## OPTION TO PURCHASE CONSERVATION EASEMENT

**THIS OPTION TO PURCHASE CONSERVATION EASEMENT (the “Option”)** is made and entered into this 27<sup>th</sup> day of January, 2017 (the “Effective Date”), by and among Grady M. Shore and Steve Andrew Shore (the “Grantors”), and **ECOSYSTEM PLANNING AND RESTORATION, LLC**, a limited liability company with offices at 559 Jones Franklin Road, Suite 150, Raleigh, North Carolina 27606 (“EPR”).

### WITNESSETH:

WHEREAS, Grantors are the owner of that certain real properties located in Yadkin County, North Carolina, containing 0.839 and 9.142 acres, more or less, having Parcel No. 4867254139 and 4867254364 respectively and being more particularly described on Exhibit A attached hereto and incorporated herein by reference, together with the improvements thereon and all appurtenances thereto belonging and appertaining, and all creeks, streams, rights-of-way, roads, streets and ways bounding said real property (collectively the “Property”); and

WHEREAS, Grantors have agreed to convey to EPR, an exclusive right and option to acquire a conservation easement, as more particularly described on the attached Exhibit B (the “Easement”), over the Property in accordance with the terms of this Option; and

WHEREAS, EPR is interested in acquiring the Easement in order to develop and construct a full delivery wetland and/or stream mitigation project over the lands covered by the Easement (the “Work”) in conjunction with requests for proposals issued by the Division of Mitigation Services within the North Carolina Department of Environmental Quality (“DEQ”), and EPR has agreed to undertake such Work with respect to the Easement in accordance with the scope of work set forth in Exhibit C, attached hereto; and

WHEREAS, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, EPR hereby notifies Grantor that: (i) EPR believes the fair market value of the Easement is the purchase price, pursuant to Paragraph 5(a) together with the value of the environmental improvements to be made to the Easement by EPR in performing the Work on the Easement; and (ii) EPR does not possess the power of eminent domain;

NOW THEREFORE, in consideration of the sum of One Hundred Dollars (\$100.00) (the “Option Deposit”) and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Grantors hereby grants unto EPR, its successors and assigns, including a third-party designated by EPR qualified to be the grantee of a conservation easement under N.C.G.S. §121-35, the exclusive right and option to purchase the Easement in accordance with and subject to the terms and conditions set forth in this Option.

2. Term. The term of this Option shall commence on the Effective Date and shall expire eighteen (18) months after the Effective Date (the “Term”), unless extended by the parties, in writing.



**EXHIBIT A**

**DESCRIPTION OF PROPERTY**

INSERT EXHIBIT THAT  
GRAPHICALLY SHOWS THE  
PARENT PARCEL THAT  
CONTAINS THE EASEMENT,  
ALONG WITH THE PARCEL  
PIN NUMBER.



This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

**Legend**

 Parcel

0 75 150  Feet

**SHORE PROPERTY**  
PROPERTY MAP

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION

EXHIBIT A

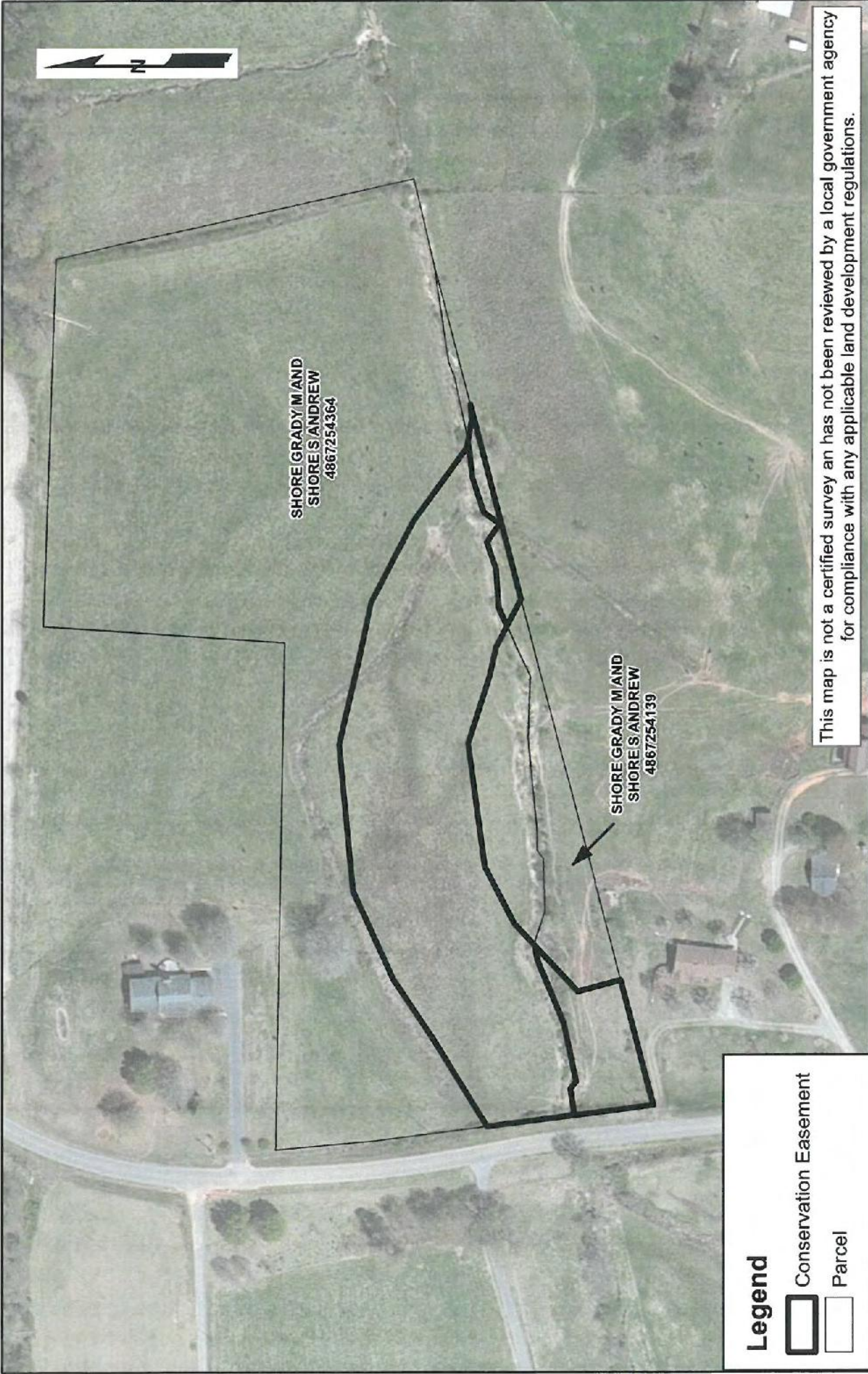
YADKIN COUNTY, NC

DATE:  
JANUARY 2017

**EXHIBIT B**



**DESCRIPTION OF EASEMENT**

INSERT EXHIBIT THAT  
GRAPHICALLY SHOWS THE  
PROPOSED EASEMENT  
BOUNDARIES.



This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

**Legend**

-  Conservation Easement
-  Parcel

0 75 150 Feet



**SHORE PROPERTY**  
PROPERTY MAP

PREPARED BY:  
 ECOSYSTEM PLANNING & RESTORATION EPR

EXHIBIT B

YADKIN COUNTY, NC

DATE:  
JANUARY 2017

## EXHIBIT C

### SCOPE OF WORK

**Property:** Grady M. Shore & Steve A. Shore  
**County:** Yadkin  
**Type of Work Proposed:** Stream Restoration

EPR will provide the following services as part of the proposed work:

**Task 1** - EPR will conduct an environmental screening to identify/survey potential protected species, archaeological sites, historical architecture structures, contamination, etc. of the site.

**Task 2** - EPR will develop a surveyed plat of the proposed conservation easement, and will execute and record the easement with the Grantor.

**Task 3** – EPR will develop a site-specific restoration and/or mitigation plan for the project, including design plans that describe the work to be performed. Required permits from local, state, and federal agencies will be obtained.

**Task 4** – EPR will secure a contractor to construct the restoration/mitigation project as designed.

**Task 5** – EPR will secure a contractor to plant the site to native vegetation species, and will install any necessary monitoring devices, plots, or other required monitoring equipment.

**Tasks 6** – EPR will develop a baseline monitoring report that describes and documents the condition of the site after construction.

**Tasks 7 through 13** – EPR will conduct annual monitoring activities to document the condition of the site and to ensure the site is performing as designed and planned. Maintenance activities will be performed on an as-needed basis to ensure compliance.

**EXHIBIT D**

**Memorandum Recording**

FILED  
YADKIN COUNTY NC  
ARIC WILHELM  
REGISTER OF DEEDS  
FILED Jan 27, 2017  
AT 11:22:45 am  
BOOK 01202  
START PAGE 0247  
END PAGE 0251  
INSTRUMENT # 00332  
EXCISE TAX (None)

Prepared by and Return:

WARD ELIS  
559 JONES FRANKLIN RD -SUITE 150  
RALEIGH, NC 27606

#### MEMORANDUM OF OPTION TO PURCHASE CONSERVATION EASEMENT

**THIS MEMORANDUM FOR OPTION TO PURCHASE CONSERVATION EASEMENT** ("Memorandum") is made and entered into this 27<sup>th</sup> day of JANUARY, 2017, by and between BRADY MICHAEL SHURE + STEVE ANDREW SHURE (the "Grantors") and **ECOSYSTEM PLANNING AND RESTORATION, LLC**, a limited liability corporation with offices at 559 Jones Franklin Road, Raleigh, NC 27606 ("EPR").

**WHEREAS**, Grantor and EPR have entered into a certain Option to Purchase Conservation Easement (the "Option") dated JAN 27<sup>th</sup>, 2017, pursuant to which Grantor granted to EPR, its successors and assigns, an option to purchase a conservation easement (the "Easement") over certain real property located in Yadkin County, North Carolina, which property is more particularly described on the attached Exhibit B (the "Property"); and

**WHEREAS**, The parties enter into this Memorandum for the purpose of setting forth certain terms and conditions of the Option and to provide constructive notice of the Option;

**NOW, THEREFORE**, in consideration of the foregoing, the parties hereby agree as follows.

1. The term of the Option commenced on JAN 27<sup>th</sup> 2017 and shall expire on JULY 27<sup>th</sup> 2018.
2. All of the provisions set forth in the Option are incorporated in this Memorandum by reference.
3. The Option shall be binding upon and inure to the benefit of the parties and their respective heirs, successors and assigns.

[SIGNATURES AND NOTARY ACKNOWLEDGMENTS APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

**GRANTOR:**

By: Grady Michael Shore

Print Name Grady Michael Shore

Title: Land Owner

STATE OF North Carolina

COUNTY OF Wake

I, a Notary Public of the County and State aforesaid, certify that Grady Michael Shore personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: driver license

This the 27 day of January, 2017.



Christa E Morrison  
Official Signature of Notary Public

Christa E Morrison  
Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]



IN WITNESS WHEREOF, the parties have duly executed this Memorandum as of the date first above written.

GRANTOR:

By: Steve Andrew Shore

Print Name: Steve Andrew Shore

Title: Land owner

STATE OF North Carolina

COUNTY OF Wake

I, a Notary Public of the County and State aforesaid, certify that Steve Andrew Shore personally appeared before me this day and acknowledged that he/she voluntarily executed the foregoing instrument. I have received satisfactory evidence of the principal's identity in the form of: driver license

This the 27 day of January, 2017.



Christa E. Morrison  
Official Signature of Notary Public

Christa E. Morrison  
Printed or Typed Name of Notary

My Commission Expires 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]

**ECOSYSTEM PLANNING AND RESTORATION, LLC**, a limited liability company

By: [Signature]

Print Name: Kevin Tweedy

Title: Vice President

STATE OF North Carolina

COUNTY OF Wake

I, Christa E Morrison, the undersigned Notary Public of the County and State aforesaid, certify that Kevin L Tweedy personally appeared before me this day, acknowledging to me that he is Vice President of Ecosystem Planning and Restoration, LLC, a limited liability company and that he acknowledged to me that he voluntarily signed the foregoing document for the purposes therein expressed and in the representative capacity so stated. I have received satisfactory evidence of the principal's identity in the form of driver license.

This is the 25 day of January, 2017.

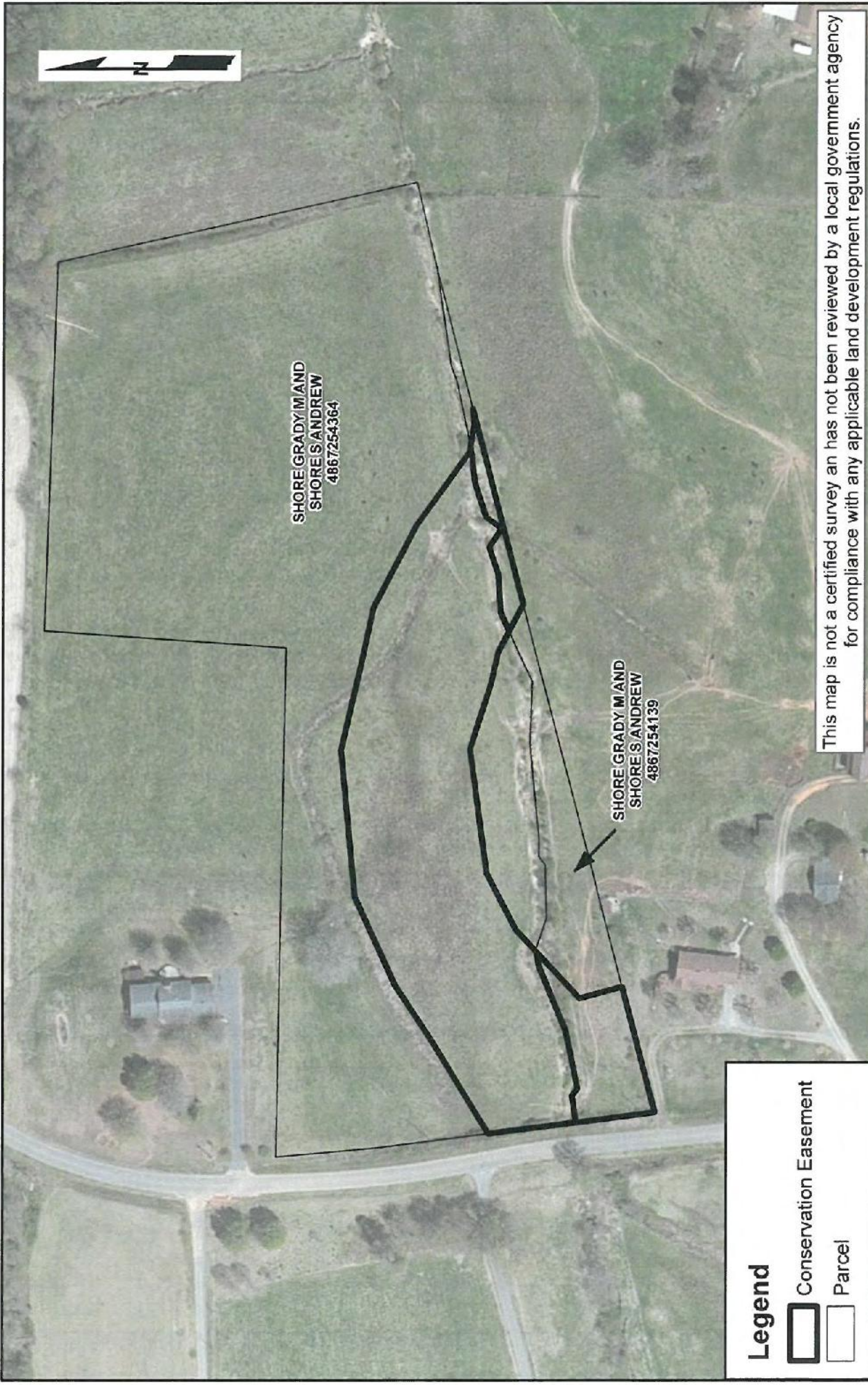


Christa E Morrison  
Official Signature Notary Public

Christa E Morrison  
Printed or Typed Name of Notary

My Commission Expires: 3-31-21

[AFFIX NOTARIAL STAMP-SEAL]



This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

**Legend**

-  Conservation Easement
-  Parcel



**SHORE PROPERTY**  
PROPERTY MAP

PREPARED BY:  
 ECOSYSTEM PLANNING & RESTORATION

EXHIBIT B

YADKIN COUNTY, NC

DATE:  
JANUARY 2017

# **USFWS CORRESPONDENCE**



Ecosystem Planning and Restoration, LLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606

Phone: (919) 388-0787  
www.eprusa.net

June 21, 2017

Marella Buncick, Endangered Species Biologist  
USFWS Asheville Field Office  
160 Zillicoa Street  
Asheville NC 28801

**RE: Categorical Exclusion for Meadow Brook Stream Restoration, NCDEQ DMS Full-Delivery Yadkin River Basin, Cataloging Unit 03040101, Yadkin County, NC**

Dear Ms. Buncick,

Ecosystem Planning and Restoration (EPR) respectfully requests review and comment from the United States Fish and Wildlife Service (USFWS) on any possible concerns they may have regarding the implementation the subject project. In order to comply with the Nationwide Permit general conditions and development of a Categorical Exclusion (CE), EPR requests the US Fish and Wildlife Service's comments on the proposed project. Project details are presented below.

The project is located on Marler Road, approximately  $\frac{3}{4}$  miles east of Interstate 77 and seven miles south of the City of Elkin in Yadkin County, North Carolina. Figure 1 depicts the project on the United States Geological Survey (USGS) Elkin South, North Carolina 7.5-minute topographic map at latitude 36° 08' 29" N and longitude 80° 49' 08" W and is comprised of three parcels: Parcel ID# 4867254362, Parcel ID# 4867254139 and parcel ID# 485700258016.

The Meadow Brook site was identified to provide in-kind mitigation for unavoidable stream and/or wetland impacts. Segments of this stream have been identified as incised, eroding, and no longer connected to its floodplain. In total, approximately 3,400 linear feet of stream will be restored by reconnecting them to their historic floodplain at their approximate historic locations. The new channel will be constructed within the existing pasture land with excavation depths ranging between 1-4 feet. All work will take place within the 10-acre conservation easement shown on Figure 2.

Construction activities will take place within a jurisdictional waterbody requiring Section 401 and 404 permits from NC Department of Environmental Quality (DEQ) and the US Army Corps of Engineers. Grading activities will require a Sediment and Erosion Control permit from NC Division of Land Quality. The site is also located within a mapped FEMA floodplain and will require coordination with Yadkin County Floodplain Administrators.

As of April 2, 2015, USFWS lists one federally protected species (Northern long-eared bat) and three federal species of concern for Yadkin County NC. A brief description of the Northern long-eared bat's (NLEB) habitat requirements follows, along with the Biological Conclusion rendered based on field assessments of the project area. Habitat requirements of the NLEB are based on the current best available information and/or USFWS.



Common Name	Scientific Name	Federal Status	Habitat Present	Biological Conclusion
Allegheny woodrat	<i>Neotoma magister</i>	FSC	No	N/A
Northern long-eared bat	<i>Myotis septentrionalis</i>	T	No	No Effect
Robust redhorse	<i>Moxostoma robustum</i>	FSC	No	N/A
Brook floater	<i>Alasmidonta varicose</i>	FSC	No	N/A

T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

FSC = Federal Species of Concern. FSC is an informal term. It is not defined in the federal Endangered Species Act. In North Carolina, the Asheville and Raleigh Field Offices of the US Fish and Wildlife Service (Service) define Federal Species of Concern as those species that appear to be in decline or otherwise in need of conservation and are under consideration for listing or for which there is insufficient information to support listing at this time. Subsumed under the term "FSC" are all species petitioned by outside parties and other selected focal species identified in Service strategic plans, State Wildlife Action Plans, or Natural Heritage Program Lists.

N/A – Not applicable to FSC

### Northern long-eared bat

USFWS Recommended Survey Window: June 1 – August 15

**Habitat Description:** In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat has also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

**Biological Conclusion:** No effect

Suitable habitat for the NLEB does not occur within the project area. The project area is comprised of open pastureland with minimal shrubby vegetation adjacent to the stream. A search of the NC Natural Heritage data base didn't identify any occurrences of threatened or endanger species within 1 mile of the project area.

If EPR has not received response from you within 45 days, we will assume that the USFWS does not have any comment or information relevant to the implementation of this project at the current time. We thank you in advance for your timely response, input, and cooperation. Please contact me at the above phone number or address with any question.

Sincerely,

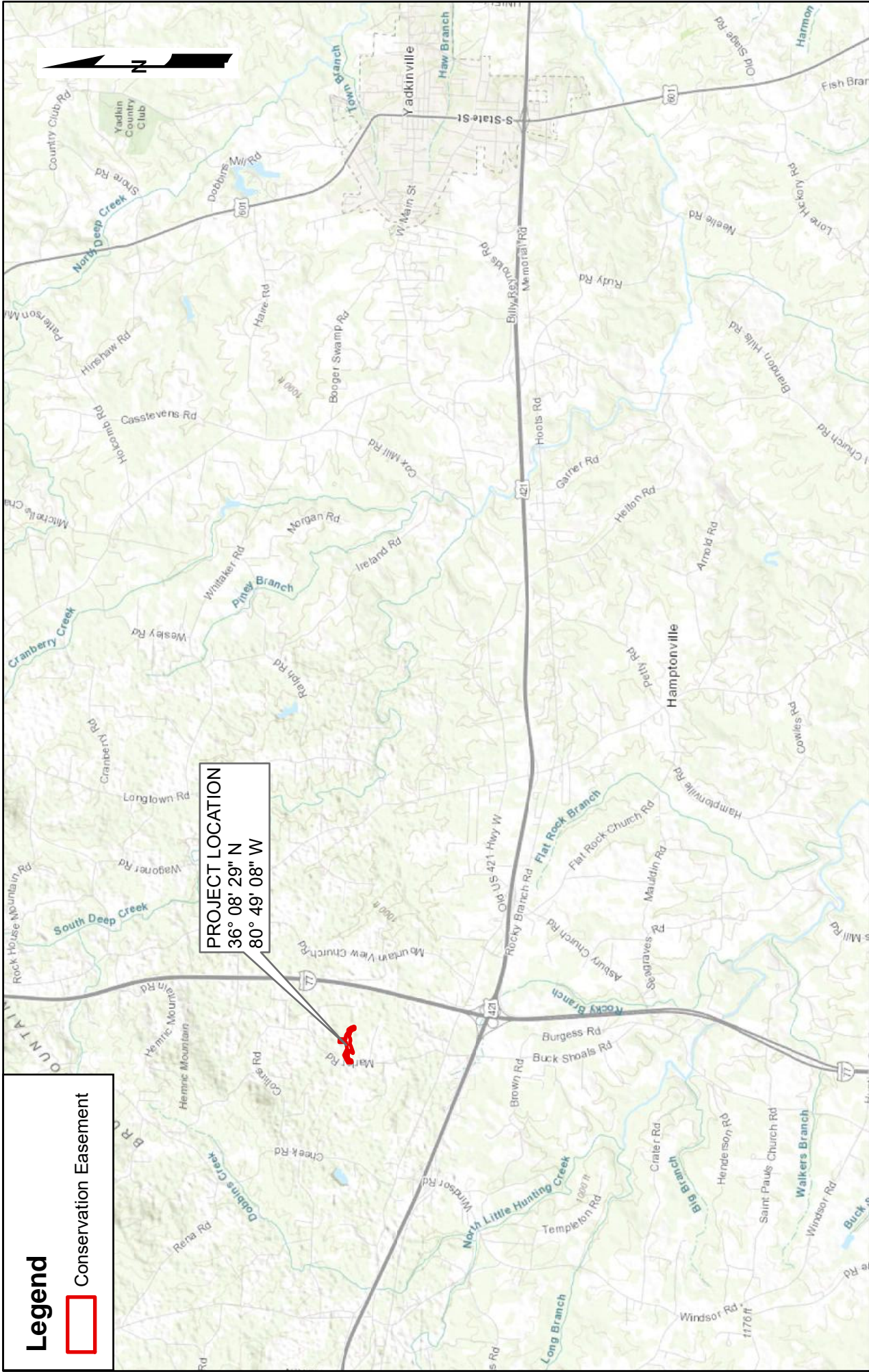


Kevin Tweedy, PE  
Vice President

Natureserve. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, VA. <http://explorer.natureserve.org>. (Accessed: May 31, 2017.)

[USFWS]  
<https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/NLEBFactSheet01April2015.pdf>. (Accessed: May 31, 2017.)

[USFWS]. 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5 & 6. <https://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf>. (Accessed: May 31, 2017.)

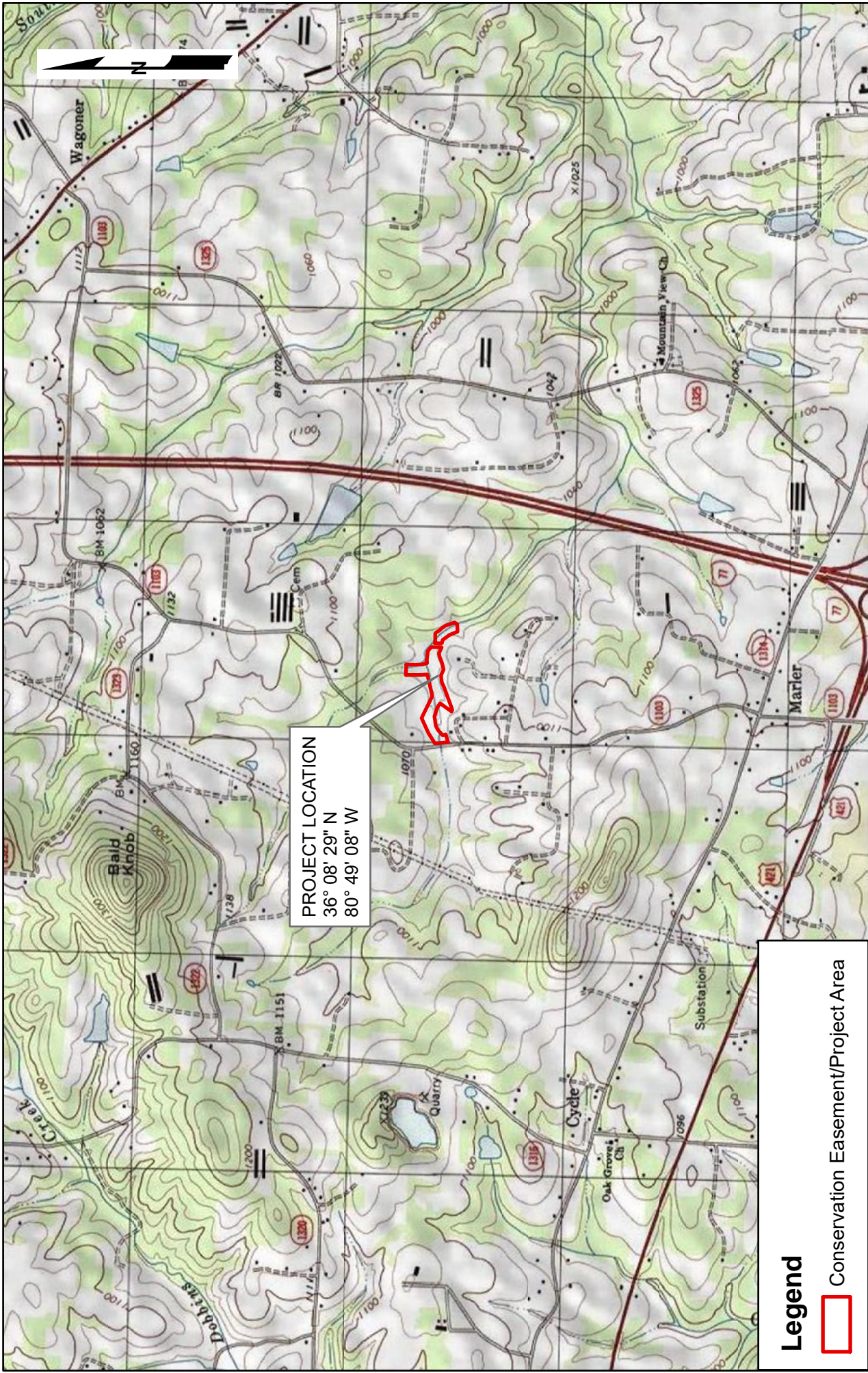


**Legend**

Conservation Easement

<p>PREPARED FOR: NCDEQ DIVISION OF MITIGATION SERVICES</p>	<p>MEADOW BROOK SITE VICINITY MAP</p>	<p>0 0.5 1 Miles</p>
<p>PREPARED BY: ECOSYSTEM PLANNING &amp; EPR RESTORATION</p>	<p>YADKIN COUNTY, NC</p>	<p>FIGURE 1</p>

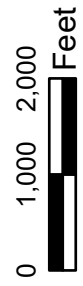





**PROJECT LOCATION**  
 36° 08' 29" N  
 80° 49' 08" W

**Legend**

Conservation Easement/Project Area



<p>FIGURE 2</p>	<p><b>MEADOW BROOK SITE</b>        USGS TOPOGRAPHIC MAP</p>	<p>PREPARED FOR:        NCDEQ        DIVISION OF        MITIGATION SERVICES</p>
<p>YADKIN COUNTY, NC</p>	<p>PREPARED BY:   ECOSYSTEM        PLANNING &amp;        RESTORATION</p>	<p>PREPARED FOR:        NCDEQ        DIVISION OF        MITIGATION SERVICES</p>



Overview of site.



