



Mitigation Plan

Final

May 8, 2015

Holman Mill Mitigation Project

Alamance County, NC
DENR Contract No. 005795
EEP ID No. 96316

Cape Fear River Basin
HUC 03030002

PREPARED FOR:

NC Department of Environment and Natural Resources
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

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May 8, 2015

EXECUTIVE SUMMARY

Wildlands Engineering, Inc (Wildlands) is completing a stream restoration and enhancement project at the Holman Mill Mitigation Site (Site) for the North Carolina Ecosystem Enhancement Program (NCEEP) to restore and enhance a total of 8,774 linear feet (LF) of perennial and intermittent stream in Alamance County, NC. The Site is proposed to generate 3,928 Stream Mitigation Units (SMUs) through the restoration and enhancement of UT to Pine Hill Branch and five unnamed tributaries (UT1, UT1A, UT2, UT2A, UT2B). This site is located in the Cape Fear River Basin Hydrologic Unit Code (HUC) 03030002. The Site is also within the Cane Creek Targeted Local Watershed (TLW) (HUC 03030002050050), which flows into Cane Creek and eventually into the Haw River.

The proposed project will improve water quality as well as provide numerous ecological benefits within the Cane Creek TLW. This project will help meet the goals described in the 2009 Cape Fear River Basin Restoration Priorities (RBRP) by restoring a vegetated riparian buffer zone, stabilizing eroding stream banks, and removing livestock from stream and riparian zones. These activities will result in reduced nutrient, sediment, and fecal coliform inputs; improved aquatic and riparian habitats, and other ecological benefits.

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).
- NCDENR Ecosystem Enhancement Program In-Lieu Fee Instrument signed and dated July 28, 2010

These documents govern NCEEP operations and procedures for the delivery of compensatory mitigation.



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1.0 RESTORATION PROJECT GOALS AND OBJECTIVES

The Holman Mill Mitigation Site (Site) is located within the Cape Fear River Basin Hydrologic Unit Code (HUC) 03030002. The Site is also within the Cane Creek Targeted Local Watershed (TLW) (HUC 03030002050050), which flows into Cane Creek and eventually into the Haw River. The TLW is a combination of forested and agricultural lands with 51 dairy, cattle, and poultry operations that contribute to the watershed's "fair" aquatic habitat conditions. Primary stressors to the aquatic habitat are high nutrient and sediment loads.

This project will help meet the functional goals of nutrient reduction and the promotion of good riparian and aquatic conditions described in the 2009 Cape Fear River Basin Restoration Priorities (RBRP), through stream restoration and enhancement and riparian buffer re-establishment.

The primary project goals will be:

- Reduce fecal coliform, nitrogen, and phosphorous inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor *to intercept and process sediment and nutrients before they reach the channel during storm events*;
- Reducing sediment loads by stabilizing eroding stream banks;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Install instream structures to improve bed and bank stability, create fish and macroinvertebrate habitat, and help oxygenate streamflows; and
- Protect existing high quality streams and forested buffers.

Secondary project objectives are expected to include:

- Improving instream nutrient cycling by incorporating woody debris into constructed riffles and bank stabilization measures;
- Reducing thermal loadings through establishment of riparian shading;
- Reconnecting channels with floodplains to raise the local water table; and
- Create and implement a stream and riparian area restoration design that is both natural and aesthetically pleasing.

2.0 PROJECT SITE LOCATION AND SELECTION

2.1 Directions to Project Site

The site is located in southern Alamance County, NC, as shown in Figure 1.

From Raleigh, NC, take I-40 West towards Durham. Take exit 273A for NC-54 West toward Chapel Hill. Travel approximately three miles and turn right to follow NC-54 West. Travel approximately 3.9 miles, take the Jones Ferry Road exit towards Carrboro. At the end of the ramp, turn left onto Jones Ferry Road and continue 0.9 miles. Turn right onto Old Greensboro Road. Travel 17.9 miles and turn left onto Holman Mill Road. Travel approximately 3.3 miles; the entrance to the Site is located on the left before reaching Clark Road.



2.2 Site Selection and Project Components

The Site has been selected by the NC Ecosystem Enhancement Program (NCEEP) to provide stream mitigation units (SMUs) in the Cape Fear River Basin. It was selected based on the current degraded condition of the streams and the potential for functional restoration and ecological uplift.

The project includes a combination of stream restoration and enhancement. The streams include UT to Pine Hill Branch and several unnamed tributaries to UT to Pine Hill Branch (UT1, UT1A, UT2, UT2A, and UT2B) (Figure 2). Jurisdictional wetlands are present in the surrounding floodplain that will be preserved as part of the project but are not proposed for credit at this time.

3.0 SITE PROTECTION INSTRUMENT

The land required for construction, management, and stewardship of this mitigation project includes portions of the parcel listed in Table 1. A conservation easement will be recorded on the parcel to include the streams being enhanced and restored along with their corresponding riparian buffers.

Table 1: Site Protection Instrument

Holman Mill Mitigation Project

Landowner	PIN	County	Site Protection Instrument	Deed Book and Page Number	Acreeage to be Protected
M Darryl Lindley Rev Trust	8786552224	Alamance	Conservation Easement	TBD	27.9

All site protection instruments require 60-day advance notification to the Corps and the State prior to any action to void, amend, or modify the document. No such action shall take place unless approved by the State.

4.0 BASELINE INFORMATION –PROJECT SITE AND WATERSHED SUMMARY

4.1 Watershed Existing Conditions

Table 2 presents the project information and baseline watershed information. The watershed areas were delineated using a combination of site existing conditions survey, Alamance County, NC GIS data, and USGS 7.5-minute topographic quadrangles (Figure 3).



Table 2: Project and Watershed Information*Holman Mill Mitigation Project*

Project County	Alamance					
Easement Area (acres)	27.9					
Project Coordinates	35°51'310.12"N, 79°23'16.00"W					
Physiographic Region	Carolina Slate Belt of the Piedmont Physiographic Province					
Ecoregion	Piedmont					
River Basin	Cape Fear					
USGS HUC (8 digit, 14 digit)	03030002, 03030002050050					
NCDWQ Sub-basin	03-06-04					
Reaches	UT to Pine Hill Branch	UT1	UT1A	UT2	UT2A	UT2B
Drainage Area (acres)	1077	102	20	130	47	18
Drainage Area (miles²)	1.683	0.159	0.031	0.203	0.073	0.028
NCCGIA Land Cover Classification						
Forested/Scrubland	49	37	15	37	32	0
Cultivated	42	59	31	33	20	40
Impervious	3	2	4	2	2	0
Pasture	4	0	50	27	45	55
Residential	2	1	0	0	1	0
Open Water	0	1	0	1	0	5

4.2 Watershed Historical Land Use and Development Trends

The UT to Pine Hill Branch Watershed (Figure 3) is located in the rural countryside approximately four miles southeast of Snow Camp, NC. Topography can be described as somewhat hilly to gently rolling. The stream valleys within the watershed and on site are characterized by relatively narrow floodplains and moderately steep side slopes.

A review of historical aerials of the Site and immediately adjacent parcels from 1973, 1983, 1993, 1998, 2005, 2008, 2010, 2012 (Appendix 2) revealed that the project site has been used for crop production and/or agricultural livestock production since before 1973. The limits of riparian buffer and agricultural land have remained consistent over that time. Further investigation was done on landuse throughout the entire watershed using the aerial photographs listed above and additional aerials from Google Earth™ (1993-2014). The most common historical and current land use types are agricultural livestock production and grazing, silviculture, and agricultural cropland.

Wildlands conducted a watershed reconnaissance visit to verify current land uses observed in aerial photography and to identify potential watershed stressors that could impact streams on Site. Land use in the UT to Pine Hill Branch watershed was found to be consistent with information depicted

in aerial photography. Disturbed areas within the watershed consist primarily of tillage for new crop planting. As this is a long-term, on-going practice (dating before 1973) it is not considered a new stressor to the watershed. There are no signs of impending land use changes or development pressure that would impact the project evident in the UT to Pine Hill Branch Watershed. The Conservation Easement to be placed around the Site will eliminate potential for future development or agricultural use in the immediate vicinity of the onsite streams.

4.3 Physiography, Geology, and Soils

The project is located in the Slate Belt of the Piedmont Physiographic Province. The Piedmont Province is characterized by gently rolling, well rounded hills with long low ridges, with elevations ranging from 300 – 1,500 feet above sea level. The Carolina Slate Belt consists of heated and deformed volcanic and sedimentary rocks. Specifically, the proposed project is located in felsic metavolcanic rock (mapped CZfv) of the Carolina Slate Belt, which corresponds to the Uwharrie Formation's felsic volcaniclastic rocks and portions of the Cid Formation's rhyolitic-rhyodactic units. This unit consists of light gray to greenish gray, felsic metavolcanic rock interbedded with mafic and intermediate metavolcanic rock and is composed primarily of feldspar, quartz, sericite, chlorite meta-argillite, and metamudstone (NCGS, 1985; NCDNR 1982). Note: This information was obtained from geologic mapping no field investigations of rock lithology were performed.

Site investigations and existing conditions surveys revealed some bedrock outcrops located on site. The outcrops appear to be granite/sandstone with felsic crystals, which is consistent with the mapped surficial geology of the site. The bedrock outcrops are primarily located along UT1 and serve as grade control along the channel. This grade control has likely prevented incision. The natural grade control on UT1 is used as an advantage in providing a light touch in the restoration and enhancement design for the reach, as discussed in Section 9.2. There are fewer outcrops visible on the remainder of the site, and none visible along potential stream realignment areas of UT2 and UT2A. On those reaches lacking bedrock, grade control structures will be installed to prevent the stream from downcutting.

Soil mapping units are based on the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey for Alamance County. Soil types within the study area were mapped with the NRCS Web Soil Survey and are described below in Table 3. These soils are typical of those derived from felsic volcanic rocks (NCDNR 1982). A soils map based on this information is provided in Figure 4. Note: no field mapping of soils was performed for this project beyond that performed for the jurisdictional determination (Appendix 3).

Table 3: Floodplain Soil Types and Descriptions*Holman Mill Mitigation Project*

Soil Name	Location	Description
Herndon Silt Loam (10-15%)	UT1, UT2B, UT to Pine Hill Branch	Herndon silt loam soils are very deep and well drained. They are typically found in gently sloping to moderately sloping Piedmont uplands and are rarely flooded.
Local Alluvial Land	UT2, UT2A, UT to Pine Hill Branch	Alluvial land soil is a component found on floodplains. They are poorly-drained soils consisting of loamy alluvium derived from igneous and metamorphic rock. This soil is not flooded or ponded, but has a seasonal zone of water saturation at six inches of depth.
Georgeville silt loam (6-10%)	UT to Pine Hill Branch, UT2	Georgeville soils are found on uplands and hillslopes on ridges. They are well-drained with low shrink-swell potential and moderately high permeability. This soil unit is not typically ponded or flooded.
Goldston Channery Silt Loam (15-25%)	UT1, UT1A, UT to Pine Hill Branch	Goldston Channery Silt Loam soils are very deep and well drained. They are typically found on gently sloping to moderately steep Piedmont uplands. These soils are rarely flooded.

Source: Alamance County Soil Survey, USDA-NRCS, <http://efotg.nrcs.usda.gov>

As illustrated in Figure 4 and 10, Local Alluvial land is located along reaches UT2 and UT2A in areas susceptible to backwatering during flooding events of UT to Pine Hill Branch. Floodwaters likely deposited soils in these areas over a long period of time. When the channels downcut through the alluvium, both gravels and fine particles were released that contributed to the composition of bed material. The remainder of the site has relatively confined valleys, which constrict the floodplain and limit alluvial deposits. It is probable that once alluvial deposition was limited non alluvial soils formed above the alluvium from agricultural practices and leaf litter. Soils in these areas are typical of the gently to moderately sloping upland areas of the Piedmont.

4.4 Valley Classification

The topography of the project site and surrounding area consist of gently rolling hills interspersed with narrow valleys (Figure 5). The stream valleys have slopes ranging from 0.7% - 3.0% and valley side slopes ranging from 5%-15%. UT to Pine Hill Branch has a narrow alluvial valley that expands and constricts between widths of 250 and 100 feet. The valleys of the tributaries were likely once alluvial, however the incision has prevented flood flows from having access to the floodplain and limited alluvial deposits. UT1 has a narrow valley approximately 100 feet wide. UT2 transitions from a constricted valley (<100 ft) on Reach 1 to a wider valley (>200 ft) as it approaches the confluence with UT to Pine Hill Branch.

4.5 Surface Water Classification and Water Quality

On June 10 and 11, 2014 Wildlands investigated on-site jurisdictional waters of the U.S. using the U.S. Army Corps of Engineers (USACE) Routine On-Site Determination Method. This method is



defined in the 1987 Corps of Engineers Wetlands Delineation Manual and subsequent Eastern Mountain and Piedmont Regional Supplement. Determination methods include stream classification utilizing the North Carolina Division of Water Resources (NCDWR) Stream Identification Form and the USACE Stream Quality Assessment Worksheet. Potential jurisdictional wetland areas were classified using the USACE Wetland Determination Data Form (refer to Section 5.1 below for more information on jurisdictional wetlands).

The results of the on-site field investigation indicate that there are six jurisdictional stream channels located within the proposed project area that are all unnamed tributaries to Pine Hill Branch (UT to Pine Hill Branch, UT1, UT1A, UT2, UT2A, and UT2B). Figure 6 shows the hydrologic features of the site. Stream classification forms representative of on-site jurisdictional channels have been enclosed in Appendix 3 (SCP1-SCP6). Site photographs are included in Appendix 4. There is currently no best usage classification assigned by the NCDWR for streams on this Site.

4.6 Existing Stream Condition

An existing conditions assessment was performed on all perennial streams on Site (UT to Pine Hill Branch, UT1, UT2, and UT2A) in June, 2014. The purposes of the assessment were to characterize the existing morphology of the site; identify problems such as incision, bank erosion, lack of native vegetation, sedimentation, and poor habitat conditions; and to provide a basis for developing a design to enhance the ecological function of the site. The locations of the project reaches and surveyed cross-sections are shown in Figure 6. Existing conditions geomorphic survey data are included in Appendix 5. The reach summary information for each stream is summarized in Table 4 and the existing geomorphic conditions are summarized in Table 5.

Table 4: Reach Summary Information
Holman Mill Mitigation Project

	UT to Pine Hill Branch	UT1	UT2	UT2A
Existing Length (LF)	3,524	2,648	1,562	553
Valley Slope (feet/ foot)	0.007	0.019	0.013	0.023
Drainage Area (acres)	1,086	102	130	49
Drainage Area (miles ²)	1.697	0.159	0.203	0.077
NCDWQ Stream ID Score	44.5	33.5/30.5	35	36.75
Perennial (P) or Intermittent (I)	P	P	P	P
NCDWQ Classification	N/A			
Rosgen Classification of Existing Conditions	E4	Modified E5 ¹	Modified B4 to E5 ¹	Modified C4b ¹
Simon Evolutionary Stage	I-Pre-Disturbance	II-Disturbance	III-Incision & IV-Widening	III-Incision & IV-Widening
FEMA zone Classification	Mapped, Zone AE	283 ft, Zone AE	477 ft, Zone AE	162 ft, Zone AE

1. The Rosgen classification system is for natural streams. These channels have been heavily manipulated by man and therefore the Rosgen classification system is not applicable. These classifications are provided for illustrative purposes only.

Table 5: Stream Existing Conditions
Holman Mill Mitigation Project

Parameter	Notation	Units	UT to Pine Hill Branch		UT1		UT2 - Reaches 1,2,3		UT2 - Reach 4		UT2A	
			min	max	min	max	min	max	min	max	min	max
stream type			E4		E5		B4		E5		C4b	
drainage area	DA	sq mi	1.697		0.159		0.116		0.203		0.077	
bankfull cross-sectional area	A_{bkf}	SF	31.5		3.9		4.3		4.1		2.1	
avg velocity during bankfull event	v_{bkf}	fps	4.9		3.2		3		2.9		2.5	
width at bankfull	w_{bkf}	feet	17.4		4.3		5.7		5.4		5.1	
maximum depth at bankfull	d_{max}	feet	2.4		1.4		1		1.5		0.9	
mean depth at bankfull	d_{bkf}	feet	1.8		0.9		0.7		0.8		0.4	
bankfull width to depth ratio	w_{bkf}/d_{bkf}		9.6		4.7		8.1		6.8		12	
low bank height		feet	3		2.1		2.2		3.1		3	
bank height ratio	BHR		1.3		1.5		2.2		2.1		3.4	
max pool depth at bankfull	d_{pool}	feet	-		2.2		-		2.3		2.4	
pool depth ratio	d_{pool}/d_{bkf}		-		2.4		-		2.9		6.0	
pool width at bankfull	w_{pool}	feet	-		5.5		-		6.1		10	
pool width ratio	w_{pool}/w_{bkf}		-		1.3		-		1.1		2.0	
Bkf pool cross-sectional area	A_{pool}	SF	-		7.4		-		10.2		13.2	
pool area ratio	A_{pool}/A_{bkf}		-		1.9		-		2.5		6.3	
floodprone area width	w_{fpa}	feet	82.5		35		11.5		25.6		11.5	
entrenchment ratio	ER		4.7		8.1		2.0		4.7		2.3	
valley slope	S_{valley}	feet/foot	0.0070		0.019		0.030		0.013		0.023	
channel slope ¹	$S_{channel}$	feet/foot	0.0057		0.017		0.025		0.013		0.020	
sinuosity	K		1.2		1.15		1.12		1.17		1.15	
belt width	w_{blt}	feet	32	137	8	27	62	82	16	50	15	30
meander width ratio	w_{blt}/w_{bkf}		1.8	7.9	1.9	6.3	6.8	9.0	1.9	6.0	2.9	5.9
meander length	L_m	feet	115	416	18	82	209	300	42	192	27	69

Parameter	Notation	Units	UT to Pine Hill Branch		UT1		UT2 - Reaches 1,2,3		UT2 - Reach 4		UT2A	
			min	max	min	max	min	max	min	max	min	max
meander length ratio	L_m/W_{bkf}		6.6	23.9	4.2	19.1	23.0	33.0	5	22.9	5.3	13.5
radius of curvature	R_c	feet	17.5	142	5	44	56	90	10	47	5.8	33
radius of curvature ratio	R_c/W_{bkf}		1.0	8.2	1.2	10.2	6.2	9.9	1.2	5.6	1.1	6.5

Particle Size Distribution from Reachwide Pebble Count						
d_{50} Description		Very Fine Gravel	Medium Sand	Very Coarse Gravel	Coarse Sand	Very Fine Gravel
d_{16}	mm	0.37	Silt/Clay	0.18	Silt/Clay	Silt/Clay
d_{35}	mm	1.45	0.14	8.66	0.43	0.56
d_{50}	mm	3.01	0.47	33.11	0.69	3.18
d_{84}	mm	45	10.16	128	17.84	17.4
d_{95}	mm	151.79	80.33	2655	32.14	25.53
d_{100}	mm	256	>2048	>2048	64	64

1. Channel slopes are specific to the length of profile studied.

4.6.1 UT to Pine Hill Branch

The channel slope and valley slope for UT to Pine Hill Branch are typical for Piedmont streams in similar valley types (Table 5). The bed of UT to Pine Hill Branch is characterized by riffle-pool sequences, with a few log/debris jams creating deeper pools. While the dominant substrate is gravel, in-stream cobble from several small remnant mill dams has contributed to variability in substrate as well as channel pattern and cross-section dimension along the length of the stream. The dams were created from larger cobble compacted together across the stream and into the floodplain. Over the years the dams have failed and the cobble has migrated to riffles immediately downstream of their locations. Locations of the remnant mill dams can be seen in Figure 6 and photographs in Appendix 4. Large bedrock outcrops have also had influence on the pattern and bedform along UT to Pine Hill Branch. Although there are many fewer outcrops than on UT1, the two surveyed during existing conditions provide grade control to the system. The outcrops appear to be consistent with the geology discussed in Section 4.3. The channel classifies as a Rosgen E4 in stable condition. Results of the existing conditions morphologic survey of UT to Pine Hill Branch are summarized in Table 5 and the survey data is included in Appendix 5.

The location of UT to Pine Hill Branch within its valley, along with the channel pattern and sinuosity indicate that the stream has not been greatly altered by past land owners. Historical photos show the stream location and stream buffers as varying little since 1973. UT to Pine Hill Branch is the only stream on the Site where fencing prohibits livestock access to the stream. This has allowed the stream to remain relatively stable with low incision and little to no scour. The stream has a mature forested buffer over 100 ft wide along the right bank. The forested buffer along the left bank is over 50 feet wide upstream of UT1, but is non-existent or limited to a single tree width between

UT1 and UT2. Canopy species include river birch (*Betula nigra*), sweetgum (*Liquidambar styraciflua*), sycamore (*Platanus occidentalis*), shagbark hickory (*Carya ovata*), and white oak (*Quercus alba*). Understory species include American elm (*Ulmus americana*), coralberry (*Symphoricarpos orbiculatus*), winged elm (*Ulmus alata*), ironwood (*Carpinus caroliniana*), northern spicebush (*Lindera benzoin*), and some Chinese privet (*Ligustrum sinense*) (minor). Herbaceous species include Christmas fern (*Polystichum acrostichoides*), soft rush (*Juncus effusus*), aster (*Erigeron spp.*), Japanese honeysuckle (*Lonicera japonica*), and Nepalese browntop (*Microstegium vimineum*).

4.6.2 UT1

The drainage area to UT1 is currently used for livestock production. Livestock have direct access to the stream, which has resulted in heavily trampled banks and an actively eroding channel. The active scour zones and wallow areas are contributing to the fining of bed material as evidenced by the reach-wide pebble-count, which indicates that UT1 has a median particle size classified as sand. Channel incision ranges from slight to moderate throughout the reach. UT1 classifies as a Rosgen modified E5 channel type. Results of the existing conditions morphologic survey of UT1 are summarized in Table 5 and the survey data is included in Appendix 5.

Mature trees are sparsely scattered along the top of bank on UT1. Tree species include American elm, black willow (*Salix nigra*), and willow oak (*Quercus nigra*). Coralberry, which is a shrub, is scattered along portions of the pasture. The majority of vegetation is pasture grasses (primarily *Festuca spp.*). Other herbaceous species include blackberry (*Rubus spp.*), rough cocklebur (*Xanthium strumarium*), horsenettle (*Solanum carolinense*), and wingstem (*Verbesian alternifolia*).

4.6.3 UT2

UT2 is divided into two sections for existing conditions analysis: Reach 1, and Reaches 2-4. Reach 1 of UT2 is forested within the floodplain area and has a boulder and cobble substrate. This section of UT2 shows areas of erosion from frequent cattle crossing, but in-stream bedrock provides grade control and the stream remains in fairly stable condition. Canopy species in these areas include green ash (*Fraxinus pennsylvanica*), shagbark hickory, sweetgum, and white oak. Understory was sparse with coralberry, Eastern red cedar (*Juniperus virginiana*), and American holly (*Ilex opaca*). Herbaceous species were present but not dense, likely due to grazing. Species include wingstem, Nepalese browntop, Pennsylvania smartweed (*Polygonum pennsylvanicum*), and an unknown mint species.

Reaches 2-4 of UT2 begin at a bedrock knick point. Below this point, UT2 pushes up against the right edge of the valley with a wooded buffer present along the right bank. It is unclear as to whether the stream location within the valley is a result of natural stream migration processes or historical agricultural manipulation, but according to historical photographs the stream has been in the same location since 1973. The left floodplain is dominated by a wide pasture area between UT2 and UT2a. The stream is incised (BHR = 1.6) with cattle having free access to the stream. Based on the survey data, the lower portion of UT2 classifies as an incised Rosgen E5 transitioning to a G5 stream with a bimodal sediment distribution and evidence of fining of bed material. The fining of bed material as compared to UT2 Reach 1 is a result of erosion due to incision and mass wasting of bank material due to livestock trampling. As the buffer opens to pasture, a few black willows, winged elms, sweetgum, and common hackberry (*Celtis occidentalis*) are scattered along the top of bank. Coralberry is present in clusters within the pasture. Herbaceous species include fescue,



wingstem, cocklebur, blackberry, horsenettle, and unknown mint. Results of the existing conditions morphologic survey of UT2 is summarized in Table 5 and the survey data is included in Appendix 5.

4.6.4 UT2A

UT2A has the steepest valley slope and channel slope of any reach on the Site, with the greatest degree of incision (BHR = 3.4) and the lowest entrenchment ratio (ER = 2.3). It serves as a water source for livestock and trampled banks and cattle crossings are frequent along the length of the stream. An existing conditions survey showed that the entire length of UT2A is incised and 34% of the length has scoured banks. The incision and trampled banks have led to a fining of bed material and median particle size classified as very fine gravel. The channel classifies as an incised Rosgen C4b transitioning to a G4. Results of the existing conditions morphologic survey of UT2A are summarized in Table 5 and the survey data is included in Appendix 5.

There is little vegetated buffer present along UT2A, with pasture on both the left and right floodplain areas. A few black willows, winged elms, sweetgum, and sugarberry are scattered along the top of bank. Coralberry is present in clusters within the pasture. Herbaceous species include fescue, wingstem, cocklebur, blackberry, horsenettle, and unknown mint.

4.6.5 UT1A and UT2B

There are two intermittent streams on the Site: UT1A and UT2B. UT1A is a relatively short spring fed channel at the upstream end of UT1 near Holman Mill Road. It is a small channel highly connected to its floodplain and riparian wetlands. Cattle currently have access to UT1A, which has led to minor trampling of streambanks. There is, however, no indication of channel incision. UT2B is an intermittent channel that flows southwest to northeast across a cattle pasture towards UT2. While the stream is impacted by cattle access, it is not as incised as the other streams on site. The riparian buffers along both UT1A and UT2B are comprised of pasture grasses.