Hillside adjacent to stream used as pasture land.



Representative section of stream with brushy vegetation.



Representative section of stream with no woody vegetation.

**NORTHERN LONG-EARED BAT  
STREAMLINED CONSULTATION FORM**

## Cidney Jones

---

**From:** Brew, Donnie (FHWA) <Donnie.Brew@dot.gov>  
**Sent:** Friday, September 29, 2017 12:54 PM  
**To:** Marella\_Buncick@fws.gov  
**Cc:** Wiesner, Paul; Tsomides, Harry; Kevin Tweedy  
**Subject:** Meadow Brook site NLEB 4(d) rule consultation  
**Attachments:** Meadow Brook site NLEB 4(d) Consultation form.pdf

Good afternoon Marella,

The purpose of this message is to notify your office that FHWA will use the streamlined consultation framework for the Meadow Brook Mitigation Site in Yadkin County, NC.

Attached is a completed NLEB 4(d) Rule Streamlined Consultation form, including site maps.

Thank you and have a great weekend,

Donnie

## Notifying the Service Under the Framework

### ***Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form***

Federal agencies (or designated non-federal representatives) should use the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation form to notify the Service of their project and meet the requirements of the framework.

[Northern Long-Eared Bat 4\(d\) Rule Streamlined Consultation Form](#) (Word document)

Information requested in the Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form serves to

- (1) notify the field office that an action agency will use the streamlined framework;
- (2) describe the project with sufficient detail to support the required determination; and
- (3) enable the USFWS to track effects and determine if reinitiation of consultation for the 4(d) rule is required. This form requests the minimum amount of information required for the Service to be able to track this information.

Providing information in the Streamlined Consultation Form does not address section 7(a)(2) compliance for any other listed species.

**Donnie Brew**  
***Preconstruction & Environment Engineer***  
**Federal Highway Administration**  
**310 New Bern Ave, Suite 410**

Raleigh, NC 27601  
[donnie.brew@dot.gov](mailto:donnie.brew@dot.gov)  
919-747-7017

\*\*\*Please consider the environment before printing this email.\*\*\*

## Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

<b>Information to Determine 4(d) Rule Compliance:</b>	<b>YES</b>	<b>NO</b>
1. Does the project occur wholly outside of the WNS Zone <sup>1</sup> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Have you contacted the appropriate agency <sup>2</sup> to determine if your project is near known hibernacula or maternity roost trees?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Could the project alter the entrance or interior environment of a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

### Agency and Applicant<sup>3</sup> (Name, Email, Phone No.):

Agency:

Federal Highway Administration (FHWA)

Donnie Brew, [donnie.brew@dot.gov](mailto:donnie.brew@dot.gov), (919) 747-7017

Agency Representative:

Ecosystem Planning and Restoration, LLC

Kevin Tweedy, PE, [ktweedy@eprusa.net](mailto:ktweedy@eprusa.net), (919) 388-1787

<sup>1</sup> <http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf>

<sup>2</sup> See <http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html>

<sup>3</sup> If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

**Project Name:** Meadow Brook Stream Restoration

**Project Location** (include coordinates if known):

The project is located on Marler Road, approximately ¾ miles east of Interstate 77 and seven miles south of the City of Elkin in Yadkin County, North Carolina. Figure 2 depicts the project on the United States Geological Survey (USGS) Elkin South, North Carolina 7.5-minute topographic map at latitude 36° 08' 29" N and longitude 80° 49' 08" W and is comprised of three parcels: Parcel ID# 4867254362, Parcel ID# 4867254139 and parcel ID# 485700258016.

**Basic Project Description** (provide narrative below or attach additional information):

The Meadow Brook site was identified to provide in-kind mitigation for unavoidable stream and/or wetland impacts. Segments of this stream have been identified as incised, eroding, and no longer connected to its floodplain. In total, approximately 3,400 linear feet of stream will be restored by reconnecting them to their historic floodplain at their approximate historic locations. The new channel will be constructed within the existing pasture land with excavation depths ranging between 1-4 feet. All work will take place within the 10-acre conservation easement shown on Figure 2.

<b>General Project Information</b>	<b>YES</b>	<b>NO</b>
Does the project occur within 0.25 miles of a known hibernaculum?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the project occur within 150 feet of a known maternity roost tree?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the project include forest conversion <sup>4</sup> ? (if yes, report acreage below)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Estimated total acres of forest conversion	<0.1 Acre	
If known, estimated acres <sup>5</sup> of forest conversion from April 1 to October 31		
If known, estimated acres of forest conversion from June 1 to July 31 <sup>6</sup>		
Does the project include timber harvest? (if yes, report acreage below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Estimated wind capacity (MW)		

<sup>4</sup> Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).

<sup>5</sup> If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.

<sup>6</sup> If the activity includes tree clearing in June and July, also include those acreage in April to October.



Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

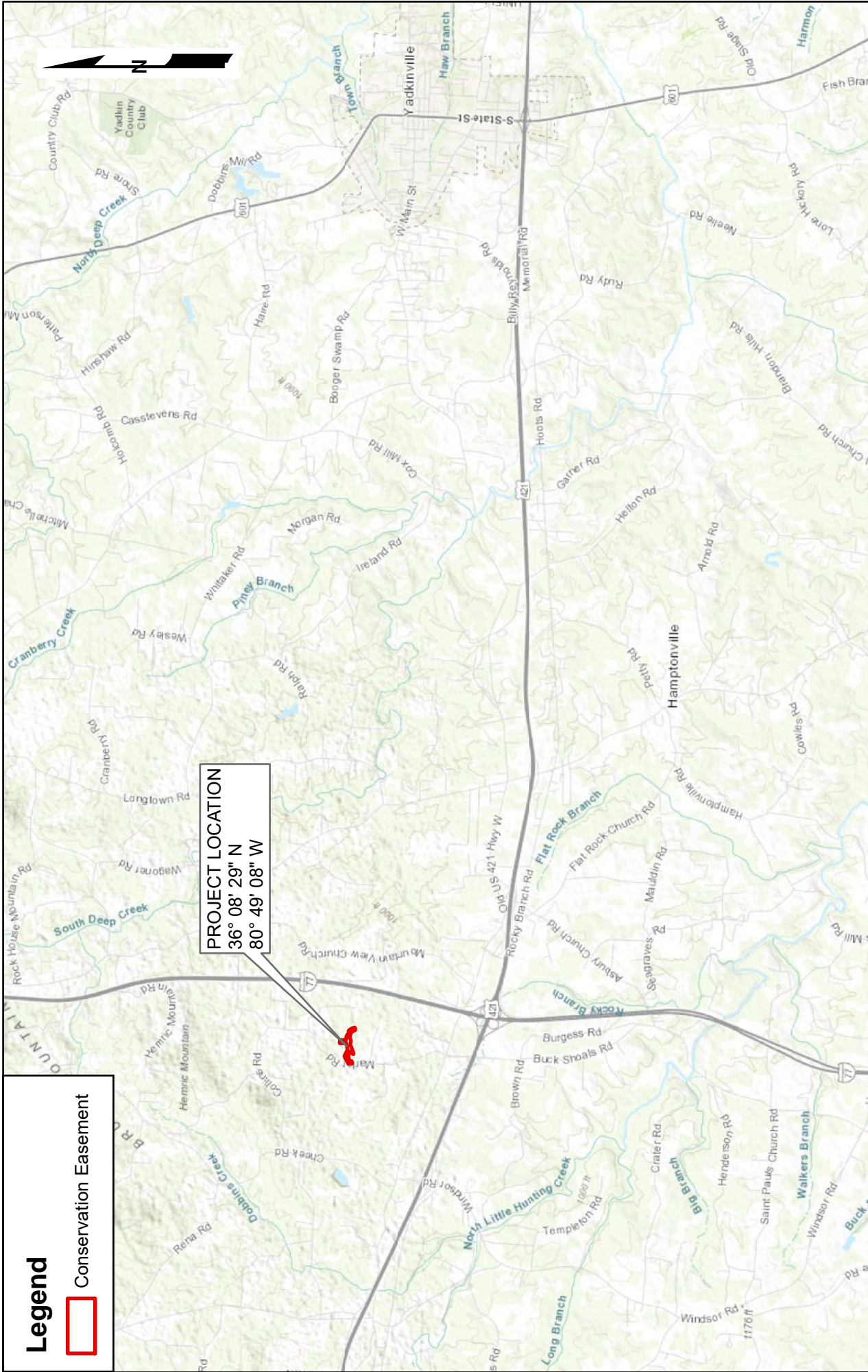
The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: \_\_\_\_\_



Date Submitted: \_\_\_\_\_

9-29-17



**Legend**

Conservation Easement

PREPARED FOR:  
 NCDEQ  
 DIVISION OF  
 MITIGATION SERVICES

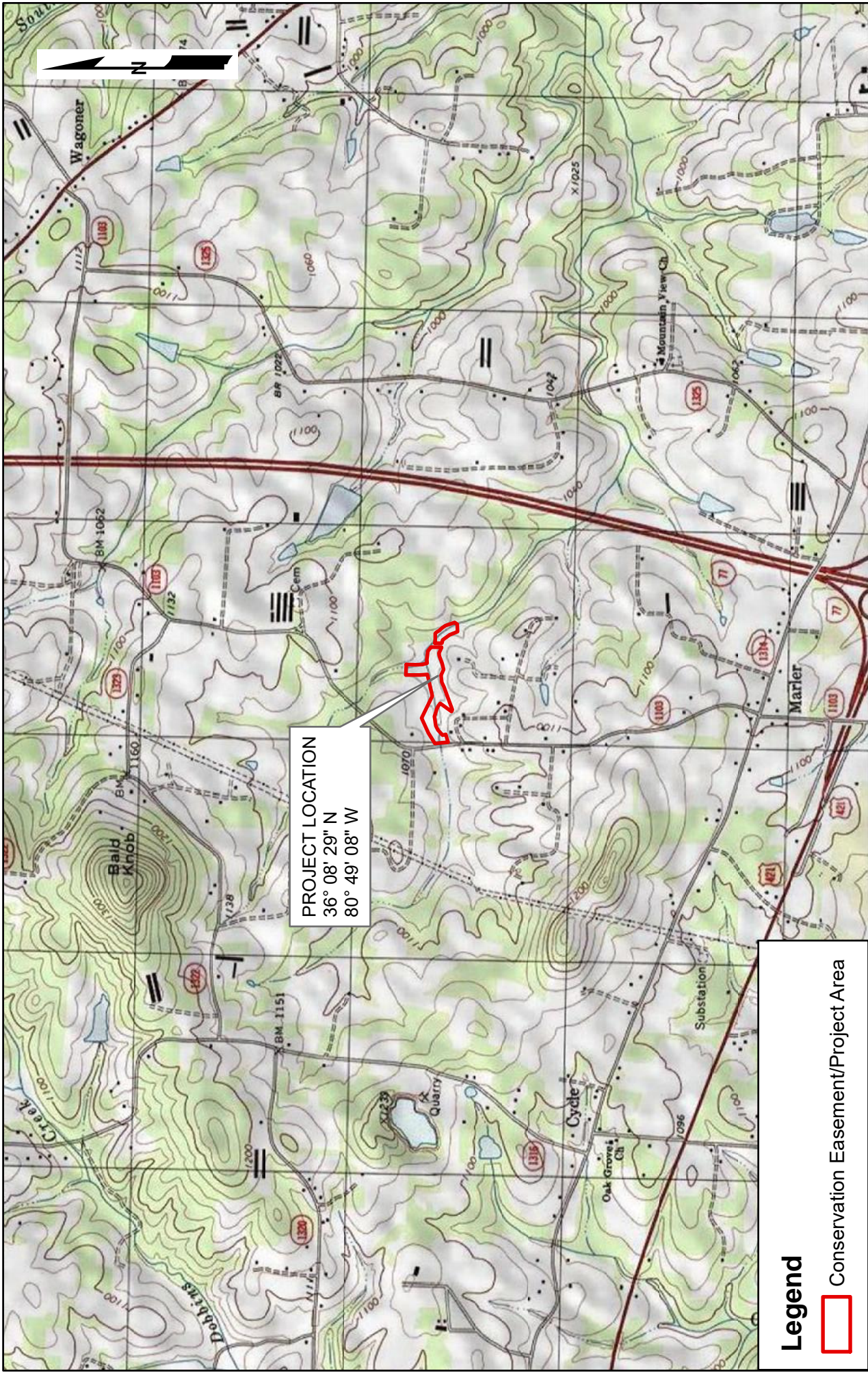
**MEADOW BROOK SITE**  
 VICINITY MAP

0 0.5 1 Miles

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION


YADKIN COUNTY, NC


FIGURE 1



**PROJECT LOCATION**  
 36° 08' 29" N  
 80° 49' 08" W

**Legend**

 Conservation Easement/Project Area

0 1,000 2,000  
 Feet

**MEADOW BROOK SITE**  
 USGS TOPOGRAPHIC MAP

PREPARED FOR:  
 NCDEQ  
 DIVISION OF  
 MITIGATION SERVICES

FIGURE 2

YADKIN COUNTY, NC

PREPARED BY:  
 ECOSYSTEM  
 PLANNING &  
 RESTORATION



Overview of site.



Hillside adjacent to stream used as pasture land.



Representative section of stream with brushy vegetation.



Representative section of stream with no woody vegetation.

# **NCWRC RESPONSE**



## ☒ North Carolina Wildlife Resources Commission ☒

---

Gordon Myers, Executive Director

11 July 2017

Mr. Kevin Tweedy, PE  
Ecosystem Planning and Restoration, LLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606

Subject: Categorical Exclusion  
Meadow Brook Stream Restoration Project  
Yadkin County, North Carolina

Dear Mr. Tweedy,

Biologists with the North Carolina Wildlife Resource Commission (NCWRC) received your request for review and comment on potential concerns for the Meadow Brook Stream Restoration Project. We have no records of federally or state protected species within or adjacent to the restoration project. Based upon the information provided to NCWRC, it is unlikely that the site will adversely affect any federal or state-listed species.

Stream restoration projects often improve water quality and aquatic habitat. Establishing native, forested buffers in riparian areas will help protect water quality, improve aquatic and terrestrial habitats, and provide a travel corridor for wildlife species. Provided measures are taken to minimize erosion and sedimentation from construction/restoration activities, we do not anticipate the project to result in significant adverse impacts to aquatic and terrestrial wildlife resources.

Thank you for the opportunity to review this proposed project. If I can be of additional assistance, please call (336) 290-0056 or email [olivia.munzer@ncwildlife.org](mailto:olivia.munzer@ncwildlife.org).

Sincerely,

Olivia Munzer  
Western Piedmont Habitat Conservation Coordinator  
Habitat Conservation Program

# **NRCS CORRESPONDENCE**



## Cidney Jones

---

**From:** Cidney Jones  
**Sent:** Thursday, September 7, 2017 8:47 AM  
**To:** 'milton.cortes@nc.usda.gov'  
**Cc:** Robert Lepsic; 'kent.clary@nc.usda.gov'  
**Subject:** Meadow Brook Stream Restoration Project, FPPA  
**Attachments:** AD1006\_MeadowBrookStreamRestoration\_EPR.PDF;  
MeadowBrookSite\_Farmland\_Classification.pdf; MB\_NRCS\_Packet.pdf

Dear Mr. Cortes,

Please find attached the AD1006 form for the Meadow Brook Stream Restoration Project with Parts VI and VII completed. The original request from Ecosystem Planning and Restoration and the Farmland Classification sheet are attached as well. Please contact me with any questions.

Sincerely,  
Cidney



**Cidney Jones, PE, CFM**  
Water Resource Engineer  
919-388-0787 (office)  
925-337-1470 (cell)  
[cjones@eprusa.net](mailto:cjones@eprusa.net)  
[www.eprusa.net](http://www.eprusa.net)

**FARMLAND CONVERSION IMPACT RATING**

<b>PART I</b> (To be completed by Federal Agency)		Date Of Land Evaluation Request August 4, 2017				
Name of Project Meadow Brook Stream Restoration		Federal Agency Involved Federal Highway Administration (FHWA)				
Proposed Land Use Stream Mitigation		County and State Yadkin County, North Carolina				
<b>PART II</b> (To be completed by NRCS)		Date Request Received By NRCS August 11, 2017		Person Completing Form: Milton Cortes NRCS NC		
Does the site contain Prime, Unique, Statewide or Local Important Farmland? (If no, the FPPA does not apply - do not complete additional parts of this form)		YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	Acres Irrigated None	Average Farm Size 106 acres	
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 174,015 acres 80.51 %	Amount of Farmland As Defined in FPPA Acres: 153,764 acres 71 %				
Name of Land Evaluation System Used Yadkin Co., NC LESA	Name of State or Local Site Assessment System None	Date Land Evaluation Returned by NRCS August 14, 2017 by eMail				
<b>PART III</b> (To be completed by Federal Agency)		Alternative Site Rating				
		Site A	Site B	Site C	Site D	
A. Total Acres To Be Converted Directly		9.6				
B. Total Acres To Be Converted Indirectly		-				
C. Total Acres In Site		9.6				
<b>PART IV</b> (To be completed by NRCS) Land Evaluation Information						
A. Total Acres Prime And Unique Farmland		8				
B. Total Acres Statewide Important or Local Important Farmland		1.6				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted		0.0062				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value		38%				
<b>PART V</b> (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)		85				
<b>PART VI</b> (To be completed by Federal Agency) Site Assessment Criteria (Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)		Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use		(15)	15			
2. Perimeter In Non-urban Use		(10)	10			
3. Percent Of Site Being Farmed		(20)	0			
4. Protection Provided By State and Local Government		(20)	0			
5. Distance From Urban Built-up Area		(15)	15			
6. Distance To Urban Support Services		(15)	0			
7. Size Of Present Farm Unit Compared To Average		(10)	0			
8. Creation Of Non-farmable Farmland		(10)	0			
9. Availability Of Farm Support Services		(5)	5			
10. On-Farm Investments		(20)	20			
11. Effects Of Conversion On Farm Support Services		(10)	0			
12. Compatibility With Existing Agricultural Use		(10)	0			
TOTAL SITE ASSESSMENT POINTS		160	65	0	0	0
<b>PART VII</b> (To be completed by Federal Agency)						
Relative Value Of Farmland (From Part V)		100	85	0	0	0
Total Site Assessment (From Part VI above or local site assessment)		160	65	0	0	0
<b>TOTAL POINTS (Total of above 2 lines)</b>		260	150	0	0	0
Site Selected: Yes		Date Of Selection 9/6/2017		Was A Local Site Assessment Used? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
Reason For Selection: The site scored less than 160 and "need not be given further consideration for protection". (7 CFR 658.4).						
Name of Federal agency representative completing this form: Ecosystem Planning and Restoration					Date: 9/6/2017	

(See Instructions on reverse side)

Form AD-1006 (03-02)

## **Appendix 8**

### **DMS FLOODPLAIN REQUIREMENTS CHECKLIST**

## Cidney Jones

---

**From:** Cidney Jones  
**Sent:** Wednesday, March 7, 2018 3:32 PM  
**To:** 'Dan.Brubaker@ncdps.gov'; 'Dawn Vallieres'  
**Cc:** 'Tsomides, Harry'; LeeAnne Lutz  
**Subject:** Meadow Brook Stream Restoration Project - DMS Project No. 100024  
**Attachments:** Signed NCDMS Floodplain Checklist.pdf; MB\_Figure\_7\_FEMA.PDF; MB\_Figure\_1\_VIN.PDF

Hello Mr. Brubaker and Ms. Vallieres,

My name is Cidney Jones and I work with Ecosystem Planning and Restoration. We are currently working for NC DMS on a full delivery stream restoration project in Yadkin County. This project will impact the SFHA Zone AE Limited Detail study on South Deep Creek Tributary 5A. We have been preparing a Conditional Letter of Map Revision (CLOMR) as we work on the design and it will be submitted shortly after we submit our Mitigation Plan to NC DMS for review. Please find attached a completed and signed NC DMS Floodplain Checklist and two figures, one vicinity map and one map showing the project area and SFHA.

Ms. Vallieres, I will be in contact in the next week or so with a draft CLOMR for you to review before we submit it to FEMA.

Please let me know if you have any questions or if you would like a hard copy of this letter mailed to you.  
Best, Cidney



**Cidney Jones, PE, CFM**

Water Resource Engineer  
919-388-0787 (office)  
925-337-1470 (cell)  
[cjones@eprusa.net](mailto:cjones@eprusa.net)  
[www.eprusa.net](http://www.eprusa.net)



## NCDMS Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program and NC Floodplain Mapping program to be filled out for all NCDMS projects. The form is intended to summarize the floodplain requirements during the design phase of the projects. The form should be submitted to the Local Floodplain Administrator with three copies submitted to NFIP (attn. State NFIP Engineer), NC Floodplain Mapping Unit (attn. State NFIP Coordinator) and NCDMS.

### Project Location

Name of project:	Meadow Brook Stream Restoration Project
Name if stream or feature:	South Deep Creek Tributary 5A
County:	Yadkin
Name of river basin:	Yadkin
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Yadkin County (CID 370400)
DFIRM panel number for entire site:	3710486600J Effective 5/18/2009
Consultant name:	Ecosystem Planning and Restoration
Phone number:	919.388.0787
Address:	559 Jones Franklin Road Suite 150 Raleigh NC 27606

## Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500".

The Meadow Brook Stream Restoration Project consists of instituting stream restoration practices following natural channel design techniques along the main stem and one tributary.

Summarize stream reaches or wetland areas according to their restoration priority.

Reach	Length	Priority
<i>Meadow Brook (South Deep Creek Tributary 5A)</i>	1921 256	<i>One and Two (Restoration) Two (Enhancement)</i>
<i>Unnamed Tributary to Meadow Brook (Unregulated/Backwater of Meadow Brook)</i>	396	<i>One and Two (Restoration)</i>

## Floodplain Information

Is project located in a Special Flood Hazard Area (SFHA)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If project is located in a SFHA, check how it was determined: <input type="checkbox"/> Redelineation <input type="checkbox"/> Detailed Study <input checked="" type="checkbox"/> Limited Detail Study <input type="checkbox"/> Approximate Study <input type="checkbox"/> Don't know
List flood zone designation:
Check if applies: <input checked="" type="checkbox"/> AE Zone <input type="checkbox"/> Floodway <input checked="" type="checkbox"/> Non-Encroachment <input type="checkbox"/> None <input type="checkbox"/> A Zone

<input type="checkbox"/> Local Setbacks Required <input type="checkbox"/> No Local Setbacks Required
If local setbacks are required, list how many feet: N/A
Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Land Acquisition (Check) <input type="checkbox"/> State owned (fee simple) <input type="checkbox"/> Conservation easment (Design Bid Build) <input checked="" type="checkbox"/> Conservation Easement (Full Delivery Project) Note: if the project property is state-owned, then all requirements should be addressed to the Department of Administration, State Construction Office (attn: Herbert Neily, (919) 807-4101)
Is community/county participating in the NFIP program? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)
Name of Local Floodplain Administrator: Dawn Vallieres Email: <a href="mailto:dvallieres@yadkincountync.gov">dvallieres@yadkincountync.gov</a> Phone Number: (336) 679 – 4243

### Floodplain Requirements

This section to be filled by designer/applicant following verification with the LFPA


- No Action
- No Rise
- Letter of Map Revision
- Conditional Letter of Map Revision
- Other Requirements

List other requirements: Yadkin County Floodplain Development Permit
--

Comments:

CLOMR package is being currently being prepared to submit.

Name: Cidney Jones

Signature: 

Title: Water Resources Engineer

Date: 3/7/18



# Appendix 9

## DESIGN PLAN SHEETS

PROJECT: MEADOW BROOK

NC DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF MITIGATION SERVICES

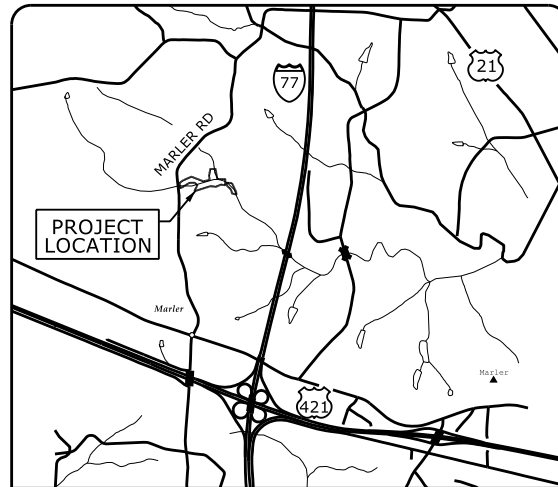
# YADKIN COUNTY

LOCATION: MARLER RD., YADKIN COUNTY, NC

TYPE OF WORK: STREAM RESTORATION

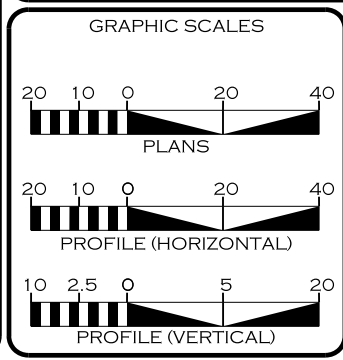
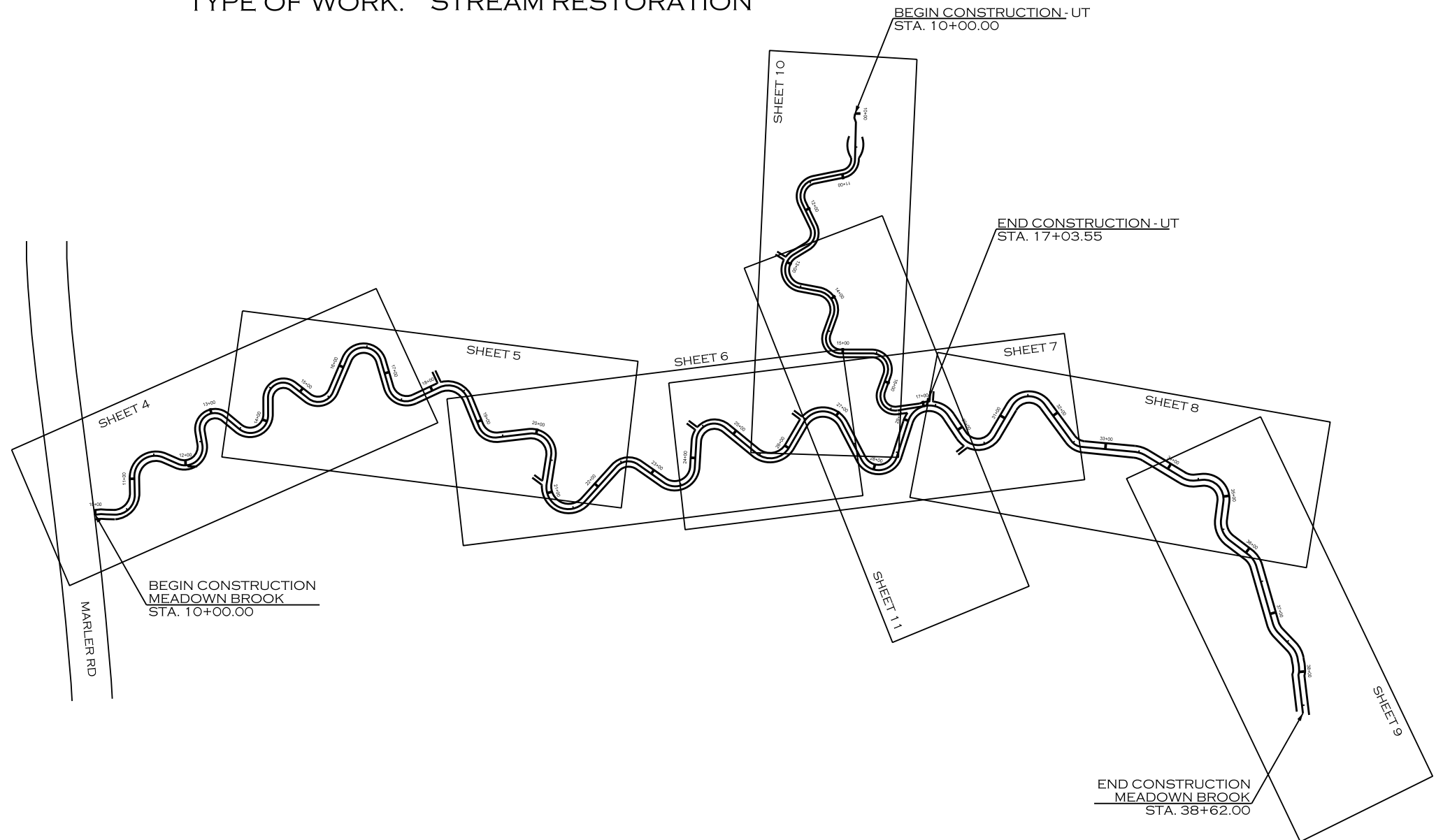
STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	082	1	25

PROJECT LENGTH	
EXISTING STREAM LENGTH	= 2,573 FEET
PROPOSED DESIGN STREAM LENGTH	= 3,565 FEET



VICINITY MAP

INDEX OF SHEETS	
1...	TITLE SHEET
1A...	STREAM CONVENTIONAL SYMBOLS GENERAL NOTES CONSTRUCTION SEQUENCE
2...	TYPICAL SECTIONS
2A-2G...	DETAILS
3-3B...	TABLES
4-11...	PLAN AND PROFILE
12-13...	VEGETATION PLAN
14-15...	GRADING PLAN



REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
2	FINAL MITIGATION PLAN	CJ	KLT	9/10/18

PREPARED FOR:

NC DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
RALEIGH, NC 27699-1652

HARRY TSOMIDES  
PROJECT MANAGER

PREPARED IN THE OFFICE OF:

ECOSYSTEM PLANNING & RESTORATION

559 JONES FRANKLIN RD  
SUITE 150  
RALEIGH, NC 27606  
LICENSE # P-1182

SPRING 2018  
LETTING DATE:

CIDNEY JONES, PE  
PROJECT ENGINEER

PROJECT ENGINEER

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DO NOT USE FOR CONSTRUCTION

SIGNATURE: \_\_\_\_\_ P.E.