4.7 Channel Evolution

The evolution of the project streams has been analyzed and is described here in terms of the channel evolution model (Simon, 1989). According to the historical aerial photographs, the land use on site has been used for crop or livestock production since 1973. The extent of riparian buffers on site have remained the same since then. The only stressor that is variable on the Site and may impact channel evolution is the presence of livestock and their access to UT1, UT1A, UT2, UT2A, and UT2B.

Livestock are excluded from UT to Pine Hill Branch and there is an extensive riparian buffer on the right side of the channel but minimal buffer on the left (see Section 4.6.1). Field investigations found no active areas of incision or scour. Bedrock and old mill dams appear to hold the channel bed at grade. The old mill dams no longer backwater the channel, instead the channel likely aggraded until the crests became the bed elevation. The old mill dams tie into the banks at an elevation slightly lower than the floodplain. This is evidence that the floodplain has aggraded with alluvial deposits since installation of the mill dams. The channel has adapted to this change in elevation of the bed and floodplain and is currently hydrologically connected to the floodplain. This floodplain connection along with a lack of evidence of degradation and aggradation indicates that the system is in a state of quasi-equilibrium with the landscape (Stage IV).



The land immediately adjacent to UT1 has been subject to livestock access or crop production since before 1973. Bedrock outcrops along the channel have prevented incision, however, livestock access and a lack of riparian buffer have led to disturbance along the channel length ranging from minor scour to bank failure (Stage II – Disturbance).

The upper reach of UT2 has some riparian buffer, but has been exposed to livestock. Like UT1, UT2-Reach 1 has bedrock control that has prevented further incision, however mass wasting of bank material is evident in several locations (Stage II – Disturbance). Below the bedrock knick point separating Reaches 1 and 2, UT2 no longer has bedrock bed control and is subject to active areas of incision and bank scour, indicating it is between evolutionary Stages III and IV (Incision and Widening). UT2a also shows active areas of incision and widening, indicating that it is between evolutionary Stages III and IV.

4.8 Channel Stability

Wildlands utilized a modified version of the Rapid Assessment of Channel Stability as described in Hydrologic Engineering circular (HEC)-20 (Legasse, 2001). The method is semi-qualitative and incorporates 13 stability indicators that are evaluated in the field. In a 2006 publication, the Federal Highway Administration (FHWA) updated the method for HEC-20 by modifying the metrics included in the assessment and incorporating a stream type determination. The result is an assessment method that can be rapidly applied on a variety of stream types in different physiographic settings with a range of bed and bank materials.

The Channel Stability Assessment protocol was design to evaluate 13 parameters. Once all parameters are scored, the stability of the stream is classified as Excellent, Good, Fair, or Poor. As the protocol was designed to assess stream channel stability near bridges, two minor modifications were made to the methodology to make it more applicable to project specific conditions. The first modification involved adjusting scoring so that naturally meandering streams score lower (better condition) than straight and/or engineered channels. Because straight, engineered channels are hydraulically efficient and necessary for bridge protection, they score low (excellent to good rating) with the original methodology. Secondly, the last assessment parameter – upstream distance to bridge – was removed from the protocol because it relates directly to the potential effects of instability on a bridge and should not influence stability ratings for the streams for this project. The final scores and corresponding ratings were based on the 12 remaining parameters. The rating adjectives were assigned to the streams based on the FHWA guidelines for pool-riffle stream types.

The HEC-20 manual also describes both lateral and vertical components of overall channel stability, which can be separated with this assessment methodology. Some of the parameters described above relate specifically to either vertical or horizontal stability. When all parameter scores for the vertical category or all parameter scores for the horizontal category are summed and normalized by the total possible scores for their respective categories, a vertical or horizontal fraction is produced. These fractions may then be compared to one another to determine if the channel is more vertically or horizontally unstable.

The assessment results for the streams on the Site are shown in Table 6. UT to Pine Hill Branch, UT1, UT1a, and UT2-R1 are rated good, whereas UT2-R2-4, UT2a, and UT2B are rated as fair. The vertical and lateral fractions for UT to Pine Hill Branch are similar, indicating it is relatively stable.



For UT1, UT1a, UT2, and UT2a the lateral fraction is larger than the vertical fraction indicating that the streams are more laterally unstable than vertically unstable. This is mostly due to livestock trampling of banks. The least stable reach is UT2a, with areas of mass-wasting and bank failure as well as minimal bank protection, high entrenchment, and near vertical banks.

Table 6: Existing Conditions Channel Stability Assessment Results
Holman Mill Mitigation Project

Parameter	UT to Pine Hill Branch	UT1	UT1a	UT2 - R1	UT2- R2-4	UT2a	UT2B
1. Watershed characteristics	8	8	8	6	7	7	8
2. Flow habit	2	2	2	2	2	2	3
3. Channel pattern	3	3	3	3	3	9	4
4. Entrenchment	4	4	1	5	9	9	10
5. Bed material	9	10	10	4	9	7	8
6. Bar development	3	3	1	5	3	3	3
7. Obstructions	5	4	1	7	6	5	4
8. Bank soil texture and coherence	4	4	4	5	5	5	4
9. Average bank slope angle	8	10	10	10	12	12	10
10. Bank protection	6	9	11	4	9	11	8
11. Bank cutting	6	7	6	9	8	9	6
12. Mass wasting or bank failure	6	7	3	9	9	10	6
Score	64	71	60	69	82	89	74
Ranking	Good	Good	Good	Good	Fair	Fair	Fair
Lateral Score	30	37	34	37	43	47	34
Vertical Score	16	17	12	14	21	19	21
Lateral Fraction	50.0%	61.7%	56.7%	61.7%	71.7%	78.3%	56.7%
Vertical Fraction	44.4%	47.2%	33.3%	38.9%	58.3%	52.8%	58.3%

4.9 Utilities and Site Access

There are no underground or overhead utilities on the Site. There is an existing culvert under a state maintained road at the upstream end of UT1 (Holman Mill Road) and under a residential/farm gravel road at the upstream end of UT2a. The project will not affect these culverts and they will remain in place in their current configuration. There are no proposed farm crossings or easement breaks within the project area. The site can be easily accessed from farm entrances off of Holman Mill Road.

5.0 REGULATORY CONSIDERATIONS

5.1 401/404

On June 10 and 11, 2014 Wildlands investigated on-site jurisdictional waters of the U.S. within the proposed project easement area. Jurisdictional areas were delineated using the USACE Routine On-Site Determination Method. This method is defined by the 1987 Corps of Engineers Wetlands Delineation Manual and subsequent Eastern Mountain and Piedmont Regional Supplement.

Wetland determination Data Forms representative of on-site jurisdictional areas as well as non-jurisdictional upland areas have been included in Appendix 3. All jurisdictional waters of the U.S. were surveyed by Infinite Land Design, Professional Land Surveyors.

The results of the on-site field investigation indicate that there are six jurisdictional stream channels located within the proposed project area that are all unnamed tributaries to Pine Hill Branch (UT to Pine Hill Branch, UT1, UT1A, UT2, UT2A and UT2B). Stream reaches UT1A and UT2B are intermittent and the other four channels are perennial (UT to Pine Hill Branch, UT1, UT2, UT2A).

On-site field investigation also indicated that there were seventeen jurisdictional wetland areas, ranging from 0.003 to 0.216 acres, were identified within the proposed project area (Wetland A-Q) and are located within the floodplains of the unnamed tributaries. These 17 areas are considered wetland inclusions in non-wetland soils. Wetlands A, G-J, and N were classified as seeps using the North Carolina Wetland Assessment Method (NCWAM) classification key and the evaluator's best professional judgment regarding what the wetlands would become if the area wasn't maintained. Wetlands B, E, F, K, L, M, and O-Q were classified as headwater forest. Wetlands C and D are located in the floodplain of UT to Pine Hill Branch and are classified as bottomland hardwood forest wetlands. On-site wetland features exhibited saturation within the upper 12 inches of the soil profiles, algal mats, shallow inundation, water-stained leaves, and/or oxidized rhizospheres on living roots. All wetlands had low chroma soils. Common hydrophytic vegetation included common rush (*Juncus effuses*), foxtail sedge (*Carex vulpinoidea*), shallow sedge (*Carex lurida*), and spikerush (*Elocharis sp.*). Fescue was also common in several wetland sites. Characteristics of wetlands A-Q are described in Table 7.

The design of the Site is focused on minimizing impacts to the wetlands and protecting wetland areas with a conservation easement. All wetland areas inside the limits of disturbance will be flagged with safety fence during construction to prevent unintended impacts. This will be denoted in the final construction plans Erosion and Sediment Control sheets, details, and specifications. There are two areas along UT1 that will be minimally impacted due to grading activities: Wetlands "P" and "N" (Figure 2). There will be a 0.002 acre temporary impact to wetland "N". The proposed stream alignment abuts the existing wetland. The wetland will not be filled or cut, but may be temporarily impacted during construction activities. There will be a 0.0005 acre permanent impact to wetland "P". This impact is due to the installation of a rock outlet that will stabilize the area where the wetland seeps into UT1. These impacts are not large enough to warrant mitigation. All impacts are described in the PCN located in Appendix 10.



Table 7: Wetland Summary Information
Holman Mill Mitigation Project

	A	B	C	D	E
Size of Wetland (acres)	0.097	0.008	0.092	0.216	0.016
Wetland Type (non-riparian, riparian riverine, or riparian) non-riverine)	Seep	Headwater Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Headwater Forest
Mapped Soil Series	Herndon Silt Loam	Herndon Silt Loam	Georgeville silt loam	Goldston Channery Silt Loam	Goldston Channery Silt Loam
Drainage Class	well drained	well drained	well drained	well drained	well drained
Soil Hydric Series	N/A	N/A	N/A	N/A	N/A
Source of Hydrology	groundwater seep	groundwater /overbank flooding	groundwater/o verbank flooding	groundwater/ove rbank flooding	groundwat er/overban k flooding
Hydrologic impairment	N/A	N/A	ditching	ditching	N/A
Native Vegetation Community	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Bottomland Hardwood Forest	Bottomland Hardwood Forest	Piedmont Alluvial Forest
% Composition Invasive Species	0%	0%	0%	0%	0%

	F	G	H	I	J
Size of Wetland (acres)	0.005	0.016	0.041	0.047	0.008
Wetland Type (non-riparian, riparian riverine, or riparian) non-riverine)	Headwater Forest	Seep	Seep	Seep	Seep
Mapped Soil Series	Goldston Channery Silt Loam	Herndon Silt Loam/ Goldston Channery Silt Loam	Herndon Silt Loam/ Goldston Channery Silt Loam	Herndon Silt Loam/ Goldston Channery Silt Loam	Herndon Silt Loam/ Goldston Channery Silt Loam
Drainage Class	well drained	well drained	well drained	well drained	well drained
Soil Hydric Series	N/A	N/A	N/A	N/A	N/A
Source of Hydrology	groundwater /overbank flooding	groundwater seep	groundwater seep	groundwater seep	groundwat er seep

	F	G	H	I	J
Hydrologic impairment	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest
% Composition Invasive Species	0%	0%	0%	0%	0%

	K	L	M	N	O	P	Q
Size of Wetland (acres)	0.003	0.011	0.021	0.042	0.037	0.005	0.017
Wetland Type (non-riparian, riparian riverine, or riparian) non-riparian)	Headwater Forest	Headwater Forest	Headwater Forest	Seep	Headwater Forest	Headwater Forest	Headwater Forest
Mapped Soil Series	Herndon Silt Loam/ Goldston Channery Silt Loam	Goldston Channery Silt Loam	Herndon Silt Loam	Herndon Silt Loam	Goldston Channery Silt Loam	Goldston Channery Silt Loam	Herndon Silt Loam
Drainage Class	well drained	well drained	well drained	well drained	well drained	well drained	well drained
Soil Hydric Series	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Source of Hydrology	groundwater /overbank flooding	groundwater /overbank flooding	groundwater /overbank flooding	groundwater seep	groundwater /overbank flooding	groundwater /overbank flooding	groundwater /overbank flooding
Hydrologic impairment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Native Vegetation Community	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest	Piedmont Alluvial Forest
% Composition Invasive Species	0%	0%	0%	0%	0%	0%	0%

5.2 Threatened and Endangered Species

5.2.1 Site Evaluation Methodology

The Endangered Species Act (ESA) of 1973, amended (16 U.S.C. 1531 et seq.), defines protection for species with 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).

Wildlands utilized the US Fish and Wildlife Service (USFWS) and NC Natural Heritage Program (NHP) databases to search for federally listed threatened and endangered plant and animal species in Alamance County, NC. There are currently no federally listed species in Alamance County that are Subject to Section 10 of the Endangered Species Act. The Categorical Exclusion (included in Appendix 7) has been approved by the Federal Highway Administration.

5.2.2 USFWS Concurrence

Wildlands requested comment on the project from both the USFWS and the North Carolina Wildlife Resource Commission (NCWRC) on February 27, 2014. NCWRC responded on March 14, 2014 and stated they “do not anticipate the project to result in significant adverse impacts to aquatic and terrestrial resources.” The USFWS responded on April 4, 2014 and concurred with NCWRC stating that “the proposed action is not likely to adversely affect any federally-listed endangered or threatened species, their formally designated critical habitat, or species currently proposed for listing under the Act.” All correspondence is located in Appendix 7.

5.3 Cultural Resources

5.3.1 Site Evaluation Methodology

The National Historic Preservation Act (NHPA) of 1966, 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 HPA mandates that federal agencies take into account the effect of undertaking on any property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

5.3.2 SHPO/THPO Concurrence

Wildlands requested review and comment from the State Historic Preservation Office (SHPO) with respect to any archeological and architectural resources related to the Holman Mill Mitigation Site on February 27, 2014. The SHPO responded on March 24, 2014 and stated they were aware of no historic resources that would be affected by the project. All correspondence related to this is located in Appendix 7.

5.4 FEMA Floodplain Compliance and Hydrologic Trespass

UT to Pine Hill Branch is mapped in a Zone AE Special Flood Hazard Area (SFHA) on Alamance County Flood Insurance Rate Map Panel 8786. Portions of UT2 and UT2A are located the “flood fringe” of the UT to Pine Hill Branch floodplain but are not modeled systems. Wildlands coordinated with the Alamance County, NC Floodplain Administrator to determine what would be required for this project. They determined the County will require a technical memo stating all activities within Zone AE on the project, but that no FEMA modeling will be necessary. After review of the technical memo, the Floodplain Administrator will determine if a floodplain development permit is required and if so, will issue one at that time. The Floodplain Checklist is located in Appendix 9.



6.0 REFERENCE SITES

6.1 Reference Streams

Reference streams provide geomorphic parameters of a stable system, which can be used to design stable channels of similar stream types in similar landscapes and watersheds. Three reference reaches were identified near the Site and used to support the design of the proposed restoration and enhancement measures (Figure 7). These reference reaches were chosen because of their similarities to the project streams to be restored including drainage area, valley slope, morphology, and bed material. The reference reaches are within the Carolina Slate Belt region of the Piedmont. Geomorphic parameters for these reference reaches are summarized in Table 8.

6.2 Channel Morphology and Classification of Reference Streams

The UT to Polecat Creek reference reach is located in northern Randolph County. The site was identified by Wolf Creek Engineering and used as a reference reach for the Holly Grove Restoration Site (Wolf Creek Engineering, 2007). Wildlands conducted a site visit and reference reach survey in March, 2013 to confirm the geomorphic parameters listed in the Holly Grove Restoration Site Plan. The site is similar to Holman Mill in valley type, slope, and influence of bedrock control on UT1. The UT to Polecat Creek reference reach is classified as a Rosgen E4 stream type.

The Agony Acres reference reach (UT1A – Reach 1) is located in northeast Guilford County, NC. It was identified as a high quality preservation area on the Agony Acres Mitigation Site in the mitigation plan submitted in March, 2014 and was used as a reference reach for that project. Wildlands performed a detailed morphologic survey in March of 2013. The Agony Acres reference reach has a drainage area of 0.3 square miles and is classified as a Rosgen E4 stream type. This site was specifically chosen because the position of the Agony Acres reference reach in the landscape is similar to that of UT2A and UT2 Reaches 2 and 3.

The UT to Varnals reference reach is located in south central Alamance County, NC near the Cane Creek Mountains. The site was identified by EcoLogic Associates and used as a reference reach for the Reedy Branch stream restoration site (EcoLogic Associates, 2002). Wildlands visited UT to Varnals in September, 2014 and visually confirmed that the land use is unchanged from reported conditions and that the stream is laterally and vertically stable. Wildlands conducted a detailed morphological survey in October, 2014. UT to Varnals has a drainage area of 0.41 square miles and is classified as a Rosgen E4 stream type for the majority of the reach. UT to Varnals has a similar channel and valley slope to UT2 and UT2A on Holman Mill. The riffle pool sequences and spacing of grade control structures on UT to Varnals were used in the plan and profile development for these reaches where native bedrock control is lacking.



Table 8: Summary of Reference Reach Geomorphic Parameters
Holman Mill Mitigation Project

	Notation	Units	Agony Acres UT1A - Reach 1		UT to Polecat Creek		UT to Varnals Creek	
			Min	Max	Min	Max	Min	Max
stream type			E4		E4		E4	
drainage area	DA	sq mi	0.30		0.41		0.41	
design discharge	Q	cfs	25.3		20.3		54.0	
bankfull cross-sectional area	A _{bkf}	SF	10.7	11.3	5.4	12.4	10.3	12.3
average velocity during bankfull event	V _{bkf}	fps	2.2	2.4	2.2	3.5	4.4	5.2
Cross-Section								
width at bankfull	w _{bkf}	feet	9.1	10.4	5.3	10.9	9.3	10.5
maximum depth at bankfull	d _{max}	feet	1.8		1.4	1.7	1.5	1.7
mean depth at bankfull	d _{bkf}	feet	1.0	1.2	1.0	1.1	1.1	1.2
bankfull width to depth ratio	w _{bkf} /d _{bkf}		7.3	10.1	5.2	9.6	8.1	9.3
depth ratio	d _{max} /d _{bkf}	feet	1.8		1.4	1.7	1.4	1.4
bank height ratio	BHR		1.0		1.0	1.1	0.9	1.0
floodprone area width	w _{fpa}	feet	>36		25	65	20	64
entrenchment ratio	ER		>3.9		3.2	8.3	1.9	6.1
Slope								
valley slope	S _{valley}	feet/foot	0.010	0.034	0.017		0.020	
channel slope	S _{chnl}	feet/foot	0.004	0.028	0.012		0.017	
Profile								
riffle slope	S _{riffle}	feet/foot	N/A	N/A	0.004	0.047	0.024	0.057
riffle slope ratio	S _{riffle} /S _{chnl}		N/A	N/A	0.3	4.0	1.4	3.4
pool slope	S _p	feet/foot	N/A	N/A	0.017		0.000	0.015
pool slope ratio	S _p /S _{chnl}		N/A	N/A	1.4		0.0	0.9
pool-to-pool spacing	L _{p-p}	feet	N/A	N/A	34	52	8	82
pool spacing ratio	L _{p-p} /w _{bkf}		N/A	N/A	0.3	3.2	0.5	5.6
pool cross-sectional area	A _{pool}	SF	14.5		9.3		22.0	22.7
pool area ratio	A _{pool} /A _{bkf}		1.3		0.8	1.7	1.8	1.9
maximum pool depth	d _{pool}	feet	2.5		1.8		2.5	2.6
pool depth ratio	d _{pool} /d _{bkf}		2.3		1.6	1.8	3.0	3.1
pool width at bankfull	w _{pool}	feet	9.4		8.0		15.1	18.6

	Notation	Units	Agony Acres UT1A - Reach 1		UT to Polecat Creek		UT to Varnals Creek	
			Min	Max	Min	Max	Min	Max
pool width ratio	w_{pool}/w_{bkf}		1.0		0.7	1.5	1.0	1.3
Pattern								
sinuosity	K		1.35		1.40		1.20	
belt width	w_{blt}	<i>feet</i>	21	93	28	50	15	45
meander width ratio	w_{blt}/w_{bkf}		2.3	8.9	3.0	5.3	1.0	3.0
linear wavelength (formerly meander length)	L_m	<i>feet</i>	121	171	56	85	16	47
linear wavelength ratio (formerly meander length ratio)	L_m/w_{bkf}		13.3	16.4	6.0	9.0	1.1	3.2
radius of curvature	R_c	<i>feet</i>	14	60	19	50	8	47
radius of curvature ratio	R_c/w_{bkf}		1.5	5.8	2.0	5.3	0.6	3.2

7.0 DETERMINATION OF CREDITS

Mitigation credits presented in Table 9 are projections based on site design. Upon completion of site construction, the project components and credits data will be revised to be consistent with the as-built condition.

Table 9: Determination of Credits
Holman Mill Mitigation Project

Mitigation Credits									
	Stream		Riparian Wetland		Non-riparian wetland		Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	3,915	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Project Components							
Project Component or Reach ID	Existing Footage/Acreage	Proposed Stationing Location	Approach (P1, P2, etc)	Restoration (R) or Restoration Equivalent (RE)	Restoration Footage or Acreage	Mitigation Ratio	Proposed Credit
UT to Pine Hill Branch	3,526	600+00 - 635+26	E2	R	3,526	5:1	705
UT1 R1	215	100+00-102+02	P1	R	202	1:1	202
UT1 R2	435	102+02 - 106+34	E2	R	432	2.5:1	173
UT1 R3	331	106+34 - 109+35	PI	R	301	1:1	301
UT1 R4	1,687	109+35 - 126+22	E2	R	1,687	2.5:1	675
UT1A	84	400+00 - 400+84	E2	R	84	2.5:1	34
UT2A	468	300+65 - 306+18	P1	R	540	1:1	540
UT2 R1	588	200+00 - 205+88	E2	R	588	2.5:1	235
UT2 R2	298	205+88 - 208+73	E1	R	285	1.5:1	190
UT2 R3	396	208+73 - 213+52	P1	R	479	1:1	479
UT2 R4	242	213+52 - 215+62	P1	R	210	1:1	210
UT2B	429	500+00 - 504+29	E2	R	429	2.5:1	172

Component Summation					
Restoration Level	Stream (LF)	Riparian Wetland (Acres)	Non-Riparian Wetland (AC)	Buffer (sq.ft.)	Upland (AC)
Restoration	1,732	N/A	N/A	N/A	N/A
Enhancement	N/A	N/A	N/A	N/A	N/A
Enhancement I	190	N/A	N/A	N/A	N/A
Enhancement II	1,993	N/A	N/A	N/A	N/A
Creation	N/A	N/A	N/A	N/A	N/A
Preservation	N/A	N/A	N/A	N/A	N/A

8.0 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 standard. The release of project credits will be subject to the criteria described as follows:

Table 10: Credit Release Schedule – Stream Credits
Holman Mill Mitigation Project

Monitoring Year	Credit Release Activity	Interim Release	Total Released
0	Initial Allocation – see requirements below	30%	30%
1	First year monitoring report demonstrates performance	10%	40%
	standards are being met		
2	Second year monitoring report demonstrates performance	10%	50% (60%*)
	standards are being met		
3	Third year monitoring report demonstrates performance	10%	60% (70%*)
	standards are being met		
4	Fourth year monitoring report demonstrates performance	5%	65% (75%*)
	standards are being met		
5	Fifth year monitoring report demonstrates performance	10%	75% (85%*)
	standards are being met		
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 the project has received closeout approval	10%	90% (100%)

*Accounts for the 10% of credits that are withheld until two bankfull events have occurred. Refer to Section 8.2

8.1 Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan, can be released 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 NCEEP 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 project where DA permit issuance is not required.

8.2 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 10% of a site's total stream credits shall be released after two bankfull events have occurred in separate years, provided the channel is stable and all other performance standards are met. In the event that less than two 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 the credit release, the NCEEP will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

9.0 PROJECT SITE MITIGATION PLAN

9.1 Justification for Proposed Intervention

The primary project goals and objectives described in Section 1.0 are focused on improving the ecological function of the site including a reduction in sedimentation and fecal coliform concentrations. The existing conditions assessment demonstrates that the tributaries to UT to Pine Hill Branch on site have been degraded due to livestock access and the removal of riparian vegetation. The bedforms of the tributaries' channels are highly degraded due to trampling by cattle and a fining of bed material from bank erosion and mass wasting of bank material. The riparian vegetation has largely been removed, with only a few specimen trees located along the streambanks. While the tributaries on the northern portion of the site, UT2 and UT2A, are highly incised, most of UT1 is connected to its current floodplain.

Intervention is needed to rectify these problems; however, full restoration of all project reaches is not necessary in this case. Wildlands proposes to use minimal intervention to reestablish functioning stream and riparian ecosystems and to protect those ecosystems from further damage.

9.2 Stream Restoration and Enhancement Design Overview

A range of stream enhancement techniques will be used in cases where most appropriate. UT1A, UT2B, UT to Pine Hill Branch, and the upper reach of UT2 will be restored using Enhancement II techniques that focus on fencing out cattle and reestablishing a thriving riparian buffer. Enhancement II techniques will also be used along the majority of UT1 (Reaches 2 and 4); however, treatment of this reach will also include minor bank stabilization and habitat improvement through instream structures. Full restoration is proposed for two sections along UT1 (Reaches 1 and 3) to treat unstable pattern and a high degree of bank scour. Full restoration is also proposed for the downstream reach of UT2 and the entirety of UT2A, where the existing channels are highly incised (Figure 8).



9.3 Design Discharge Analysis

Multiple methods were used to develop bankfull discharge estimates for each of the project restoration reaches: NC Rural Piedmont Regional Curve Predictions, NC Piedmont/Mountain Regional Curves (Walker), Reference Reach Curve, USGS Rural Flood Frequency analysis and USGS Rural Flood Frequency Equations. The resulting values were compared and concurrence between the estimates and best professional judgment was used to determine the specific design discharge for each restoration reach.

For this project, concurrence was primarily found between the reference reach curve, the Alan Walker curve and the Manning's equation applied to surveyed cross-sections. The aforementioned modeled discharges also fell between the 1- and 1.2-year event modeled by the USGS Rural Flood Frequency analysis. The NC Rural Piedmont Regional Curve and the Regional Flood Frequency Analysis were similar to one another, but approximately 1.5 times higher than the other methods of estimation. This is likely due to the large drainage areas for streams used as data points in the creation of these methods. In order to create a design that ensures floodplain connectivity, a design discharge was chosen for each reach using values from the Reference Reach Curve, Alan Walker Curve, the Manning's equation applied to existing conditions, and approximately the 1.1-year event of the USGS Rural Flood Frequency Analysis. The methods to estimate discharge are described below and the results are summarized in Table 11 and on Figure 9.

9.3.1 NC Rural Piedmont Regional Curve Predictions

The published NC rural Piedmont Curve (Harman et al., 1999) was used to estimate discharge based on the drainage area for each design reach.

9.3.2 Provisional Updated NC Piedmont/Mountain Regional Curve Predictions

Design discharges using the draft updated curve for rural Piedmont and mountain streams (Walker, unpublished) were estimated based on drainage area for each design reach.

9.3.3 Drainage Area-Discharge Relationships from Reference Reaches

Three reference reaches were identified for this project (Section 6.1). Each reference reach was surveyed to develop information for analyzing drainage area-discharge relationships as well as development of design parameters. Stable cross-sectional dimensions and channel slopes were used to compute a bankfull discharge with the Manning's equation for each reference reach. The resulting discharge values were plotted with drainage area and compared to the regional curve datasets described in Sections 9.3.1 and 9.3.2.

9.3.4 Regional Flood Frequency Analysis

Five USGS stream gage sites were identified within reasonable proximity of the project site for use in development of a project specific regional flood frequency analysis. The Hosking and Walls homogeneity test was performed in R[®] to identify the most appropriate gages (Hosking and Walls, 1993). The gages used were:

- USGS 02096740 – Gun Branch near Alamance, NC (DA = 4.06 mi²)
- USGS 02096846 – Cane Creek near Orange Grove, NC (DA = 7.54 mi²)
- USGS 02097010 – Robeson Creek near Pittsboro, NC (DA = 1.71 mi²)
- USGS 02101030 – Falls Creek near Bennett, NC (DA = 3.43 mi²)
- USGS 0210166029 – Rocky River at SR1300 near Crutchfield Crossroads, NC (DA = 7.42 mi²)



Flood frequency curves were developed for the 1.2-year and 1.5-year recurrence interval discharges. These relationships can be used to estimate discharge of those recurrence intervals for ungauged streams in the same hydrologic region and were solved for discharge with the drainage area for each project reach as the input.

9.3.5 USGS Flood Frequency Equations for Rural Watersheds in North Carolina

USGS flood frequency equations for rural watersheds in North Carolina (Weaver et al., 2009) were used to estimate peak discharges for each reach for floods with a recurrence interval of two years.

Table 11, below, shows results for all of the aforementioned methods of calculating a design discharge as well as the design discharge chosen for each reach.

Table 11: Summary of Design Bankfull Discharge Analysis
Holman Mill Mitigation Project

		UT1	UT2	UT2a	UT2 Reach 2 downstream UT2A
	DA (acres)	102	81	49	130
	DA (sq. mi.)	0.16	0.13	0.08	0.20

		Qbkf (cfs)	Qbkf (cfs)	Qbkf (cfs)	Qbkf (cfs)
USGS rural flood frequency extrapolations	1-yr event	6	5	3	7
	1.2-yr event	20	17	12	24
	1.5-yr event	30	33	18	36
	1.8-yr event	39	41	23	46
	2-yr event	48	81	30	56
Manning's equation at surveyed XS from Mecklenburg spreadsheets	XS3	13			
	XS4		13		
	XS5		12		
	XS8			6	
Piedmont Regional Curve	Bankfull	24	20	14	28
Alan Walker Curve	Bankfull	13	11	7	16
Regional Flood Frequency Analysis (from Gage Homogeneity Test)	1.2-yr event	26	24	18	30
	1.5-yr event	39	35	27	45
	1.8-yr event	50	45	35	57
Qbkf from Reference Reach Curve		16	14	10	19
Final Design Q		14	13	9	22

9.4 Design Channel Morphologic Parameters

Design parameters were developed for restoration reaches based on the design bankfull discharge, dimensionless ratios from the reference reach data, and professional judgment of the designers. The restoration reaches were designed to be similar to type C streams according to the Rosgen classification system (Rosgen, 1996). Type C streams are slightly entrenched, meandering streams with access to the floodplain (entrenchment ratios >2.2), and channel slopes of 2% or less. They occur within a wide range of valley types and are appropriate for the project landscape. The design morphological parameters are shown in Table 12.

Table 12: Design Morphological Parameters
Holman Mill Mitigation Project

	Notation	Units	UT1		UT2 – Reach 3 ¹		UT2 Reach 4		UT2A	
			Min	Max	Min	Max	Min	Max	Min	Max
stream type			C4		C4		C4		C4	
drainage area	DA	sq mi	0.16		0.13		0.21		0.08	
design discharge	Q	cfs	14.0		13.0		22.0		9.0	
bankfull cross-sectional area	A _{bkf}	SF	4.3		4.4		9.1		3.3	
average velocity during bankfull event	V _{bkf}	fps	3.2		2.9		2.5		3.1	
Cross-Section										
width at bankfull	w _{bkf}	feet	7.8		7.9		11.2		6.4	
maximum depth at bankfull	d _{max}	feet	0.8	1.0	0.8	1.0	1.1	1.5	0.7	0.9
mean depth at bankfull	d _{bkf}	feet	0.6		0.6		0.8		0.5	
bankfull width to depth ratio	w _{bkf} /d _{bkf}		14.0		14.0		14.0		13.0	
depth ratio		feet	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.8
bank height ratio	BHR		1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1
floodprone area width	w _{fpa}	feet	15	65	17	79	25	90	14	80
entrenchment ratio	ER		1.9	8.3	2.2	10.0	2.2	8.0	2.2	12.5
Slope										
valley slope	S _{valley}	feet/foot	0.0190		0.0172		0.0074		0.0230	
channel slope	S _{chnl}	feet/foot	0.016	0.017	0.014	0.015	0.006	0.007	0.018	0.020

	Notation	Units	UT1		UT2 – Reach 3 ¹		UT2 Reach 4		UT2A	
			Min	Max	Min	Max	Min	Max	Min	Max
Profile										
riffle slope	S_{riffle}	feet/foot	0.016	0.066	0.014	0.060	0.0062	0.0264	0.018	0.080
riffle slope ratio	S_{riffle}/S_{chnl}		1.0	4.0	1.0	4.0	1.0	4.0	1.0	4.0
pool slope	S_p	feet/foot	0.000	0.007	0.000	0.006	0.000	0.003	0.000	0.008
pool slope ratio	S_p/S_{chnl}		0.00	0.40	0.00	0.40	0.00	0.40	0.00	0.40
pool-to-pool spacing	L_{p-p}	feet	2	44	4	44	3	63	2	36
pool spacing ratio	L_{p-p}/w_{bkf}		0.3	5.6	0.5	5.6	0.3	5.6	0.3	5.6
pool cross-sectional area		SF	4.8	8.2	4.8	8.3	10.0	17.3	3.6	6.2
pool area ratio			1.1	1.9	1.1	1.9	1.1	1.9	1.1	1.9
maximum pool depth		feet	0.9	1.7	0.9	1.7	1.3	2.5	0.8	1.6
pool depth ratio			1.6	3.1	1.6	3.1	1.6	3.1	1.6	3.1
pool width at bankfull		feet	8.6	11.7	8.7	11.9	12.3	16.8	7.0	9.6
pool width ratio			1.1	1.5	1.1	1.5	1.1	1.5	1.1	1.5
Pattern										
sinuosity	K		1.15	1.20	1.15	1.25	1.13	1.20	1.15	1.25
belt width	w_{blt}	feet	12	69	13	70	18	100	10	57
meander width ratio	w_{blt}/w_{bkf}		1.6	8.9	1.6	8.9	1.6	8.9	1.6	8.9
linear wavelength (formerly meander length)	L_m	feet	25	128	25	130	36	184	20	105
linear wavelength ratio (formerly meander length ratio)	L_m/w_{bkf}		3.2	16.4	3.2	16.4	3.2	16.4	3.2	16.4
radius of curvature	R_c	feet	10	45	10	46	15	65	8	37
radius of curvature ratio	R_c/w_{bkf}		1.3	5.8	1.3	5.8	1.3	5.8	1.3	5.8

1. Profile design parameters for UT2-Reach 3 are also used for the profile bedform design along the Enhancement 1 section of UT2-Reach 2.

9.5 Sediment Transport Analysis

As an initial step in the sediment transport analysis, Wildlands performed an assessment of the existing watershed and stream channels as well as a determination of expected changes to the watershed during the life of the project. This was necessary to qualitatively understand the sediment supply for the design system. In unstable or rapidly changing watersheds or for streams with visual signs of high bedload supply, a detailed analysis including field data collection and capacity calculations may be necessary for proper design. A watershed assessment was conducted for the project as described in Section 4.1 and 4.2 of this document. Historical land use changes within the watershed were analyzed through aerial photo review, the existing conditions were evaluated on the ground, and the future land use changes were determined to be minor based on historical trends and the rural character of the surrounding area. The historic watershed conditions varied little over time and are still reflective of the current watershed condition. The watershed was therefore determined to be stable and is expected to remain stable for the foreseeable future. In addition, the existing stream channels on the project site do not show signs of deposition or aggradation. The assessment indicates that the unnamed tributaries to Pine Hill Branch have relatively low bedload supplies and, therefore, no bedload monitoring was performed. The competence and capacity analyses are described below.

9.5.1 Competence Analysis

In natural streams, the shear stress in a channel increases corresponding to an increase in discharge until the point at which the stream is flowing full and gains access to the floodplain. The floodplain access disperses the flow and enables the shear stress in the channel to level out. This relationship of shear stress, channel dimension and discharge influences erosion potential within the channel and the channels ability to transport certain sizes of sediment (competence).

To model this change in channel function and competence from the existing to the proposed stream dimensions, all restoration reaches were modeled in HEC-RAS using flowrates that correspond to the channel flowing full (just before floodplain is accessible). This flowrate corresponds to the maximum shear stress of the channel. The proposed channels were modeled using their design bankfull flow. The existing channels were modeled using a flowrate much higher than the design bankfull flow, as the increased channel areas provided a higher discharge capacity. The shear stresses calculated in the HEC-RAS model, corresponding to the flowrates, were compared with the critical shear stresses obtained from the revised Shields Diagram (Rosgen, 2013), shown in Table 13, to provide a rough estimate of the degree to which shear stress in the proposed stream will be able to move the bed material.

Results in Table 13 indicate that restoration activities will have minimal effect on the ability of the UT1 channel to move bed material. The existing model indicates the stream has the ability to move the D_{50} and D_{84} particles, but not the D_{100} . The proposed conditions also have the ability to move the D_{84} particle size however the bankfull shear stress is much less in the proposed design, primarily due to increased width-depth ratio. The reduction in shear stress will reduce the likelihood of further channel incision and bank scour, which will prevent fine sediment from being added to the system. The upstream sediment supply for UT1 is not anticipated to change.

The two restoration reaches of UT2 have smaller existing bed material. The existing channel shear stress is high and indicates that UT2 has the capacity to entrain particles much higher than what is

currently in the channel. This high shear stress has likely contributed to the channel incision along the reaches to be restored. The proposed model shear stress indicates that the channels can entrain all particles within the system and aggradation is not likely to become a problem. It should be noted that, although the upstream sediment supply is not expected to change, fine bed materials from fluvial erosion and trampling of the banks will be reduced after construction resulting in some coarsening of bed materials. In order to ensure constructed riffle material will remain in place and provide grade control to the system, the median diameter will be sized larger than that which can be moved by the proposed stream channel's shear stress.

The restoration reach UT2A has a large change (1.33lb/ft²) in shear stress pre and post restoration likely due to the difference in channel dimensions and discharge capacity. The existing UT2A channel has a high degree of incision that has led it to be oversized for the watershed hydrology. The existing HEC-RAS model showed that the channel could carry a flowrate 20 times that of the design bankfull discharge. These high flowrates and shear stresses have contributed to the continual degradation of UT2A. In its existing state, UT2A could entrain all particle sizes recorded in the sediment samples. In its proposed state, it should be able to entrain the D₅₀ and nearly the D₈₄, but not the D₁₀₀. This lower shear, the change in width depth ratio, and the exclusion of cattle post-restoration will contribute to the coarsening of bed material over time.

Table 13: Sediment Transport Competence Analysis
Holman Mill Mitigation Project

Parameter	UT1	UT2		UT2A
		Reach 3	Reach 4	
D50 of subpavement sediment sample (mm)	8.66	3.81	3.81	6.33
D84 of subpavement sediment sample (mm)	52.81	12.52	12.52	36.43
D100 subpavement particle sampled (mm)	180	29.53	29.53	64
Shear Stress required to move :				
D50 particle	0.13	0.055	0.055	0.1
D84 Particle	0.72	0.2	0.2	0.5
D100 particle	2.3	0.4	0.4	0.8
Existing Shear Stress	1.60	1.77	1.10	1.85
Movable Particle Size (mm) Shield curve	110	120	80	125
Proposed Shear Stress	0.85	0.38	0.59	0.52
Movable Particle Size (mm) Shield curve	55	29.5	40	30

The sediment transport analysis and HEC-RAS models were used in the design of grade control structures on site to ensure stability. Constructed riffles were sized with a D₅₀ greater than the proposed movable particle listed in Table 13. Specific structures were chosen based on localized conditions at each riffle (described in Section 9.6.1). Chunky riffles will be used on steeper riffle features in order to reduce shear stress and velocity. Native material riffles and Jazz rifles will be used on intermediate slopes as they provide a good distribution of size classes within the riffle, imbed well, and reduce channel shear stress. Lower slope riffles will be used as an opportunity to incorporate wood into the system through the installation of woody debris riffles. Log drops will be used throughout the site to provide grade control over any drops 0.3 feet or greater and rock drops

will be used at the confluence of UT2 and UT to Pine Hill Branch to prevent the formation of headcuts.

9.5.2 Capacity Analysis

Based on the watershed assessment described above, the project streams currently appear to be supply limited, or in other words, have at least enough capacity to transport the sediment loads supplied to them. In addition, the watershed supplied sediment loads are not expected to change considerably in the future. In this case, an appropriate transport capacity analysis is to compare the capacity of the existing channels to that of the proposed. If the proposed channels have similar or greater capacity to move sediment supply as the existing channels, they will not be expected to aggrade. Excess capacity that might cause incision can be controlled by grade control structures.

This analysis was done with the sediment transport capacity module in HEC-RAS. HEC-RAS modules were built for existing and proposed conditions of all design reaches. The sediment transport capacity modules uses the hydraulic model along with bed material data to estimate capacity. Various capacity equations can be used to analyze a stream reach, but should be carefully selected with consideration of the channel size and slope, bed material ranges, channel velocities, and other variables. For this analysis, the Meyer-Peter-Muller equation was used to calculate an average capacity value for each existing and proposed model. For information on this and other equations please consult the HEC-RAS user's manual (HEC, 2010). These average results for each existing reach and the proposed reach are shown in Table 13a.

Table 13a: Sediment Transport Capacity Analysis
Holman Mill Mitigation Project

Reach	Existing, tons/day	Proposed, tons/day
UT1	143	563
UT2 R2/3	234	1,100
UT2 R4	1,304	1,438
UT2a	312	276

The results in Table 13a indicate that sediment transport capacity for UT1 and UT2 will increase significantly when the proposed design is implemented. These results indicate that aggradation is not likely a problem and any excess stream power will be controlled through grade control to reduce the potential for degradation. Grade control structures are described in Section 9.6. However, results indicate that the capacity of UT2a will be slightly reduced, primarily due to a decrease in the channel slope and channel velocities (which are quite high in the existing condition). This would be a concern if there were indications that the bedload supply to the stream was high. But, in this case, assessments of the channel and watershed do not indicate a high bedload system and the existing condition likely has excess capacity. There is no reason to believe that a disturbance in the UT2A watershed that would increase the sediment yield is likely in the foreseeable future. In this case, the reduction of the high channel capacity will be a positive change and create a more stable condition. The proposed designs of all streams are expected to remain stable.

9.6 Project Implementation

9.6.1 Grading and Installation of Structures

UT1A, UT2B, the upstream portion of UT2 (Reach 1), and UT to Pine Hill Branch will be improved through Enhancement II techniques. There are currently minimal to no buffers along the small tributaries (UT1A, UT2B and Ut2-R1). Enhancement II activities will include planting a minimum of 50 feet wide riparian buffer on each side of the channel with native tree species, fencing out livestock, and treating any invasive species. UT to Pine Hill branch is a much larger system, and in order to further protect the water quality a riparian buffer a minimum of 100 feet wide will be planted along the current pasture on the left bank. The fencing will be moved to the edge of this buffer in order to continue cattle exclusion practices along this reach. There will be no alteration of floodplain grades or channel dimensions for the aforementioned reaches.

A combination of Restoration and Enhancement II techniques will be used to improve UT1. There are two short sections of Restoration. The first begins at the culvert at Holman Mill Road and continues 202 LF downstream where it ties into the existing channel and the second is a 301 LF reach further downstream where the existing pattern is highly unstable. Enhancement II techniques will be used for the remaining length of UT1 along with the installation of constructed riffles and woody debris to improve instream habitat. Additionally, streambanks at existing cattle crossings and wallow areas will be reconstructed, matted with coir fiber matting and planted with live stakes to improve stability and reduce scour. The entire riparian buffer will be planted with native vegetation, livestock will be fenced out, and invasive species will be treated.

Enhancement I techniques will be used on Reach 2 of UT2 to enhance bed features and reduce the level of incision of the existing channel. The channel bed will be raised and a riffle-pool sequence will be constructed. This design approach also allows the downstream reaches of UT2 (Reach 2 and 3) to be restored using Priority I restoration.

Reaches 3 and 4 of UT2 and the entirety of UT2A will be improved through a combination of Priority I and Priority II Restoration techniques. UT2A will start as a Priority II Restoration at the upstream limit in order to maintain the existing culvert grade and will transition to Priority I Restoration after approximately 200 feet. UT2 Reach 3 and the upstream portion of Reach 4 will be Priority I restoration, and then Reach 4 will transition to Priority II Restoration in order to tie in to the existing bed elevation of UT to Pine Hill Branch. New channels will be constructed offline for these reaches with stable meander patterns mimicking natural Piedmont streams, and the beds of the channels will be raised so that the floodplains are inundated during flow events larger than the design bankfull discharge. Where necessary, the floodplain will be reshaped to improve functioning in overbank events. The streambeds will be composed of alternating riffle-pool sequences to provide habitat and flow diversity. The cross-sectional dimensions of the channels will be reconstructed as designed with stable side slopes that are matted and planted with native vegetation for long-term stability. Brush toe built from on-site materials will be used to protect banks and provide aquatic habitat.

Instream structures will primarily include constructed riffles, angled log sills, log vanes and log-vane j-hooks, and rock sills. Several types of constructed riffles will be utilized in the restoration reaches to establish a varied flow pattern, habitat, and grade control while providing a source of carbon for nutrient cycling. Native rock of various sizes (cobble, gravel, and fines) harvested on site will be

used as much as possible to create these types of riffles. Types of riffles proposed for this site include:

- Chunky riffles with larger (small boulder and large cobble) rock embedded throughout the length of the native rock riffle to provide additional habitat as well as grade control for steeper riffles.
- Native material riffles to re-establish a large gravel substrate to the channels.
- Woody riffles with brush and logs compacted into the bed of native rock to increase woody material in the channel.
- Jazz riffles to incorporate larger woody debris and meander the thalweg within longer riffles.

9.6.2 Riparian Planting

As a final stage of construction, riparian buffers of restoration and enhancement reaches will be seeded and planted with early successional native vegetation chosen to create a Piedmont Bottomland Forest community. The specific species composition to be planted was selected based on the community type, observations of the occurrence of species in the existing buffer, and best professional judgment on species establishment and anticipated site conditions in the early years following project implementation. Species chosen for the planting plan are listed on Sheet 3.1 of the Construction Plans.

The riparian buffer areas will be planted with bare root seedlings. In addition, the stream banks will be planted with live stakes and the channel toe will be planted with plugs of *Juncus effusus*. Permanent herbaceous seed will be placed on stream banks, floodplain areas, and all disturbed areas within the project easement. Proposed plant species are shown in the construction plan set.

To help ensure tree growth and survival, soil amendments may be added to areas of floodplain cut along UT1 and UT2a. Soil tests will be performed in areas of cut and fertilizer and lime will be applied based on the results. Additionally, topsoil will be stockpiled, reapplied, and disked before permanent seeding and planting activities take place.

Species planted as bare roots will be spaced at an initial density of 605 plants per acre based on 12-ft by 6-ft spacing (targeted densities after monitoring year 3 are 320 woody stems per acre). Live stakes will be planted on channel banks at a 2-ft to 3-ft spacing on the outside of meander bends and a 6-ft to 8-ft spacing on tangent sections.

Invasive species within the riparian buffers will be treated and/or removed at the time of construction. The extent of invasive species coverage will be monitored, mapped and controlled as necessary throughout the required monitoring period.

10.0 MAINTENANCE PLAN

The Site shall be monitored on a regular basis and a physical inspection of the Site shall be conducted at a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify the 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:



Table 14: Maintenance Plan
Holman Mill Mitigation Project

Component / Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include chinking of in-stream structures to prevent piping, securing 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. Beaver dams that inundate the streams channels shall be removed and the beaver shall be trapped.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted 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 the NC Department of Agriculture (NCDA) rules and regulations.
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.

11.0 PERFORMANCE STANDARDS

The stream and buffer performance criteria for the project site will follow approved performance criteria presented in the EEP Mitigation Plan Template (version 2.2, 06/08/2012), the EEP Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011), and the Stream Mitigation Guidelines issued in April 2003 by the USACE and NCDWR. Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. The stream restoration and enhancement sections and the buffer restoration sections of the project will be assigned specific performance criteria components for stream morphology, hydrology, and vegetation. Performance criteria will be evaluated throughout the seven year post-construction monitoring. If all performance criteria have been successfully met and two (2) bankfull events have occurred during separate years, Wildlands may propose to terminate stream and/or vegetation monitoring after Year 5, in accordance with the Early Closure Provision in the EEP Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011).

An outline of the performance criteria components follows.

11.1 Streams

11.1.1 Dimension

Riffle cross-sections on the restoration and enhancement I reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Per EEP guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios shall be at least 2.2 for restored channels to be considered stable. Reach riffle cross-section dimension means should fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a trend in vertical incision or eroding channel banks over the monitoring period. Changes in the channel that indicate a movement toward stability or

enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. Remedial action would not be taken if channel changes indicate a movement toward stability.

11.1.2 Pattern and Profile

Visual assessments and photo documentation should indicate that streams are remaining stable and do not indicate a trend toward vertical or lateral instability. Signs of instability may include bank scour and migration and bed incision.

11.1.3 Substrate

Substrate materials in the restoration and enhancement reaches should indicate a progression towards or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

11.1.4 Bankfull Events

Two bankfull flow events must be documented on the restoration and enhancement reaches within the seven-year monitoring period. The two bankfull events must occur in separate years. Stream monitoring will continue until success criteria in the form of two bankfull events in separate years have been documented.

11.1.5 Photo Documentation

Photographs should illustrate the site's vegetation and morphological stability on an annual basis. Cross-section photos should demonstrate no excessive erosion or degradation of the banks. Longitudinal photos should indicate the absence of persistent bars within the channel or vertical incision. Grade control structures should remain stable. Deposition of sediment on the bank side of vane arms is preferable. Maintenance of scour pools on the channel side of vane arms is expected.

11.1.6 Vegetation

The final vegetative success criteria for the stream restoration and enhancement areas will be the survival of 210 planted stems per acre in the riparian corridor at the end of the required monitoring period (year seven). The interim measure of vegetative success will be the survival of at least 320 planted stems per acre at the end of the third monitoring year and at least 260 stems per acre at the end of the fifth year of monitoring. Planted vegetation must average 10 feet in height in each plot at the end of the seventh year of monitoring. If this performance standard is met by year five and stem density is trending towards success (i.e., no less than 260 five year old stems/acre), monitoring of vegetation on the site may be terminated with written approval by the USACE in consultation with the NC Interagency Review Team.

11.1.7 Visual Assessment

Visual assessments should support the specific performance standards for each metric as described above.

12.0 MONITORING PLAN

Annual monitoring data will be reported using the EEP Monitoring Report Template (version 1.5, 06/08/2012). The monitoring report shall provide project data chronology that will facilitate an understanding of project status and trends, population of EEP databases for analysis, research



purposes, and assist in decision making regarding close-out. The monitoring period will extend seven years beyond completion of construction or until performance criteria have been met. All survey will be tied to grid. Project monitoring requirements in the sections below are listed in more detail in Table 15, below.