# STREAM CONVENTIONAL SYMBOLS

- ROCK J-HOOK (JH)
- ROCK VANE (RV)
- OFFSET ROCK CROSS VANE (OV)
- ROCK CROSS VANE (XV)
- TEMPORARY SILT CHECK
- ROOT WAD (RW)
- GRADE CONTROL LOG J-HOOK (LJH)
- LOG VANE (LV)
- LOG STEP (LS)
- ROCK STEP (RS)
- LOG CROSS VANE (XV)
- CONSTRUCTED CASCADE (CC)
- CONSTRUCTED RIFFLE (CR)
- BOULDER CLUSTER
- LOG ROLLER (LR)
- GRADE CONTROL WOODY RIFFLE (WFR)
- TOEWOOD WITH GEOLIFT (TW)
- SOD MATS (SM)
- DEBRIS JAM (DJ-T#)
- SINGLE WING DEFLECTOR (SW)
- DOUBLE WING DEFLECTOR (DW)
- SF — SAFETY FENCE
- TP — TAPE FENCE
- ||| — SILT FENCE
- CE — CONSERVATION EASEMENT
- - 20 - - EXISTING MAJOR CONTOUR
- - - - - EXISTING MINOR CONTOUR
- - - - - LIMITS OF DISTURBANCE
- - - - - BANKFULL BENCH (GRADE)
- - - - - PROPERTY LINE
- ::::::::::: ACCESS ROAD
- 10+00  
— STREAM THALWEG
- STREAM TOP OF BANKS
- |||| FOOT BRIDGE
- |||| TEMPORARY STREAM CROSSING
- |||| PERMANENT FORD STREAM CROSSING (PFC)
- ⊕ TRANSPLANTED VEGETATION
- ⊗ TREE REMOVAL
- ⊕ TREE PROTECTION
- [X] GEOLIFT
- [█] CHANNEL FILL / DITCH PLUG
- [//] GRADE BANK 2:1 OR FLATTER
- [•••] EXISTING WETLANDS

\*\*NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

## GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL INSTREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS, AND STRUCTURES.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED TO BEGIN WINTER 2018 / 2019.

# CONSTRUCTION SEQUENCE

PROJECT # 082 SHEET NO. 1A

SYMBOLGY / NOTES

CONSTRUCTION SEQUENCE TO BE DETERMINED AT 100% DESIGN

9/10/2018 R:\PROJECTS\RD\0082\_NCDEQ\_Meadow Brook\FD\CADD\PLANS\ME\_PSH\_1A.dgn

REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
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PREPARED FOR:

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DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
RALEIGH, NC 27699-1652

MEADOW BROOK  
YADKIN COUNTY, NC

PREPARED IN THE OFFICE OF:

559 JONES FRANKLIN RD, SUITE 150  
RALEIGH, NC 27606  
LICENSE # P-1182

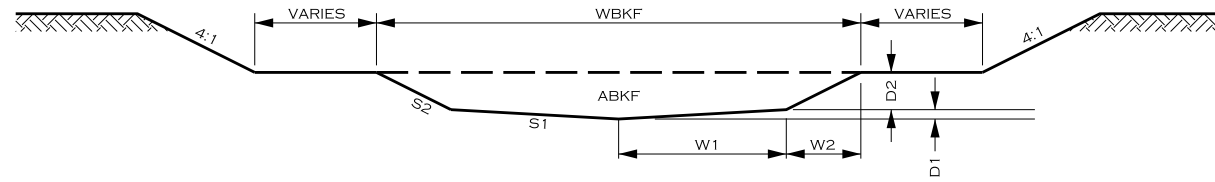
PROJECT ENGINEER

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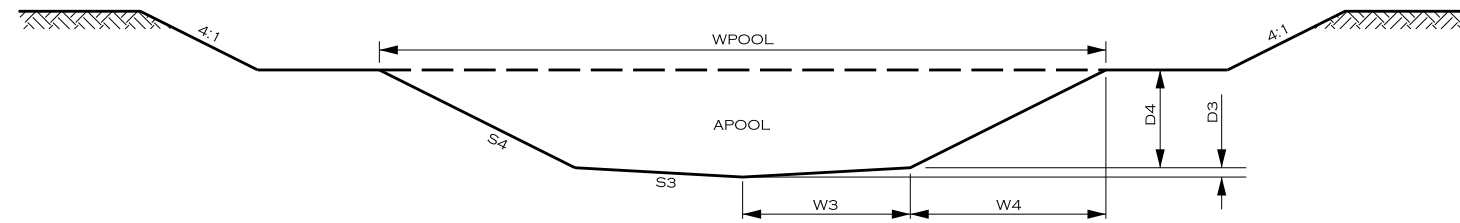
TYPICAL SECTIONS

DETAILS

"A" AND "B" TYPE CHANNELS

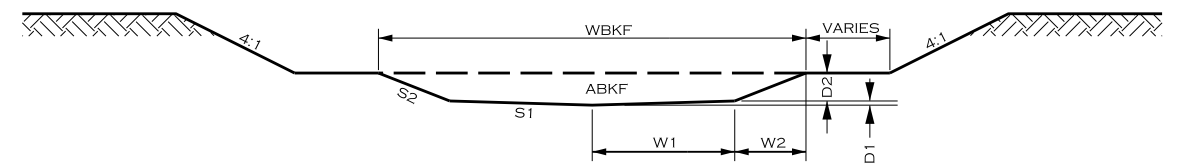


TYPICAL RIFFLE CROSS SECTION

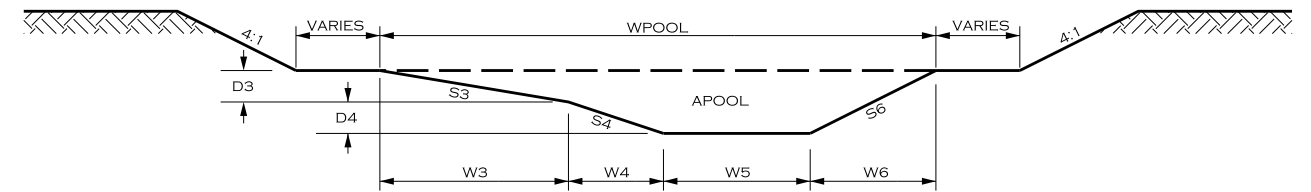


TYPICAL POOL CROSS SECTION

"C" TYPE CHANNELS



TYPICAL RIFFLE CROSS SECTION



TYPICAL POOL RIGHT CROSS SECTION

B STREAM TYPE TYPICAL CROSS SECTION DIMENSIONS

Stream	Station	RIFFLES								POOLS							
		ABKF	WBKF	W1	W2	D1	D2	S1	S2	APOOL	WPOOL	W3	W4	D3	D4	S3	S4
Meadow Brook	33+29 to 38+62	26	17.7	5.4	3.5	0.3	1.7	20:1	2:1	44	21.1	5.3	5.3	0.4	2.6	15:1	2:1

C STREAM TYPE TYPICAL CROSS SECTION DIMENSIONS

Stream	Station	RIFFLES								POOLS										
		ABKF	WBKF	W1	W2	D1	D2	S1	S2	APOOL	WPOOL	W3	W4	W5	W6	D3	D4	S3	S4	S6
Meadow Brook	10+00 to 29+36	19	14.5	4.2	3.0	0.3	1.5	15:1	2:1	36	21.7	7.6	3.8	4.3	6.0	1.5	1.5	5:1	3:1	2:1
	29+36 to 33+29	23	16.6	5.2	3.1	0.4	1.6	15:1	2:1	47	24.9	8.0	4.0	6.6	6.4	1.6	1.6	5:1	3:1	2:1
Unnamed Tributary	10+00 to 17+03	14	12.4	3.5	2.7	0.2	1.4	15:1	2:1	24	18.6	7.8	3.5	2.1	3.0	1.3	1.3	6:1	3:1	1:1

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RALEIGH, NC 27699-1652

MEADOW BROOK  
YADKIN COUNTY, NC

PREPARED IN THE OFFICE OF:



ECOSYSTEM  
PLANNING &  
RESTORATION

559 JONES FRANKLIN RD, SUITE 150  
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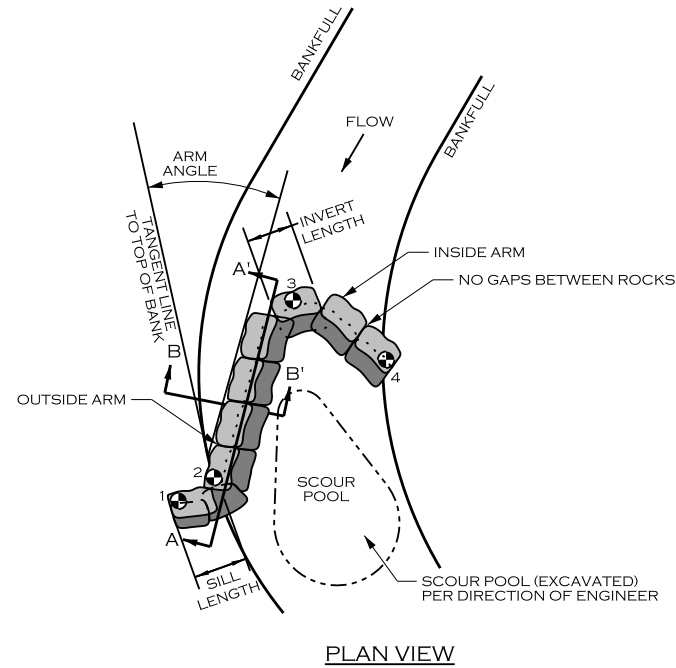
OFFSET ROCK CROSS VANE (OV)

DETAILS

OFFSET ROCK CROSS VANE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: 3 FT X 2 FT X 2 FT NUMBER OF HEADER ROWS: 1 NUMBER OF FOOTER ROWS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A AND ON-SITE ALLUVIUM (50/50 MIX)

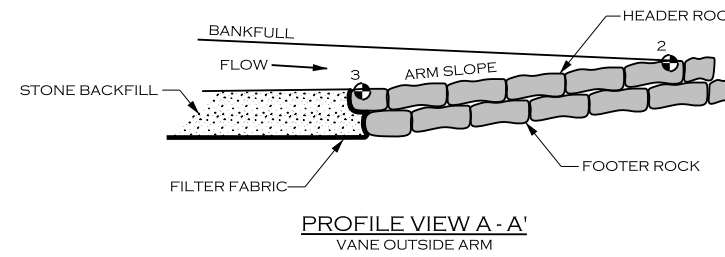
**NOTES FOR OFFSET ROCK CROSS VANE:**

- STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURES TABLE SHEET.
- DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
- PLACE FOOTER ROCKS AND THEN HEADER ROCKS TO ACHIEVE DESIGN DIMENSIONS AND ELEVATIONS.
- USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
- PLACE FILTER FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTENDING DOWN TO THE DEPTH OF THE FOOTER ROCKS, THEN OUTWARD THE DISTANCE SPECIFIED IN THE STRUCTURES TABLE SHEET.
- INSTALL STONE BACKFILL AS SHOWN, TO THE DIMENSIONS INDICATED IN THE STRUCTURES TABLE SHEET.
- AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF THE TOP OF HEADER ROCK.

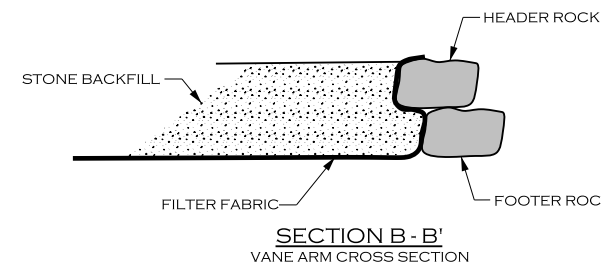


PLAN VIEW

⊙ - ELEVATION POINT (SEE STRUCTURE TABLES)



PROFILE VIEW A-A'  
VANE OUTSIDE ARM



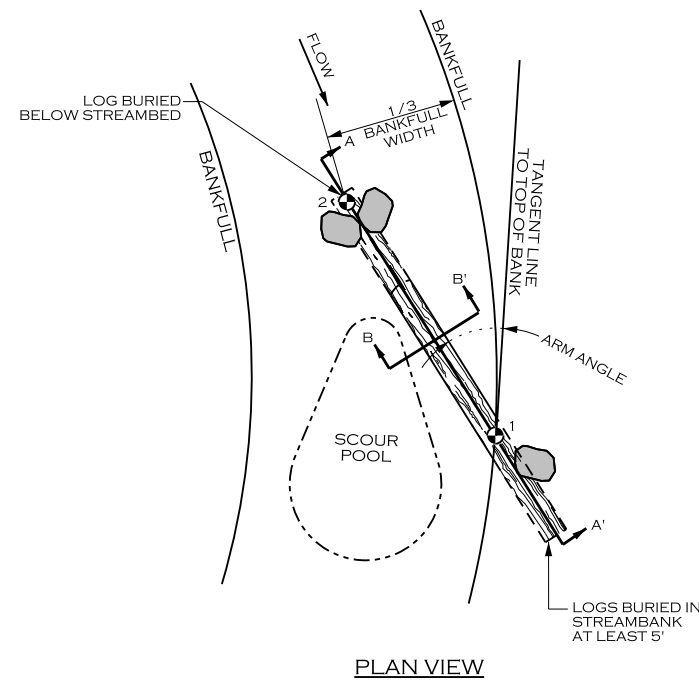
SECTION B-B'  
VANE ARM CROSS SECTION

LOG VANE (LV)

LOG VANE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BOULDER	TYPE: GRANITE OR COMPARABLE SIZE: 3 FT X 2 FT X 2 FT
LOGS	TYPE: HARDWOOD SIZE: 12 INCH Ø MIN. NUMBER OF HEADER LOGS: 1 NUMBER OF FOOTER LOGS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
STONE BACKFILL	CLASS A AND ON-SITE ALLUVIUM (50/50 MIX)

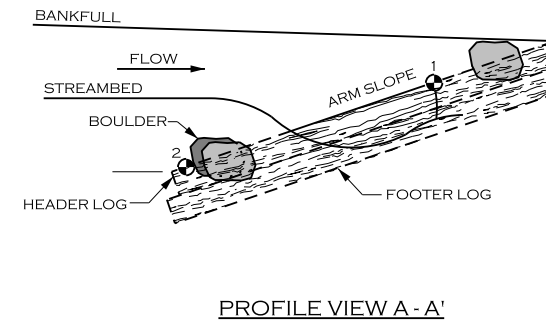
**NOTES FOR LOG VANE STRUCTURES:**

- STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET.
- LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.
- BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
- SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
- BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
- FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.

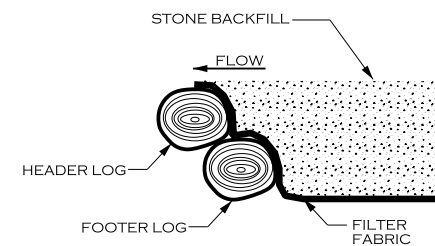


PLAN VIEW

⊙ - ELEVATION POINT (SEE STRUCTURE TABLES)



PROFILE VIEW A-A'



SECTION B-B'

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2	FINAL MITIGATION PLAN	CJ	KLT	9/10/18

PREPARED FOR:

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DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
RALEIGH, NC 27699-1652

MEADOW BROOK  
YADKIN COUNTY, NC

PREPARED IN THE OFFICE OF:

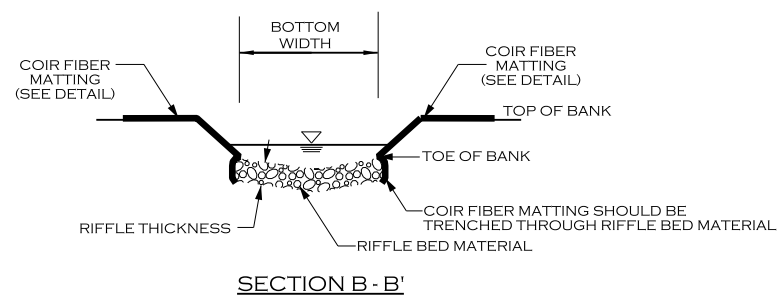
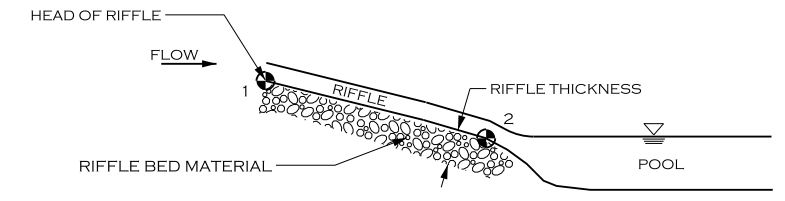
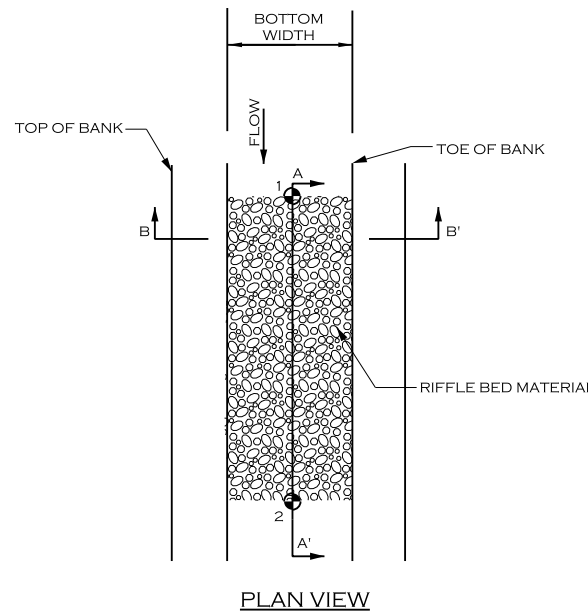
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LICENSE # P-1182

PROJECT ENGINEER

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DETAILS

CONSTRUCTED RIFFLE (CR)



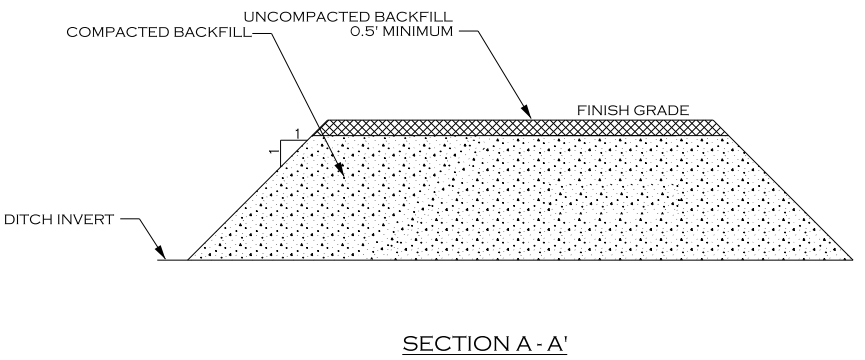
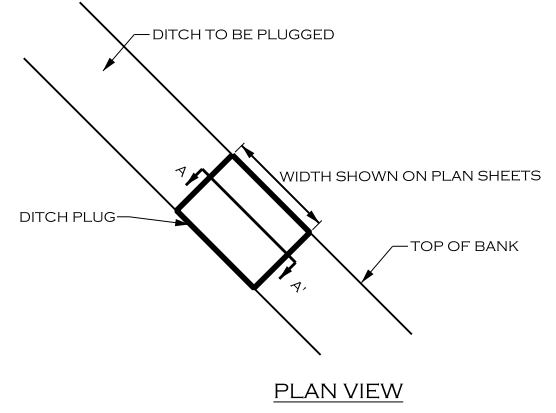
• ELEVATION POINT (SEE STRUCTURE TABLES)

CONSTRUCTED RIFFLE SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
RIFFLE BED MATERIAL	TYPE: HARVESTED ON-SITE OR COMPARABLE SIZE: CLASS B AND 57 STONE (50/50 MIX) THICKNESS: 16 INCHES MIN.
COIR FIBER MATTING	SEE DETAIL

**NOTES FOR CONSTRUCTED RIFFLE STRUCTURES:**

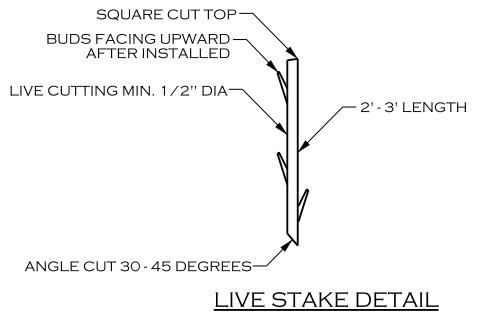
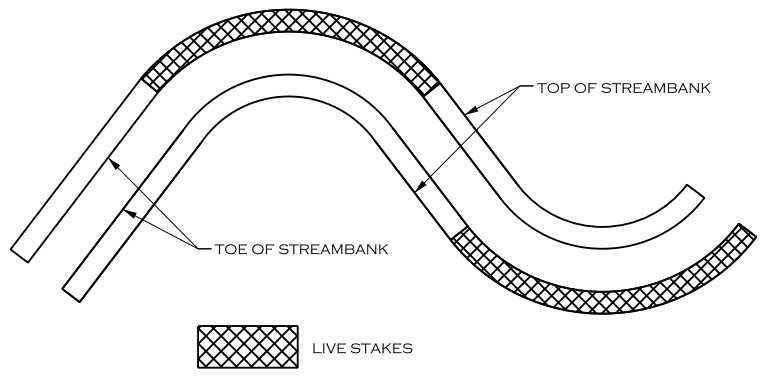
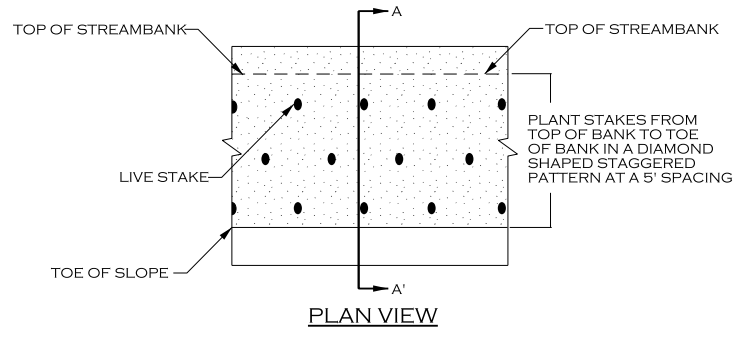
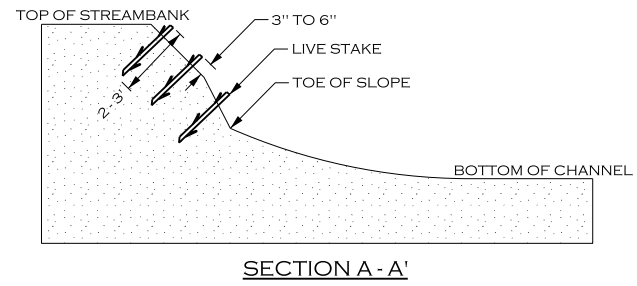
1. GRADE STREAMBED AND BANKS TO PROPOSED DIMENSIONS PER TYPICAL CROSS-SECTION AND PROFILE.
2. EXCAVATE TRENCH BELOW PROPOSED STREAMBED ELEVATION EQUAL TO OR GREATER THAN RIFFLE THICKNESS.
3. INSTALL COIR FIBER MATTING ALONG STREAMBANKS ENSURING MATTING IS SUFFICIENTLY TRENCHED ALONG TOE OF BANK.
4. FILL TRENCH WITH RIFFLE BED MATERIAL TO FINAL DESIGN STREAM GRADE.

DITCH PLUG



NOTE:  
COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.

LIVE STAKING



- NOTES:
1. IF STAKES ARE BEING HARVESTED NEAR THE SITE, STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
  2. KEEP STAKES COOL AND MOIST WHILE ON THE JOB SITE AND PRIOR TO INSTALLATION.
  3. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
  4. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
  5. STAKES SHALL BE INSTALLED PERPENDICULAR TO BANK.
  6. STAKES SHALL BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
  7. STAKES SHALL BE INSTALLED LEAVING 1/5 OF STAKE ABOVE GROUND.