Table 15: Monitoring Requirements.
Holman Mill Mitigation Project

Parameter	Monitoring Feature	Quantity/Length by Reach							Frequency	Notes
		UT to Pine Hill Branch	UT1	UT1a	UT2-R1	UT2-R2,3,4	UT2a	UT2b		
Dimension	Riffle Cross-Section	N/A	2	N/A	N/A	1	1	N/A	Annual	1
	Pool Cross-Section	N/A	2	N/A	N/A	1	1	N/A		
Pattern	Pattern	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
Profile	Longitudinal Profile	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Substrate	Reach-wide (RW), Riffle (RF) 100 pebble count	N/A	N/A	N/A	N/A	1 RW, 1 RF	1 RW, 1 RF	N/A	Annual	
Hydrology	Crest Gage	N/A	1	N/A	1		1	N/A	Annual	3
Vegetation	Vegetation Plots	12							Annual	
Visual Assessment	All Streams	Y	Y	Y	Y	Y	Y	Y	Bi-annual	
Exotic and Nuisance vegetation									Annual	4
Project Boundary									Annual	5
Reference Photos	Photos	45							Annual	6

Notes:

1. Cross-sections will be permanently marked with rebar to establish location. Surveys will include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg. The number of cross-sections proposed was established using small stream guidance, with two cross-sections every 1,000 LF. Cross-sections will be located on the portions of channels where restoration activities occurred.
2. Entire profile will be surveyed during the as-built for all project streams.
3. One crest gage will be installed along each stream. Where there is more than one approach applied to a reach, the crest gage will be installed in a central location to capture bankfull events for both design approaches. Device will be inspected quarterly or semi-annually, evidence of bankfull will be documented with a photo.
4. Locations of exotic and nuisance vegetation will be recorded using a GPS and mapped.
5. Locations of fence damage, vegetation damage, boundary encroachments, etc. will be recorded using a GPS and mapped.
6. Markers will be established and recorded using a GPS so that the same locations and view directions on the site are monitored.



12.1 Streams

12.1.1 Dimensions

In order to monitor the channel dimension, permanent cross-sections will be installed along riffle and pool sections according to EEP guidance. Two cross-sections will be installed every 1,000 LF of stream per the small stream guidance. Each cross-section will be permanently marked with pins to establish its location. Cross-section surveys will include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg. Cross-sections will be surveyed annually for the seven year monitoring period.

12.1.2 Pattern and Profile

The as-built survey will include a longitudinal profile for the baseline monitoring report. Longitudinal profile surveys will not be conducted during the seven year monitoring period unless other indicators during the annual monitoring indicate a trend towards vertical and/or lateral instability. If a longitudinal profile is deemed necessary, monitoring will follow standards as described in the EEP Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/07/2011) and the 2003 USACE and NCDWR Stream Mitigation Guidance for the necessary reaches.

12.1.3 Substrate

A reach-wide pebble count will be performed in each restoration reach (UT1, UT2-R3, UT2-R4, and UT2a) each year for classification purposes. A pebble count will be performed at each surveyed riffle to characterize the bed material during the years of the cross-section survey.

12.1.4 Bankfull Events

Bankfull events will be documented using a crest gage, photographs, and visual assessments such as debris lines. Three crest gages will be installed: one on UT1, UT2, and UT2a. The crest gages will be installed within one of the surveyed riffle cross-sections. The gages will be checked at each site visit to determine if a bankfull event has occurred. Photographs will be used to document occurrences of debris lines and sediment deposition.

12.1.5 Photo Documentation

Photographs will be taken once a year to visually document stability for seven years following construction. Permanent markers will be established and located with GPS equipment so that the same locations and view directions on the site are photographed each year. Photos will be used to monitor stream restoration and enhancement reaches as well as vegetation plots.

Longitudinal reference photos will be established at the tail of riffles approximately every 200 LF along the channel by taking a photo looking upstream and downstream. Cross-sectional photos will be taken of each permanent cross-section looking upstream and downstream. Reference photos will also be taken for each of the vegetation plots. Representative digital photos of each permanent photo point, cross-section and vegetation plot will be taken on the same day the stream and vegetation surveys are conducted. The photographer will make every effort to consistently maintain the same area in each photo over time.



12.1.6 Vegetation

Vegetation monitoring plots will be installed and evaluated within the restoration and enhancement areas to measure the survival of the planted trees. The number of monitoring quadrants required is based on the EEP monitoring guidance document (version 1.4, 11/17/11). The size of individual quadrants will be 100 square meters for woody tree species and shrubs. Vegetation assessments will be conducted following the Carolina Vegetation Survey (CVS) Level 2 Protocol for Recording Vegetation- Version 4.0 (2006).

The initial baseline survey will be conducted within 21 days from completion of site planting and used for subsequent monitoring year comparisons. The first annual vegetation monitoring activities will commence at the end of the first growing season, during the month of September. The restoration and enhancement sites will then be evaluated each subsequent year between June 1 and September 31. Species composition, density, and survival rates will be evaluated on an annual basis by plot and for the entire site. Individual plot data will be provided and will include height, density, vigor, damage (if any), and survival. Planted woody stems will be marked annually as needed and given a coordinate, based off a known origin, so they can be found in succeeding monitoring years. Mortality will be determined from the difference between the previous year's living planted stems and the current year's living planted stems.

12.1.7 Visual Assessment

Visual assessments will be performed along all stream and buffer restoration areas on a semi-annual basis during the seven year monitoring period. Problem areas will be noted such as channel instability (i.e. lateral and/or vertical instability, in-stream structure failure/instability and/or piping, headcuts), vegetation health (i.e. low stem density, vegetation mortality, invasive species or encroachment), beaver activity, or livestock access. Areas of concern will be mapped and photographed accompanied by a written description in the annual report. Problem areas will be re-evaluated during each subsequent visual assessment. Should remedial actions be required, recommendations will be provided in the annual monitoring report.

13.0 LONG-TERM MANAGEMENT PLAN

Upon approval for close-out by the Interagency Review Team (IRT), the site will be transferred to the NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program. This party shall be responsible for periodic inspection of the site to ensure that restrictions required in the conservation easement or the deed restriction document(s) are upheld. Endowment funds required to uphold easement and deed restrictions shall be negotiated prior to site transfer to the responsible party.

The NCDENR Division of Natural Resource Planning and Conservation's Stewardship Program currently houses EEP stewardship endowments within the non-reverting, interest-bearing Conservation Lands Stewardship Endowment Account. The use of funds from the Endowment Account is governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used only for the purpose of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable. The NCDENR Stewardship Program intends to manage the account as a non-wasting endowment. Only interest generated from the endowment funds will be used to steward the compensatory mitigation sites. Interest funds not



used for those purposes will be re-invested in the Endowment Account to offset losses due to inflation.

14.0 ADAPTIVE MANAGEMENT PLAN

Upon completion of site construction, EEP will implement the post-construction monitoring protocols previously defined in this document. Project maintenance will be performed as described previously in this document. If, during the course of annual monitoring it is determined the site's ability to achieve site performance standards are jeopardized, EEP will notify the USACE of the need to develop a Plan of Corrective Action. The Plan of Corrective Action may be prepared using in-house technical staff or may require engineering and consulting services. Once the Corrective Action Plan is prepared and finalized EEP will:

- Notify the USACE as required by the Nationwide 27 permit general conditions.
- Revise performance standards, maintenance requirements, and monitoring requirements as necessary and/or required by the USACE.
- Obtain other permits as necessary.
- Implement the Corrective Action Plan.
- Provide the USACE a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

15.0 FINANCIAL ASSURANCES

Pursuant to Section IV and Appendix III of the Ecosystem Enhancement Program's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environment and Natural Resources has provided the US Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by EEP. This commitment provides financial assurance for all mitigation projects implemented by the program.

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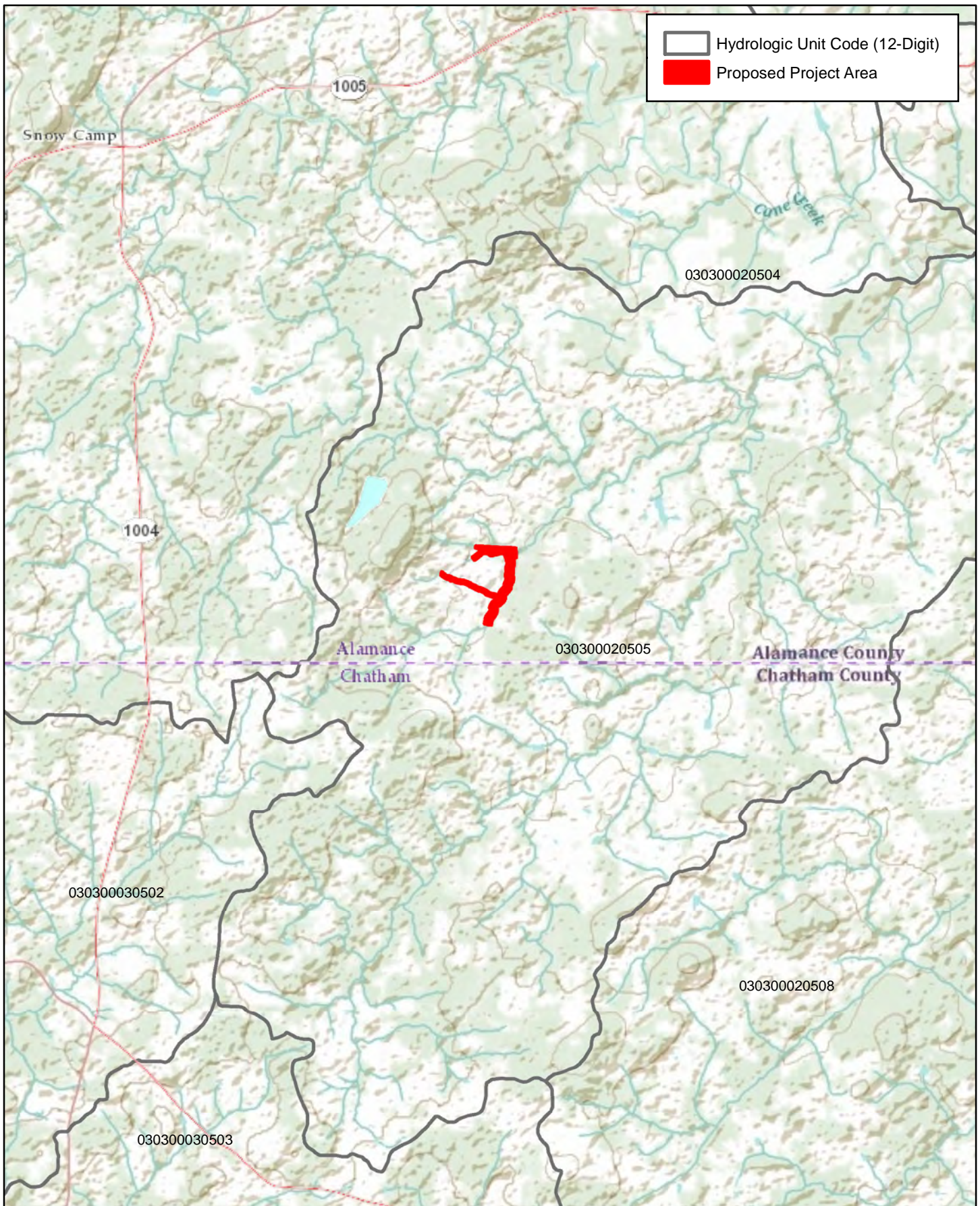
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Figures



0 1 Miles



Figure 1: Vicinity Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002

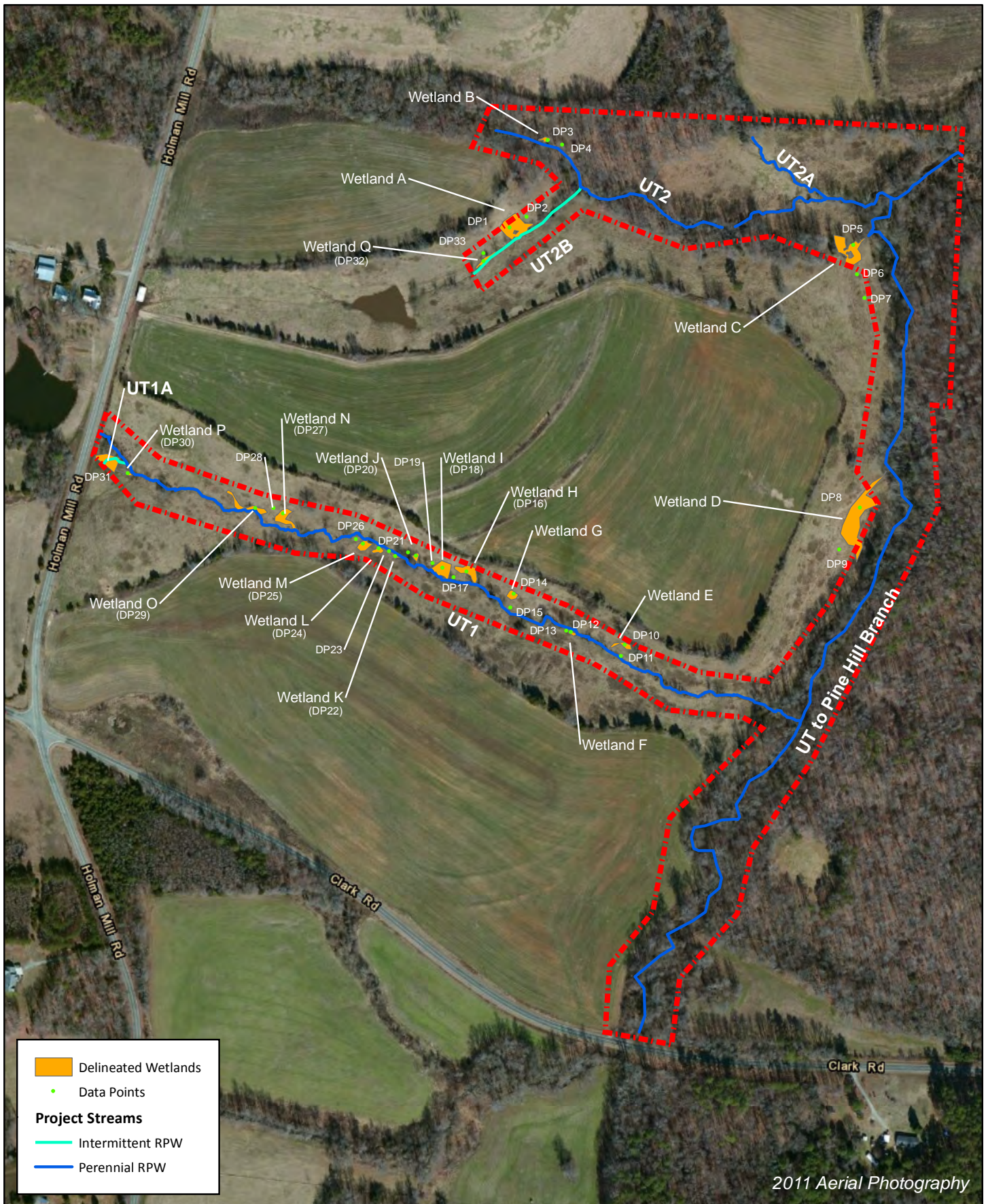
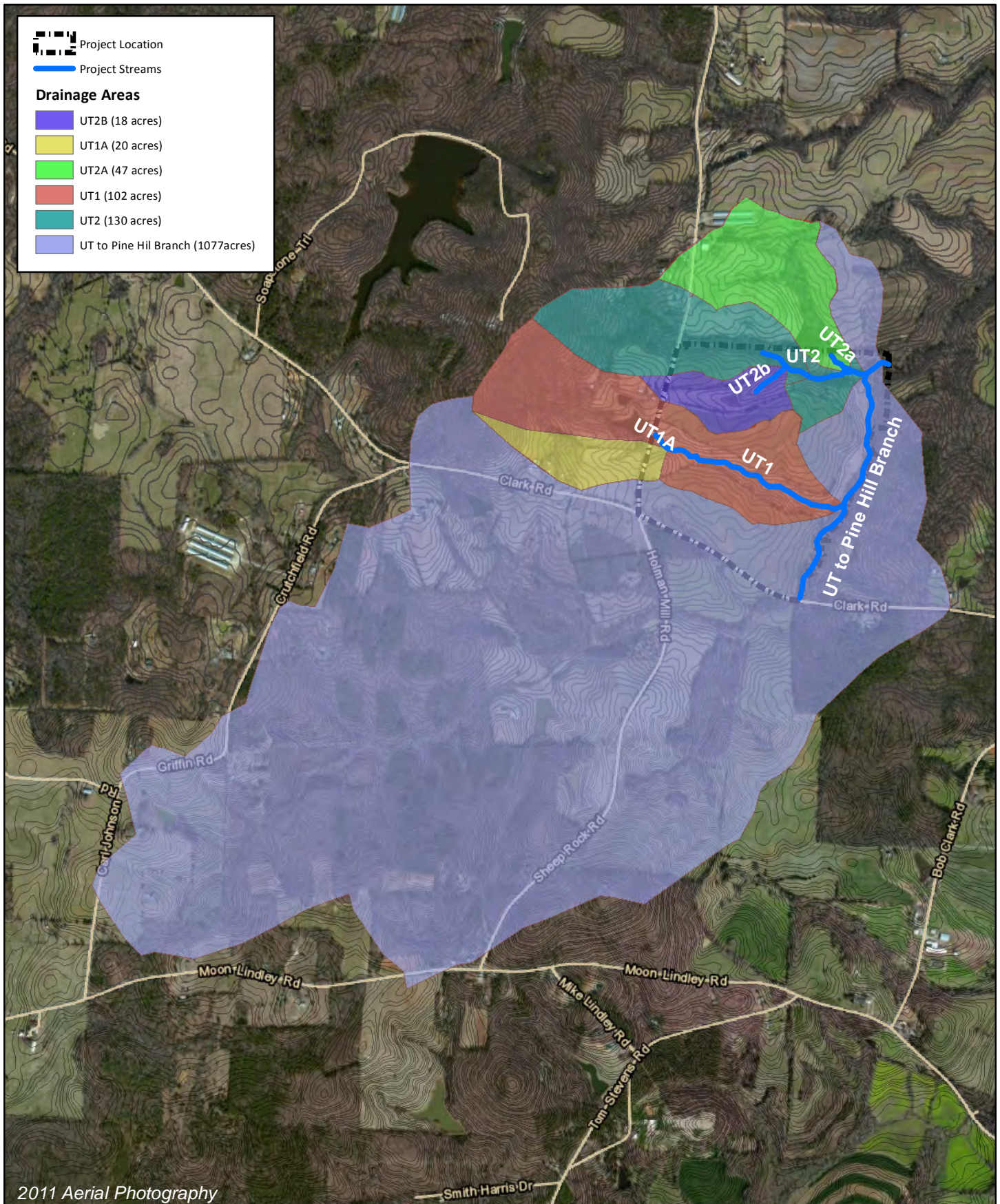


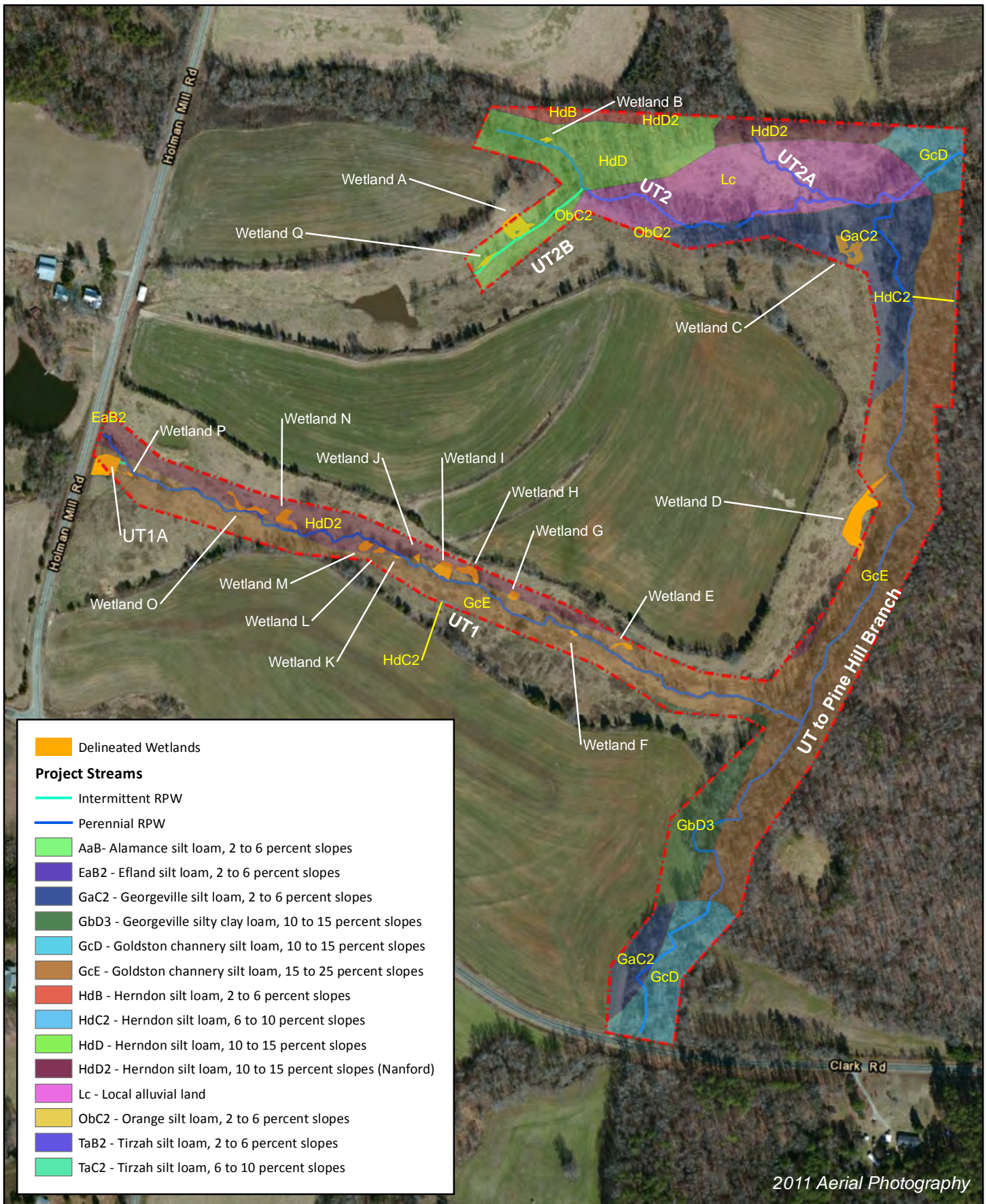
Figure 2: Site Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002



0 1,500 Feet



Figure 3: Watershed Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002



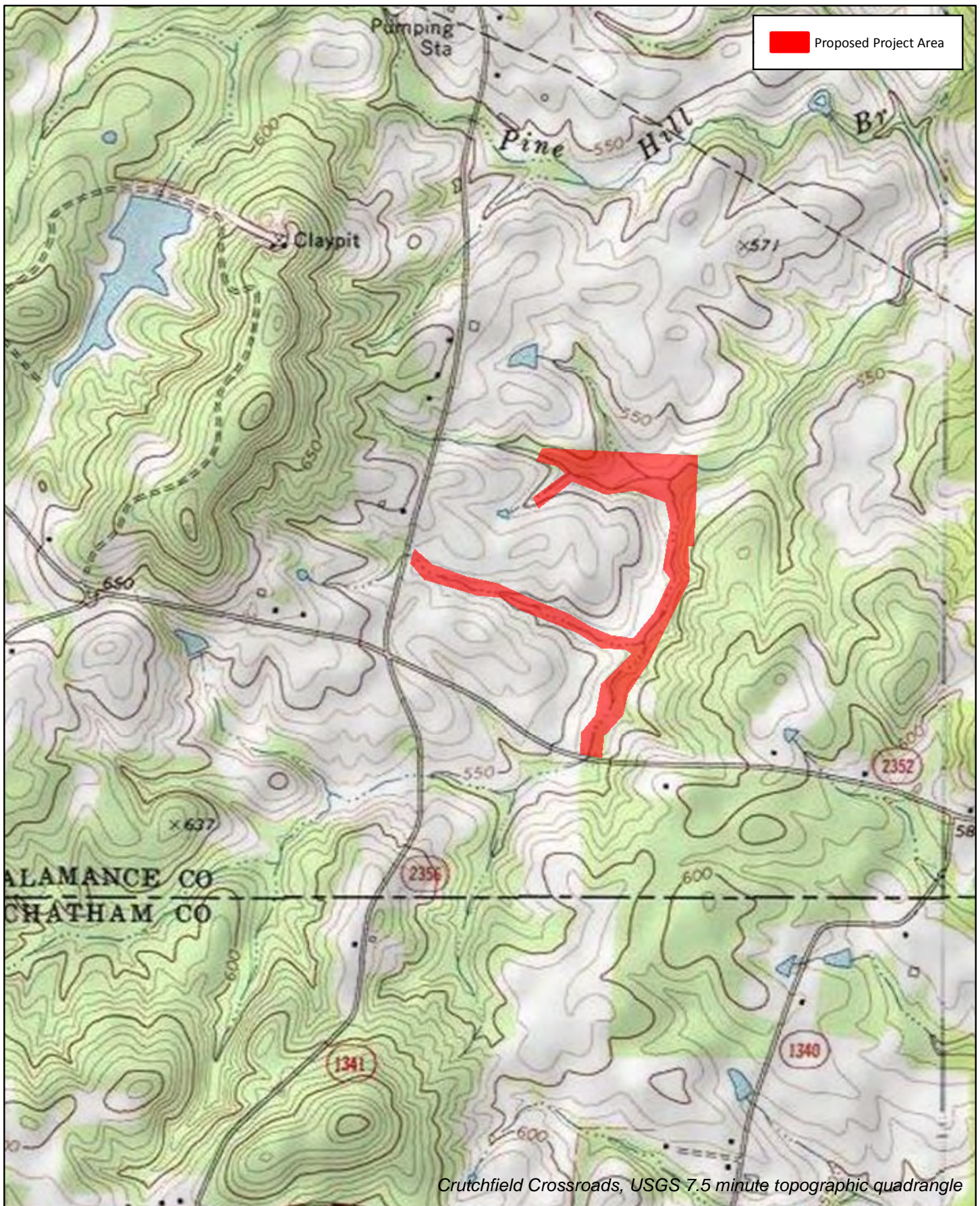
2011 Aerial Photography



0 400 Feet



Figure 4: Soils Map
Holman Mill Stream Mitigation Site
Cape Fear River Basin 03030002



0 1,200 Feet



Figure 5: USGS Topographic Map
Holman Mill Stream Mitigation Site
Cape Fear River Basin 03030002

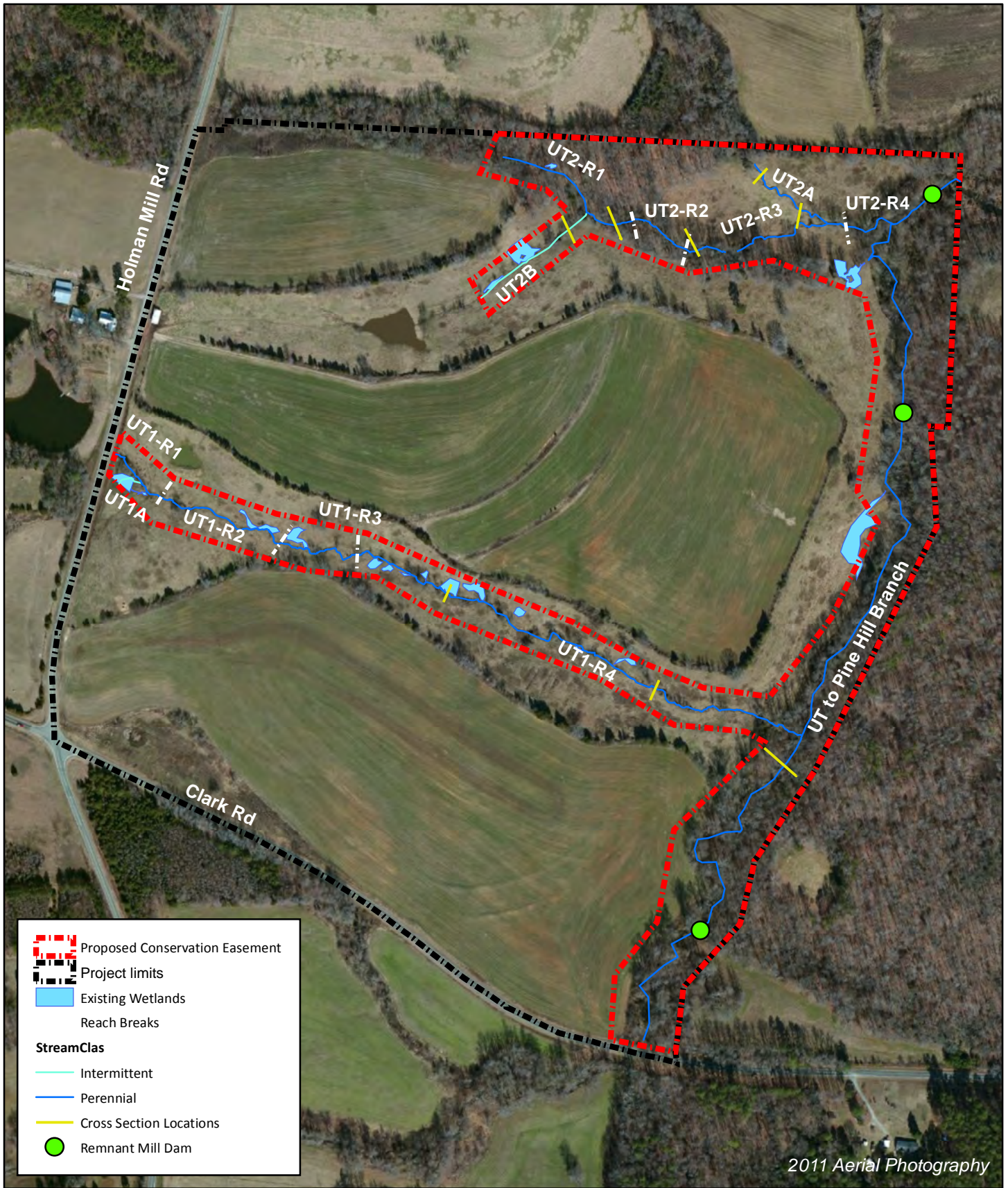


Figure 6: Hydrologic Features Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002

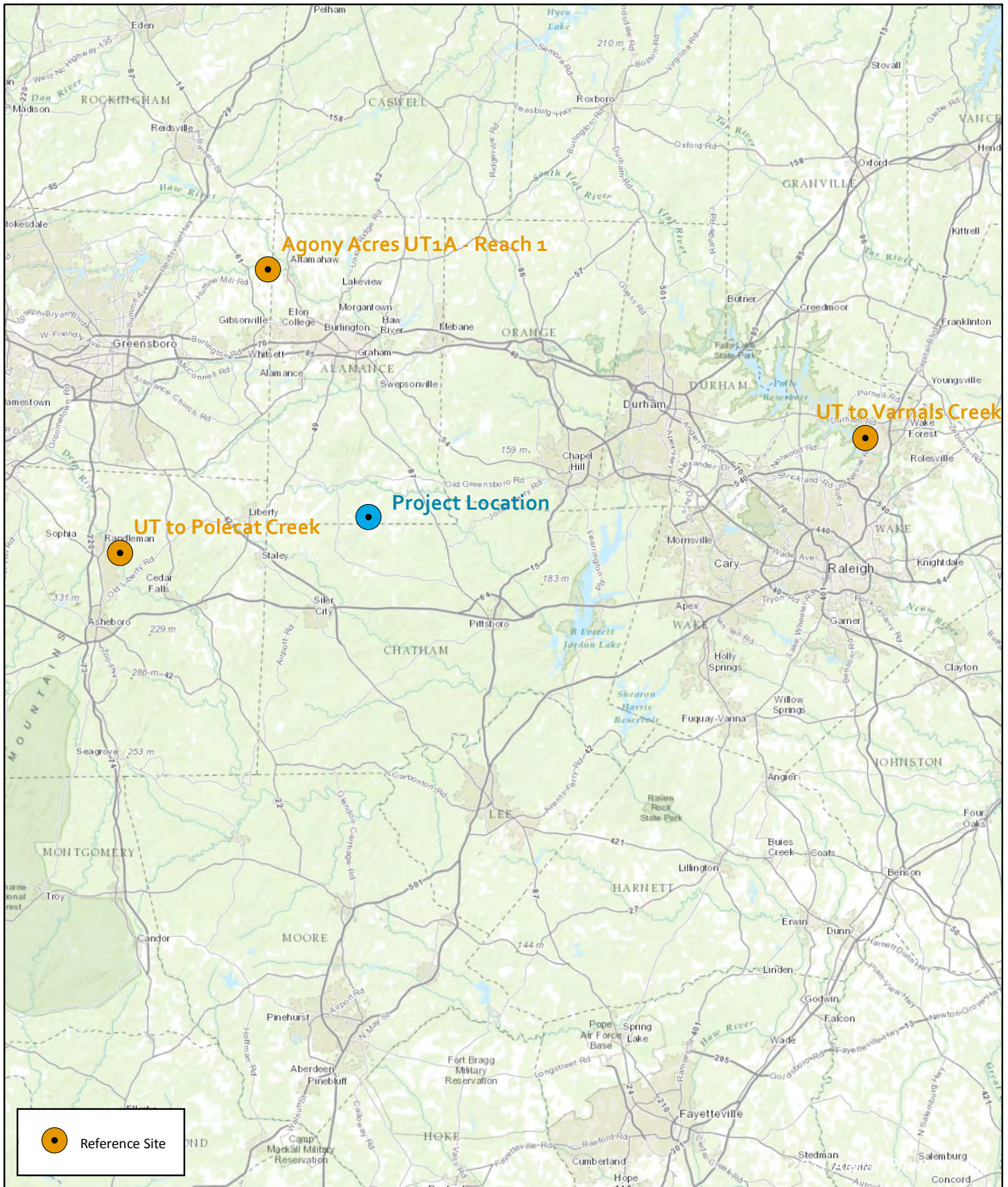


Figure 7: Reference Reach Vicinity Map
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 Cape Fear River Basin 03030002



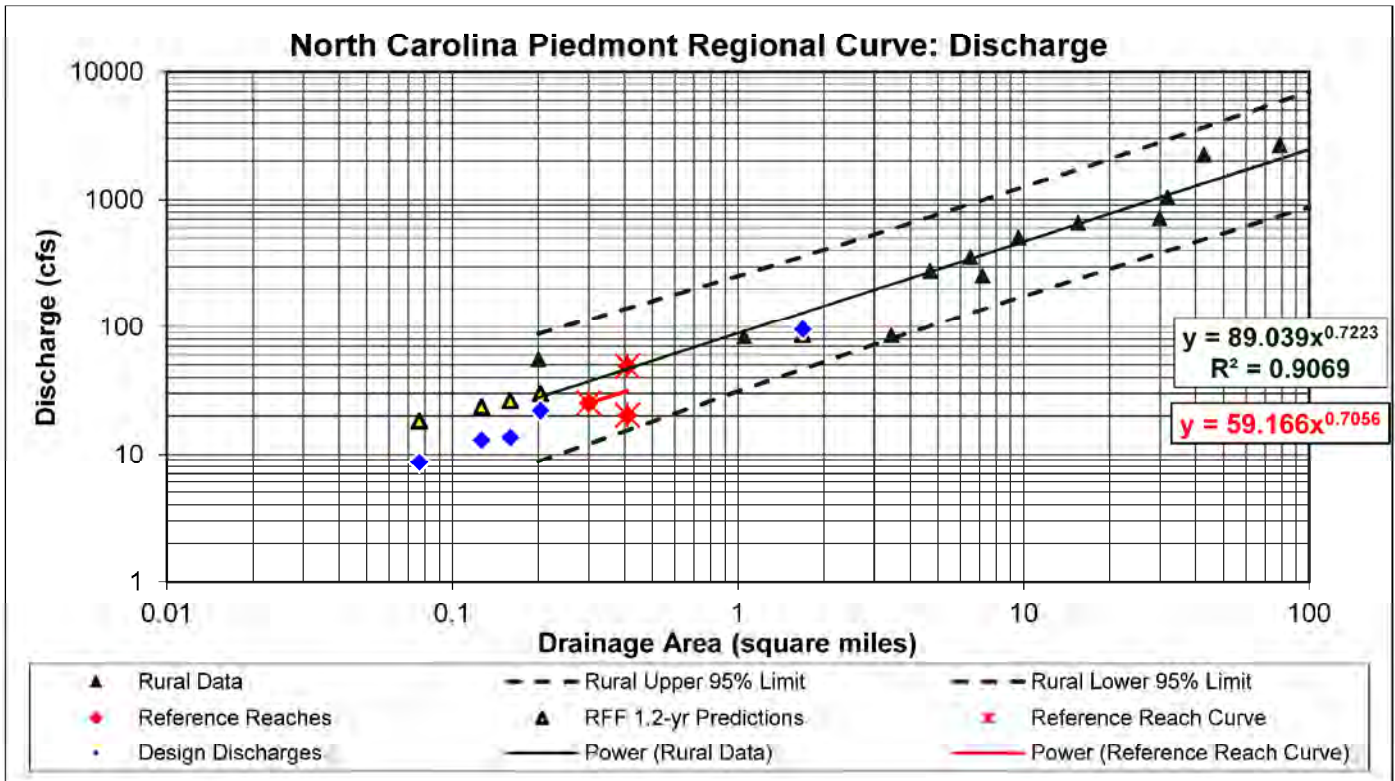
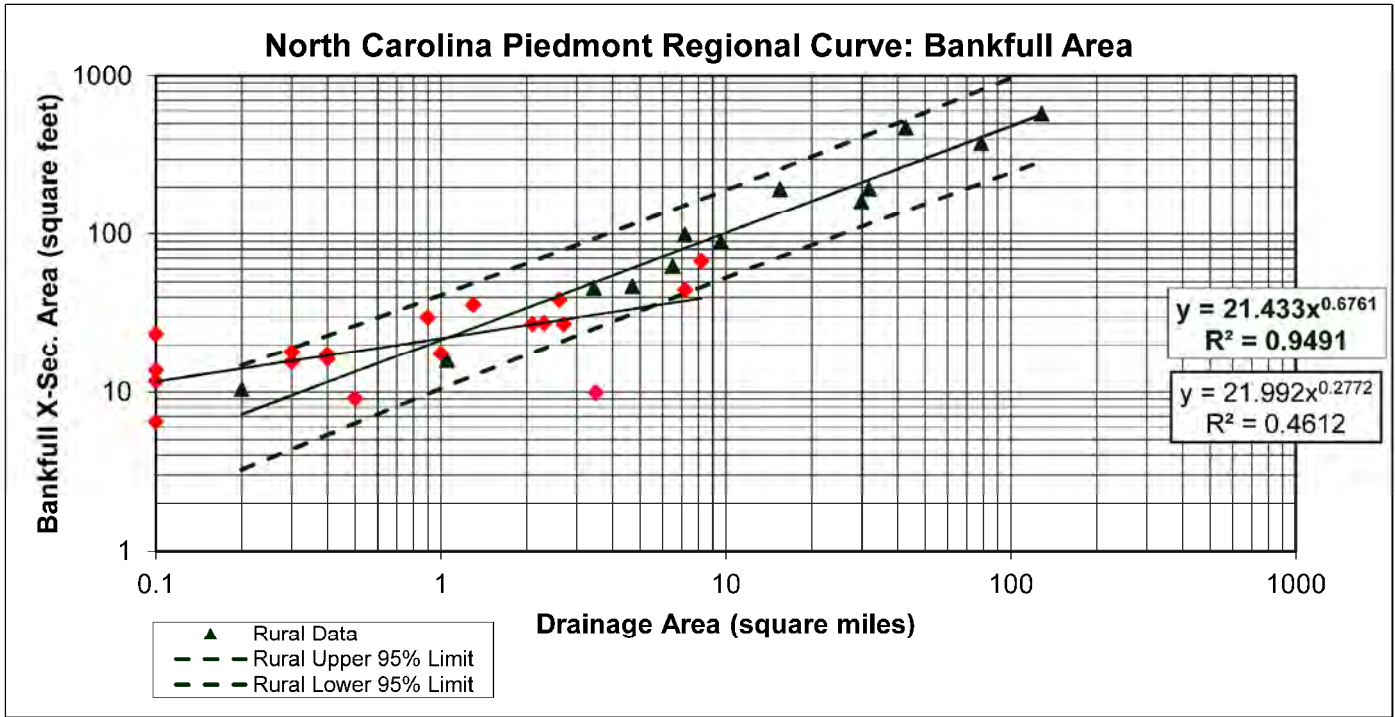
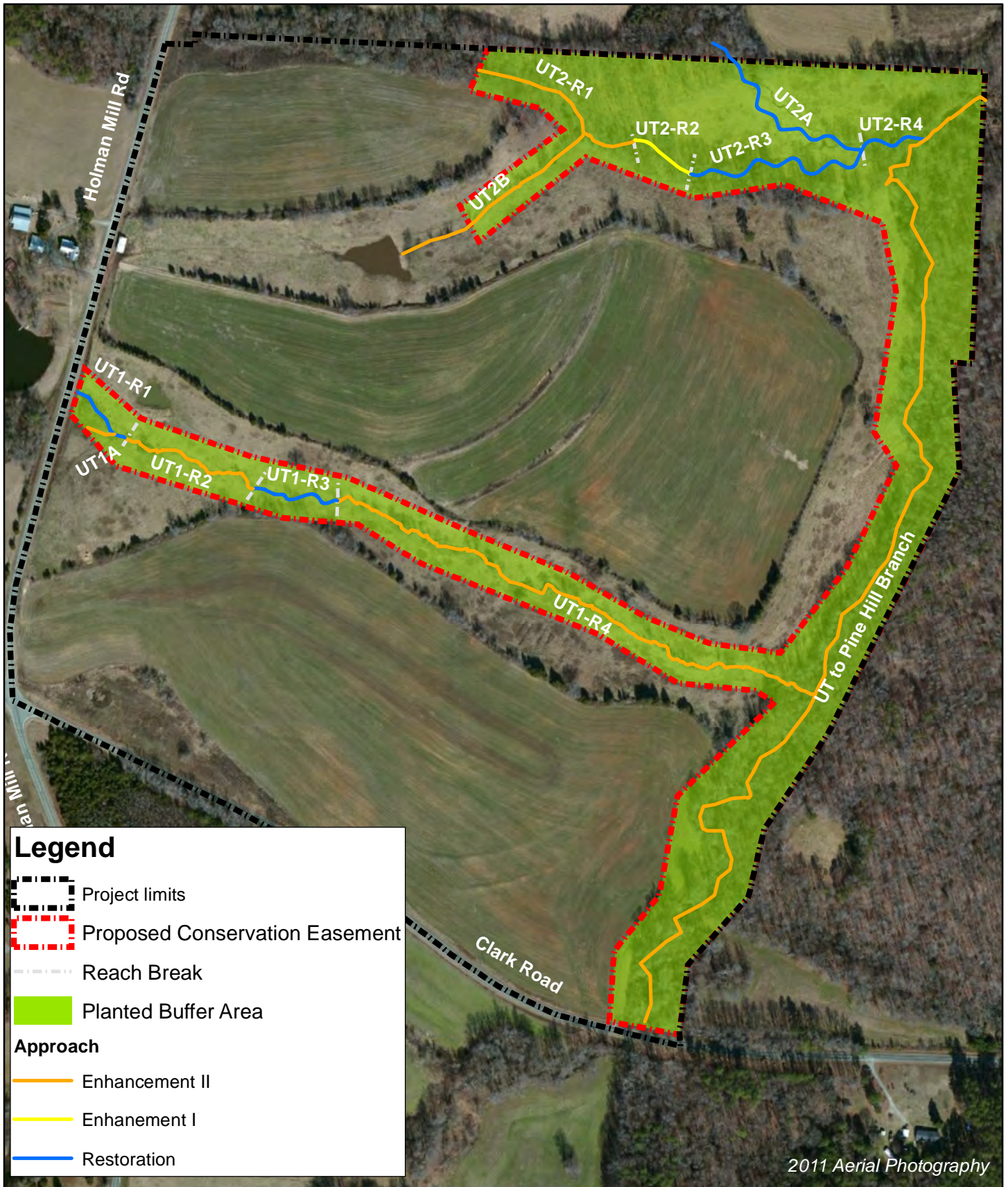


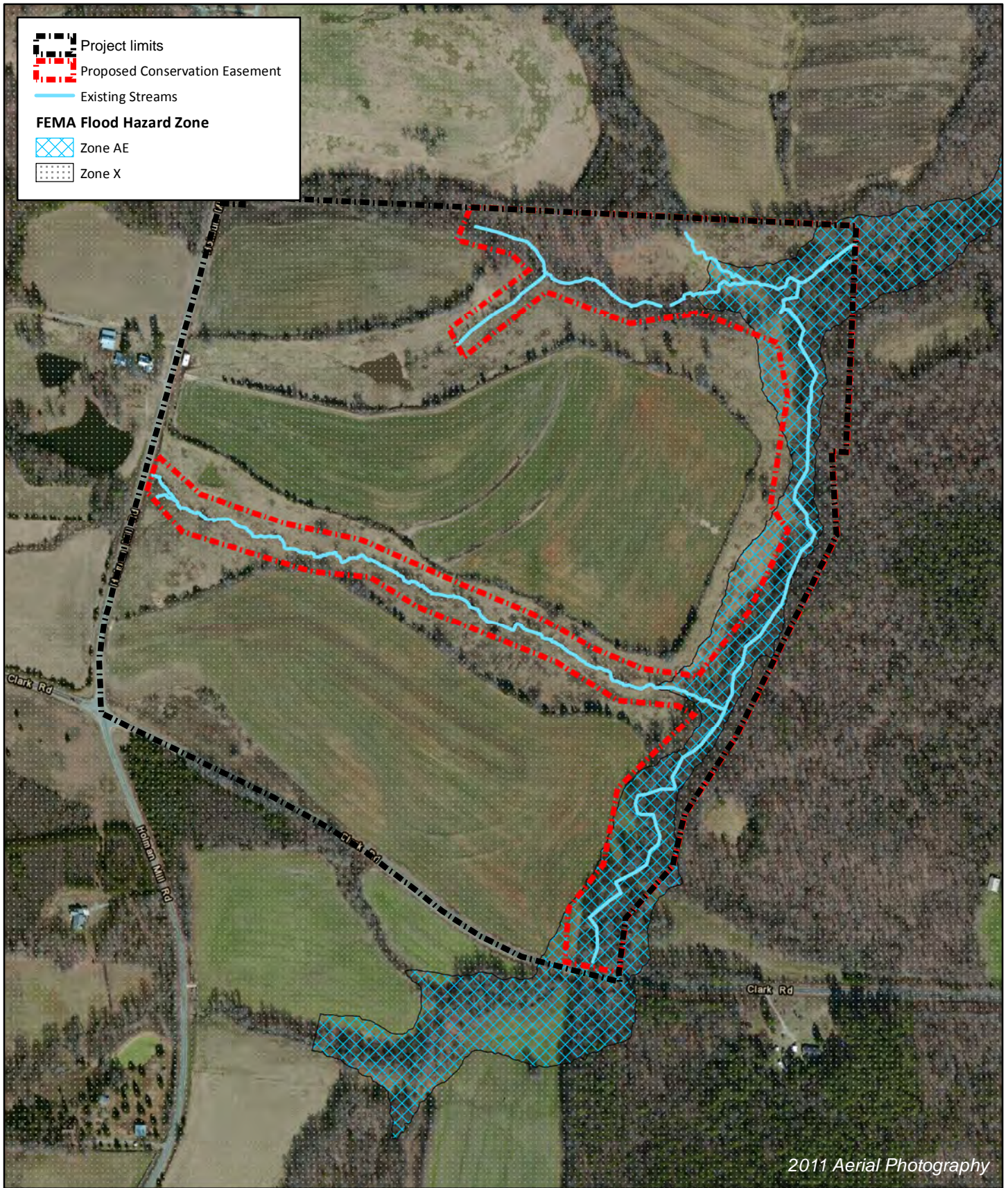
Figure 8: NC Piedmont Regional Curves with Project Data Overlay
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002



0 400 Feet



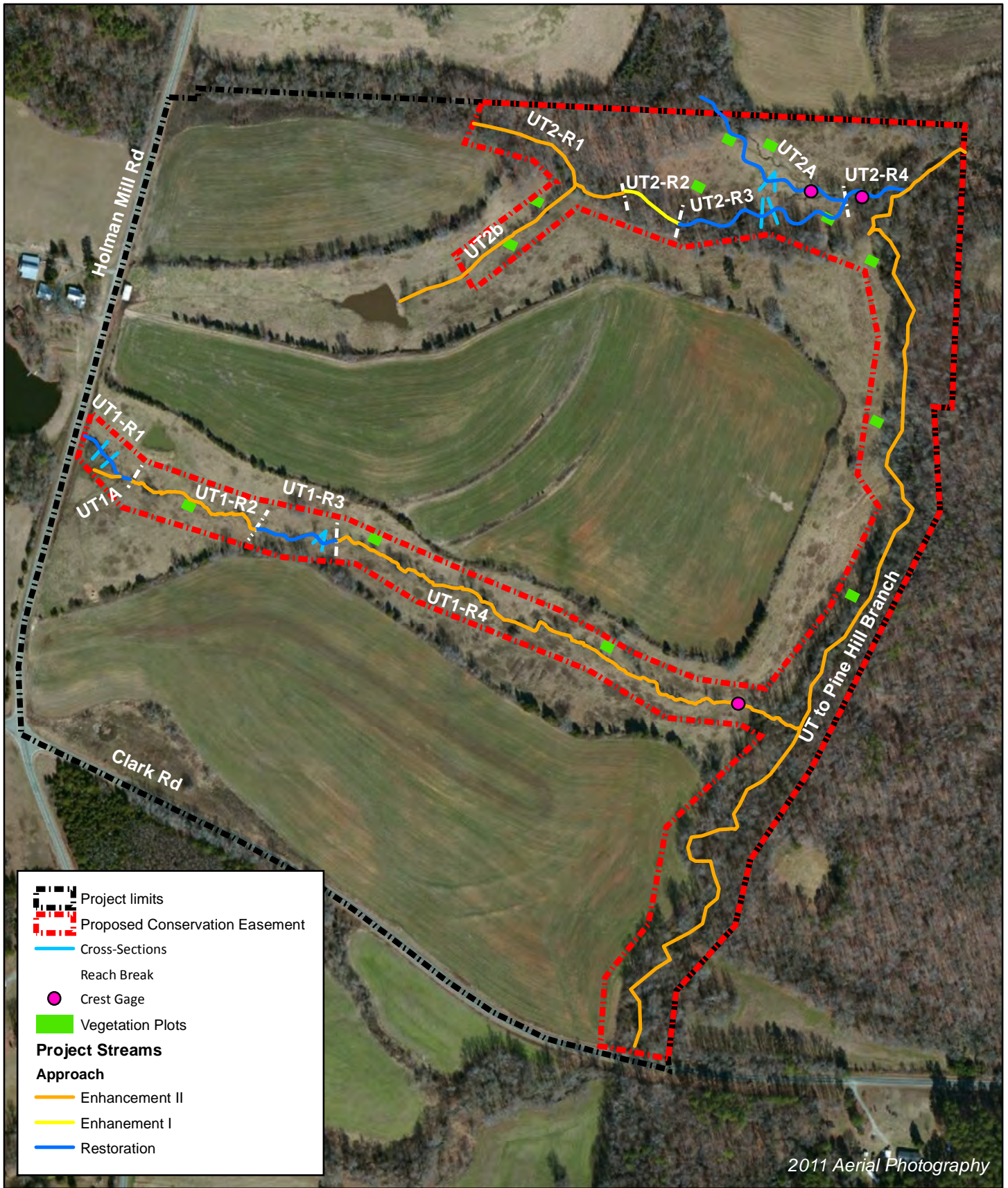
Figure 9: Concept Design Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002



0 500 Feet



Figure 10: FEMA Flood Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002



0 400 Feet



Figure 11: Proposed Monitoring Components Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002

Appendix 1

Site Protection Instrument Template

SITE PROTECTION INSTRUMENT

The land required for the construction, management, and stewardship of this mitigation project includes portions of the following parcels. A copy of the land protection instrument(s) is included in the appendices.