REVISIONS				
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PREPARED FOR:

NC DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
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MEADOW BROOK  
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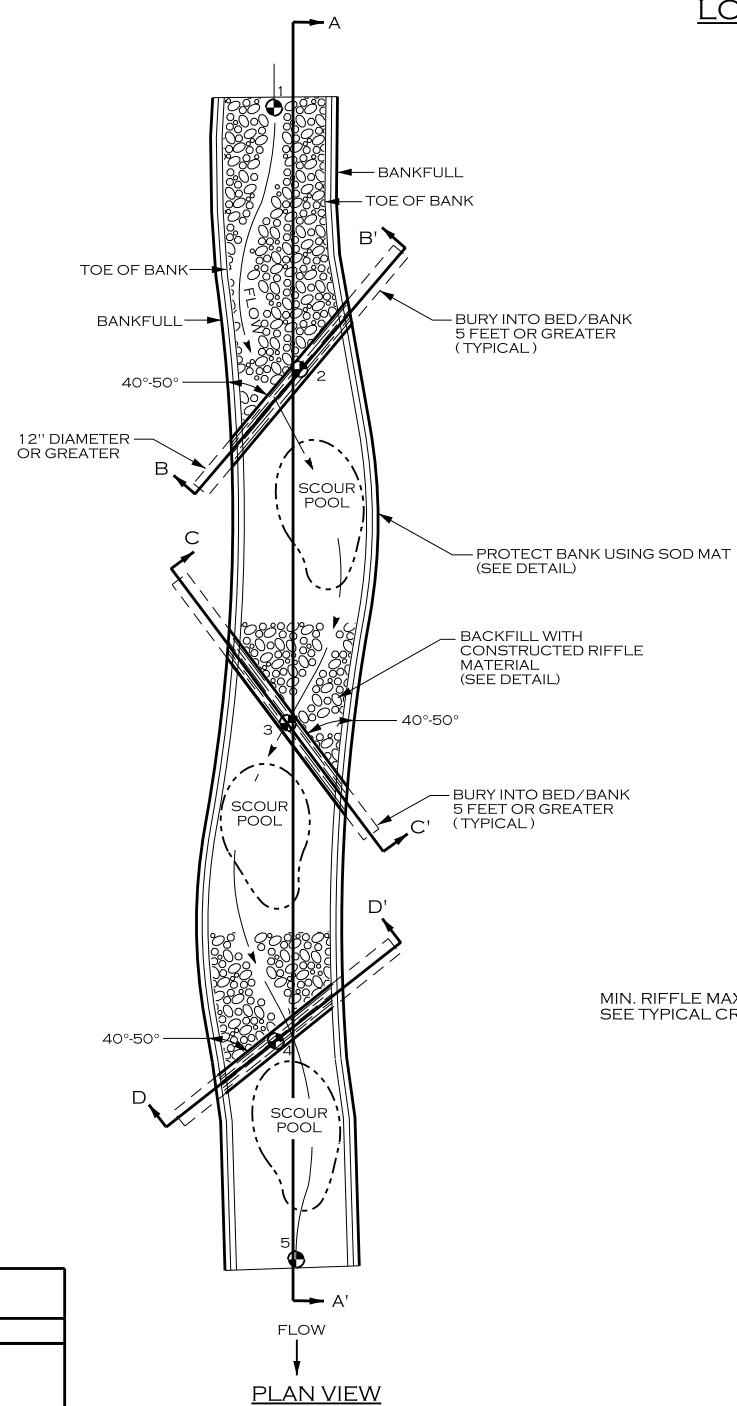
PROJECT ENGINEER

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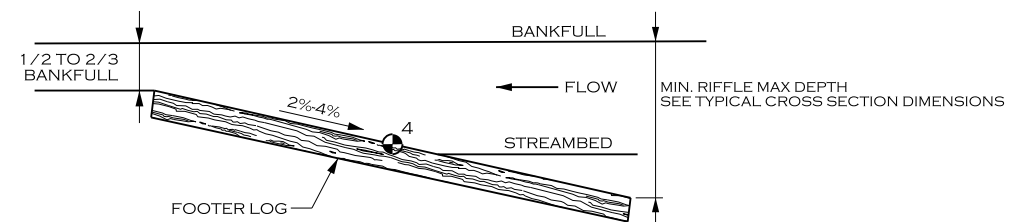
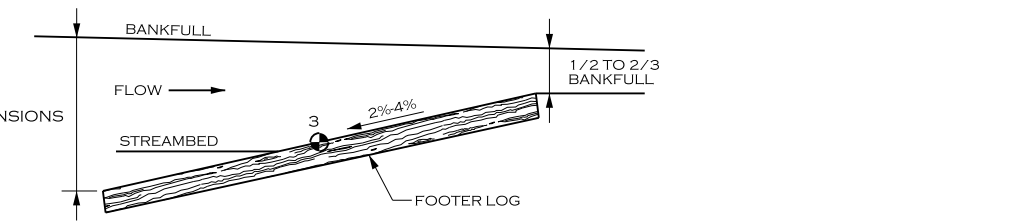
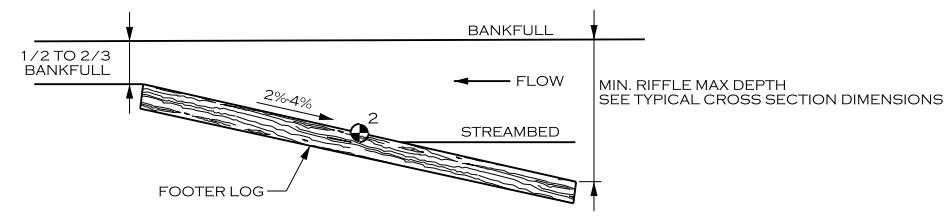
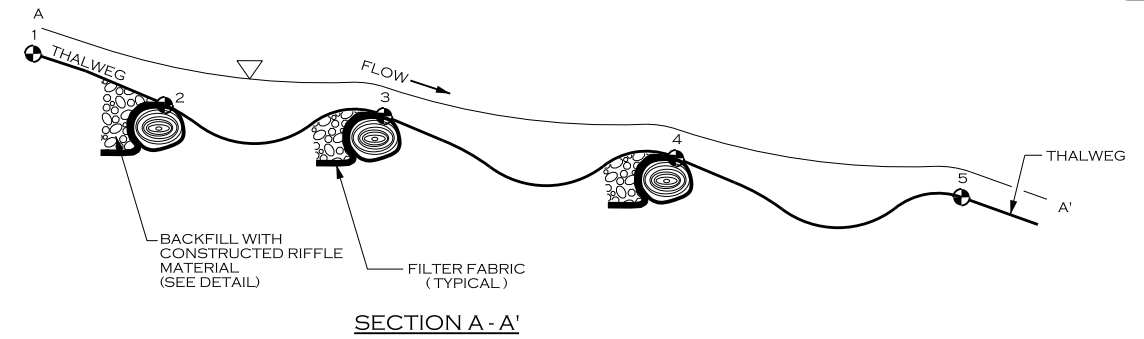
9/10/2018 R:\PROJECTS\RD\082\_NCDEQ\_Meadow Brook\FD\CADD\PLANS\MB\_PSH\_02B.DGN

DETAILS

LOG ROLLER LR



● - ELEVATION POINT (SEE STRUCTURE TABLES)



LOG ROLLER SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
RIFFLE BED MATERIAL	SEE CONSTRUCTED RIFFLE DETAIL
LOGS	TYPE: HARDWOOD SIZE: LENGTH = 2 X WbKF, 12" DIA. NUMBER OF HEADER LOGS: 1
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
NOTES FOR LOG ROLLER STRUCTURES:	
1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET. NUMBER OF LOGS MAY VARY.	
2. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.	
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.	
4. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.	

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MEADOW BROOK  
YADKIN COUNTY, NC

PREPARED IN THE OFFICE OF:

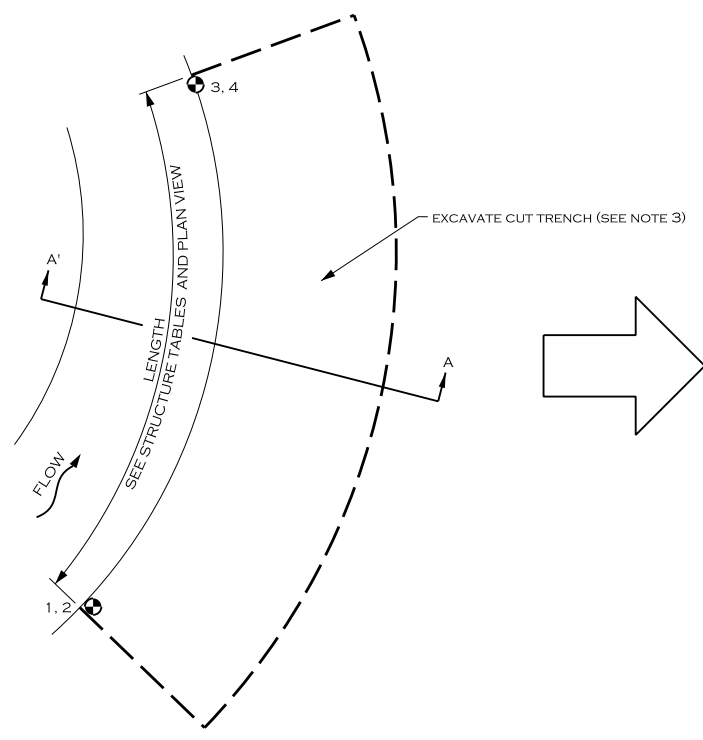
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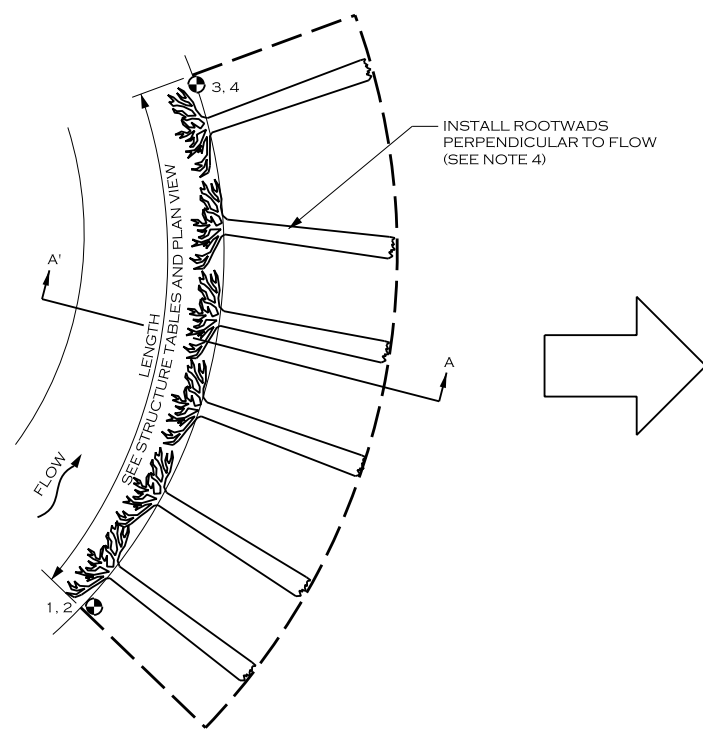
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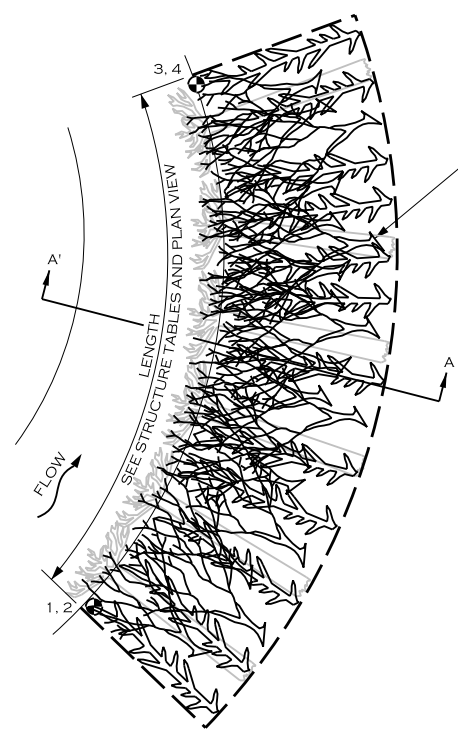
DETAILS



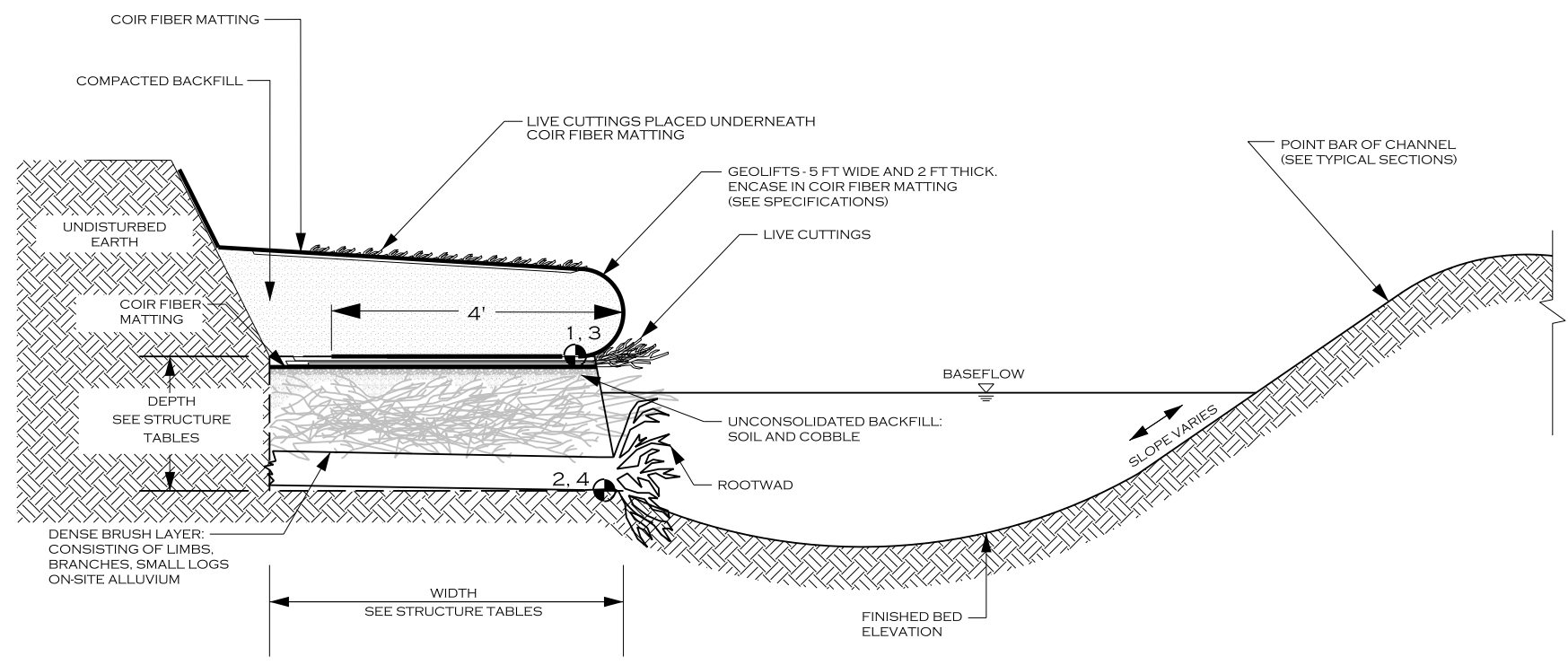
PLAN VIEW - 1  
TRENCH EXCAVATION



PLAN VIEW - 2  
ROOTWAD INSTALLATION



PLAN VIEW - 3  
BRUSH LAYER INSTALLATION



SECTION VIEW

● - ELEVATION POINT (SEE STRUCTURE TABLES)

TOE WOOD SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
BRUSH MATERIAL	TYPE: BRUSH MATERIAL SIZE: MIN. 5 FT LONG, 1 INCH DIAMETER
ROOTWAD MATERIAL	TYPE: HARDWOOD SIZE: MIN. 6 FT LONG MIN. 12 INCH DIAMETER
COIR FIBER MATTING	SEE DETAIL
NOTES FOR TOE WOOD STRUCTURES:	
1. STRUCTURE DIMENSIONS AND MEASUREMENTS ARE SHOWN ON THE STRUCTURE TABLES SHEET. 2. DIG A TRENCH ALONG BANK WHERE TOE WOOD IS TO BE INSTALLED, TO THE DEPTH AND WIDTH SPECIFIED IN THE DETAILS AND STRUCTURE TABLES. IF TOE WOOD IS BEING PLACED IN A LOCATION WHERE THERE IS NOT EXISTING GROUND, PLACE FILL MATERIAL AND COMPACT TO FORM THE TRENCH FOR THE TOE WOOD MATERIALS. 3. EXCAVATE TRENCH BELOW TOEWOOD GRADE (PLAN VIEW 1), TO ELEVATION POINTS 2 AND 4. 4. INSTALL ROOTWADS PERPENDICULAR TO THE FLOW AS SHOWN IN PLAN VIEW 2. 5. INSTALL BRUSH MATERIAL INCLUDING BRANCHES, LOGS, AND BRUSH, AND AT LEAST 1" IN DIAMETER. LARGE MATERIALS AND SMALL MATERIALS SHALL BE MIXED, PLACED IN LAYERS NO MORE THAN 1 FOOT DEEP, COVERED IN A THIN LAYER OF ONSITE ALLUVIUM, AND COMPACTED BEFORE PLACING THE NEXT LAYER OF TOE WOOD MATERIAL. CONTINUE PLACING MATERIALS TO FORM A DENSE LAYER OF WOODY MATERIALS AND ONSITE ALLUVIUM TO THE DEPTH AND ELEVATIONS SPECIFIED (PLAN VIEW 3). 6. PLACE AN UNCONSOLIDATED LAYER OF SOIL AND COBBLE ON TOP OF BRUSH LAYER. 7. COVER SOIL AND COBBLE LAYER IN COIR FIBER MATTING. 8. INSTALL LIVE CUTTINGS, INCLUDING BRANCHES AND BRUSH, AT LEAST 5 FEET IN LENGTH, AND AT LEAST 1 INCH IN DIAMETER. 9. CONSTRUCT GEOLIFTS OR PLACE TRANSPLANTS AS SPECIFIED OR DIRECTED BY THE ENGINEER TO REBUILD THE STREAMBANK ABOVE THE TOE WOOD LAYER.	

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1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
2	FINAL MITIGATION PLAN	CJ	KLT	9/10/18

PREPARED FOR:

NC DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
RALEIGH, NC 27699-1652

MEADOW BROOK  
YADKIN COUNTY, NC

PREPARED IN THE OFFICE OF:

559 JONES FRANKLIN RD, SUITE 150  
RALEIGH, NC 27606  
LICENSE # P-1182

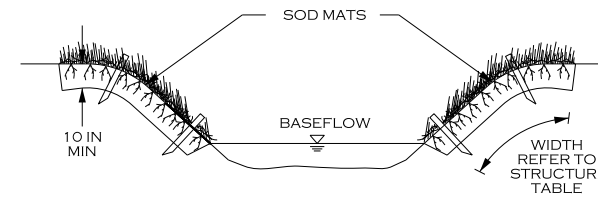
PROJECT ENGINEER

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SOD MAT HARVESTING



SOD MAT PLACEMENT

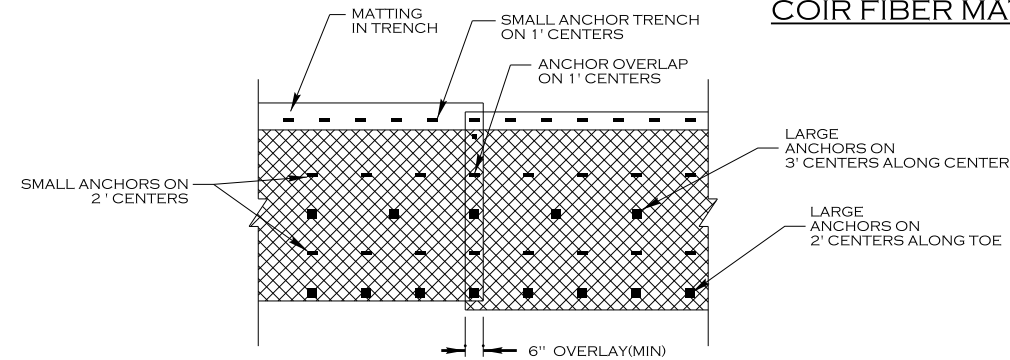
**NOTES:**  
HARVESTING

1. USE FULL-SIZE LOADER, OR SIMILAR APPROVED EQUIPMENT, FOR EXCAVATING, TRANSPORTING, AND PLACING ON-SITE SOD MATS.
2. DISTURB SOD MATS AS LITTLE AS POSSIBLE AND MAINTAIN SOIL MOISTURE.
3. MINIMUM MAT DEPTH IS 10 INCH.

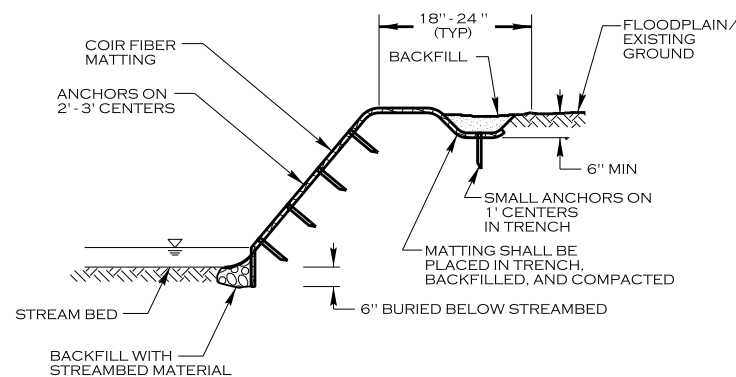
PLACEMENT

1. PLACE SOD MATS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK OR TOEWOOD.
2. SOD MATS CAN BE SUBSTITUTED WITH COIR FIBER MATTING AT THE DIRECTION OF THE ENGINEER.

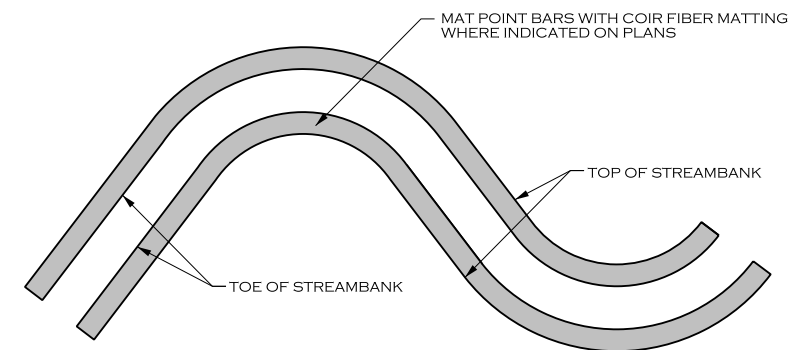
**COIR FIBER MATTING**



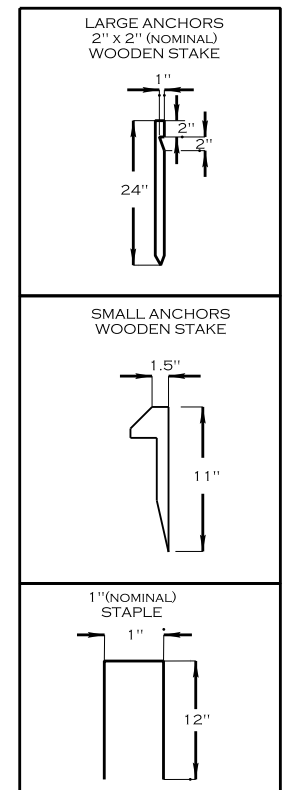
PLAN VIEW



TYPICAL CROSS SECTION



TYPICAL MATTING PLAN VIEW



ANCHOR OPTIONS

**NOTES:**

1. IN AREAS TO BE MATTED, ALL SEEDING, SOIL AMENDMENTS, AND SOIL PREPARATION MUST BE COMPLETED PRIOR TO PLACEMENT OF COIR FIBER MATTING.
2. WOODEN STAKES ARE PREFERRED. USE OF STAPLES AS SMALL ANCHORS MUST BE PRE-APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.

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MEADOW BROOK  
YADKIN COUNTY, NC

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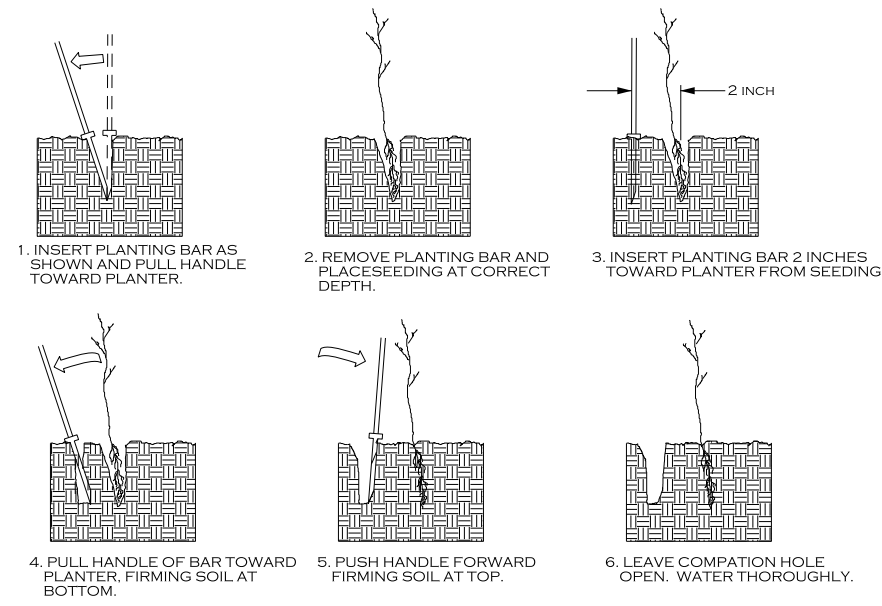
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LICENSE # P-1182

PROJECT ENGINEER

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DETAILS

DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



PLANTING NOTES:

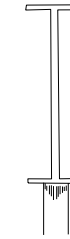
PLANTING BAG

DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.



KBC PLANTING BAR

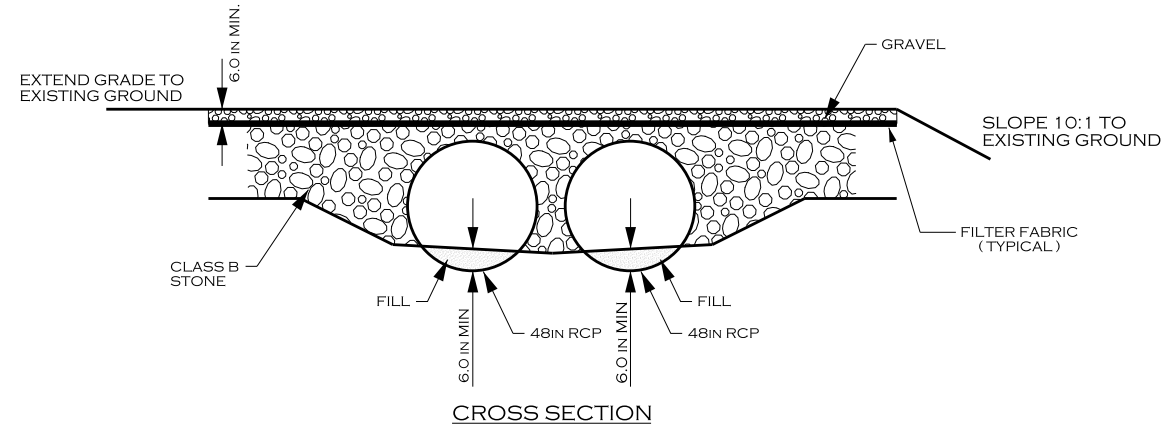
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.



ROOT PRUNING

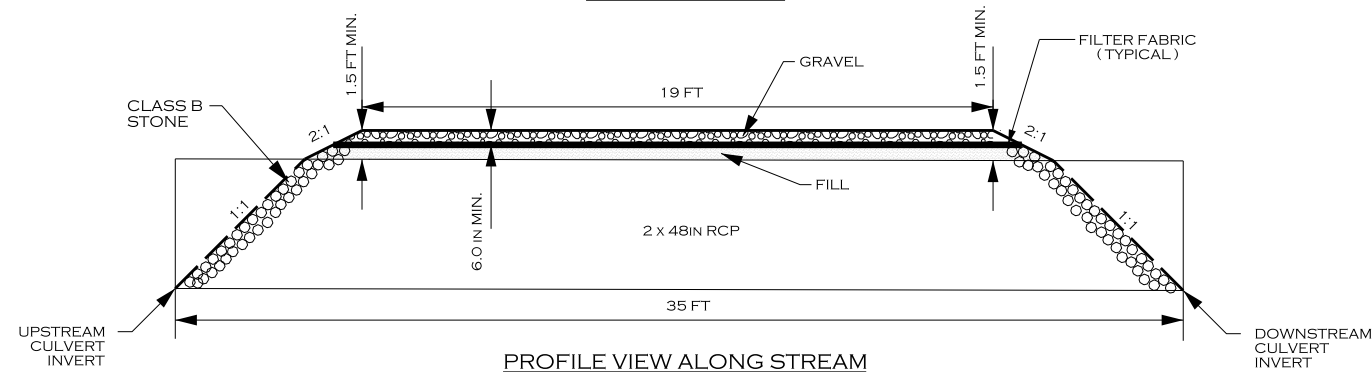
ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 10 INCHES BELOW THE ROOT COLLAR.