	Landowner	PIN	County	Site Protection Instrument	Deed Book and Page Number	Acreage protected
Parcel A						
Parcel B						
Parcel C						
Parcel D, etc.						

When available, the recorded document(s) will be provided. If the recorded document(s) are not available, the template documents will be provided.

All site protection instruments require 60-day advance notification to the Corps and the State prior to any action to void, amend, or modify the document. No such action shall take place unless approved by the State.

Site Protection Instrument Figure

NOTE: figure must be in either 8.5"x11" –or- 11"x17" format

NOTE: Consultant provides plan view of site with parcel boundaries and site protection instrument boundaries; date of photograph required

Scale

Site Name

North Arrow

Appendix 2

Historic Aerial Photographs



INQUIRY #: 3754328.1

YEAR: 1973

| = 500'





INQUIRY #: 3754328.1

YEAR: 1983

| = 500'





INQUIRY #: 3754328.1

YEAR: 1993

| = 500'





INQUIRY #: 3754328.1

YEAR: 1998

| = 750'





INQUIRY #: 3754328.1

YEAR: 2005

| = 500'





INQUIRY #: 3754328.1

YEAR: 2006

| = 500'



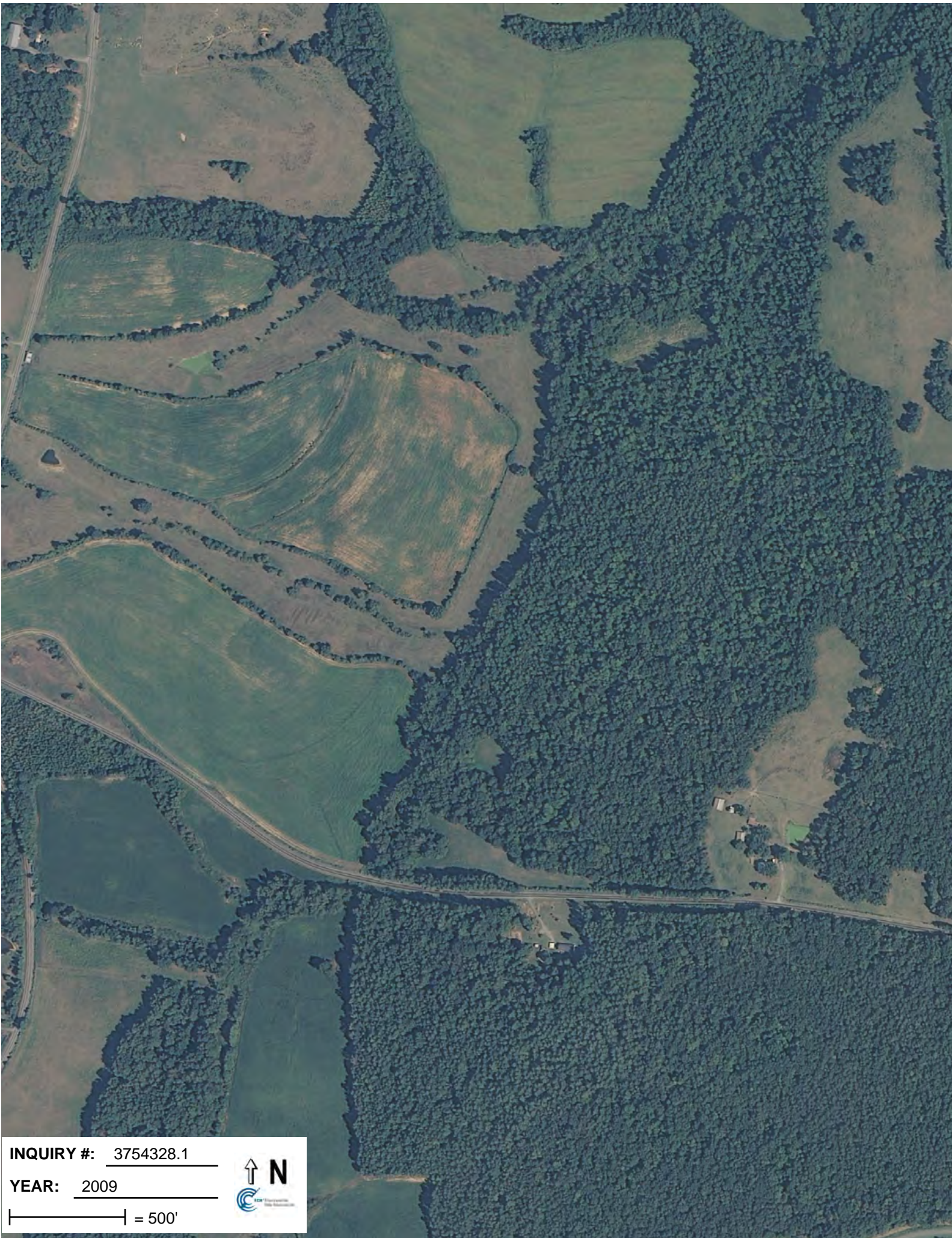


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YEAR: 2008

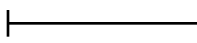
| = 500'





INQUIRY #: 3754328.1

YEAR: 2009

 = 500'





INQUIRY #: 3754328.1

YEAR: 2010

| = 500'





INQUIRY #: 3754328.1

YEAR: 2012

| = 500'



Appendix 3

Project Site USACE Routine Wetland Determination Data Forms

&

Jurisdictional Determination

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP1 - Wetland A
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.854307N Long: -79.387224W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point located on a saturated hillside adjacent to UT2B that receives hydrology from a groundwater seep. The point is located in an actively grazed pasture where tree and sapling strata have been removed.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP1 - Wetland A

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
<u>10</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: <u>5'</u>)					
1. <u>Festuca sp.</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Carex lurida</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>		
3. <u>Panicum virgatum</u>	<u>18</u>	<u>No</u>	<u>FAC</u>		
4. <u>Juncus effusus</u>	<u>10</u>	<u>No</u>	<u>FACW</u>		
5. <u>Carex vulpinoidea</u>	<u>10</u>	<u>No</u>	<u>OBL</u>		
6. <u>Ranunculus hispidus</u>	<u>2</u>	<u>No</u>	<u>FAC</u>		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
<u>100</u> = Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>30'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	

Remarks: (Include photo numbers here or on a separate sheet.)

Located in an active pasture where tree and sapling strata are removed.

SOIL

Sampling Point: DP1 - Wetland A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	2.5Y 5/2	85	5YR 4/6	15	C	PL	loam	
4-9	2.5Y 6/2	90	7.5YR 4/6	10	C	PL	loam	
9-12	2.5Y 5/1	95	7.5YR 5/6	5	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP2 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillside Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.854392 N Long: -79.387067 W Datum: _____
 Soil Map Unit Name: Herndon silt loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an actively grazed pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP2 - Upland

<u>Tree Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>20</u> x 3 = <u>60</u> FACU species <u>52</u> x 4 = <u>208</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>72</u> (A) <u>268</u> (B) Prevalence Index = B/A = <u>3.72</u>
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Ulmus alata</u>	<u>2</u>	<u>No</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Trifolium repens</u>	<u>50</u>	<u>Yes</u>	<u>FACU</u>	
2. <u>Festuca sp.</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Rubus sp.</u>	<u>15</u>	<u>No</u>	<u>Unknown</u>	
4. <u>Solanum sp.</u>	<u>10</u>	<u>No</u>	<u>Unknown</u>	
5. <u>Eupatorium capillifolium</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.				Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP3 - Wetland B
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.855015 N Long: -79.386602 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point located on a trampled area along UT2.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) _____ High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) _____ _____ Water-Stained Leaves (B9) _____ <input checked="" type="checkbox"/> Aquatic Fauna (B13) _____	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP3 - Wetland B

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <u>Fraxinus pennsylvanica</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)	
2. <u>Liquidambar styraciflua</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
<u>60</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: <u>5'</u>)					
1. <u>Microstegium vimineum</u>	<u>50</u>	<u>Yes</u>	<u>FAC</u>		
2. <u>Polygonum pensylvanicum</u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>		
3. <u>Dichanthelium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
<u>80</u> = Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>30'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Include photo numbers here or on a separate sheet.)					
<p>Located within a wooded area that is actively grazed.</p>					

SOIL

Sampling Point: DP3 - Wetland B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y 3/2	100					silt loam	
2-12	2.5Y 5/2	95	10YR 4/6	5	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP4 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.854910 N Long: -79.386501 W Datum: _____
 Soil Map Unit Name: Herndon silt loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in wooded area that's actively grazed.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP4 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <u>Fraxinus pennsylvanica</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)	
2. <u>Carya ovata</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>		
3. <u>Liquidambar styraciflua</u>	<u>10</u>	<u>No</u>	<u>FAC</u>		
4. <u>Celtis occidentalis</u>	<u>10</u>	<u>No</u>	<u>FACU</u>		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
	<u>75</u>	= Total Cover		Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
	_____	= Total Cover			
Herb Stratum (Plot size: <u>5'</u>)					
1. <u>Polygonum pensylvanicum</u>	<u>40</u>	<u>Yes</u>	<u>FACW</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
2. <u>Microstegium vimineum</u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>		
3. <u>Verbesina alternifolia</u>	<u>10</u>	<u>No</u>	<u>FAC</u>		
4. <u>Dichantherium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
	<u>90</u>	= Total Cover			
Woody Vine Stratum (Plot size: <u>30'</u>)					
1. _____	_____	_____	_____	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
	_____	= Total Cover			
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>					
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in wooded area that's actively grazed.					

SOIL

Sampling Point: DP4 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	2.5Y 3/3	100					loam	
3-12	2.5Y 4/3	100					loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP5 - Wetland C
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.854104 N Long: -79.383289 W Datum: _____
 Soil Map Unit Name: Georgeville silt loam (GaC2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point located near the toe of slope and has ditched to improve drainage.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) _____ High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP5 - Wetland C
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status				
Tree Stratum (Plot size: 30')							
1. <u>Betula nigra</u>	40	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)			
2. <u>Liquidambar styraciflua</u>	15	Yes	FAC				
3. <u>Fraxinus pennsylvanica</u>	10	No	FACW				
4. _____							
5. _____							
6. _____							
7. _____							
8. _____							
	65	= Total Cover					
Sapling/Shrub Stratum (Plot size: 15')							
1. _____				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____			
2. _____							
3. _____							
4. _____							
5. _____							
6. _____							
7. _____							
8. _____							
9. _____							
10. _____							
		= Total Cover					
Herb Stratum (Plot size: 5')							
1. <u>Festuca sp.</u>	50	Yes	FAC	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)			
2. <u>Polygonum pensylvanicum</u>	20	Yes	FACW				
3. <u>Carex lurida</u>	15	No	OBL				
4. <u>Dichanthelium clandestinum</u>	5	No	FAC				
5. <u>Panicum virgatum</u>	5	No	FAC				
6. _____							
7. _____							
8. _____							
9. _____							
10. _____							
11. _____							
12. _____							
	95	= Total Cover					
Woody Vine Stratum (Plot size: 30')							
1. _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.			
2. _____							
3. _____							
4. _____							
5. _____							
6. _____							
		= Total Cover					
<table style="width:100%; border: none;"> <tr> <td style="width:60%;">Hydrophytic Vegetation Present?</td> <td style="width:20%; text-align: center;">Yes <input checked="" type="checkbox"/></td> <td style="width:20%; text-align: center;">No <input type="checkbox"/></td> </tr> </table>					Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>					
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in wooded area that's actively grazed.							

SOIL

Sampling Point: DP5 - Wetland C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 4/6	100					silt loam	
3-6	2.5Y 4/1	85	5YR 4/6	15	C	PL	silt loam	
6-12	5Y 5/1	90	5YR 4/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP6 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.853942 N Long: -79.383780 W Datum: _____
 Soil Map Unit Name: Georgeville silt loam (GaC2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP6 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <u>Fraxinus pennsylvanica</u>	20	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. <u>Liquidambar styraciflua</u>	20	Yes	FAC		
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
<u>40</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: <u>5'</u>)					
1. <u>Festuca sp.</u>	40	Yes	FAC		
2. <u>Microstegium vimineum</u>	30	Yes	FAC		
3. <u>Rubus sp.</u>	15	No	Unknown		
4. <u>Solidago arguta</u>	10	No	UPL		
5. <u>Toxicodendron radicans</u>	5	No	FAC		
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
12. _____					
<u>100</u> = Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>30'</u>)					
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: (Include photo numbers here or on a separate sheet.)					

SOIL

Sampling Point: DP6 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 3/4	100					loam	
3-12	2.5Y 5/3	80	5YR 4/4	20	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
---	---

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP7 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.853343 N Long: -79.383655 W Datum: _____
 Soil Map Unit Name: Georgeville silt loam (GaC2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP7 - Upland

<u>Tree Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Liquidambar styraciflua</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Betula nigra</u>	<u>5</u>	<u>Yes</u>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Juncus effusus</u>	<u>50</u>	<u>Yes</u>	<u>FACW</u>	
2. <u>Festuca sp.</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Carex vulpinoidea</u>	<u>10</u>	<u>No</u>	<u>OBL</u>	
4. <u>Rubus sp.</u>	<u>5</u>	<u>No</u>	<u>UPL</u>	
5. <u>Toxicodendron radicans</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Polygonum pensylvanicum</u>	<u>5</u>	<u>No</u>	<u>FACW</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

SOIL

Sampling Point: DP7 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	2.5Y 4/3	100					loam	
4-12	2.5Y 5/4	85	7.5YR 5/6	15	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP8 - Wetland D
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): concave Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851948 N Long: -79.383603 W Datum: _____
 Soil Map Unit Name: Tirzah silt loam (TaB2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture. The feature has been ditched to improve drainage.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP8 - Wetland D
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Festuca sp.</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Carex lurida</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	
3. <u>Juncus effusus</u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>	
4. <u>Polygonum pensylvanicum</u>	<u>10</u>	<u>No</u>	<u>FAC</u>	
5. <u>Carex vulpinoidea</u>	<u>8</u>	<u>No</u>	<u>OBL</u>	
6. <u>Dichanthelium clandestinum</u>	<u>7</u>	<u>No</u>	<u>FAC</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture. Tree and sapling strata have been removed.				

SOIL

Sampling Point: DP8 - Wetland D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 4/4	100					silt loam	
3-5	2.5Y 5/1	95	7.5YR 4/6	5	C	PL	loam	
5-12	2.5Y 5/1	80	7.5YR 4/6	20	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP9 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851830 N Long: -79.383859 W Datum: _____
 Soil Map Unit Name: Tirzah silt loam (TaC2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP9 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Festuca sp.</u>	<u>70</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>10</u>	<u>No</u>	<u>FACU</u>	
3. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
4. <u>Solidago arguta</u>	<u>5</u>	<u>No</u>	<u>UPL</u>	
5. <u>Dichanthelium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Solanum sp.</u>	<u>5</u>	<u>No</u>	<u>Unknown</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: DP9 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 3/4	100					loam	
3-12	2.5Y 5/4	92	7.5YR 4/6	8	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
---	---

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP10 - Wetland E
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): concave Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.850814 N Long: -79.386069 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

DP10 - Wetland E
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
1. <u>Salix nigra</u>	<u>20</u>	<u>Yes</u>	<u>OBL</u>	
2. <u>Fraxinus pennsylvanica</u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Celtis occidentalis</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>40</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Polygonum pensylvanicum</u>	<u>40</u>	<u>Yes</u>	<u>FACW</u>	
2. <u>Festuca sp.</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Carex lurida</u>	<u>15</u>	<u>No</u>	<u>OBL</u>	
4. <u>Juncus effusus</u>	<u>10</u>	<u>No</u>	<u>FACW</u>	
5. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
6. <u>Dichanthelium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
<u>100</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				

SOIL

Sampling Point: DP10 - Wetland E

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y 3/3	100					loam	
2-5	5Y 5/1	90	5YR 4/6	10	C	PL	loam	
5-12	5Y 5/2	90	5YR 4/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/10/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP11 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.850732 N Long: -79.386057 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GaC2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u>	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP11 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
1. <u>Salix nigra</u>	<u>20</u>	<u>Yes</u>	<u>OBL</u>		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
_____	_____	_____	_____		
<u>20</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ✓ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: <u>5'</u>)					
1. <u>Festuca sp.</u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>		
2. <u>Microstegium vimineum</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>		
3. <u>Solanum sp.</u>	<u>15</u>	<u>No</u>	<u>Unknown</u>		
4. <u>Trifolium repens</u>	<u>15</u>	<u>No</u>	<u>FACU</u>		
5. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>		
6. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
_____ = Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>30'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
_____ = Total Cover					Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
_____ = Total Cover					
Remarks: (Include photo numbers here or on a separate sheet.)					

SOIL

Sampling Point: DP11 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 4/4	100					loam	
2-9	2.5Y 5/4	90	7.5YR 4/6	10	C	PL	loam	
9-12	2.5Y 6/3	85	7.5YR 4/6	15	C	PL	sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP12 - Wetland F
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.850915 N Long: -79.386659 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

DP12 - Wetland F
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: 30')					
1. <u>Salix nigra</u>	15	Yes	OBL	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. <u>Ulmus americana</u>	10	Yes	FACW		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
25 = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: 15')					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: 5')					
1. <u>Festuca sp.</u>	50	Yes	FACW		
2. <u>Polygonum pensylvanicum</u>	20	Yes	FAC		
3. <u>Carex lurida</u>	15	No	OBL		
4. <u>Microstegium vimineum</u>	10	No	FAC		
5. <u>Trifolium repens</u>	5	No	FACU		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
100 = Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: 30')					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.					

SOIL

Sampling Point: DP12 - Wetland F

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 3/2	100					loam	
3-9	2.5Y 5/1	92	7.5YR 4/6	8	C	PL	loam	
9-12	2.5Y 5/3	85	7.5YR 4/6	15	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Stripped Matrix (S6)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP13 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.850882 N Long: -79.386712 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP13 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. <u>Salix nigra</u>	<u>15</u>	<u>Yes</u>	<u>OBL</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>4</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet:
				Total % Cover of: _____ Multiply by: _____
1. _____	_____	_____	_____	OBL species <u>15</u> x 1 = <u>15</u>
2. _____	_____	_____	_____	FACW species <u>5</u> x 2 = <u>10</u>
3. _____	_____	_____	_____	FAC species <u>40</u> x 3 = <u>120</u>
4. _____	_____	_____	_____	FACU species <u>45</u> x 4 = <u>180</u>
5. _____	_____	_____	_____	UPL species <u>5</u> x 5 = <u>25</u>
6. _____	_____	_____	_____	Column Totals: <u>110</u> (A) <u>350</u> (B)
7. _____	_____	_____	_____	Prevalence Index = B/A = <u>3.18</u>
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
				Hydrophytic Vegetation Indicators:
				<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
				<input type="checkbox"/> 2 - Dominance Test is >50%
				<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
				<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>5'</u>)				Definitions of Four Vegetation Strata:
				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
				Woody vine – All woody vines greater than 3.28 ft in height.
1. <u>Festuca sp.</u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Symphoricarpos orbiculatus</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
4. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
5. <u>Microstegium vimineum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Solidago arguta</u>	<u>5</u>	<u>No</u>	<u>UPL</u>	
7. <u>Dichantherium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
8. <u>Rosa multiflora</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
				Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: DP13 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5YR 4/4	100					loam	
3-12	2.5Y 5/3	90	7.5YR 4/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP14 - Wetland G
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851250 N Long: -79.387178 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) & Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP14 - Wetland G
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Festuca sp.</u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Cyperus strigosus</u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Carex lurida</u>	<u>20</u>	<u>Yes</u>	<u>OBL</u>	
4. <u>Juncus effusus</u>	<u>10</u>	<u>No</u>	<u>FACW</u>	
5. <u>Dichanthelium clandestinum</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Polygonum pensylvanicum</u>	<u>5</u>	<u>No</u>	<u>FACW</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

SOIL

Sampling Point: DP14 - Wetland G

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 3/3	100					loam	
2-8	2.5Y 5/2	85	7.5YR 4/6	15	C	PL	loam	
8-12	2.5Y 5/4	80	7.5YR 4/6	20	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP15 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851123 N Long: -79.387153 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP15 - Upland

<u>Tree Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>80</u> x 3 = <u>240</u> FACU species <u>25</u> x 4 = <u>100</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>105</u> (A) <u>340</u> (B) Prevalence Index = B/A = <u>3.24</u>
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Ulmus alata</u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Festuca sp.</u>	<u>50</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Solanum sp.</u>	<u>10</u>	<u>No</u>	<u>Unknown</u>	
4. <u>Ranunculus hispidus</u>	<u>10</u>	<u>No</u>	<u>FAC</u>	
5. <u>Toxicodendron radicans</u>	<u>10</u>	<u>No</u>	<u>FAC</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. <u>Smilax rotundifolia</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>

SOIL

Sampling Point: DP15 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y 4/3	100					loam	
2-12	2.5Y 6/4	100					loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP16 - Wetland H
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851396 N Long: -79.387605 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>>12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP16 - Wetland H
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Eleocharis sp.</u>	30	Yes	FACW-OBL	
2. <u>Polygonum pensylvanicum</u>	25	Yes	FACW	
3. <u>Carex lurida</u>	15	No	OBL	
4. <u>Juncus effusus</u>	15	No	FACW	
5. <u>Festuca sp.</u>	10	No	FAC	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
95 = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				

SOIL

Sampling Point: DP16 - Wetland H

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	2.5Y 4/2	80	7.5YR 4/6	20	C	PL	loam	
4-12	5Y 4/1	90	7.5YR 4/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP17 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851461 N Long: -79.387802 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u>	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP17 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Festuca sp.</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>15</u>	<u>No</u>	<u>FACU</u>	
3. <u>Solanum sp.</u>	<u>10</u>	<u>No</u>	<u>Unknown</u>	
4. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
5. <u>Symphoricarpos orbiculatus</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
6. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

SOIL

Sampling Point: DP17 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 3/4	100					loam	
4-12	2.5Y 6/4	85	7.5YR 5/8	15	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP18 - Wetland I
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851488 N Long: -79.388094 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>>12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP18 - Wetland I

	Absolute % Cover	Dominant Species?	Indicator Status				
Tree Stratum (Plot size: <u>30'</u>)							
1. <u>Salix nigra</u>	10	Yes	OBL	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)			
2. <u>Ulmus americana</u>	10	Yes	FACW				
3. _____							
4. _____							
5. _____							
6. _____							
7. _____							
8. _____							
	20				= Total Cover		
Sapling/Shrub Stratum (Plot size: <u>15'</u>)							
1. _____				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____			
2. _____							
3. _____							
4. _____							
5. _____							
6. _____							
7. _____							
8. _____							
9. _____							
10. _____							
				= Total Cover			
Herb Stratum (Plot size: <u>5'</u>)							
1. <u>Carex lurida</u>	25	Yes	OBL	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)			
2. <u>Juncus effusus</u>	25	Yes	FACW				
3. <u>Festuca sp.</u>	25	Yes	FAC				
4. <u>Eleocharis sp.</u>	15	No	FACW-OBL				
5. <u>Trifolium repens</u>	10	No	FACU				
6. _____							
7. _____							
8. _____							
9. _____							
10. _____							
11. _____							
12. _____							
	100			= Total Cover			
Woody Vine Stratum (Plot size: <u>30'</u>)							
1. _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.			
2. _____							
3. _____							
4. _____							
5. _____							
6. _____							
				= Total Cover			
<table style="width:100%; border:none;"> <tr> <td style="width:60%;">Hydrophytic Vegetation Present?</td> <td style="width:20%; text-align:center;">Yes <input checked="" type="checkbox"/></td> <td style="width:20%; text-align:center;">No <input type="checkbox"/></td> </tr> </table>					Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>					
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.							

SOIL

Sampling Point: DP18 - Wetland I

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5	7.5YR 4/2	80	7.5YR 4/6	20	C	PL	silt loam	
5-12	2.5Y 6/1	85	7.5YR 5/8	15	C	PL	sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP19 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851576 N Long: -79.388189 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GaC2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
---	--

Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
--	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP19 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>3</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>5</u> x 2 = <u>10</u> FAC species <u>60</u> x 3 = <u>180</u> FACU species <u>35</u> x 4 = <u>140</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>100</u> (A) <u>330</u> (B) Prevalence Index = B/A = <u>3.3</u>
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. <u>Symphoricarpos orbiculatus</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>15</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>Festuca sp.</u>	<u>45</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Solanum sp.</u>	<u>15</u>	<u>No</u>	<u>Unknown</u>	
4. <u>Dichanthelium clandestinum</u>	<u>10</u>	<u>No</u>	<u>FAC</u>	
5. <u>Toxicodendron radicans</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
<u>100</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>

SOIL

Sampling Point: DP19 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-1	10YR 3/3	100					loam	
1-4	2.5Y 5/2	85	7.5YR 5/8	15	C	PL	loam	
4-12	2.5Y 6/3	90	7.5YR 5/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:
 Very thin layer near the surface has low chroma soils and enough redox features to satisfy F3, depleted matrix criteria.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP20 - Wetland J
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851560 N Long: -79.388289 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) & Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>>12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP20 - Wetland J
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Juncus effusus</u>	35	Yes	FACW	
2. <u>Polygonum pensylvanicum</u>	25	Yes	FACW	
3. <u>Carex lurida</u>	20	Yes	OBL	
4. <u>Festuca sp.</u>	10	No	FAC	
5. <u>Ranunculus hispidus</u>	5	No	FAC	
6. <u>Carex vulpinoidea</u>	3	No	OBL	
7. <u>Dichanthelium clandestinum</u>	2	No	FAC	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
100 = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

SOIL

Sampling Point: DP20 - Wetland J

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-1	10YR 4/3	80	10YR 4/8	20	C	PL	silt loam	
1-5	10YR 4/2	85	5YR 4/6	15	C	PL	silt loam	
5-12	2.5Y 6/2	85	10YR 5/8	15	C	PL	sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP21 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851593 N Long: -79.388368 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP21 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:	
1. <u>Ulmus alata</u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)	
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>4</u> (B)	
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>25</u> (A/B)	
4. _____	_____	_____	_____	Prevalence Index worksheet:	
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
<u>30</u> = Total Cover					Total % Cover of: _____ Multiply by: _____
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					OBL species <u>0</u> x 1 = <u>0</u>
1. <u>Juniperus virginiana</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>		FACW species <u>5</u> x 2 = <u>10</u>
2. _____	_____	_____	_____	FAC species <u>60</u> x 3 = <u>180</u>	
3. _____	_____	_____	_____	FACU species <u>75</u> x 4 = <u>300</u>	
4. _____	_____	_____	_____	UPL species <u>5</u> x 5 = <u>0</u>	
5. _____	_____	_____	_____	Column Totals: <u>145</u> (A) <u>490</u> (B)	
6. _____	_____	_____	_____	Prevalence Index = B/A = <u>3.38</u>	
7. _____	_____	_____	_____	Hydrophytic Vegetation Indicators:	
8. _____	_____	_____	_____		<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
9. _____	_____	_____	_____		<input type="checkbox"/> 2 - Dominance Test is >50%
10. _____	_____	_____	_____		<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
<u>15</u> = Total Cover				<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
Herb Stratum (Plot size: <u>5'</u>)				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
1. <u>Festuca sp.</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
2. <u>Trifolium repens</u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>		
3. <u>Microstegium vimineum</u>	<u>10</u>	<u>No</u>	<u>FAC</u>	Definitions of Four Vegetation Strata:	
4. <u>Juncus effusus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>		
5. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>		
6. <u>Carex alopecoidea</u>	<u>5</u>	<u>No</u>	<u>FACW</u>		
7. <u>Solidago arguta</u>	<u>5</u>	<u>No</u>	<u>UPL</u>		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
<u>100</u> = Total Cover					Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Woody Vine Stratum (Plot size: <u>30'</u>)					Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
1. _____	_____	_____	_____	Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.	
2. _____	_____	_____	_____	Woody vine – All woody vines greater than 3.28 ft in height.	
3. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
_____ = Total Cover					
Remarks: (Include photo numbers here or on a separate sheet.)					

SOIL

Sampling Point: DP21 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y 3/3	100					loam	
2-6	2.5Y 5/3	80	5YR 4/6	20	C	PL	loam	
6-12	5Y 5/2	90	7.5YR 4/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP22 - Wetland K
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851531 N Long: -79.388360 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>>12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP22 - Wetland K
Sampling Point: _____

<u>Tree Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Ulmus alata</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Festuca sp.</u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Carex vulpinoidea</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	
3. <u>Polygonum pensylvanicum</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>	
4. <u>Juncus effusus</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

SOIL

Sampling Point: DP22 - Wetland K

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	7.5YR 4/2	100					loam	
4-12	2.5Y 5/1	92	7.5YR 3/4	8	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP23 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851612 N Long: -79.388400 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP23 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
1. <u>Salix nigra</u>	<u>50</u>	<u>Yes</u>	<u>OBL</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____	_____	_____	_____	
<u>50</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>15</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Festuca sp.</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Microstegium vimineum</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
4. <u>Solanum sp.</u>	<u>10</u>	<u>No</u>	<u>Unknown</u>	
5. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Toxicodendron radicans</u>	<u>5</u>	<u>No</u>	<u>FACW</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
<u>100</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: DP23 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5YR 3/3	100					loam	
3-12	2.5Y 6/3	80	7.5YR 4/6	20	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP24 - Wetland L
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851579 N Long: -79.388572 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP24 - Wetland L

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. <u>Salix nigra</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>3</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>25</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Festuca sp.</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Juncus effusus</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Microstegium vimineum</u>	<u>15</u>	<u>No</u>	<u>FACW</u>	
4. <u>Polygonum pensylvanicum</u>	<u>10</u>	<u>No</u>	<u>OBL</u>	
5. <u>Carex lurida</u>	<u>10</u>	<u>No</u>	<u>FACU</u>	
6. <u>Trifolium repens</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
<u>80</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
<p>Remarks: (Include photo numbers here or on a separate sheet.)</p> <p>Sampling point is located in an active pasture.</p>				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

SOIL

Sampling Point: DP24 - Wetland L

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5YR 3/4	100					loam	
3-12	2.5Y 5/1	90	5YR 4/6	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP25 - Wetland M
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851594 N Long: -79.388714 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

DP25 - Wetland M
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: 30')				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet:
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	OBL species _____ x 1 = _____
7. _____	_____	_____	_____	FACW species _____ x 2 = _____
8. _____	_____	_____	_____	FAC species _____ x 3 = _____
9. _____	_____	_____	_____	FACU species _____ x 4 = _____
10. _____	_____	_____	_____	UPL species _____ x 5 = _____
_____ = Total Cover				Column Totals: _____ (A) _____ (B)
Sapling/Shrub Stratum (Plot size: 15')				Prevalence Index = B/A = _____
1. _____	_____	_____	_____	Hydrophytic Vegetation Indicators:
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
4. _____	_____	_____	_____	<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
5. _____	_____	_____	_____	<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
7. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
8. _____	_____	_____	_____	Definitions of Four Vegetation Strata:
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
11. _____	_____	_____	_____	Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
12. _____	_____	_____	_____	Woody vine – All woody vines greater than 3.28 ft in height.
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Woody Vine Stratum (Plot size: 30')				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				

Remarks: (Include photo numbers here or on a separate sheet.)

Sampling point is located in an active pasture.

SOIL

Sampling Point: DP25 - Wetland M

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 3/3	100					loam	
3-12	2.5Y 5/1	85	7.5YR 4/6	15	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP26 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851641 N Long: -79.388793 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP26 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status															
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:														
1. <u>Liquidambar styraciflua</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)														
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>4</u> (B)														
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)														
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
	<u>25</u>	= Total Cover		Prevalence Index worksheet:														
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				<table style="width:100%; border:none;"> <tr> <td style="width:50%;"><u>Total % Cover of:</u></td> <td style="width:50%;"><u>Multiply by:</u></td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>83</u></td> <td>x 3 = <u>249</u></td> </tr> <tr> <td>FACU species <u>55</u></td> <td>x 4 = <u>220</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>138</u> (A)</td> <td><u>469</u> (B)</td> </tr> </table>	<u>Total % Cover of:</u>	<u>Multiply by:</u>	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>83</u>	x 3 = <u>249</u>	FACU species <u>55</u>	x 4 = <u>220</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>138</u> (A)	<u>469</u> (B)
<u>Total % Cover of:</u>	<u>Multiply by:</u>																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>83</u>	x 3 = <u>249</u>																	
FACU species <u>55</u>	x 4 = <u>220</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>138</u> (A)	<u>469</u> (B)																	
1. <u>Symphoricarpos orbiculatus</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>	Prevalence Index = B/A = <u>3.39</u>														
2. <u>Juniperus virginiana</u>	<u>5</u>	<u>No</u>	<u>FACU</u>															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
	<u>30</u>	= Total Cover		Hydrophytic Vegetation Indicators:														
Herb Stratum (Plot size: <u>5'</u>)				<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)														
1. <u>Festuca sp.</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.														
2. <u>Trifolium repens</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>															
3. <u>Solanum sp.</u>	<u>15</u>	<u>No</u>	<u>Unknown</u>															
4. <u>Toxicodendron radicans</u>	<u>10</u>	<u>No</u>	<u>FAC</u>															
5. <u>Rosa multiflora</u>	<u>8</u>	<u>No</u>	<u>FAC</u>															
6. <u>Rubus sp.</u>	<u>7</u>	<u>No</u>	<u>Unknown</u>															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
11. _____	_____	_____	_____															
12. _____	_____	_____	_____															
	<u>100</u>	= Total Cover		Definitions of Four Vegetation Strata:														
Woody Vine Stratum (Plot size: <u>30'</u>)				<p>Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.</p> <p>Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.</p> <p>Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.</p> <p>Woody vine – All woody vines greater than 3.28 ft in height.</p>														
1. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
	_____	= Total Cover																
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: DP26 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	2.5Y 4/4	100					loam	
4-12	2.5Y 6/4	95	7.5YR 5/8	5	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP27 - Wetland N
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851849 N Long: -79.389547 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u><12</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

DP27 - Wetland N
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Polygonum pensylvanicum</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>	
2. <u>Festuca sp.</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Juncus effusus</u>	<u>15</u>	<u>No</u>	<u>FACW</u>	
4. <u>Eleocharis sp.</u>	<u>10</u>	<u>No</u>	<u>FACW-OBL</u>	
5. <u>Carex lurida</u>	<u>15</u>	<u>No</u>	<u>OBL</u>	
6. <u>Carex vulpinoidea</u>	<u>10</u>	<u>No</u>	<u>OBL</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover	<u>90</u>	_____	_____	
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Remarks: (Include photo numbers here or on a separate sheet.)				
Sampling point is located in an active pasture.				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				

SOIL

Sampling Point: DP27 - Wetland N

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	7.5YR 4/1	95	5YR 4/6	5	C	PL	silt loam	
4-12	10YR 4/1	95	7.5YR 4/6	5	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP28 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851940 N Long: -79.389684 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: <p style="font-size: 1.2em;">Sampling point located in an active cattle pasture.</p>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP28 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status															
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33</u> (A/B)														
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
_____ = Total Cover																		
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="width:50%; text-align: right;">Total % Cover of:</td> <td style="width:50%; text-align: right;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>70</u></td> <td>x 3 = <u>210</u></td> </tr> <tr> <td>FACU species <u>40</u></td> <td>x 4 = <u>160</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>110</u> (A)</td> <td><u>370</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.36</u>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>70</u>	x 3 = <u>210</u>	FACU species <u>40</u>	x 4 = <u>160</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>110</u> (A)	<u>370</u> (B)
Total % Cover of:	Multiply by:																	
OBL species <u>0</u>	x 1 = <u>0</u>																	
FACW species <u>0</u>	x 2 = <u>0</u>																	
FAC species <u>70</u>	x 3 = <u>210</u>																	
FACU species <u>40</u>	x 4 = <u>160</u>																	
UPL species <u>0</u>	x 5 = <u>0</u>																	
Column Totals: <u>110</u> (A)	<u>370</u> (B)																	
1. <u>Symphoricarpos orbiculatus</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
_____ = Total Cover																		
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)														
1. <u>Festuca sp.</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>															
2. <u>Trifolium repens</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>															
3. <u>Solanum sp.</u>	<u>10</u>	<u>No</u>	<u>Unknown</u>															
4. <u>Toxicodendron radicans</u>	<u>5</u>	<u>No</u>	<u>FAC</u>															
5. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
11. _____	_____	_____	_____															
12. _____	_____	_____	_____															
_____ = Total Cover																		
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.														
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
_____ = Total Cover																		
<table style="width:100%; border:none;"> <tr> <td style="width:70%;">Hydrophytic Vegetation Present?</td> <td style="width:10%; text-align: center;">Yes _____</td> <td style="width:20%; text-align: center;">No <input checked="" type="checkbox"/></td> </tr> </table>				Hydrophytic Vegetation Present?	Yes _____	No <input checked="" type="checkbox"/>												
Hydrophytic Vegetation Present?	Yes _____	No <input checked="" type="checkbox"/>																
Remarks: (Include photo numbers here or on a separate sheet.)																		

SOIL

Sampling Point: DP28 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 4/4	100					loamy sand	
4-12	2.5Y 7/4	100					loamy sand	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP29 - Wetland O
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.851918 N Long: -79.389866 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD2) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

DP29 - Wetland O
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <u>Salix nigra</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
<u>25</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: <u>5'</u>)					
1. <u>Polygonum pensylvanicum</u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Festuca sp.</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>		
3. <u>Carex vulpinoidea</u>	<u>20</u>	<u>No</u>	<u>OBL</u>		
4. <u>Carex lurida</u>	<u>20</u>	<u>No</u>	<u>OBL</u>		
5. <u>Cyperus strigosus</u>	<u>10</u>	<u>No</u>	<u>FACW</u>		
6. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
<u>100</u> = Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>30'</u>)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Include photo numbers here or on a separate sheet.) Sampling point is located in an active pasture.					

SOIL

Sampling Point: DP29 - Wetland O

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 4/3						silt loam	
2-5	2.5Y 4/2	85	5YR 3/4	15	C	PL	loam	
5-12	5Y 6/1	90	10YR 5/8	10	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP30 - Wetland P
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.8512211 N Long: -79.391228 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) _____ High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

DP30 - Wetland P
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <u>Polygonum pensylvanicum</u>	30	Yes	FACW	
2. <u>Carex lurida</u>	20	Yes	OBL	
3. <u>Polygonum sagittatum</u>	20	Yes	OBL	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover	70	_____	_____	
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover	_____	_____	_____	
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
Sampling point is located in an active pasture.				

SOIL

Sampling Point: DP30 - Wetland P

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	2.5Y 5/2	80	10YR 5/8	20	C	PL	silt loam	
3-12	5Y 5/1	92	10YR 5/8	8	C	PL	silt loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP31 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.852262 N Long: -79.391374 W Datum: _____
 Soil Map Unit Name: Goldston channery silt loam (GcE) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture. Sampling area has hydrophytic vegetation but appears to have been drained by ditching efforts and didn't meet hydric soil criteria.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u>	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP31 - Upland

<u>Tree Stratum</u> (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: _____ (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: <u>5'</u>)				
1. <u>Typhus latifolia</u>	60	Yes	OBL	
2. <u>Polygonum pensylvanicum</u>	20	Yes	FACW	
3. <u>Festuca sp.</u>	10	No	FAC	
4. <u>Polygonum sagittatum</u>	5	No	OBL	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
95 = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
				_____ = Total Cover

SOIL

Sampling Point: DP31 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 5/3	100					loam	
4-12	2.5Y 5/3	85	7.5YR 4/6	15	C	PL	loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP32 - Wetland Q
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.854003 N Long: -79.387520 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Sampling point is located in an active pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u><12</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

DP32 - Wetland Q
Sampling Point: _____

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. <u>Salix nigra</u>	<u>35</u>	<u>Yes</u>	<u>OBL</u>	Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: _____ (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
	<u>35</u>	= Total Cover		Prevalence Index worksheet:
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Total % Cover of: _____ Multiply by: _____
1. _____	_____	_____	_____	OBL species _____ x 1 = _____
2. _____	_____	_____	_____	FACW species _____ x 2 = _____
3. _____	_____	_____	_____	FAC species _____ x 3 = _____
4. _____	_____	_____	_____	FACU species _____ x 4 = _____
5. _____	_____	_____	_____	UPL species _____ x 5 = _____
6. _____	_____	_____	_____	Column Totals: _____ (A) _____ (B)
7. _____	_____	_____	_____	Prevalence Index = B/A = _____
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
	_____	= Total Cover		Hydrophytic Vegetation Indicators:
Herb Stratum (Plot size: <u>5'</u>)				<input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
1. <u>Polygonum pensylvanicum</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>	<input type="checkbox"/> 2 - Dominance Test is >50%
2. <u>Carex lurida</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
3. <u>Festuca sp.</u>	<u>10</u>	<u>No</u>	<u>FAC</u>	<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
4. <u>Trifolium repens</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
5. <u>Carex vulpinoidea</u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
	<u>75</u>	= Total Cover		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata:
1. _____	_____	_____	_____	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
2. _____	_____	_____	_____	Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
3. _____	_____	_____	_____	Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
4. _____	_____	_____	_____	Woody vine – All woody vines greater than 3.28 ft in height.
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
	_____	= Total Cover		Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

Remarks: (Include photo numbers here or on a separate sheet.)

Sampling point is located in an active pasture.

SOIL

Sampling Point: DP32 - Wetland Q

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 3/4						loam	
3-7	2.5Y 5/1	95	7.5YR 4/6	5	C	PL	sandy loam	
7-12	2.5Y 6/2	85	7.5YR 4/6	15	C	PL	sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Holman Mill Stream Mitigation Site City/County: Alamance Sampling Date: 6/11/14
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP33 - Upland
 Investigator(s): Ian Eckardt Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): none Slope (%): -
 Subregion (LRR or MLRA): MLRA 136 Lat: 35.854028 N Long: -79.387602 W Datum: _____
 Soil Map Unit Name: Herndon silt loam (HdD) NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: Sampling point located in an active cattle pasture.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>-</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP33 - Upland

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>45</u> x 3 = <u>135</u> FACU species <u>25</u> x 4 = <u>100</u> UPL species <u>10</u> x 5 = <u>50</u> Column Totals: <u>80</u> (A) <u>285</u> (B) Prevalence Index = B/A = <u>3.56</u>
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Festuca sp.</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Trifolium repens</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Solanum sp.</u>	<u>10</u>	<u>No</u>	<u>Unknown</u>	
4. <u>Solidago arguta</u>	<u>10</u>	<u>No</u>	<u>UPL</u>	
5. <u>Ranunculus hispidus</u>	<u>5</u>	<u>No</u>	<u>FAC</u>	
6. <u>Eupatorium capillifolium</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
<u>90</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>

SOIL

Sampling Point: DP33 - Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 4/4	100					loam	
4-12	10YR 4/3	100					loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks:

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Holman Mill Stream Mitigation Site - UT1 and Wetlands E, F, G, H, I, J, K, L, M, N, O, & P.

State: NC County/parish/borough: Alamance City:
Center coordinates of site (lat/long in degree decimal format): Lat. 35.854104° **N**, Long. -79.384634° **W**.
Universal Transverse Mercator:

Name of nearest waterbody: Pine Hill Branch

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Haw River

Name of watershed or Hydrologic Unit Code (HUC): Cape Fear River 03030002

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: 2,669 linear feet: 4-6 width (ft) and/or acres.

Wetlands: 0.247 acres.

c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual

Elevation of established OHWM (if known): .

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain: .

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is “adjacent”:

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: 102 acres

Drainage area: 102 acres

Average annual rainfall: 45.08 inches

Average annual snowfall: 2.9 inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through 4 tributaries before entering TNW.

Project waters are 10-15 river miles from TNW.

Project waters are 1 (or less) river miles from RPW.

Project waters are 5-10 aerial (straight) miles from TNW.

Project waters are 1 (or less) aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: No.

Identify flow route to TNW⁵: UT1 flows into UT to Pine Hill Branch in the project area. UT to Pine Hill Branch leaves the project site and joins Pine Hill Branch. Pine Hill Branch flows into South Fork Cane Creek which drains into Cane

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Creek. Cane Creek flows into the Haw River (the TNW). The Haw River joins Deep River below Jordan Lake to form the Cape Fear River which continues to the Atlantic Ocean.
Tributary stream order, if known: First.

(b) General Tributary Characteristics (check all that apply):

Tributary is: Natural
 Artificial (man-made). Explain: .
 Manipulated (man-altered). Explain: Historic and current agriculture practices have impacted the channel. Cattle have direct access to the stream and a majority of the buffer has been removed and replaced with pasture grasses.

Tributary properties with respect to top of bank (estimate):

Average width: 5-10 feet
Average depth: 2-3 feet
Average side slopes: **Vertical (1:1 or less).**

Primary tributary substrate composition (check all that apply):

Silts Sands Concrete
 Cobbles Gravel Muck
 Bedrock Vegetation. Type/% cover:
 Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: The reach exhibits areas of bank instability in the form of scour and raw banks along portions of the project reach.

Presence of run/riffle/pool complexes. Explain: Bedform features including riffle/run/pool sequences were present but cattle trampling have made them infrequent.

Tributary geometry: **Relatively straight**

Tributary gradient (approximate average slope): 0-2 %

(c) Flow:

Tributary provides for: **Pick List**

Estimate average number of flow events in review area/year: **1**

Describe flow regime: The channel exhibited strong perennial baseflow.

Other information on duration and volume: N/A.

Surface flow is: **Discrete and confined.** Characteristics: Baseflow is readily observed and occupies the majority of the channel bed.

Subsurface flow: **Unknown.** Explain findings: .

Dye (or other) test performed: .

Tributary has (check all that apply):

Bed and banks
 OHWM⁶ (check all indicators that apply):
 clear, natural line impressed on the bank the presence of litter and debris
 changes in the character of soil destruction of terrestrial vegetation
 shelving the presence of wrack line
 vegetation matted down, bent, or absent sediment sorting
 leaf litter disturbed or washed away scour
 sediment deposition multiple observed or predicted flow events
 water staining abrupt change in plant community
 other (list):
 Discontinuous OHWM.⁷ Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

High Tide Line indicated by: Mean High Water Mark indicated by:
 oil or scum line along shore objects survey to available datum;
 fine shell or debris deposits (foreshore) physical markings;
 physical markings/characteristics vegetation lines/changes in vegetation types.
 tidal gauges
 other (list):

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: UT1 drains a rural watershed. The water was muddy during the delineation due to cattle access.

Identify specific pollutants, if known: .

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width):
- Wetland fringe. Characteristics:
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: 0.247 acres

Wetland type. Explain: Using the NCWAM key Wetlands E, F, K-M, O, and P were classified as headwater forest wetlands. Wetland G-J and N were classified as seeps. Wetland types are based on observers best professional judgement of what the wetlands would become if the area wasn't maintained.

Wetland quality. Explain: All wetlands are impacted by active cattle grazing. They have evidence of trampling and cattle waste (manure).

Project wetlands cross or serve as state boundaries. Explain: No.

(b) General Flow Relationship with Non-TNW:

Flow is: **Ephemeral flow**. Explain: During large rainfall events UT1 can get out of bank and flow to Wetlands E, F, and H-P. During periods of high groundwater or large rainfall events overland flow drains from Wetland G to UT1.

Surface flow is: **Overland sheetflow**

Characteristics:

Subsurface flow: **Unknown**. Explain findings:

- Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:

Directly abutting

Not directly abutting

Discrete wetland hydrologic connection. Explain: Wetland E is located within geomorphic floodplain of UT1 and can capture out of bank flows. Wetland G originates on a hillside adjacent to UT1. Surface water flows from Wetland G to UT1 during periods of high groundwater.

Ecological connection. Explain:

Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are **10-15** river miles from TNW.

Project waters are **5-10** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters**.

Estimate approximate location of wetland as within the **5 - 10-year** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: The wetlands are actively grazed. Evidence of trampling and cattle fecal matter was observed in both.

Identify specific pollutants, if known:

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width):
- Vegetation type/percent cover. Explain: Wetland E through P are primarily covered in herbaceous species.
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **12**

Approximately (0.247) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>	<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>
Wetland E - N	0.016	Wetland K - Y	0.003
Wetland F - Y	0.005	Wetland L - Y	0.011
Wetland G - N	0.016	Wetland M - Y	0.021
Wetland H - Y	0.041	Wetland N - Y	0.042
Wetland I - Y	0.047	Wetland O - Y	0.032
Wetland J - Y	0.008	Wetland P - Y	0.005

Summarize overall biological, chemical and physical functions being performed: Wetlands E, F, K, L, M, O, and P provide water treatment and flood storage for UT1. Wetlands G, H, I, J, and N have the ability to carry pollutants (specifically cattle waste) to UT1. All wetlands also serve as aquatic habitat for organisms (primarily amphibians) in combination with UT1.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: Wetland E and G don't directly abut UT1. Wetland E is located within the geomorphic floodplain of UT1 and is able to capture and store flood waters with UT1 comes out of bank. Wetland G is located on a hillside adjacent to UT1. During periods of high groundwater Wetland G has the ability to transfer nutrients and pollutants (cattle waste) to UT1.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 - TNWs: linear feet width (ft), Or, acres.
 - Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**

- Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: UT1 exhibited average bankfull widths of 4 to 6 feet, well-defined bed and bank, and soil-based evidence of a high water (hydric soils). During biological sampling within the channel amphibians, crayfish, macroinvertebrates and algae were present. UT1 scored 35 and 38 out of a possible 100 points on the USACE Stream Assessment Form and scored 30.5 and 33.5 out of 61.5 possible points on the NCDWQ Stream Classification Form, indicating perennial status (SCP2 and SCP3).
- Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: **2,669** linear feet **4-6** width (ft).
 - Other non-wetland waters: acres.
- Identify type(s) of waters: .

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
 - Other non-wetland waters: acres.
- Identify type(s) of waters: .

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
- Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Wetlands F, H, I, J, K, L, M, N, O, and P directly abut the top of bank of UT1.**
- Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **0.215** acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: **0.032** acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
- Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
- Demonstrate that water is isolated with a nexus to commerce (see E below).

⁸See Footnote # 3.

⁹ To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

- which are or could be used by interstate or foreign travelers for recreational or other purposes.
- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- 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: Crutchfield Crossroads, NC 7.5 Quadrangle.
- USDA Natural Resources Conservation Service Soil Survey. Citation: Alamance County Soils.
- National wetlands inventory map(s). Cite name: .
- State/Local wetland inventory map(s): .

¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- FEMA/FIRM maps: .
- 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): .
or Other (Name & Date):see attached report.
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature: .
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Holman Mill Stream Mitigation Site - UT1A

State: NC

County/parish/borough: Alamance

City:

Center coordinates of site (lat/long in degree decimal format): Lat. 35.854104° **N**, Long. -79.384634° **W**.