CULVERT DETAIL



VARIABLE	CULVERT 1
REQUIRED COVER DEPTH	1.5 FT. MIN.
UPSTREAM INLET ELEV.	1037.60
DOWNSTREAM INLET ELEV.	1037.43
UPSTREAM INLET STA.	10+01
DOWNSTREAM INLET STA.	10+36
FARM PATH ELEV.	1043.09

CULVERT SPECIFICATIONS	
MATERIALS:	SPECIFICATIONS:
GRAVEL	TYPE: #57 STONE AND CRUSHER RUN (50/50 MIX)
FILL	TYPE: ON-SITE ALLUVIUM
FILTER FABRIC	TYPE: TYPE 2 NON-WOVEN WIDTH UPSTREAM: 6 FT MINIMUM
<b>NOTES FOR CULVERT STRUCTURES:</b>	
1. TYPE 4 BEDDING, POSITIVE EMBANKMENT CONDITION.	
2. CLASS I OR STRONGER 48 IN X 35 FT MINIMUM TO BE INSTALLED.	
3. STABILIZE FILL AROUND CULVERTS WITH CLASS B STONE. STABILIZE REMAINING ROAD SIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.	



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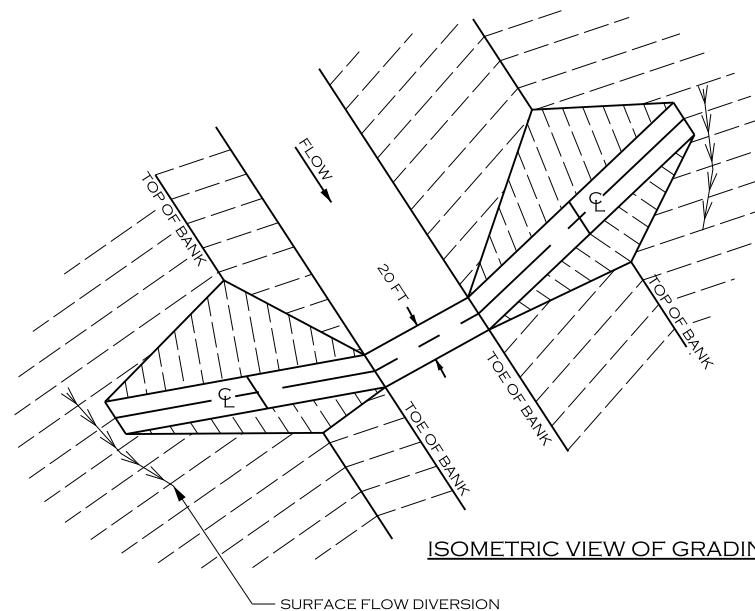
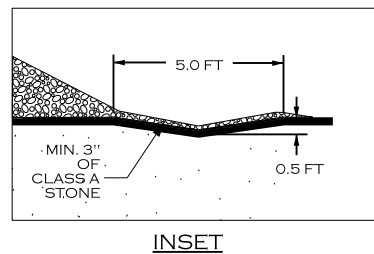
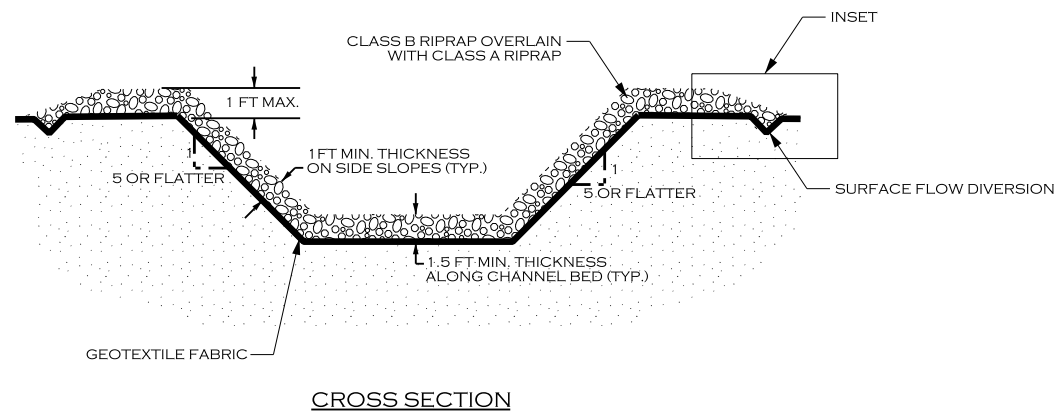
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PERMANENT FORD STREAM CROSSING (PFC)

PROJECT # 082 SHEET NO. 2G

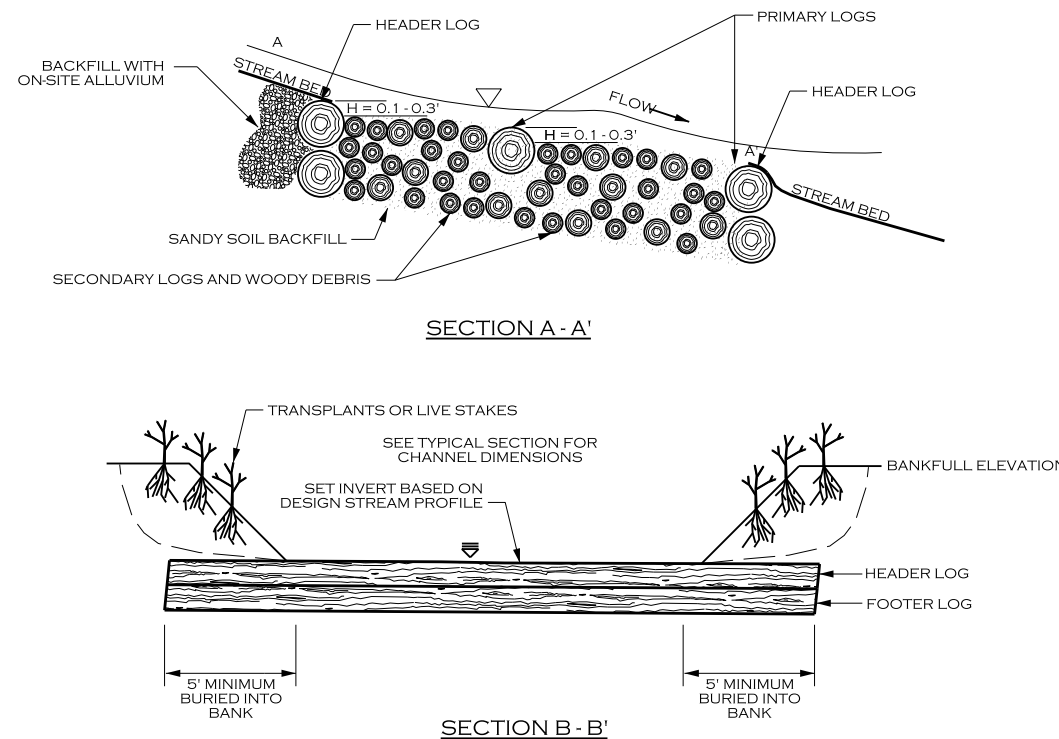
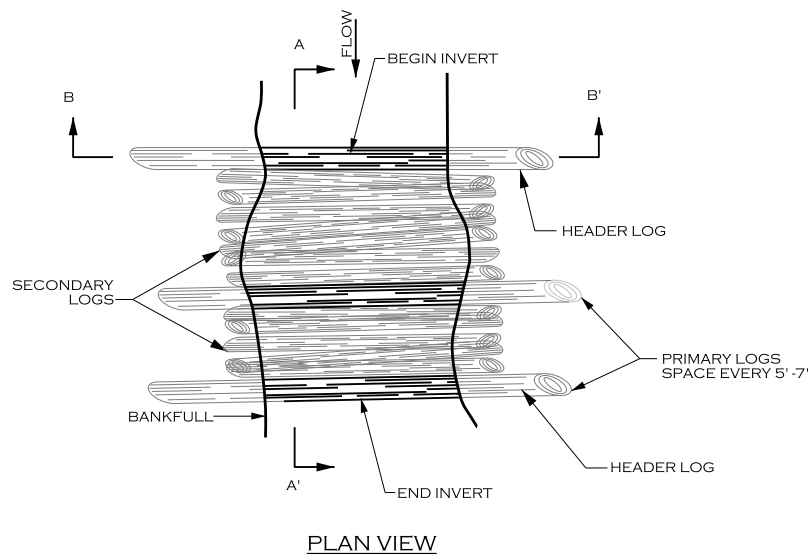
DETAILS



NOTES:

1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. COMPLETE ONE SIDE BEFORE STARTING ON THE OTHER SIDE.
4. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
5. DIVERT ALL SURFACE RUNOFF FROM CONSTRUCTION SITE ONTO UNDISTURBED AREAS ADJOINING THE STREAM.
6. ALIGN ROAD APPROACHES WITH THE CENTERLINE OF THE CROSSING FOR A MINIMUM DISTANCE OF 30 FEET.
7. GRADE SLOPES TO A 5:1 SLOPE OR FLATTER. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES IF POSSIBLE.
8. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
9. A STABILIZED PAD OF STONE BACKFILL, LINED WITH GEOTEXTILE FABRIC SHALL BE USED OVER ACCESS SLOPES.
10. WIDTH OF THE CROSSING SHALL BE 20 FEET.
11. INSPECT STREAM CROSSING AFTER RUNOFF - PRODUCING RAINS TO CHECK FOR BLOCKAGE IN CHANNEL, EROSION OF BANKS, CHANNEL SCOUR, STONE DISPLACEMENT, OR PIPING. MAKE ALL REPAIRS IMMEDIATELY TO PREVENT FUTHER DAMAGE TO INSTALLATION.

GRADE CONTROL WOODY RIFFLE (WR)



NOTES:

1. PRIMARY LOGS SHOULD BE AT LEAST 12" OR MORE IN DIAMETER, RELATIVELY STRAIGHT, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SECONDARY LOGS SHOULD BE AT LEAST 1" IN DIAMETER AND NO LARGER THAN 10", AND EXTEND INTO THE BANK 2 FEET ON EACH SIDE. WOOD MATERIAL SHALL BE VARYING DIAMETER TO ALLOW MATERIAL TO BE COMPACTED.
3. ROOTWADS AND COIR FIBER MATTING CAN BE USED INSTEAD OF TRANSPLANTS OR LIVE STAKES, PER DIRECTION OF ENGINEER.
4. AFTER TRENCH HAS BEEN EXCAVATED A LAYER OF SECONDARY LOGS AND WOODY DEBRIS SHOULD BE PLACED WITH MINIMAL GAPS. A LAYER OF ON-SITE ALLUVIUM SHOULD BE APPLIED TO FILL VOIDS BETWEEN SECONDARY LOGS BEFORE ADDITIONAL LAYERS ARE PLACED.

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# STRUCTURE TABLES - MEADOW BROOK

## TABLES

### Log Vanes

Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
	Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
11+19.00	17.0	16.5	5.0%	25.0	1041.35	1040.50
12+03.00	17.0	16.5	5.0%	25.0	1041.07	1040.22
12+81.00	16.0	17.5	5.0%	25.0	1040.80	1040.00
13+66.00	17.0	16.5	5.0%	25.0	1040.52	1039.67
14+48.00	16.0	17.5	5.0%	25.0	1040.25	1039.45
15+30.00	16.0	17.5	5.0%	25.0	1039.97	1039.17
16+26.00	17.0	16.5	5.0%	25.0	1039.65	1038.80
16+55.00	17.0	16.5	5.0%	25.0	1039.55	1038.70
17+38.00	15.0	18.7	5.5%	25.0	1039.27	1038.45
18+28.00	18.0	15.5	4.5%	25.0	1038.97	1038.16
19+15.00	16.0	17.5	5.0%	25.0	1038.68	1037.88
20+09.00	15.0	18.7	5.5%	25.0	1038.37	1037.54
21+01.00	17.0	16.5	5.0%	25.0	1038.06	1037.21
21+33.00	16.0	17.5	5.5%	25.0	1037.95	1037.07
22+48.00	16.0	17.5	5.0%	25.0	1037.57	1036.77
23+39.00	16.0	17.5	5.0%	25.0	1037.26	1036.46
24+40.00	16.0	17.5	5.0%	25.0	1036.92	1036.12
25+59.00	16.0	17.5	5.5%	25.0	1036.52	1035.64
26+59.00	16.0	17.5	5.0%	25.0	1036.19	1035.39
26+87.00	16.0	17.5	5.0%	25.0	1036.09	1035.29
27+94.00	16.0	17.5	5.5%	25.0	1035.74	1034.86
30+28.00	16.0	20.2	0.1	25.0	1034.78	1033.90
31+36.00	16.0	20.2	0.1	25.0	1034.37	1033.49
32+45.00	17.0	19.0	0.1	25.0	1033.95	1033.01
34+22.00	18.0	19.1	0.1	30.0	1032.97	1032.07
35+43.00	18.0	19.1	0.1	30.0	1032.17	1031.27
37+12.00	18.0	19.1	0.1	30.0	1031.05	1030.15

### Offset Rock Cross Vanes

Sill Length (ft)	Outside Arm			Invert Length (ft)	Inside Arm			Station (ft)	Elevation (ft)			
	Length (ft)	Angle (deg)	Slope (%)		Length (ft)	Angle (deg)	Slope (%)		At Pt 3	Pt 1	Pt 2	Pt 3
4.0	18.0	18.8	4.8%	5.0	12.4	18.8	1.0%	29+36.00	1035.53	1035.13	1034.27	1034.39
4.0	19.4	19.0	4.5%	5.0	12.8	19.0	1.0%	33+41.00	1033.91	1033.51	1032.64	1032.76
4.0	17.0	21.9	4.7%	5.0	11.0	21.9	1.0%	34+86.00	1032.96	1032.56	1031.76	1031.87

### Log Rollers

Point 1		Point 2		Point 3		Point 4		Point 5		Slope
Sta. (ft)	Elev. (ft.)	Sta. (ft)	Elev. (ft.)	Sta. (ft)	Elev. (ft.)	Sta. (ft)	Elev. (ft.)	Sta. (ft)	Elev. (ft.)	
21+71.00	1037.13	21+80.00	1037.10	22+12.00	1036.99	N/A	N/A	22+37.00	1036.91	0.33%
23+71.00	1036.46	23+85.00	1036.41	24+13.00	1036.32	N/A	N/A	24+25.00	1036.28	0.33%
24+71.00	1036.13	N/A	N/A	24+86.00	1036.08	25+18.00	1035.97	25+43.00	1035.89	0.33%
27+12.00	1035.32	N/A	N/A	27+24.00	1035.28	27+52.00	1035.18	27+75.00	1035.11	0.34%
28+31.00	1034.92	28+40.00	1034.87	28+66.00	1034.74	28+90.00	1034.61	29+00.00	1034.56	0.52%

### Constructed Riffles

Point 1		Point 2		Bottom Width	Length	Slope
Station	Elevation	Station	Elevation			
10+83.00	1040.75	11+19.00	1040.54	8.0	36.0	0.56%
12+65.00	1040.17	12+81.00	1040.02	8.0	16.0	0.92%
13+48.00	1039.89	13+66.00	1039.74	8.0	18.0	0.88%
16+00.00	1039.05	16+26.00	1038.88	8.0	26.0	0.66%
17+22.00	1038.64	17+38.00	1038.51	8.0	16.0	0.82%
19+06.00	1038.02	19+15.00	1037.92	8.0	9.0	1.08%
20+89.00	1037.41	21+01.00	1037.29	8.0	12.0	1.01%
23+22.00	1036.63	23+39.00	1036.46	8.0	17.0	0.97%
26+42.00	1035.55	26+59.00	1035.41	8.0	17.0	0.83%
29+00.00	1034.56	29+36.00	1034.27	10.4	36.0	0.81%
* 32+81.00	1033.09	33+29.00	1032.91	10.4	48.0	0.38%
33+29.00	1032.91	33+41.00	1032.64	13.0	12.0	2.29%

\* Permanent Ford Crossing runs through this constructed riffle from 32+99 to 33+19

### Toe Wood with Geolift

STA Length (ft)	Toe Wood Dimensions				Elevation (ft)				
	Bank Length (ft)	Width (ft)	Depth (ft)	Begin Station (ft)	End Station (ft)	Pt 1	Pt 2	Pt 3	Pt 4
49	69	8	2.5	10+30.00	10+79.00	1041.70	1039.20	1041.53	1039.03
32	45	8	2.5	11+34.00	11+66.00	1041.35	1038.85	1041.24	1038.74
31	46	8	2.5	13+80.00	14+11.00	1040.52	1038.02	1040.42	1037.92
25	34	8	2.5	18+39.00	18+64.00	1038.99	1036.49	1038.90	1036.40
24	33	8	2.5	20+21.00	20+45.00	1038.38	1035.88	1038.30	1035.80
27	38	8	2.75	29+50.00	29+77.00	1035.14	1032.39	1035.04	1032.29
52.5	83	8	2.5	34+55.50	35+08.00	1032.87	1030.37	1032.52	1030.02

### Sod Mats

STA Length (ft)	Bank Length (ft)	Width (ft)	Begin Station (ft)	End Station (ft)
* 32	47	8	12+14.00	12+46.00
* 30	46	8	12+92.00	13+22.00
* 27	41	8	14+60.00	14+87.00
* 19	30	8	15+42.00	15+61.00
* 38	49	8	16+34.00	16+72.00
* 23	33	8	17+48.00	17+71.00
* 25	37	8	19+17.00	19+42.00
* 124	148	8	21+13.00	22+37.00
* 66	66	8	21+71.00	22+37.00
* 22	32	8	22+56.00	22+78.00
* 74	90	8	23+51.00	24+25.00
* 54	54	8	23+71.00	24+25.00
* 91	107	8	24+52.00	25+43.00
* 72	72	8	24+71.00	25+43.00
* 32	44	8	25+71.00	26+03.00
* 63	63	8	27+12.00	27+75.00
* 63	63	8	27+12.00	27+75.00
* 94	111	8	28+06.00	29+00.00
* 79	73	8	28+31.00	29+10.00
* 32	46	8	30+42.00	30+74.00
* 28	43	8	31+52.00	31+80.00
* 23	14	8	32+59.00	32+82.00
* 20	24	8	34+36.00	34+56.00
* 23	29	8	35+57.00	35+80.00
* 22	33	8	36+04.00	36+26.00
* 44	45	8	37+49.00	37+93.00

\* Structures may change to Toe Wood at the direction of the Engineer.

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# STRUCTURE TABLES - UT

PROJECT # 082 SHEET NO. 3A

TABLES

**Log Vanes**

Station at Point 2	Arm			Log Length (ft)	Elevation (ft)	
	Length (ft)	Angle (deg)	Slope (%)		Pt 1	Pt 2
11+57.00	12.0	20	6.0%	20	1037.94	1037.22
12+37.00	12.0	20	6.0%	20	1037.56	1036.84
12+99.00	12.5	19	6.0%	20	1037.27	1036.52
13+24.00	12.5	19	6.0%	20	1037.15	1036.40
13+94.00	14.0	17	5.0%	20	1036.82	1036.12
14+66.00	13.0	19	5.5%	20	1036.48	1035.76
15+59.00	13.0	19	5.5%	20	1036.04	1035.32
16+27.00	13.0	19	5.5%	20	1035.71	1035.00

**Constructed Riffles**

Point 1		Point 2		Bottom Width	Length	Slope
Station	Elevation	Station	Elevation			
16+50.00	1035.01	17+03.55	1034.27	6.9	53.6	1.4%

**Log Rollers**

Point 1		Point 2		Point 3		Point 4		Point 5		Slope
Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	Sta. (ft)	Elev (ft.)	
14+88.00	1035.78	15+02.00	1035.71	15+25.00	1035.61	NA	NA	15+37.00	1035.55	0.5%

**Toe Wood with Geolift**

STA Length (ft)	Bank Length (ft)	Toe Wood Dimensions				Elevation (ft)			
		Width (ft)	Depth (ft)	Begin Station (ft)	End Station (ft)	Pt 1	Pt 2	Pt 3	Pt 4
30	45	7.0	2.5	10+69.00	10+99.00	1038.42	1035.92	1038.28	1035.78
22	29	7.0	2.5	15+68.00	15+90.00	1036.05	1033.55	1035.95	1033.45

**Sod Mats**

STA Length (ft)	Bank Length (ft)	Width (ft)	Begin Station (ft)	End Station (ft)
* 23	33	7.0	11+66.00	11+89.00
* 20	30	7.0	12+41.00	12+61.00
* 35	50	7.0	13+01.00	13+36.00
* 23	32	7.0	14+04.00	14+27.00
* 61	73	7.0	14+76.00	15+37.00
80	87	7.0	14+88.00	15+68.00
39	44	7.0	16+36.00	16+75.00

*\* Structures may change to Toe Wood at the direction of the Engineer.*

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1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
2	FINAL MITIGATION PLAN	CJ	KLT	9/10/18

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Mitigation Services  
ENVIRONMENTAL QUALITY

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RALEIGH, NC 27699-1652

MEADOW BROOK  
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# VEGETATION SELECTION

PROJECT # 082 SHEET NO. 3B

## VEGETATION SELECTION

### Temporary Seeding

Temporary herbaceous seed mixtures for the restoration site shall be planted in all disturbed areas. Temporary seed shall be applied according to the construction specifications and the information specified below.

Scientific Name	Common Name	Rate	Dates
<i>Secale cereale</i>	Cereal Rye Grain	130 lbs/acre	September to March (Cool Season)
<i>Urochloa ramosa</i>	Browntop Millet	30 lbs/acre	April to August (Warm Season)

Total Planting Area for Temporary Seeding: **11.6** acre(s)

### Zone 2 - Riparian Wetlands (Permanent Seeding)

This permanent seed mixture shall be planted in all disturbed areas as specified on the plans as **Zone 2**. This permanent seed mixture shall be applied with temporary seed, as defined in the construction specifications. Permanent seed shall be applied at a rate of **25 lbs/acre**.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
<i>Panicum virgatum</i>	Switchgrass	23%	FAC
<i>Elymus riparius</i>	Riverbank Wildrye	20%	FACW
<i>Panicum dichotomiflorum</i>	Smooth Panicgrass	14%	FACW
<i>Carex vulpinoidea</i>	Fox sedge	12%	OBL
<i>Panicum rigidulum</i>	Redtop Panicgrass	8%	FACW
<i>Dichanthelium clandestinum</i>	Deer-tongue	8%	FAC
<i>Bidens frondosa (or aristosa)</i>	Beggars Tick	7%	FACW
<i>Juncus effusus</i>	Soft Rush	4%	FACW
<i>Persicaria pensylvanica</i>	Pennsylvania smartweed	2%	FACW
<i>Sparganium americanum</i>	American Bur Reed	2%	OBL
<b>Total</b>		<b>100%</b>	

Total Planting Area for Permanent Seeding: **10.3** acre(s)

### Zone 3 - Uplands (Permanent Seeding)

This permanent seed mixture shall be planted in all disturbed areas as specified on the plans as **Zone 3**. This permanent seed mixture shall be applied with temporary seed, as defined in the construction specifications. Permanent seed shall be applied at a rate of **25 lbs/acre**.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
<i>Elymus virginicus</i>	Virginia wildrye	15%	FACW
<i>Tripsacum dactyloides</i>	Eastern Gamma Grass	13%	FACW
<i>Agrostis scabra</i>	Rough bentgrass	12%	FAC
<i>Panicum virgatum</i>	Switchgrass	12%	FAC
<i>Carex vulpinoidea</i>	Fox Sedge	10%	OBL
<i>Tridens flavus</i>	Purple Top	10%	FACU
<i>Schizachyrium scoparium</i>	Little Blue Stem	8%	FACU
<i>Coreopsis lanceolata</i>	Lance-Leaved Tick Seed	5%	FACU
<i>Elymus hystrix</i>	Bottlebrush Grass	5%	UPL
<i>Sorghastrum nutans</i>	Yellow Indian Grass	5%	FACU
<i>Festuca ovina var. duriuscula</i>	Hard Fescue	4%	UPL
<i>Rudbeckia hirta</i>	Black-Eyed Susan	1%	FACU
<b>Total</b>		<b>100%</b>	

Total Planting Area for Permanent Seeding: **0.9** acre(s)

### Zone 4 - Areas Outside of Easement (Permanent Seeding)

This permanent seed mixture shall be planted in all disturbed areas as specified on the plans as **Zone 4**. This permanent seed mixture shall be applied with temporary seed, as defined in the construction specifications. Permanent seed shall be applied at the rate shown below.

Scientific Name	Common Name	Rate	Dates
<i>Poa pratensis</i>	Kentucky Bluegrass	1 lb/1,000 sq.ft.	August - September (Cool Season)
<i>Schedonorus arundinaceus</i>	Tall Fescue	5 lb/1,000 sq.ft.	
<b>Total</b>		<b>6 lbs/1,000 sq.ft</b>	

Total Planting Area for Permanent Seeding: **0.4** acre(s)

### Zone 1 - Live Staking (Stream Banks)

Live stakes will be installed along all stabilized bank areas, as indicated on the planting plan sheets, details, and according to the construction specifications. Live stake all disturbed banks with a single row at a **1,742 live stakes per acre (5' x 5' spacing)**. Not all of the species listed may be planted. Commercial availability may dictate which species are actually planted.

Scientific Name	Common Name	% by Species	Approx. Number of Stems	Wetland Indicator Status
<i>Comus amomum</i>	Silky dogwood	40%	582	FACW
<i>Salix sericea</i>	Silky willow	30%	437	OBL
<i>Salix nigra</i>	Black willow	20%	291	OBL
<i>Sambucus canadensis</i>	Elderberry	10%	146	FAC
<b>Total</b>		<b>100%</b>	<b>1456</b>	

Total Planting Area for Livestakes: **0.8** acre(s)

### Zone 2 - Riparian Wetlands Vegetation

Riparian vegetation species (bare-roots) shall be planted in the areas designated on the plans using the species mixture and percentages listed below. Riparian species shall be planted at an overall density of **680 stems per acre (8' x 8' spacing)**. All species will be planted according to the plans, details, and construction specifications. Not all of the species listed may be planted - a minimum of 6 species will be planted. Commercial availability may dictate which species are actually planted.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
<i>Betula nigra</i>	River Birch	20%	FACW
<i>Celtis laevigata</i>	Sugarberry	5%	FACW
<i>Diospyros virginiana</i>	Persimmon	10%	FAC
<i>Fraxinus pennsylvanica</i>	Green Ash	10%	FACW
<i>Platanus occidentalis</i>	Sycamore	20%	FACW
<i>Quercus nigra</i>	Water Oak	10%	FAC
<i>Quercus phellos</i>	Willow Oak	15%	FAC
<i>Ulmus americana</i>	American Elm	10%	FACW
<b>Total</b>		<b>100%</b>	

Total Planting Area for Riparian Vegetation: **9.2** acre(s)

### Zone 3 - Upland Vegetation

Upland vegetation species (bare-roots) shall be planted in the areas designated on the plans using the species mixture and percentages listed below. Species shall be planted at an overall density of **680 stems per acre (8' x 8' spacing)**. All species will be planted according to the plans, details, and construction specifications. Not all of the species listed may be planted - a minimum of 6 species will be planted. Commercial availability may dictate which species are actually planted.

Scientific Name	Common Name	% by Species	Wetland Indicator Status
<i>Carya glabra</i>	Pignut Hickory	10%	FACU
<i>Carya tomentosa</i>	Mockernut Hickory	10%	NI
<i>Cercis canadensis</i>	Redbud	5%	FACU
<i>Comus florida</i>	Flowering Dogwood	5%	FACU
<i>Diospyros virginiana</i>	Persimmon	10%	FAC
<i>Ilex opaca</i>	American Holly	5%	FACU
<i>Juniperus virginiana</i>	Eastern Red Cedar	5%	FACU
<i>Liriodendron tulipifera</i>	Tulip Poplar	10%	FACU
<i>Oxydendrum arboreum</i>	Sourwood	5%	UPL
<i>Prunus serotina</i>	Black Cherry	5%	FACU
<i>Quercus alba</i>	White Oak	10%	FACU
<i>Quercus falcata</i>	Southern Red Oak	10%	FACU
<i>Quercus rubra</i>	Northern Red Oak	10%	FACU
<b>Total</b>		<b>100%</b>	

NI = No indicator status

Total Planting Area for Upland Vegetation: **0.9** acre(s)

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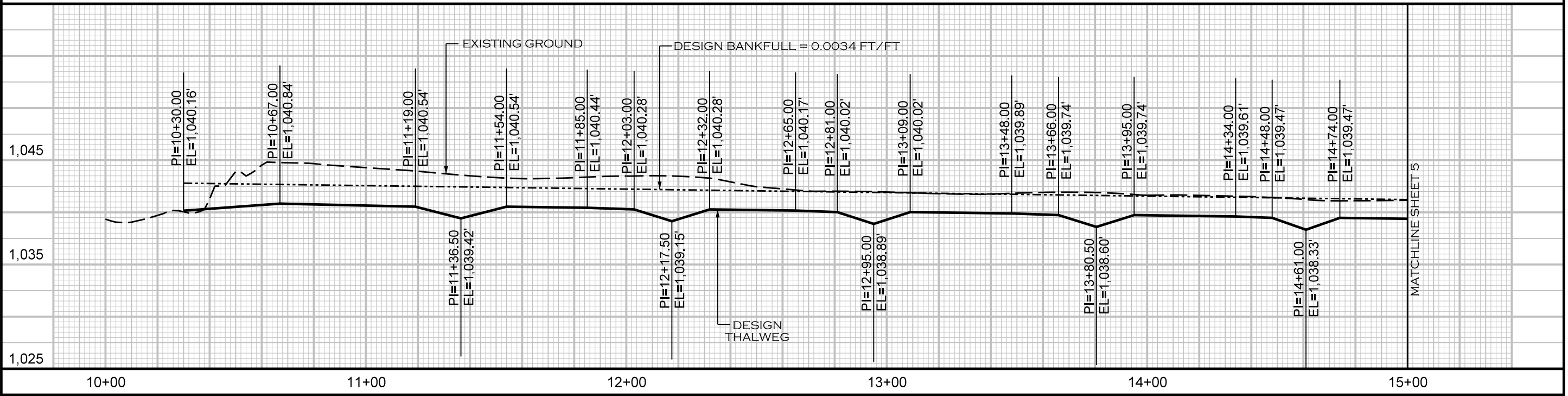
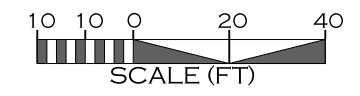
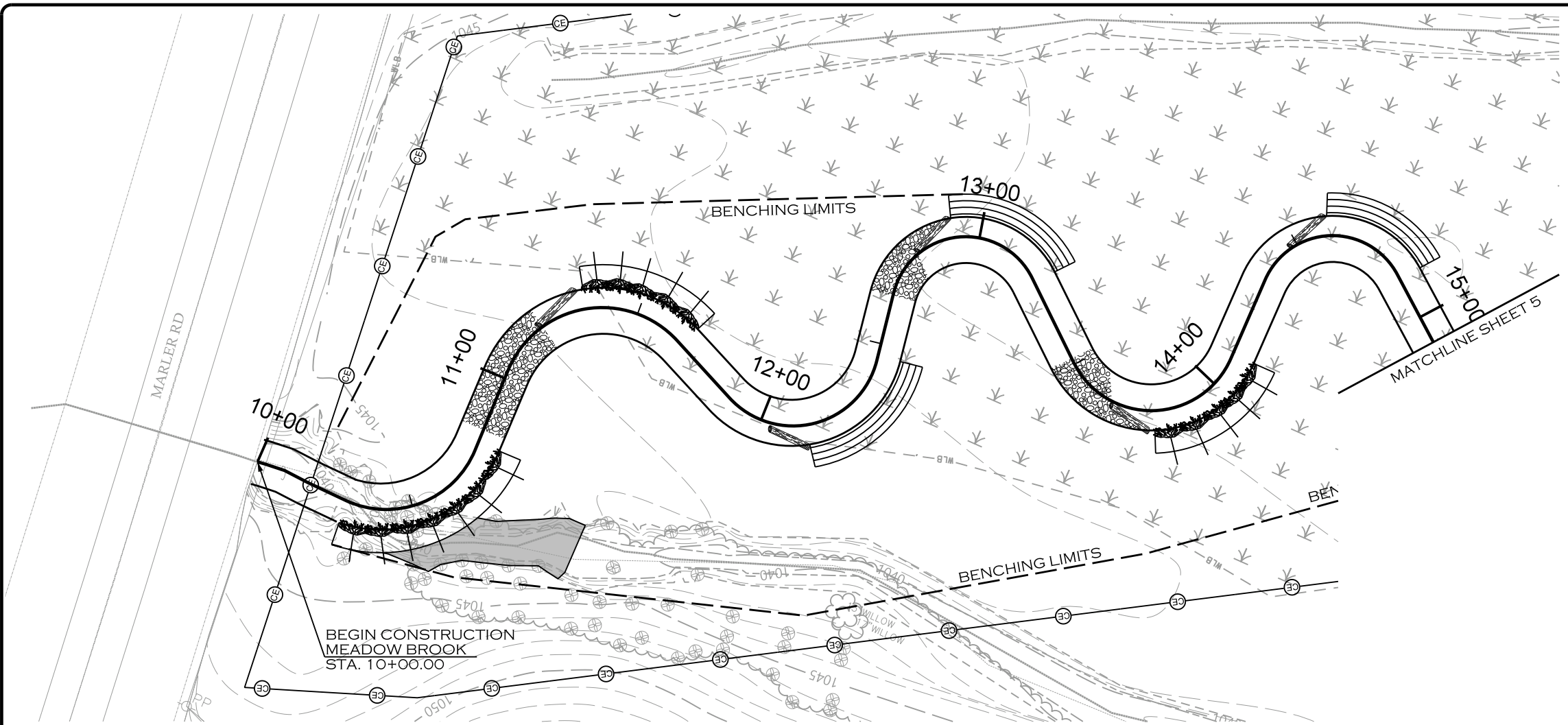
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1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
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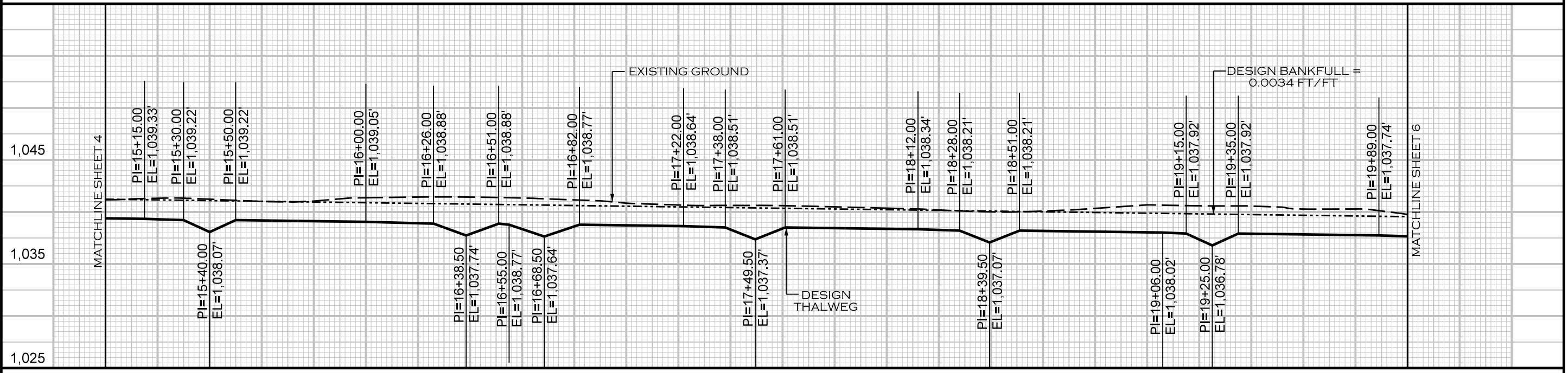
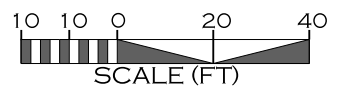
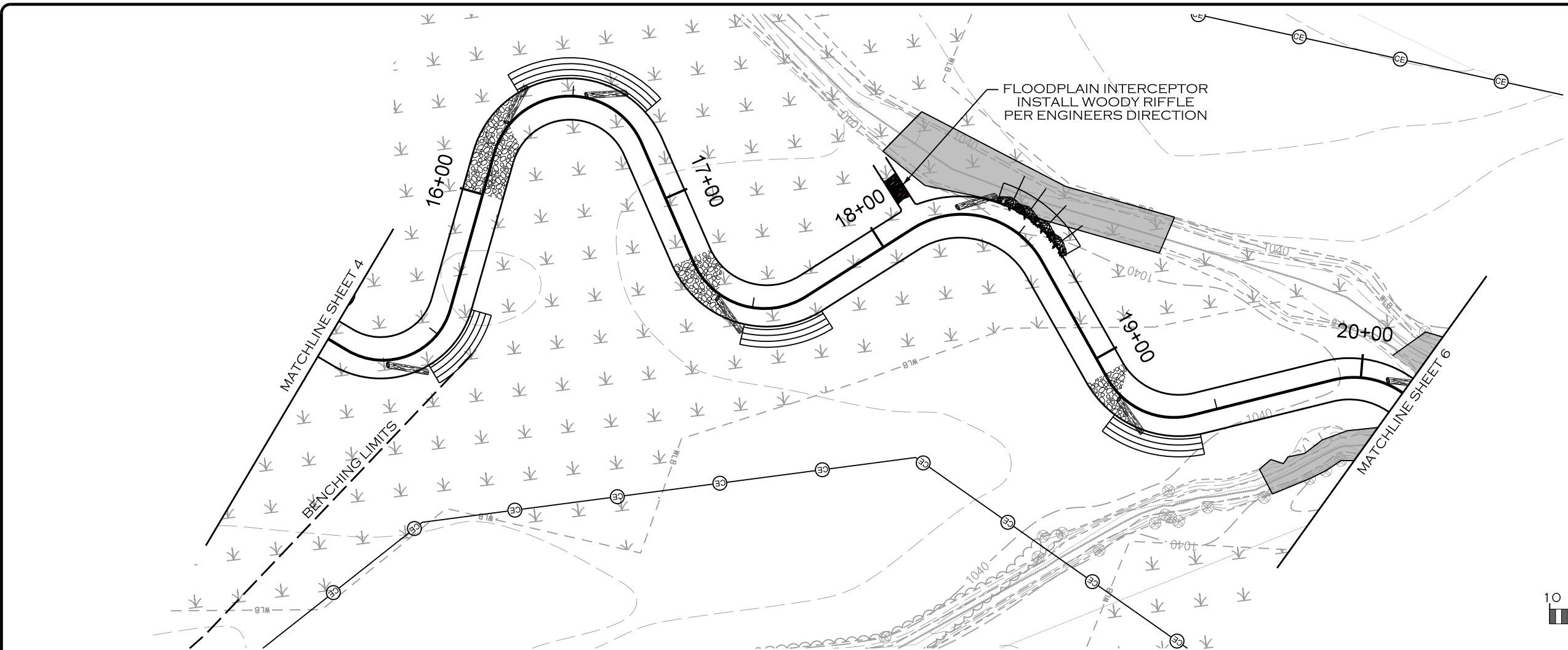
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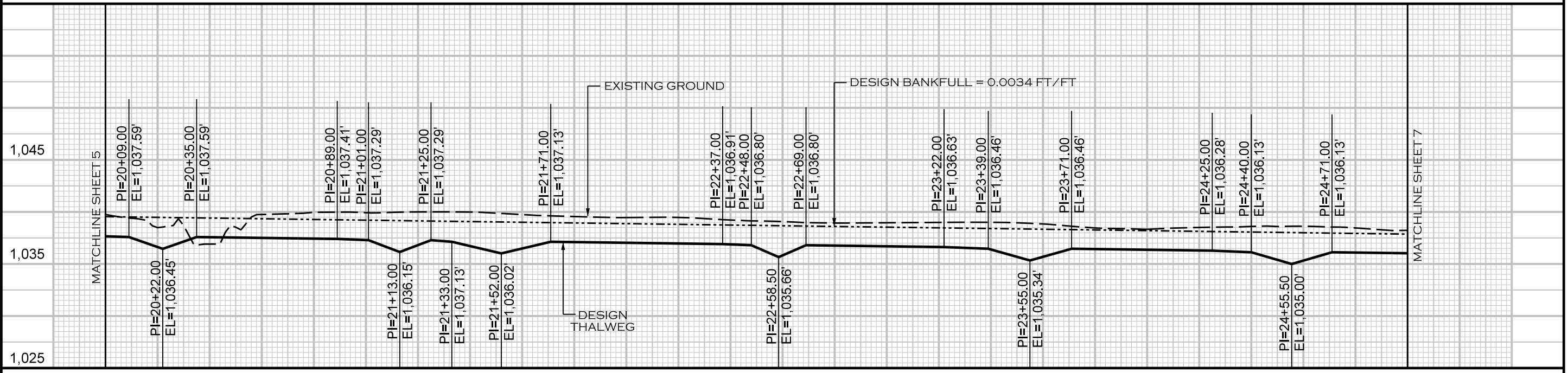
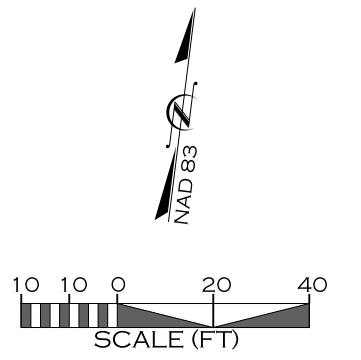
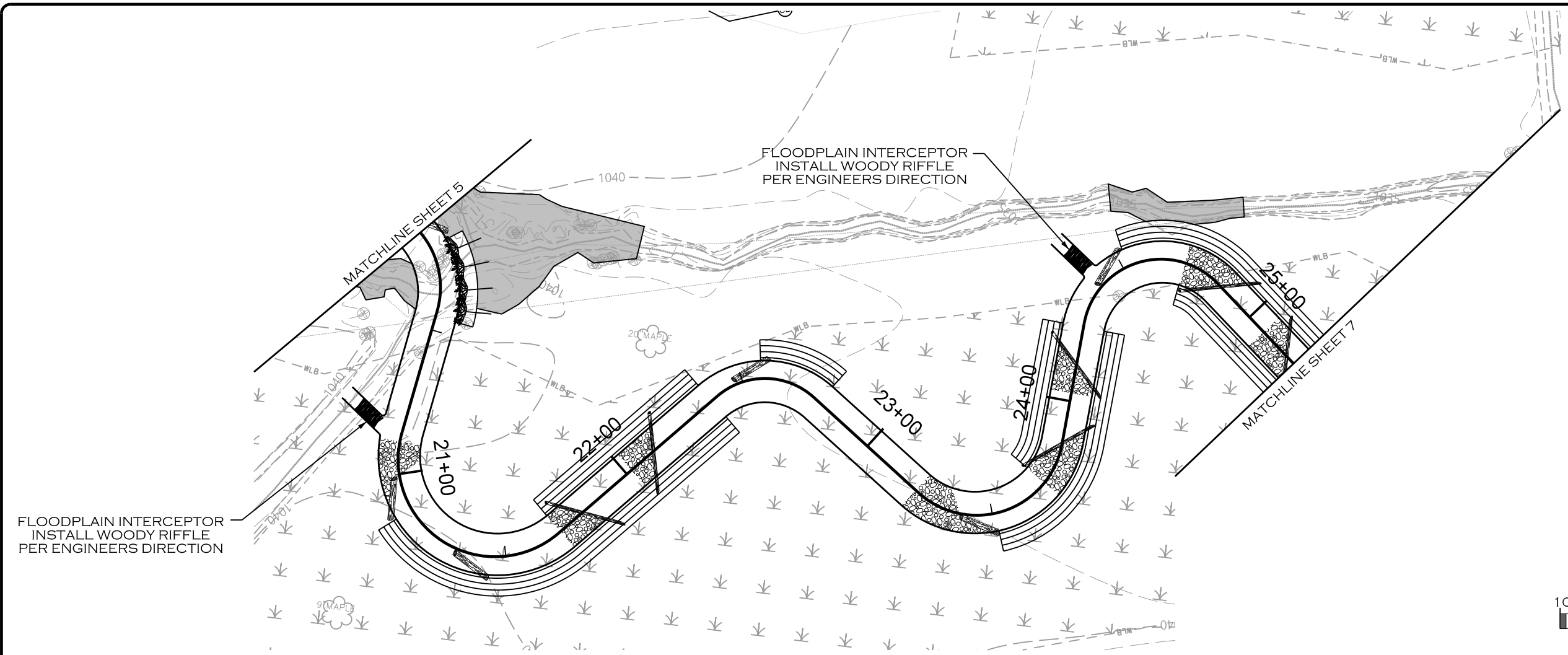
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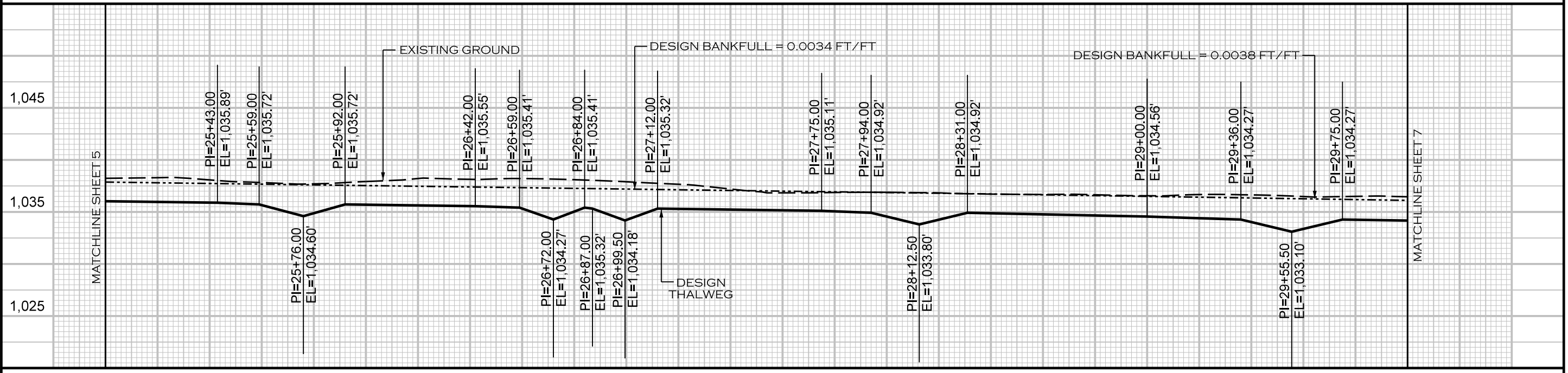
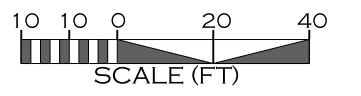
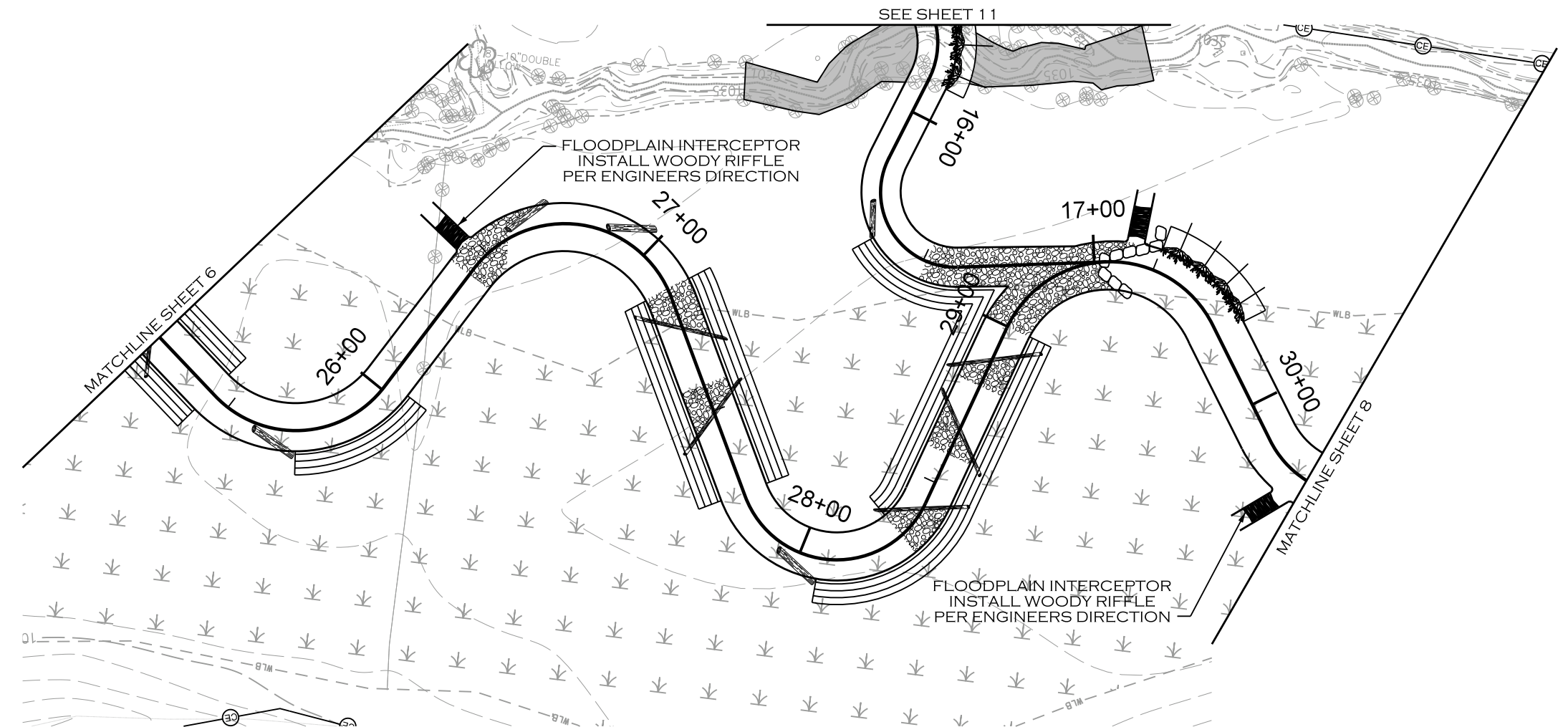
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1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
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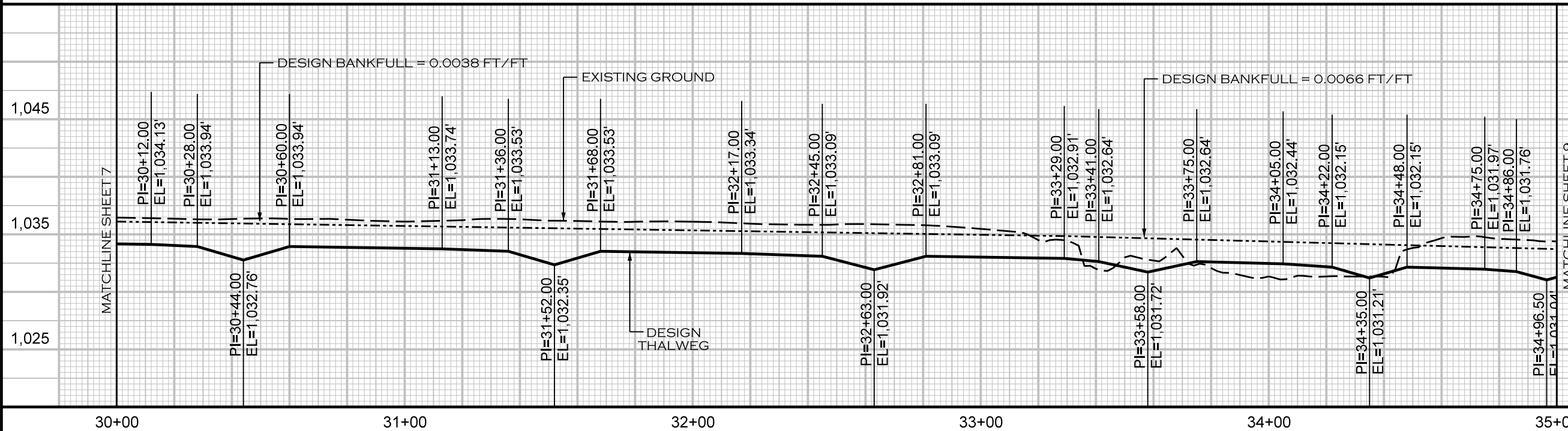
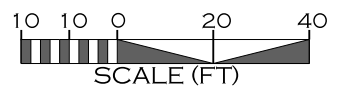
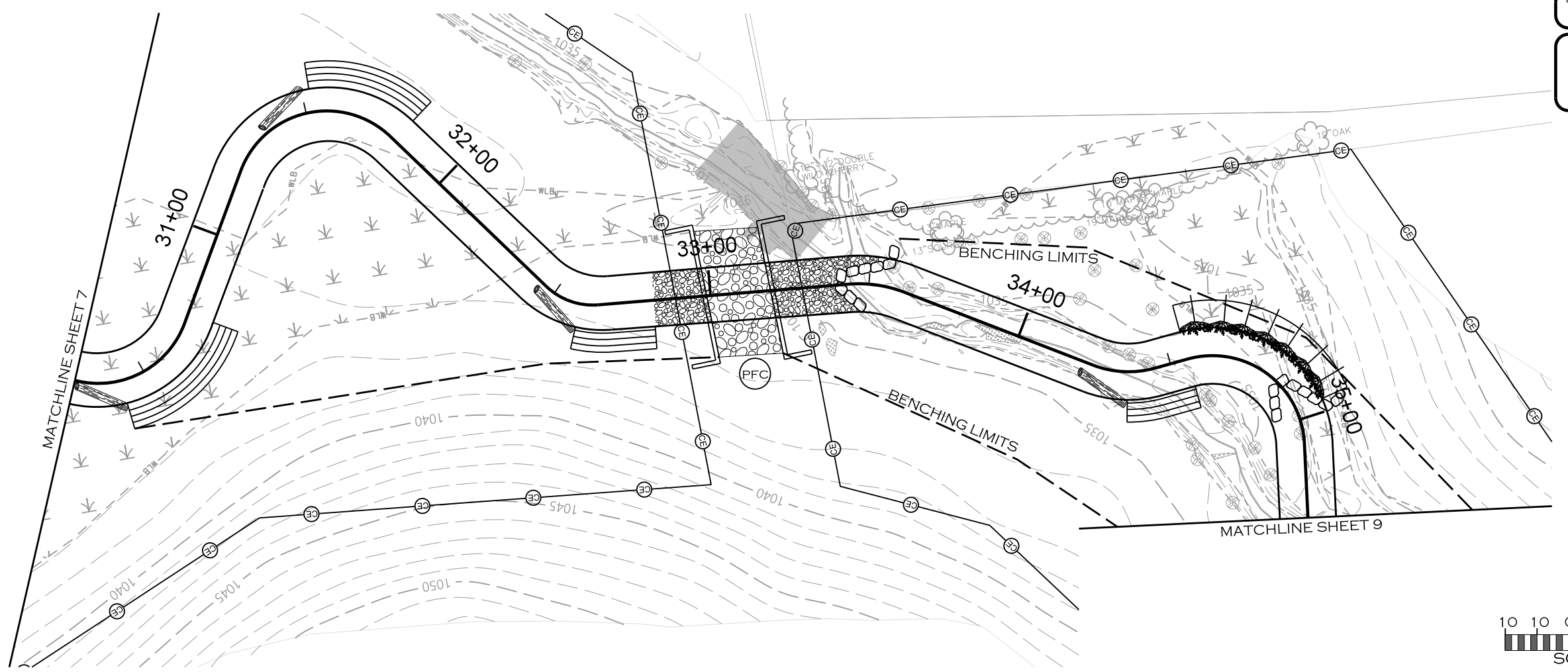
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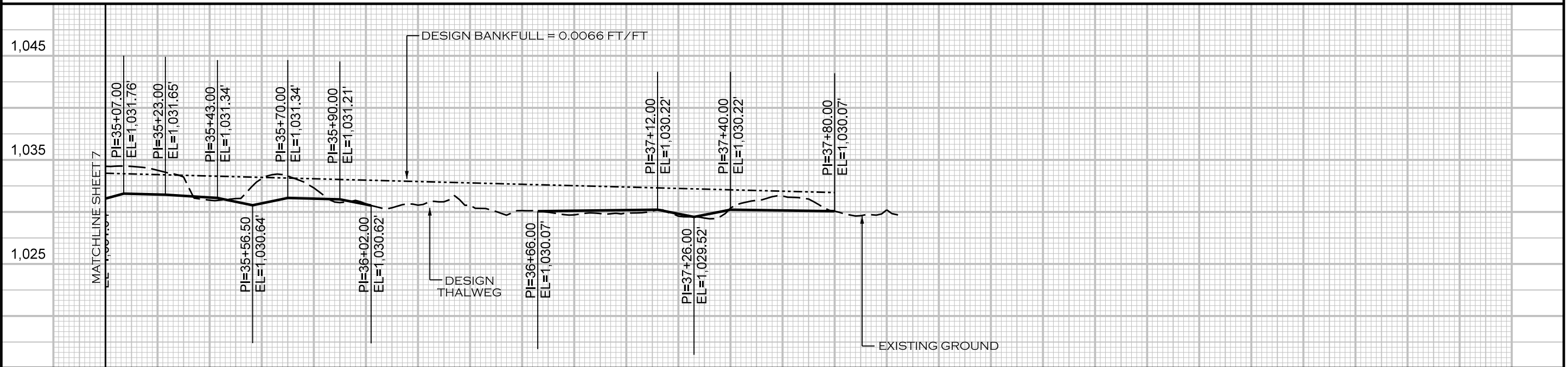
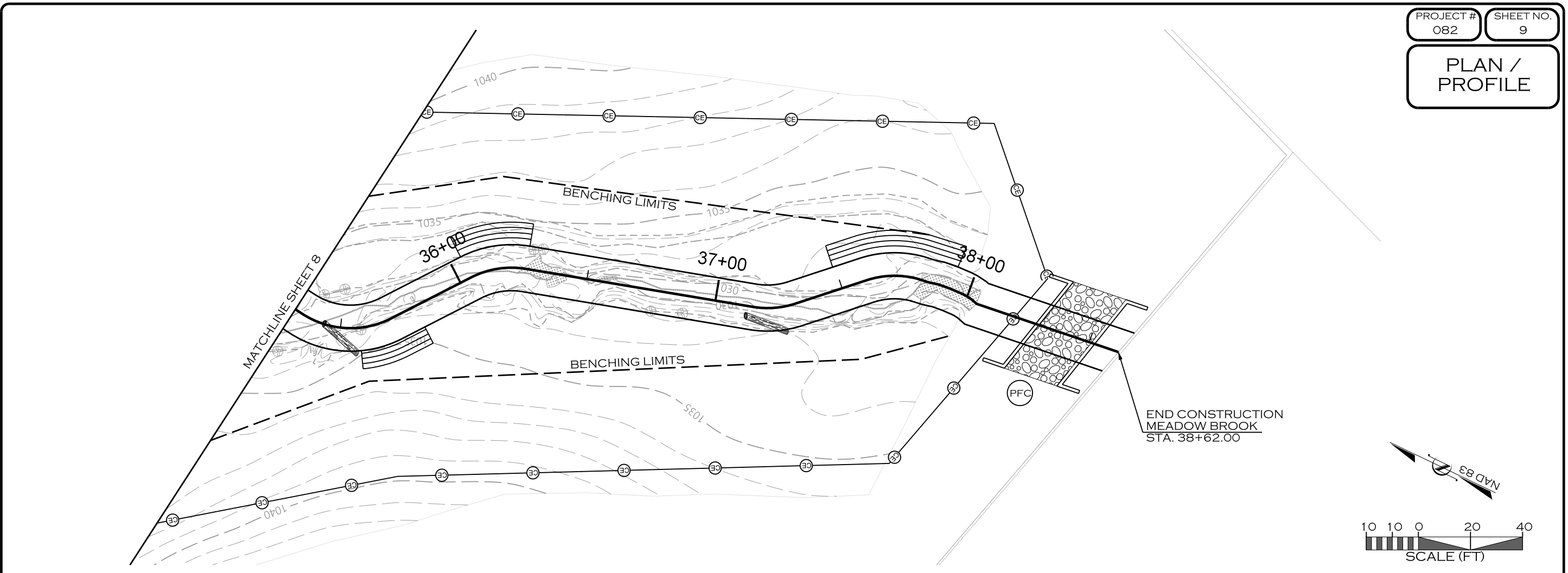
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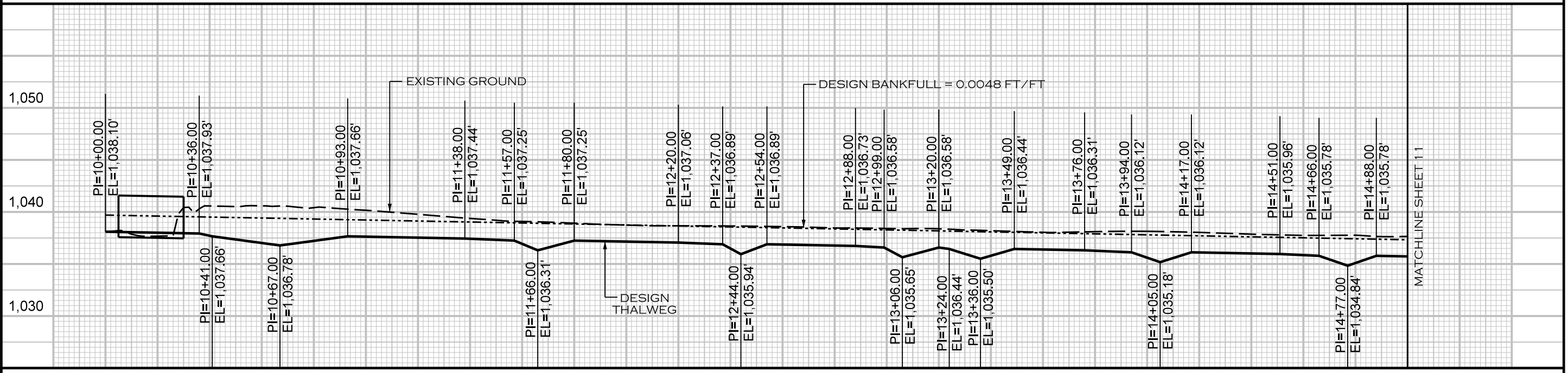
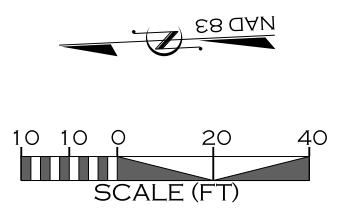
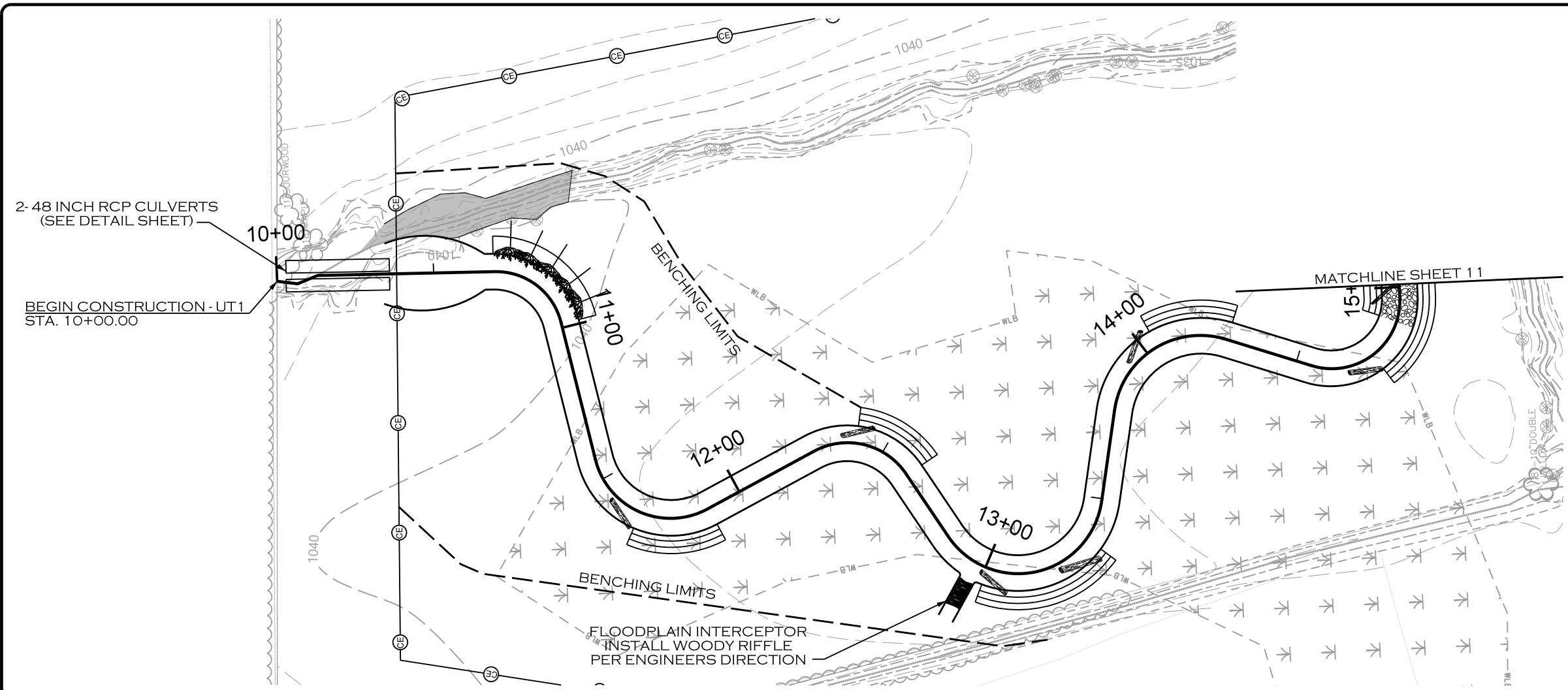
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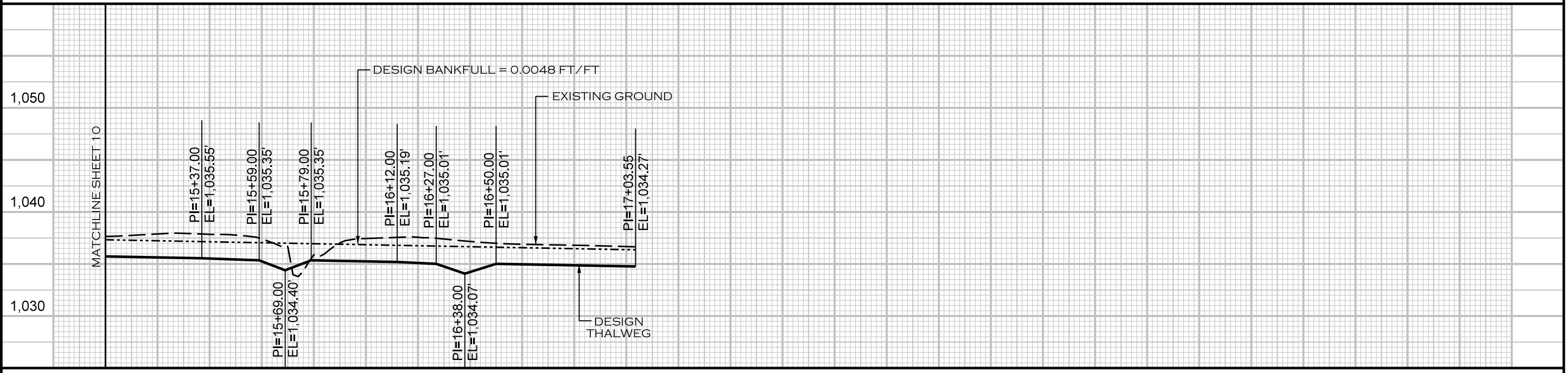
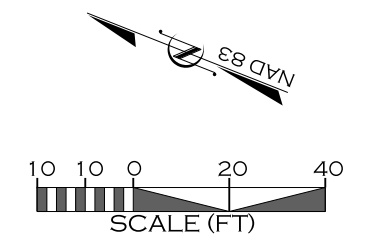
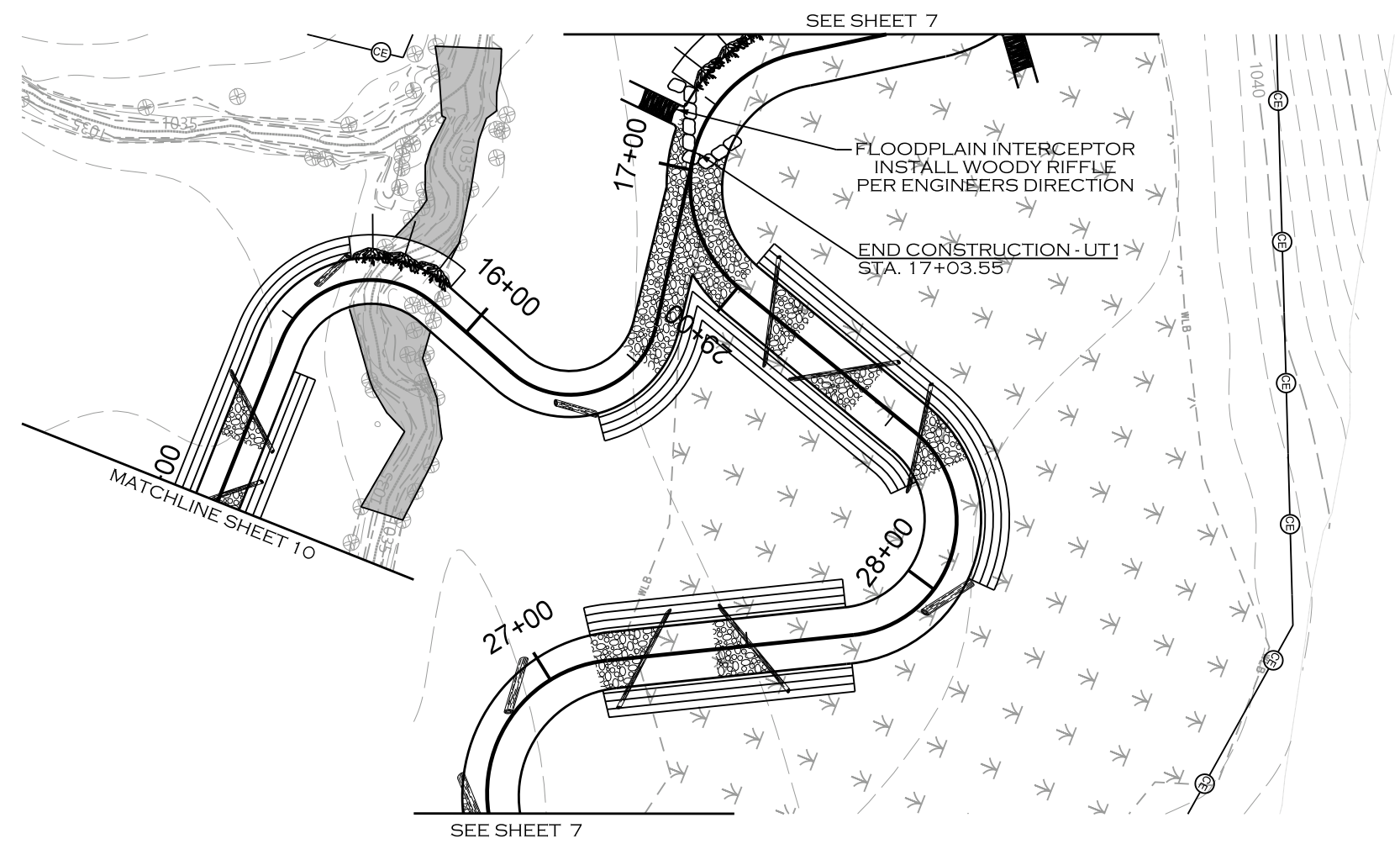
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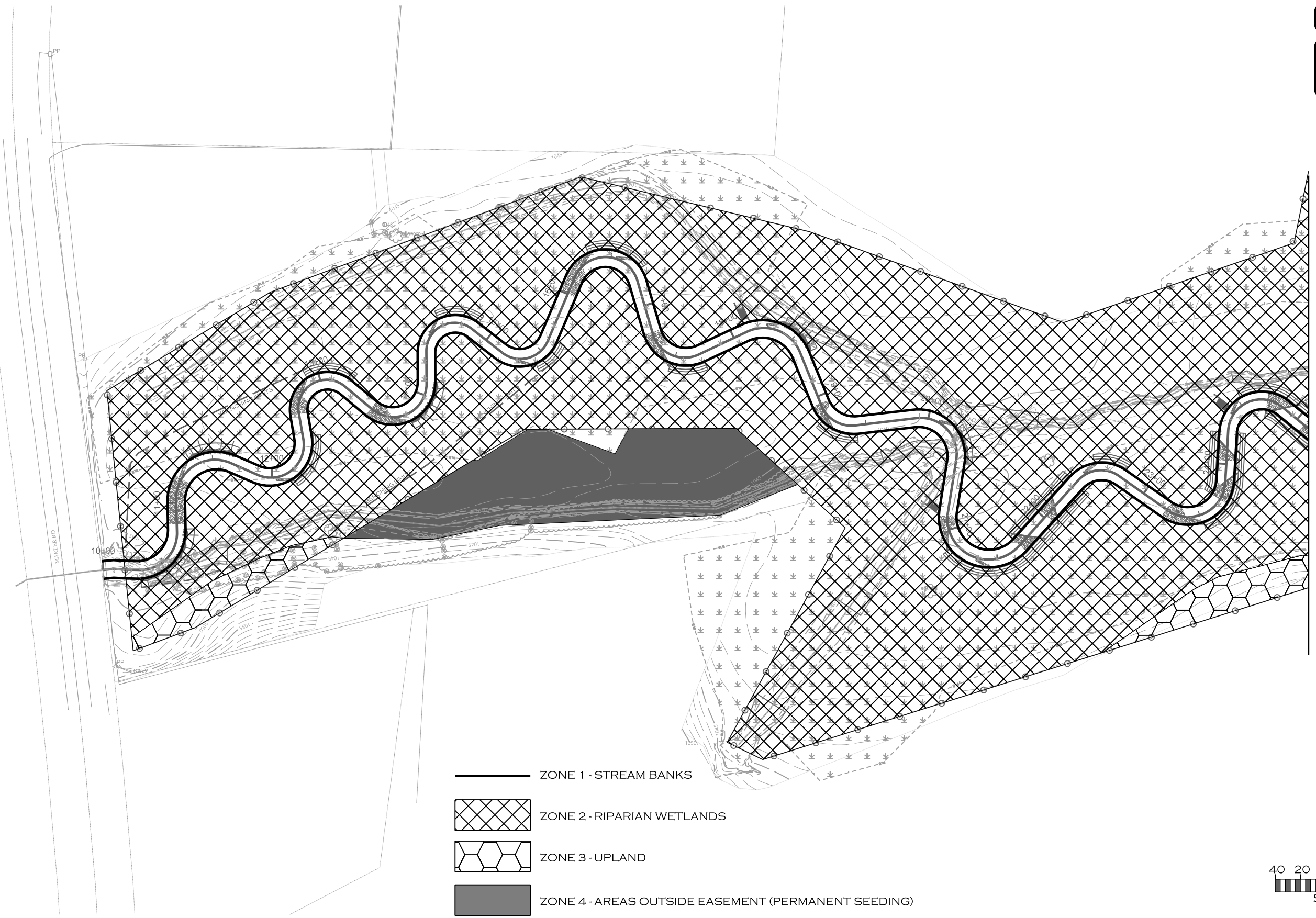
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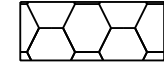

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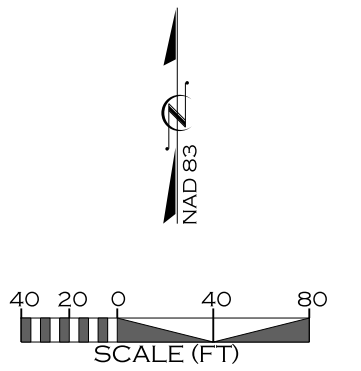
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VEGETATION PLAN



MATCHLINE SHEET 13

-  ZONE 1 - STREAM BANKS
-  ZONE 2 - RIPARIAN WETLANDS
-  ZONE 3 - UPLAND
-  ZONE 4 - AREAS OUTSIDE EASEMENT (PERMANENT SEEDING)



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REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE
1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
2	FINAL MITIGATION PLAN	CJ	KLT	9/10/18


PREPARED FOR:



NC DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF MITIGATION SERVICES  
1652 MAIL SERVICE CENTER  
RALEIGH, NC 27699-1652

MEADOW BROOK  
YADKIN COUNTY, NC

PREPARED IN THE OFFICE OF:

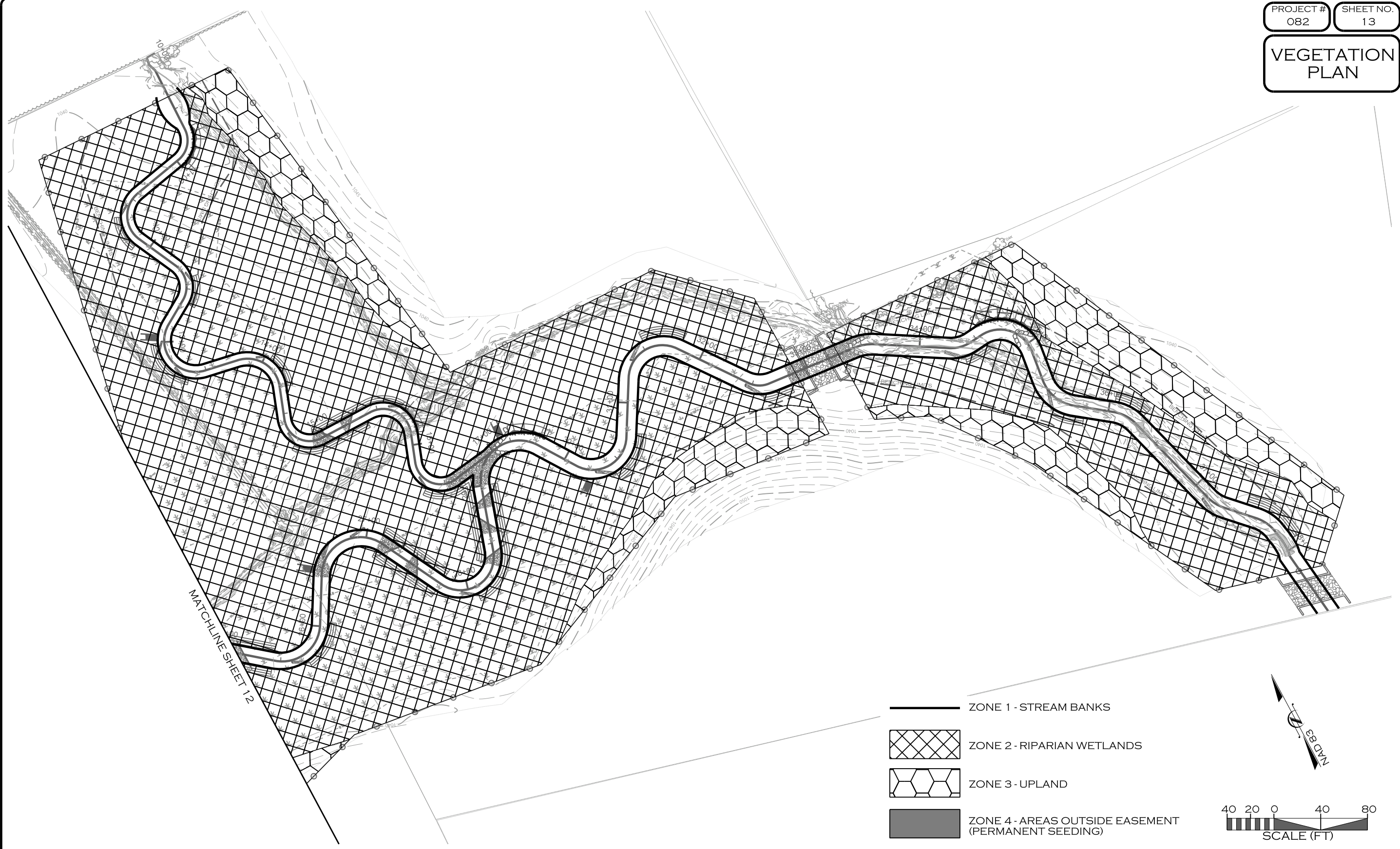




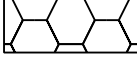

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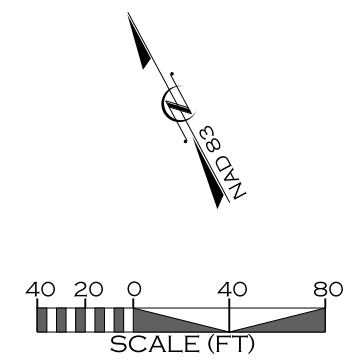
PROJECT ENGINEER

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VEGETATION PLAN



-  ZONE 1 - STREAM BANKS
-  ZONE 2 - RIPARIAN WETLANDS
-  ZONE 3 - UPLAND
-  ZONE 4 - AREAS OUTSIDE EASEMENT (PERMANENT SEEDING)



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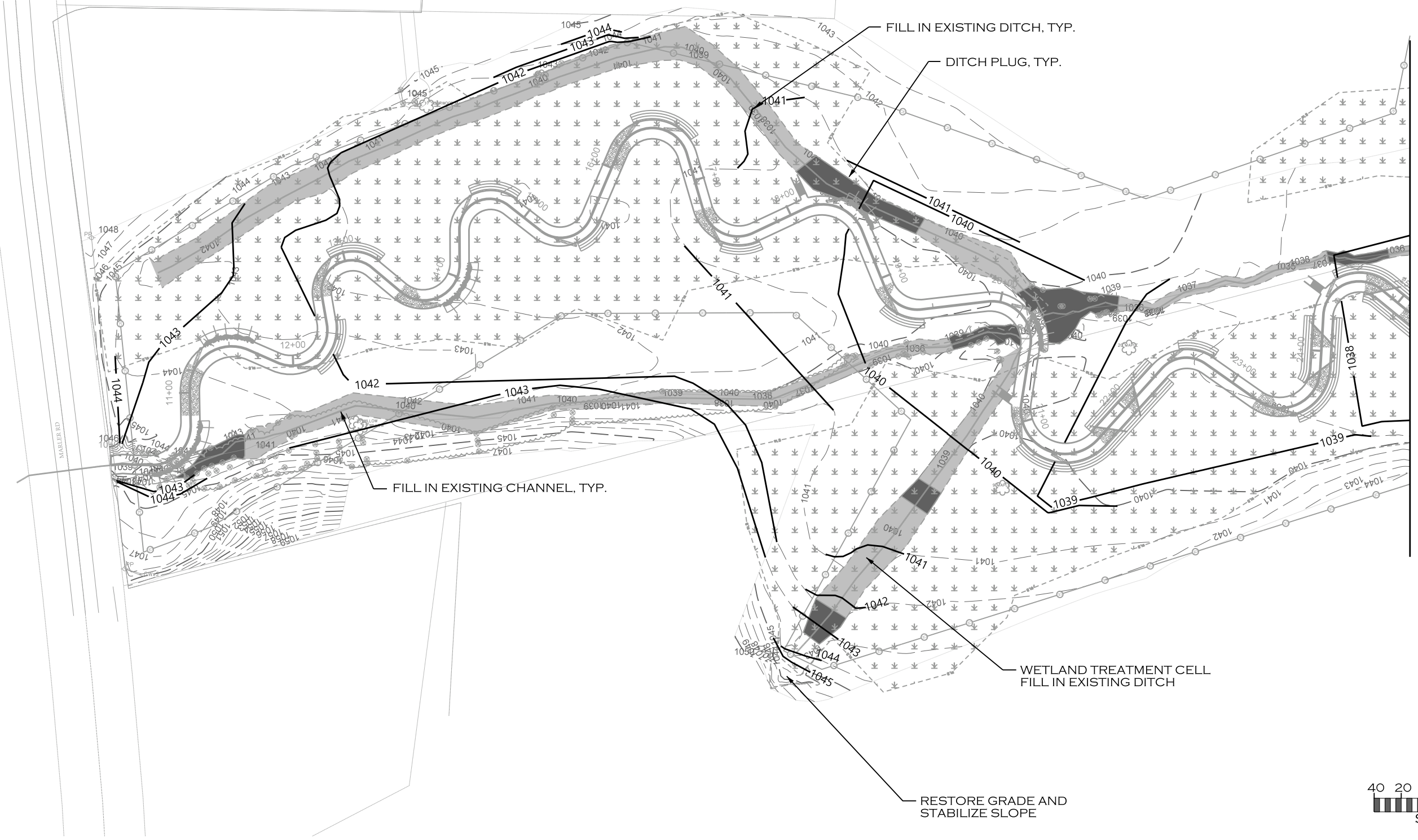
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**GRADING PLAN**



MATCHLINE SHEET 15



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1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
2	FINAL MITIGATION PLAN	CJ	KLT	9/10/18

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DIVISION OF MITIGATION SERVICES  
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YADKIN COUNTY, NC

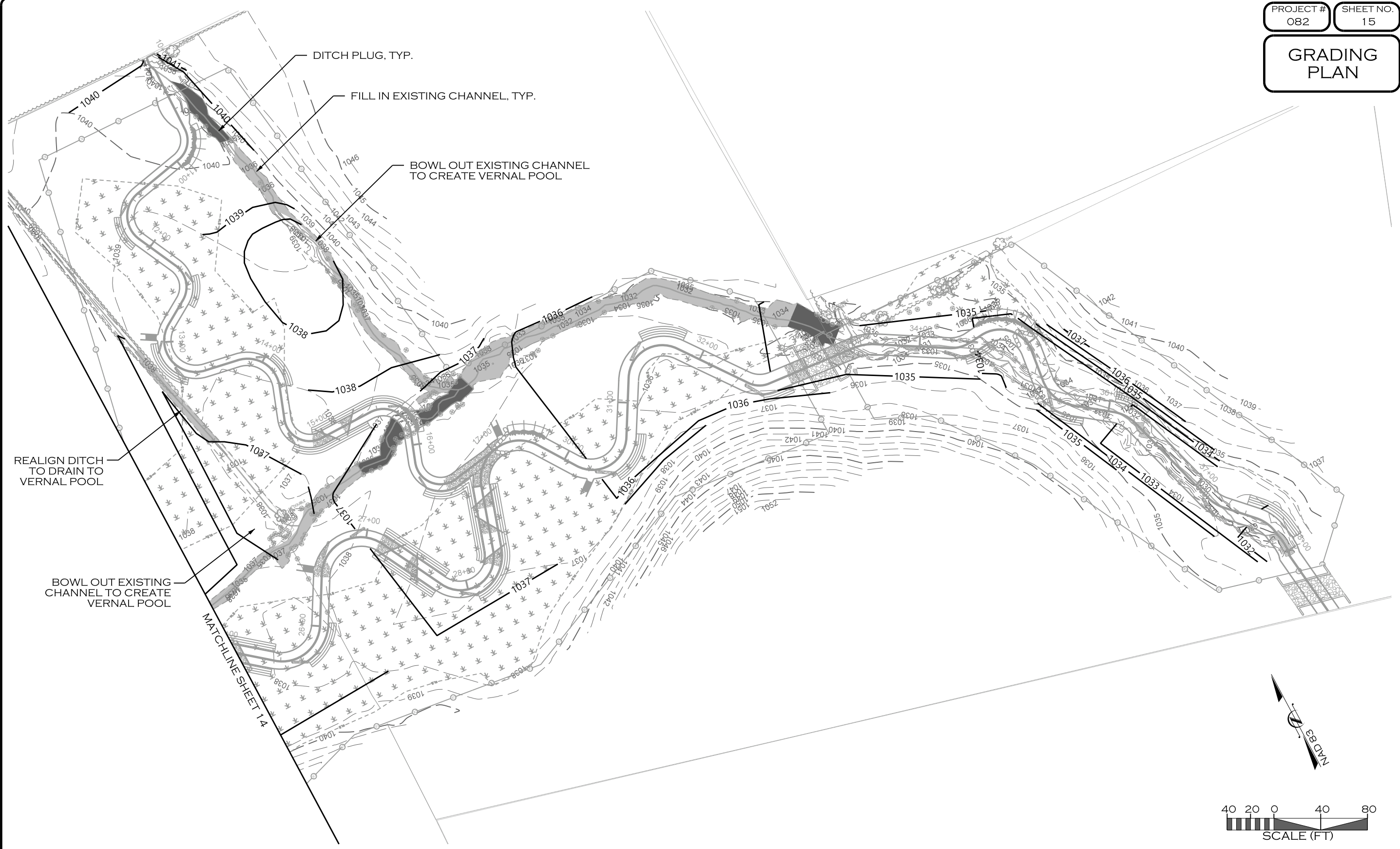
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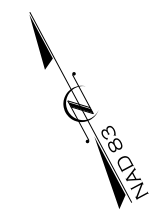
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1	DRAFT MITIGATION PLAN	CJ	KLT	3/2/18
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# Appendix 10

## MORPHOLOGICAL TABLES

Table 11a. Baseline Stream Data Summary  
Meadow Brook Stream Restoration Project (DMS No. 100024) - Meadow Brook Reach 1 (1936 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
Dimension and Substrate - <b>Riffle Only</b>	LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n		
Bankfull Width (ft)	7	25	11.5	7.2	12.5	11.6	19.6	5.4	4	13.8	15.4		16.9			13.8	14.5	15.7								
Floodprone Width (ft)				56.0	192.8	209.0	297.0	102.6	4	30.8	291.0		552			180.0	215.0	250.0								
Bankfull Mean Depth (ft)	0.9	2.3	1.5	0.8	1.5	1.4	2.2	0.6	4	0.8	1.3		1.7			1.1	1.3	1.6								
<sup>1</sup> Bankfull Max Depth (ft)				2.0	2.3	2.2	2.8	0.4	4	1.1	1.8		2.4			1.3	1.8	2.2								
Bankfull Cross Sectional Area (ft <sup>2</sup> )	9	40	15.1	15.1	15.7	15.4	16.9	0.9	4	11.0	19.9		28.7			15.2	19.0	25.1								
Width/Depth Ratio				3.3	11.4	8.4	25.4	9.8	4	10.0	12.5		15			10.0	11.0	13.0								
Entrenchment Ratio				5.7	17.5	15.7	33.0	12.5	4	2.2	3.1		40.0			12.2	22.6	33.0								
<sup>1</sup> Bank Height Ratio				1.0	1.2	1.2	1.5	0.2	5	1.0	1.1		1.1			1.0	1.0	1.0								
<b>Profile</b>																										
Riffle Length (ft)				11.0	48.7	20.0	216.0	74.2	7	Total riffle length 60-70% of reach length						31.0	52.0	72.0								
Riffle Slope (ft/ft)				0.003	0.0076	0.004	0.022	0.0067	7	0.002	0.0045		0.007			0.0034	0.0045	0.006								
Pool Length (ft)				9.0	43.9	39.0	98.0	36.8	8	Total pool length 30-40% of reach length						20.0	26.3	38.0								
Pool Max depth (ft)				2.1	2.5	2.5	2.8	0.2	8	1.6	3.8		5.0			2.1	3.2	4.7								
Pool Spacing (ft)				30.0	88.0	73.0	177.0	55.0	8	61.4	84.4		140			40.5	86.0	120.0								
<b>Pattern</b>																										
Channel Beltwidth (ft)				11.0	27.1	24.0	44.0	12.1	10	53.7	88.3		122.8			54.8	75.5	106.8								
Radius of Curvature (ft)				12.0	62.2	31.0	150.0	49.7	11	30.7	42.2		53.7			30.4	36.3	41.4								
Rc:Bankfull width (ft/ft)				1.1	5.7	2.8	13.6	4.5	11	2.0	2.8		3.5			2.1	2.5	2.8								
Meander Wavelength (ft)				65.0	176.4	120.0	450.0	143.9	7	107.5	145.8		184.2			103	138.1	189								
Meander Width Ratio				1.0	2.5	2.2	4.0	1.1	10	3.5	5.8		8.0			3.7	5.1	7.2								
<b>Transport parameters</b>																										
Reach Shear Stress (competency) lb/ft <sup>2</sup>				1												0.3										
Max part size (mm) mobilized at bankfull				243												68										
Stream Power (transport capacity) W/m <sup>2</sup>				4.6												10										
<b>Additional Reach Parameters</b>																										
Rosgen Classification				E4						C4						C4										
Bankfull Velocity (fps)	0.8	25.6	5.6	4.8												2.5										
Bankfull Discharge (cfs)	30	230	84.5	73												48										
Valley length (ft)				1249												1358*										
Channel Thalweg length (ft)				1304												1936										
Sinuosity (ft)				1.0						1.2 to 1.6						1.4										
Water Surface Slope (Channel) (ft/ft)				0.00498												0.0034										
BF slope (ft/ft)				0.00498												0.0034										
<sup>3</sup> Bankfull Floodplain Area (acres)				5.5												6.7										
<sup>4</sup> % of Reach with Eroding Banks				61%																						
Channel Stability or Habitat Metric				37%																						
Biological or Other																										

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

**Table 11b. Baseline Stream Data Summary**  
**Meadow Brook Stream Restoration Project (DMS No. 100024) - Meadow Brook Reach 2 (393 feet)**

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline						
	LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n	
<b>Dimension and Substrate - Riffle Only</b>																									
Bankfull Width (ft)	8.5	30	14.2	14.5	14.5	14.5	14.5		1	15.2	16.9		18.6			16.1	16.6	18.4							
Floodprone Width (ft)				48.0	48.0	48.0	48.0		1	37.2	323.0		608			180.0	197.5	215.0							
Bankfull Mean Depth (ft)	1.1	3	1.7	1.7	1.7	1.7	1.7		1	1	1.5		1.9			1.2	1.4	1.8							
<sup>1</sup> Bankfull Max Depth (ft)				2.5	2.5	2.5	2.5		1	1.2	1.9		2.6			1.5	1.9	2.6							
Bankfull Cross Sectional Area (ft <sup>2</sup> )	13	53	21.6	24.0	24.0	24.0	24.0		1	15.2	25.3		35.3			19.3	23.0	33.1							
Width/Depth Ratio				8.7	8.7	8.7	8.7		1	10.0	12.5		15			10.0	12.0	13.0							
Entrenchment Ratio				3.3	3.3	3.3	3.3		1	2.2	3.1		40.0			11.1	12.2	13.2							
<sup>1</sup> Bank Height Ratio				1.0	1.0	1.0	1.0		1	1.0	1.1		1.1			1.0	1.0	1.0							
<b>Profile</b>																									
Riffle Length (ft)				20.0	55.0	55.0	90.0		2	Total riffle length 60-70% of reach length						37.0	49.0	53.0							
Riffle Slope (ft/ft)				0.002	0.031	0.031	0.06		2	0.002	0.0045		0.007			0.0038	0.0045	0.006							
Pool Length (ft)				72.0	134.0	134.0	196.0		2	Total pool length 30-40% of reach length						32.0	34.0	39.0							
Pool Max depth (ft)				3.1	3.4	3.4	3.7		2	2	4.3		6.7			2.8	3.2	4.9							
Pool Spacing (ft)				135.0	213.0	213.0	290.0		2	67.6	93.0		118.3			95.0	108.0	111.0							
<b>Pattern</b>																									
Channel Beltwidth (ft)				25.0	25.0	25.0	25.0		1	59.2	97.2		135.2			49.3	84.8	92.3							
Radius of Curvature (ft)				25.0	25.0	25.0	25.0		1	33.8	46.5		59.2			37.1	38.1	42.1							
Rc:Bankfull width (ft/ft)				2.3	2.3	2.3	2.3		1	2.0	2.8		3.5			2.3	2.3	2.6							
Meander Wavelength (ft)				295.0	295.0	295.0	295.0		1	118.3	160.6		202.8			144.0	154.0	187.0							
Meander Width Ratio				2.3	2.3	2.3	2.3		1	3.5	5.8		8.0			3.0	5.2	5.7							
<b>Transport parameters</b>																									
Reach Shear Stress (competency) lb/ft <sup>2</sup>							0.7									0.3									
Max part size (mm) mobilized at bankfull							186									81									
Stream Power (transport capacity) W/m <sup>2</sup>							43									15									
<b>Additional Reach Parameters</b>																									
Rosgen Classification							E4						C4			C4									
Bankfull Velocity (fps)	3.3	6.6	5.6				4.4									2.8									
Bankfull Discharge (cfs)	43	350	120.0				100									64									
Valley length (ft)							322																		
Channel Thalweg length (ft)							350									393									
Sinuosity (ft)							1.1						1.2 to 1.6			1.2									
Water Surface Slope (Channel) (ft/ft)							0.00685									0.0038									
BF slope (ft/ft)							0.00685									0.0038									
<sup>3</sup> Bankfull Floodplain Area (acres)							0.4									1.5									
<sup>4</sup> % of Reach with Eroding Banks							33%																		
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

**Table 11c. Baseline Stream Data Summary**  
**Meadow Brook Stream Restoration Project (DMS No. 100024) - Meadow Brook Reach 3 (273 feet) and Meadow Brook Reach 4 (218 feet))**

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline						
	LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n	
<b>Dimension and Substrate - Riffle Only</b>																									
Bankfull Width (ft)	8.8	32	14.9	21	21	21	21		1	17.7	19.7		21.6			17.7	17.7	18.4							
Floodprone Width (ft)				38	38	38	38		1	27.5	736.0		708			35.0	52.5	70.0							
Bankfull Mean Depth (ft)	1.1	3	1.8	1.4	1.4	1.4	1.4		1	1.0	1.4		1.8			1.4	1.5	1.5							
<sup>1</sup> Bankfull Max Depth (ft)				2.9	2.9	2.9	2.9		1	1.1	1.7		2.3			1.5	1.9	2.0							
Bankfull Cross Sectional Area (ft <sup>2</sup> )	15	62	23.6	30	30	30	30		1	17.7	28.3		38.9			24.8	26.0	27.6							
Width/Depth Ratio				15	15	15	15		1	12.0	15.0		18			12.0	12.0	13.0							
Entrenchment Ratio				2	2	2	2		1	1.4	1.8		40			1.9	2.9	3.9							
<sup>1</sup> Bank Height Ratio				1.0	1.0	1.0	1.0		1	1.0	1.1		1.1			1.0	1.0	1.0							
<b>Profile</b>																									
Riffle Length (ft)				7	12	12	18		2	Total riffle length 60-70% of reach length						16.0	23.5	30.0							
Riffle Slope (ft/ft)				0.080	0.068	0.068	0.056		2	0.002	0.007		0.015			0.0066	0.008	0.01							
Pool Length (ft)				50	142	152	225	88	3	Total pool length 30-40% of reach length						21.0	27.5	64.0							
Pool Max depth (ft)				2.7	3.1	3.1	3.4	0.4	3	2.0	4.2		6.3			3.0	2.7	5.3							
Pool Spacing (ft)				60	152	152	243		2	29.5	63.9		98.3			22.0	61.0	104.0							
<b>Pattern</b>																									
Channel Beltwidth (ft)				28	35	35	41		2						27.1	35.6	50.1								
Radius of Curvature (ft)				25	50	50	74		2						38.0	43.0	49.0								
Rc:Bankfull width (ft/ft)				2.3	4.5	4.5	6.7		2						2.1	2.4	2.7								
Meander Wavelength (ft)				295	295	295	295		1						92.0	130.0	172.0								
Meander Width Ratio				2.5	3.1	3.1	3.7		2						1.5	2.0	2.8								
<b>Transport parameters</b>																									
Reach Shear Stress (competency) lb/ft <sup>2</sup>				0.6											0.6										
Max part size (mm) mobilized at bankfull				158											148										
Stream Power (transport capacity) W/m <sup>2</sup>				58											41										
<b>Additional Reach Parameters</b>																									
Rosgen Classification				E4											B4c			Bc4							
Bankfull Velocity (fps)	3.3	6.5	5.6	3.9														3.8							
Bankfull Discharge (cfs)	50	400	131.0	116														99							
Valley length (ft)				508																					
Channel Thalweg length (ft)				523														533							
Sinuosity (ft)				1.03											1.1 to 1.2			1.05							
Water Surface Slope (Channel) (ft/ft)				0.00369														0.0066							
BF slope (ft/ft)				0.00369														0.0066							
<sup>3</sup> Bankfull Floodplain Area (acres)				<b>0.4</b>														<b>0.6</b>							
<sup>4</sup> % of Reach with Eroding Banks				<b>18%</b>																					
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 11d. Baseline Stream Data Summary  
Meadow Brook Stream Restoration Project (DMS No. 100024) - UT to Meadow Brook (703 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n		
Bankfull Width (ft)	6	21	9.3	8	8	8	8		1	11.8	13.2		14.5			11.8	12.4	13.4								
Floodprone Width (ft)				195	195	195	195		1	28.9	250.0		472			188	188	188								
Bankfull Mean Depth (ft)	0.8	2.1	1.2	1.5	1.5	1.5	1.5		1	0.8	1.2		1.5			0.9	1.1	1.4								
<sup>1</sup> Bankfull Max Depth (ft)				2.2	2.2	2.2	2.2		1	0.9	1.5		2			1.1	1.6	1.9								
Bankfull Cross Sectional Area (ft <sup>2</sup> )	7	30	10.3	11	11	11	11		1	9.4	15.6		21.8			11	14	19								
Width/Depth Ratio				5	5	5	5		1	10	12.5		15			10	11	13								
Entrenchment Ratio				26	26	26	26		1	2.2	3.1		40			15	15.0	15.0								
<sup>1</sup> Bank Height Ratio				1.2	1.2	1.2	1.2		1	1	1.1		1.1			1	1	1								
<b>Profile</b>																										
Riffle Length (ft)				8	85	118	129	67	3	Total riffle length 60-70% of reach length						27	37	53.6								
Riffle Slope (ft/ft)				0.0066	0.0215	0.008	0.050	0.025	3	0.002	0.0045		0.007			0.005	0.006	0.008								
Pool Length (ft)				29	39	31	56	15	3	Total pool length 30-40% of reach length						17	23	52								
Pool Max depth (ft)				3.1	3.3	3.1	3.6	0.3	3	1.6	3.4		5.3			2.2	2.6	3.85								
Pool Spacing (ft)				65	160	160	254		2	52.6	72.3		92.05			10	56	92								
<b>Pattern</b>																										
Channel Beltwidth (ft)				16	16	16	16	0	3	46.0	75.6		105.2			44.7	61.7	68.7								
Radius of Curvature (ft)				81	81	81	81		1	26.3	36.2		46.0			28.3	29.8	34.3								
Rc:Bankfull width (ft/ft)				7.4	7.4	7.4	7.4		1	2.0	2.8		3.5			2.2	2.4	2.7								
Meander Wavelength (ft)										92.1	124.9		157.8			97.0	119.0	128.0								
Meander Width Ratio				1.5	1.5	1.5	1.5	0.0	3	3.5	5.8		8.0			3.5	4.9	5.4								
<b>Transport parameters</b>																										
Reach Shear Stress (competency) lb/ft <sup>2</sup>							1.8									0.3										
Max part size (mm) mobilized at bankfull							459									81										
Stream Power (transport capacity) W/m <sup>2</sup>							97									11										
<b>Additional Reach Parameters</b>																										
Rosgen Classification							E4						C4			C4										
Bankfull Velocity (fps)	2.9	6.7	5.7				6.8									2.7										
Bankfull Discharge (cfs)	20	200	59.0				77									37										
Valley length (ft)							381									514*										
Channel Thalweg length (ft)							396									703										
Sinuosity (ft)							1.04						1.2 to 1.6			1.37										
Water Surface Slope (Channel) (ft/ft)							0.00828									0.0047										
BF slope (ft/ft)							0.00828									0.0047										
<sup>3</sup> Bankfull Floodplain Area (acres)							1.7									2.2										
<sup>4</sup> % of Reach with Eroding Banks							80%																			
Channel Stability or Habitat Metric																										
Biological or Other																										

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

# Appendix 11

## INVASIVE SPECIES



## Invasive Species Plan

Invasive species vegetation identified at the Site prior to construction was sparse and confined to the stream channel corridor. Common invasive species vegetation found at the Site include Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), Bradford pear (*Pyrus calleryana*), and fescue (*Schedonorus* spp.). During construction, the existing invasive vegetation species will be controlled using mechanical methods.

During the monitoring period, the Site will be reviewed annually to locate and to quantify any residual invasive species vegetation. If invasive species are identified at the Site during the monitoring period, their location and extent will be shown on the current condition plan view (CCPV). A corresponding discussion will be included in the annual monitoring report outlining the proposed management plan. Invasive species vegetation will be managed and reviewed on all annual basis to minimize its long-term impact to planted native species. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.

Invasive species will be managed and controlled using a combination of chemical and/or mechanical methods to ensure that these species comprise less than 5% of the total easement acreage. Management and control will continue throughout the project until this percentage is achieved.

# Appendix 12

## MAINTENANCE PLAN

## Maintenance Plan

The Site shall be monitored on a regular basis and a physical inspection of the site shall be conducted a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two years following site construction and may include the following:

Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include securing of loose coir matting and supplemental installations of live stakes and other target vegetation along the channel. Areas where stormwater and floodplain flows intercept the channel may also require maintenance to prevent bank failures and head-cutting.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Beaver	Beaver and associated dams are to be removed as they colonize until the project is closed.
Site Boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, tree- blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as needed basis.
Farm Road Crossing	Farm road crossings within the site may be maintained only as allowed by Conservation Easement or existing easement, deed restrictions, rights of way, or corridor agreements.

# **Appendix 13**

## **CREDIT RELEASE SCHEDULE**

## Credit Release Schedule

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary DA authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the Interagency Review Team (IRT), will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standards. The release of project credits will be subject to the criteria described as follows:

<b>Stream Credit Release Schedule – 7-year Timeframe</b>			
<b>Monitoring Year</b>	<b>Credit Release Activity</b>	<b>Interim Release</b>	<b>Total Released</b>
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance standards are being met	10%	40%
2	Second year monitoring report demonstrates performance standards are being met	10%	50% (60%*)
3	Third year monitoring report demonstrates performance standards are being met	10%	60% (70%*)
4	Fourth year monitoring report demonstrates performance standards are being met	5%	65% (75%*)
5	Fifth year monitoring report demonstrates performance standards are being met	10%	75% (85%*)
6	Sixth year monitoring report demonstrates performance standards are being met	5%	80% (90%*)
7	Seventh year monitoring report demonstrates performance standards are being met and project has received closeout approval	10%	90% (100%)

\*Subsequent Credit Releases

## **Initial Allocation of Released Credits**

The initial allocation of released credits, as specified in the mitigation plan can be released by the NCDMS without prior written approval of the DE upon satisfactory completion of the following activities:

- a. Approval of the final Mitigation Plan
- b. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
- c. Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; Per the NCDMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
- d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

## **\* Subsequent Credit Releases**

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 15% of a site's total stream credits shall be released after four bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. The reserve will be 10% for 7-year monitoring timeframes. In the event that less than four bankfull events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the NCDMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for the release to occur. This documentation will be included with the annual monitoring report.

## **Appendix 14**

### **WILMINGTON DISTRICT STREAM BUFFER CREDIT CALCULATOR**

Wilmington District Stream Buffer Credit Calculator

Site Name:	Meadow Brook Stream Restoration
USACE Action ID:	
NCDWR Project Number:	100024
Sponsor:	NCDMS
County:	Yadkin

Minimum Required Buffer Width<sup>1</sup>: 50

Mitigation Type	Mitigation Ratio Multiplier <sup>2</sup>	Creditable Stream Length <sup>3</sup>	Baseline Stream Credit
Restoration (1:1)	1	3219	3219.00
Enhancement I (1.5:1)	1.5	218	145.33
Enhancement II (2.5:1)	2.5		
Preservation (5:1)	5		
Other (7.5:1)	7.5		
Other (10:1)	10		
Custom Ratio 1			
Custom Ratio 2			
Custom Ratio 3			
Custom Ratio 4			
Custom Ratio 5			
<b>Totals</b>		<b>3437.00</b>	<b>3364.33</b>

Buffer Width Zone (feet from Ordinary High Water Mark)

Buffer Zones	less than 15 feet	>15 to 20 feet	>20 to 25 feet	>25 to 30 feet	>30 to 35 feet	>35 to 40 feet	>40 to 45 feet	>45 to 50 feet	>50 to 75 feet	>75 to 100 feet	>100 to 125 feet	>125 to 150 feet
Max Possible Buffer (square feet) <sup>4</sup>	103110	34370	34370	34370	34370	34370	34370	34370	171850	171850	171850	171850
Ideal Buffer (square feet) <sup>5</sup>	102516	34512	33978	33031	31739	30865	29820	29231	141377	138130	136957	136251
Actual Buffer (square feet) <sup>6</sup>	100301.0712	32927.28722	32346.58514	31183.96466	29650.86564	28523.47988	27156.45374	26288.08352	81002.53273	32250.60391	10606.39381	3006.72684
Zone Multiplier	50%	10%	10%	10%	5%	5%	5%	5%	7%	5%	4%	4%
Buffer Credit Equivalent	1682.17	336.43	336.43	336.43	168.22	168.22	168.22	168.22	235.50	168.22	134.57	134.57
Percent of Ideal Buffer	98%	95%	95%	94%	93%	92%	91%	90%	57%	23%	8%	2%
Credit Adjustment	-36.34	-15.45	-16.15	-18.81	-11.07	-12.76	-15.03	-16.94	134.93	39.28	10.42	2.97

<b>Total Baseline Credit</b>	<b>Credit Loss in Required Buffer</b>	<b>Credit Gain for Additional Buffer</b>	<b>Net Change in Credit from Buffers</b>	<b>Total Credit</b>
<b>3364.33</b>	<b>-142.55</b>	<b>187.60</b>	<b>45.05</b>	<b>3409.38</b>

<sup>1</sup>Minimum standard buffer width measured from the top of bank (50 feet in piedmont and coastal plain counties or 30 feet in mountain counties)

<sup>2</sup>Use the Custom Ratio fields to enter non-standard ratios, which are equal to the number of feet in the feet-to-credit mitigation ratio (e.g., for a perservation ratio of 8 feet to 1 credit, the multiplier would be 8).

<sup>3</sup>Equal to the number of feet of stream in each Mitigation Type. If stream reaches are not creditable, they should be excluded from this measurement, even if they fall within the easement.

<sup>4</sup>This amount is the maximum buffer area possible based on the linear footage of stream length if channel were perfectly straight with full buffer width. This number is not used in calculations, but is provided as a reference.

<sup>5</sup>Maximum potential size (in square feet) of each buffer zone measured around all creditable stream reaches, calculated using GIS, including areas outside of the easement. The inner zone (0-15') should be measured from the top of the OHWM or the edge of the average stream width if OHWM is not known. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.

<sup>6</sup>Square feet in each buffer zone, as measured by GIS, excluding non-forested areas, all other credit type (e.g., wetland, nutrient offset, buffer), easement exceptions, open water, areas failing to meet the vegetation performance standard, etc. Additional credit is given to 150 feet in buffer width, so areas within the easement that are more than 150 feet from creditable streams should not be included in this measurement. Non-creditable stream reaches within the easement should be removed prior to calculating this area wtih GIS.



# Appendix 15

## FINANCIAL ASSURANCES

## Financial Assurances

Pursuant to Section IV H and Appendix III of the Division of Mitigation Services' In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environmental Quality has provided the U.S. Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

## **Appendix 16**

### **MEETING MINUTES FROM IRT ON-SITE MEETING**



Ecosystem Planning and Restoration, LLC  
559 Jones Franklin Road, Suite 150  
Raleigh, NC 27606

Phone: (919) 388-0787  
www.eprusa.net

September 1, 2017

**TO:** Mr. Harry Tsomides – Project Manager  
NCDMS

**FROM:** Kevin Tweedy, PE – Project Manager  
Ecosystem Planning and Restoration, PLLC

**SUBJECT:** Meeting Minutes from IRT On-Site Meeting - August 16, 2017  
Meadow Brook Full Delivery Project

**Attendees:** Todd Tugwell, US Army Corps of Engineers, Wilmington District  
Kim Browning, US Army Corps of Engineers, Wilmington District  
Mac Haupt, NC Department of Environmental Quality  
Olivia Munzer, NC Wildlife Resources Commission  
Paul Wiesner, NC Division of Mitigation Services  
Harry Tsomides, NC Division of Mitigation Services  
Kirsten Ullman, NC Division of Mitigation Services  
Kevin Tweedy, Ecosystem Planning and Restoration, PLLC (Provider)

The meeting started at approximately 1:15 PM at the Meadow Brook Project site in Yadkin County, NC. The group walked nearly the entire project site during the site visit, inspecting sections of stream and wetlands, and the proposed BMP wetland area.

IRT members suggested if the project addressed uplift to both hydrology and vegetation in existing wetland areas, then wetland rehabilitation credit (generally 1.5:1) would be more appropriate than enhancement credit (2:1). The group discussed improvements in hydrology through more frequent overbank flooding and the removal of drainage features within these areas. Todd noted that the stream channel construction and any associated drainage effects negatively impacting the existing wetlands would need to be considered in the wetland crediting. The IRT was very supportive of attempting to achieve wetland mitigation credits on the site (currently only contracted for stream mitigation credits).

The group agreed with the overall approach to the stream mitigation onsite, and no significant concerns were raised. Todd mentioned that since beavers have been seen in the project area before (no dams observed during the site walk), beaver control should be addressed in the mitigation plan.