Universal Transverse Mercator:

Name of nearest waterbody: Pine Hill Branch

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Haw River

Name of watershed or Hydrologic Unit Code (HUC): Cape Fear River 03030002

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: 84 linear feet: 1-2 width (ft) and/or acres.

Wetlands: acres.

c. Limits (boundaries) of jurisdiction based on: **Established by OHWM.**

Elevation of established OHWM (if known): .

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain: .

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**

Identify TNW: .

Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**

Summarize rationale supporting conclusion that wetland is “adjacent”:

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

(i) **General Area Conditions:**

Watershed size: 15 acres

Drainage area: 15 acres

Average annual rainfall: 45.08 inches

Average annual snowfall: 2.9 inches

(ii) **Physical Characteristics:**

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through 5 tributaries before entering TNW.

Project waters are 10-15 river miles from TNW.

Project waters are 1 (or less) river miles from RPW.

Project waters are 5-10 aerial (straight) miles from TNW.

Project waters are 1 (or less) aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: No.

Identify flow route to TNW⁵: UT1A flows into UT1 on the west side of the project area. UT1 flows into UT to Pine Hill Branch on the east side of the project area. UT to Pine Hill leave the project area and joins Pine Hill Branch. Pine Hill

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Branch flows into South Fork Cane Creek which drains into Cane Creek. Cane Creek flows into the Haw River (the TNW). The Haw River joins Deep River below Jordan lake to form the Cape Fear River which continues to the Atlantic Ocean.

Tributary stream order, if known: First.

(b) General Tributary Characteristics (check all that apply):

Tributary is:

Natural

Artificial (man-made). Explain: .

Manipulated (man-altered). Explain: Historic and curent agricultural practices have impacted

the channel. Cattle have direct access to the stream and a majority of the buffer has been removed and replaced with pasture grasses.

Tributary properties with respect to top of bank (estimate):

Average width: 1-2 feet

Average depth: 1 feet

Average side slopes: **Vertical (1:1 or less).**

Primary tributary substrate composition (check all that apply):

Silts

Sands

Concrete

Cobbles

Gravel

Muck

Bedrock

Vegetation. Type/% cover:

Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: Channel lacks a riparian buffer and has some raw eroding banks.

Presence of run/riffle/pool complexes. Explain: Cattle have heavily trampled the channel making it difficult to distinguish run/riffle/pool complexes.

Tributary geometry: **Relatively straight**

Tributary gradient (approximate average slope): 0-2 %

(c) Flow:

Tributary provides for: **Seasonal flow**

Estimate average number of flow events in review area/year: **2-5**

Describe flow regime: The channel exhibited moderate baseflow during delineation.

Other information on duration and volume: .

Surface flow is: **Discrete and confined.** Characteristics: Baseflow was readily observed within the bed and bank of UT1A during the delineation.

Subsurface flow: **Unknown.** Explain findings: .

Dye (or other) test performed: .

Tributary has (check all that apply):

Bed and banks

OHWM⁶ (check all indicators that apply):

clear, natural line impressed on the bank

changes in the character of soil

shelving

vegetation matted down, bent, or absent

leaf litter disturbed or washed away

sediment deposition

water staining

other (list):

Discontinuous OHWM.⁷ Explain: .

the presence of litter and debris

destruction of terrestrial vegetation

the presence of wrack line

sediment sorting

scour

multiple observed or predicted flow events

abrupt change in plant community

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

High Tide Line indicated by:

oil or scum line along shore objects

fine shell or debris deposits (foreshore)

physical markings/characteristics

tidal gauges

other (list):

Mean High Water Mark indicated by:

survey to available datum;

physical markings;

vegetation lines/changes in vegetation types.

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: Water was muddy during the delineation due to cattle access.

Identify specific pollutants, if known: .

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width): .
- Wetland fringe. Characteristics: .
- Habitat for:
 - Federally Listed species. Explain findings: .
 - Fish/spawn areas. Explain findings: .
 - Other environmentally-sensitive species. Explain findings: .
 - Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

Directly abutting

Not directly abutting

Discrete wetland hydrologic connection. Explain: .

Ecological connection. Explain: .

Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List**.

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width): .
- Vegetation type/percent cover. Explain: .
- Habitat for:
 - Federally Listed species. Explain findings: .
 - Fish/spawn areas. Explain findings: .
 - Other environmentally-sensitive species. Explain findings: .
 - Aquatic/wildlife diversity. Explain findings: .

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately () acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N) Size (in acres) Directly abuts? (Y/N) Size (in acres)

Summarize overall biological, chemical and physical functions being performed: _____

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: _____
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: _____
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: _____

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 TNWs: linear feet width (ft), Or, acres.
 Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: _____
 Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: UT1A exhibited average bankfull widths of 1 to 2 feet, well-defined bed and banks, soils based evidence of a high water table (hydic soils), small headcuts, a weak floodplain, and weak amounts of sediment on plants. During biological

sampling within the channel macroinvertebrates and amphibians were observed. UT2B scored a 25.5 out of a possible 61.5 points on the NCDWR Stream Classification Form, indicating intermittent status (SCP7).

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: **84** linear feet **1-2** width (ft).
- Other non-wetland waters: acres.
- Identify type(s) of waters: .

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
- Identify type(s) of waters: .

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
 - Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
 - Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
- Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
- Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

- which are or could be used by interstate or foreign travelers for recreational or other purposes.
- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.

⁸See Footnote # 3.

⁹To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- 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:Crutchfield Crossroads, NC 7.5 Quadrangle.
- USDA Natural Resources Conservation Service Soil Survey. Citation:Alamance County Soils.
- National wetlands inventory map(s). Cite name: .
- State/Local wetland inventory map(s): .
- FEMA/FIRM maps: .
- 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): .
or Other (Name & Date):see attached report.
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature: .
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD:

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Holman Mill Stream Mitigation Site - UT2 and Wetlands B.

State: NC County/parish/borough: Alamance City:
Center coordinates of site (lat/long in degree decimal format): Lat. 35.854104° **N**, Long. -79.384634° **W**.
Universal Transverse Mercator:

Name of nearest waterbody: Pine Hill Branch

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Haw River

Name of watershed or Hydrologic Unit Code (HUC): Cape Fear River 03030002

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: 1,435 linear feet: 10-15 width (ft) and/or acres.

Wetlands: 0.008 acres.

c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual

Elevation of established OHWM (if known): .

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain: .

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW: _____

Summarize rationale supporting determination: _____

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is “adjacent”: _____

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: _____ acres

Drainage area: _____ acres

Average annual rainfall: _____ inches

Average annual snowfall: _____ inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.

Project waters are **Pick List** river miles from RPW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Project waters are **Pick List** aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: _____

Identify flow route to TNW⁵: _____

Tributary stream order, if known: _____

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

- Tributary is:** Natural
 Artificial (man-made). Explain:
 Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):

- Average width: feet
Average depth: feet
Average side slopes: **Pick List**.

Primary tributary substrate composition (check all that apply):

- | | | |
|--|--|-----------------------------------|
| <input type="checkbox"/> Silts | <input type="checkbox"/> Sands | <input type="checkbox"/> Concrete |
| <input type="checkbox"/> Cobbles | <input type="checkbox"/> Gravel | <input type="checkbox"/> Muck |
| <input type="checkbox"/> Bedrock | <input type="checkbox"/> Vegetation. Type/% cover: | |
| <input type="checkbox"/> Other. Explain: | | |

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:

Presence of run/riffle/pool complexes. Explain:

Tributary geometry: Pick List

Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: Pick List

Estimate average number of flow events in review area/year: Pick List

Describe flow regime:

Other information on duration and volume:

Surface flow is: Pick List. Characteristics:

Subsurface flow: Pick List. Explain findings:

- Dye (or other) test performed:

Tributary has (check all that apply):

- | | |
|---|---|
| <input type="checkbox"/> Bed and banks | |
| <input type="checkbox"/> OHWM ⁶ (check all indicators that apply): | |
| <input type="checkbox"/> clear, natural line impressed on the bank | <input type="checkbox"/> the presence of litter and debris |
| <input type="checkbox"/> changes in the character of soil | <input type="checkbox"/> destruction of terrestrial vegetation |
| <input type="checkbox"/> shelving | <input type="checkbox"/> the presence of wrack line |
| <input type="checkbox"/> vegetation matted down, bent, or absent | <input type="checkbox"/> sediment sorting |
| <input type="checkbox"/> leaf litter disturbed or washed away | <input type="checkbox"/> scour |
| <input type="checkbox"/> sediment deposition | <input type="checkbox"/> multiple observed or predicted flow events |
| <input type="checkbox"/> water staining | <input type="checkbox"/> abrupt change in plant community |
| <input type="checkbox"/> other (list): | |
| <input type="checkbox"/> Discontinuous OHWM. ⁷ Explain: | |

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

- | | |
|--|--|
| <input checked="" type="checkbox"/> High Tide Line indicated by: | <input checked="" type="checkbox"/> Mean High Water Mark indicated by: |
| <input type="checkbox"/> oil or scum line along shore objects | <input type="checkbox"/> survey to available datum; |
| <input type="checkbox"/> fine shell or debris deposits (foreshore) | <input type="checkbox"/> physical markings; |
| <input type="checkbox"/> physical markings/characteristics | <input type="checkbox"/> vegetation lines/changes in vegetation types. |
| <input type="checkbox"/> tidal gauges | |
| <input type="checkbox"/> other (list): | |

(iii) **Chemical Characteristics:**

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain:

Identify specific pollutants, if known:

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width): .
- Wetland fringe. Characteristics: .
- Habitat for:
 - Federally Listed species. Explain findings: .
 - Fish/spawn areas. Explain findings: .
 - Other environmentally-sensitive species. Explain findings: .
 - Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

Directly abutting

Not directly abutting

Discrete wetland hydrologic connection. Explain: .

Ecological connection. Explain: .

Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List**.

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width): .
- Vegetation type/percent cover. Explain: .
- Habitat for:
 - Federally Listed species. Explain findings: .
 - Fish/spawn areas. Explain findings: .
 - Other environmentally-sensitive species. Explain findings: .
 - Aquatic/wildlife diversity. Explain findings: .

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately () acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N) Size (in acres) Directly abuts? (Y/N) Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 TNWs: linear feet width (ft), Or, acres.
 Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: UT2 exhibited average bankfull widths of 10 to 15 feet, well-defined bed and bank, and soil-based evidence of a high water (hydric soils). During biological sampling within the channel amphibians, macroinvertebrates and algae were present. UT2 scored 43 out of a possible 100 points on the USACE Stream Assessment Form and scored a 35 out of 61.5 possible points on the NCDWQ Stream Classification Form, indicating perennial status (SCP4).

- Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: **1,435** linear feet **10-15** width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters: .

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters: .

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
 Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Wetland B directly abuts the top of bank of UT2.**
 Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **0.008** acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
 Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
 Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

- which are or could be used by interstate or foreign travelers for recreational or other purposes.

⁸See Footnote # 3.

⁹To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- 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: Crutchfield Crossroads, NC 7.5 Quadrangle.
- USDA Natural Resources Conservation Service Soil Survey. Citation: Alamance County Soils.
- 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): see attached report.
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature: .
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Holman Mill Stream Mitigation Site - UT2A

State: NC

County/parish/borough: Alamance

City:

Center coordinates of site (lat/long in degree decimal format): Lat. 35.854104° **N**, Long. -79.384634° **W**.

Universal Transverse Mercator:

Name of nearest waterbody: Pine Hill Branch

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Haw River

Name of watershed or Hydrologic Unit Code (HUC): Cape Fear River 03030002

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: 345 linear feet: 10-15 width (ft) and/or acres.

Wetlands: acres.

c. Limits (boundaries) of jurisdiction based on: **Established by OHWM.**

Elevation of established OHWM (if known): .

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain: .

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is “adjacent”:

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: acres

Drainage area: acres

Average annual rainfall: inches

Average annual snowfall: inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.

Project waters are **Pick List** river miles from RPW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Project waters are **Pick List** aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW⁵: .

Tributary stream order, if known: .

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

- Tributary is:** Natural
 Artificial (man-made). Explain: _____
 Manipulated (man-altered). Explain: _____

Tributary properties with respect to top of bank (estimate):

- Average width: _____ feet
Average depth: _____ feet
Average side slopes: **Pick List**.

Primary tributary substrate composition (check all that apply):

- | | | |
|--|--|-----------------------------------|
| <input type="checkbox"/> Silts | <input type="checkbox"/> Sands | <input type="checkbox"/> Concrete |
| <input type="checkbox"/> Cobbles | <input type="checkbox"/> Gravel | <input type="checkbox"/> Muck |
| <input type="checkbox"/> Bedrock | <input type="checkbox"/> Vegetation. Type/% cover: _____ | |
| <input type="checkbox"/> Other. Explain: _____ | | |

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: _____

Presence of run/riffle/pool complexes. Explain: _____

Tributary geometry: **Pick List**

Tributary gradient (approximate average slope): _____ %

(c) Flow:

Tributary provides for: **Pick List**

Estimate average number of flow events in review area/year: **Pick List**

Describe flow regime: _____

Other information on duration and volume: _____

Surface flow is: **Pick List. Characteristics:** _____

Subsurface flow: **Pick List. Explain findings:** _____

Dye (or other) test performed: _____

Tributary has (check all that apply):

- | | |
|---|---|
| <input type="checkbox"/> Bed and banks | |
| <input type="checkbox"/> OHWM ⁶ (check all indicators that apply): | |
| <input type="checkbox"/> clear, natural line impressed on the bank | <input type="checkbox"/> the presence of litter and debris |
| <input type="checkbox"/> changes in the character of soil | <input type="checkbox"/> destruction of terrestrial vegetation |
| <input type="checkbox"/> shelving | <input type="checkbox"/> the presence of wrack line |
| <input type="checkbox"/> vegetation matted down, bent, or absent | <input type="checkbox"/> sediment sorting |
| <input type="checkbox"/> leaf litter disturbed or washed away | <input type="checkbox"/> scour |
| <input type="checkbox"/> sediment deposition | <input type="checkbox"/> multiple observed or predicted flow events |
| <input type="checkbox"/> water staining | <input type="checkbox"/> abrupt change in plant community |
| <input type="checkbox"/> other (list): _____ | |
| <input type="checkbox"/> Discontinuous OHWM. ⁷ Explain: _____ | |

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

- | | |
|--|--|
| <input checked="" type="checkbox"/> High Tide Line indicated by: | <input checked="" type="checkbox"/> Mean High Water Mark indicated by: |
| <input type="checkbox"/> oil or scum line along shore objects | <input type="checkbox"/> survey to available datum; |
| <input type="checkbox"/> fine shell or debris deposits (foreshore) | <input type="checkbox"/> physical markings; |
| <input type="checkbox"/> physical markings/characteristics | <input type="checkbox"/> vegetation lines/changes in vegetation types. |
| <input type="checkbox"/> tidal gauges | |
| <input type="checkbox"/> other (list): _____ | |

(iii) **Chemical Characteristics:**

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: _____

Identify specific pollutants, if known: _____

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width): .
- Wetland fringe. Characteristics: .
- Habitat for:
 - Federally Listed species. Explain findings: .
 - Fish/spawn areas. Explain findings: .
 - Other environmentally-sensitive species. Explain findings: .
 - Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

Directly abutting

Not directly abutting

Discrete wetland hydrologic connection. Explain: .

Ecological connection. Explain: .

Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List**.

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width): .
- Vegetation type/percent cover. Explain: .
- Habitat for:
 - Federally Listed species. Explain findings: .
 - Fish/spawn areas. Explain findings: .
 - Other environmentally-sensitive species. Explain findings: .
 - Aquatic/wildlife diversity. Explain findings: .

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately () acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N) Size (in acres) Directly abuts? (Y/N) Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 TNWs: linear feet width (ft), Or, acres.
 Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: UT2A exhibited average bankfull widths of 10 to 15 feet, well-defined bed and bank, and soil-based evidence of a high water (hydric soils). UT2A also displayed well defined riffle and pool sequences, grade control, and strong baseflow. During biological sampling within the channel fish, crayfish, amphibians, macroinvertebrates and algae were present. UT2A scored 36 out of a possible 100 points on the USACE Stream Assessment Form and scored a 36.75 out of 61.5 possible points on the NCDWQ Stream Classification Form, indicating perennial status (SCP5).

- Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: **345** linear feet **10-15** width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters: .

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters: .

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
 Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
 Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
 Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
 Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

- which are or could be used by interstate or foreign travelers for recreational or other purposes.

⁸See Footnote # 3.

⁹To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- 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: Crutchfield Crossroads, NC 7.5 Quadrangle.
- USDA Natural Resources Conservation Service Soil Survey. Citation: Alamance County Soils.
- 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): see attached report.
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature: .
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Holman Mill Stream Mitigation Site - UT2B and Wetlands A & Q.

State: NC County/parish/borough: Alamance City:
Center coordinates of site (lat/long in degree decimal format): Lat. 35.854104° **N**, Long. -79.384634° **W**.
Universal Transverse Mercator:

Name of nearest waterbody: Pine Hill Branch

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Haw River

Name of watershed or Hydrologic Unit Code (HUC): Cape Fear River 03030002

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: 429 linear feet: 2-3 width (ft) and/or acres.

Wetlands: 0.114 acres.

c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual

Elevation of established OHWM (if known): .

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain: .

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is “adjacent”: .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: 18 acres

Drainage area: 18 acres

Average annual rainfall: 45.08 inches

Average annual snowfall: 2.9 inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through 5 tributaries before entering TNW.

Project waters are 10-15 river miles from TNW.

Project waters are 1 (or less) river miles from RPW.

Project waters are 5-10 aerial (straight) miles from TNW.

Project waters are 1 (or less) aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: No.

Identify flow route to TNW⁵: UT2B flows into UT2 in the project area. UT2 flows into UT to Pine Hill Branch on the east side of the project area. UT to Pine Hill Branch leaves the project site and joins Pine Hill Branch. Pine Hill Branch

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

flows into South Fork Cane Creek which drains into Cane Creek. Cane Creek flows into the Haw River (the TNW). The Haw River joins Deep River below Jordan Lake to form the Cape Fear River which continues to the Atlantic Ocean. Tributary stream order, if known: First.

(b) General Tributary Characteristics (check all that apply):

Tributary is: Natural
 Artificial (man-made). Explain: .
 Manipulated (man-altered). Explain: Historic and current agriculture practices have impacted the channel. Cattle have direct access to the stream and a majority of the buffer has been removed and replaced with pasture grasses.

Tributary properties with respect to top of bank (estimate):

Average width: 2-3 feet
Average depth: 1-2 feet
Average side slopes: **Vertical (1:1 or less).**

Primary tributary substrate composition (check all that apply):

Silts Sands Concrete
 Cobbles Gravel Muck
 Bedrock Vegetation. Type/% cover:
 Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: The reach exhibits areas of bank instability in the form of scour and raw banks along portions of the project reach.

Presence of run/riffle/pool complexes. Explain: Bedform features including riffle/run/pool sequences were present but cattle trampling have made them infrequent.

Tributary geometry: **Relatively straight**

Tributary gradient (approximate average slope): 0-2 %

(c) Flow:

Tributary provides for: **Seasonal flow**

Estimate average number of flow events in review area/year: **2-5**

Describe flow regime: The channel exhibited moderate baseflow during the on site delineation.

Other information on duration and volume: N/A.

Surface flow is: **Discrete and confined.** Characteristics: Baseflow is easily observed and occupies the majority of the channel bed.

Subsurface flow: **Unknown.** Explain findings: .

Dye (or other) test performed: .

Tributary has (check all that apply):

Bed and banks
 OHWM⁶ (check all indicators that apply):
 clear, natural line impressed on the bank the presence of litter and debris
 changes in the character of soil destruction of terrestrial vegetation
 shelving the presence of wrack line
 vegetation matted down, bent, or absent sediment sorting
 leaf litter disturbed or washed away scour
 sediment deposition multiple observed or predicted flow events
 water staining abrupt change in plant community
 other (list):
 Discontinuous OHWM.⁷ Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

High Tide Line indicated by: Mean High Water Mark indicated by:
 oil or scum line along shore objects survey to available datum;
 fine shell or debris deposits (foreshore) physical markings;
 physical markings/characteristics vegetation lines/changes in vegetation types.
 tidal gauges
 other (list):

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: UT2B drains approximately 18 acres of agricultural land. The water was clear during the delineation.

Identify specific pollutants, if known: .

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width):
- Wetland fringe. Characteristics:
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: 0.114 acres

Wetland type. Explain: Using the NCWAM key Wetlands A was classified as a seep and Wetland Q was classified as a headwater forest. Wetland types are based on observers best professional judgement of what the wetlands would become if the area wasn't maintained.

Wetland quality. Explain: Wetlands A and Q are impacted by active cattle grazing. They have evidence of trampling and cattle waste (manure).

Project wetlands cross or serve as state boundaries. Explain: No.

(b) General Flow Relationship with Non-TNW:

Flow is: **Ephemeral flow**. Explain: During large rainfall events UT2B can get out of bank and flow into Wetlands A and Q.

Surface flow is: **Overland sheetflow**

Characteristics:

Subsurface flow: **Unknown**. Explain findings:

- Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:

- Directly abutting
- Not directly abutting
 - Discrete wetland hydrologic connection. Explain:
 - Ecological connection. Explain:
 - Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are **10-15** river miles from TNW.

Project waters are **5-10** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters**.

Estimate approximate location of wetland as within the **5 - 10-year** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: The wetlands are actively grazed. Evidence of trampling and cattle fecal matter was observed in both.

Identify specific pollutants, if known:

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width):
- Vegetation type/percent cover. Explain: Wetland A and Q are primarily covered in herbaceous species.
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **2**

Approximately (0.114) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>	<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>
Wetland A - Y	0.097		
Wetland Q - Y	0.017		

Summarize overall biological, chemical and physical functions being performed: Wetlands A and Q located entirely or partially within the floodplain of UT2B and serve as aquatic habitat for organisms (primarily amphibians) in combinations with UT2B. Wetland Q can capture and filter UT2B flood waters. Wetland A was the ability to carries nutrients and pollutants (cattle waste) to UT2B.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 TNWs: linear feet width (ft), Or, acres.
 Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
 Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows

seasonally: UT2B exhibited average bankfull widths of 2 to 3 feet, well-defined bed and banks, soils based evidence of a high water table (hydric soils), small headcuts, a weak floodplain, and small wracklines. During biological sampling within the channel macroinvertebrates, amphibians, and algae were observed. UT2B scored a 26.5 out of a possible 61.5 points on the NCDWR Stream Classification Form, indicating intermittent status (SCP6).

Provide estimates for jurisdictional waters in the review area (check all that apply):

Tributary waters: **429** linear feet **2-3** width (ft).

Other non-wetland waters: acres.

Identify type(s) of waters: .

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

Tributary waters: linear feet width (ft).

Other non-wetland waters: acres.

Identify type(s) of waters: .

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.

Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Wetlands A and Q directly abut the top of bank of UT2B.**

Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **0.114** acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

Demonstrate that impoundment was created from "waters of the U.S.," or

Demonstrate that water meets the criteria for one of the categories presented above (1-6), or

Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

⁸See Footnote # 3.

⁹To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- which are or could be used by interstate or foreign travelers for recreational or other purposes.
- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- 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: Crutchfield Crossroads, NC 7.5 Quadrangle.
- USDA Natural Resources Conservation Service Soil Survey. Citation: Alamance County Soils.
- 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): see attached report.
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature: .

Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: Holman Mill Stream Mitigation Site - UT to Pine Hill Branch and Wetlands C & D.

State: NC County/parish/borough: Alamance City:
Center coordinates of site (lat/long in degree decimal format): Lat. 35.854104° **N**, Long. -79.384634° **W**.
Universal Transverse Mercator:

Name of nearest waterbody: Pine Hill Branch

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Haw River

Name of watershed or Hydrologic Unit Code (HUC): Cape Fear River 03030002

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

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

Office (Desk) Determination. Date:

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

- TNWs, including territorial seas
- Wetlands adjacent to TNWs
- Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs
- Non-RPWs that flow directly or indirectly into TNWs
- Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
- Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
- Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
- Impoundments of jurisdictional waters
- Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: 3,524 linear feet: 15-20 width (ft) and/or acres.

Wetlands: 0.308 acres.

c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual

Elevation of established OHWM (if known): .

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain: .

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**

Identify TNW: .

Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**

Summarize rationale supporting conclusion that wetland is “adjacent”:

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

(i) **General Area Conditions:**

Watershed size: 1,077 acres

Drainage area: 1,077 acres

Average annual rainfall: 45.08 inches

Average annual snowfall: 2.9 inches

(ii) **Physical Characteristics:**

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through 3 tributaries before entering TNW.

Project waters are 10-15 river miles from TNW.

Project waters are 1 (or less) river miles from RPW.

Project waters are 5-10 aerial (straight) miles from TNW.

Project waters are 1 (or less) aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: No.

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW⁵: UT to Pine Hill Branch leaves the project site and joins Pine Hill Branch. Pine Hill Branch flows into South Fork Cane Creek which drains into Cane Creek. Cane Creek flows into the Haw River (the TNW). The Haw River joins Deep River below Jordan Lake to form the Cape Fear River which continues to the Atlantic Ocean. Tributary stream order, if known: Second.

(b) General Tributary Characteristics (check all that apply):

Tributary is: Natural
 Artificial (man-made). Explain:
 Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):

Average width: 15-20 feet
 Average depth: 4-6 feet
 Average side slopes: **Vertical (1:1 or less).**

Primary tributary substrate composition (check all that apply):

Silts Sands Concrete
 Cobbles Gravel Muck
 Bedrock Vegetation. Type/% cover:
 Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: The reach exhibits minor pockets of bank instability in the form of scour and raw banks along portions of the project reach but the majority of the project reach is stable.

Presence of run/riffle/pool complexes. Explain: Bedform features including riffle/run/pool sequences were present and common in the channel.

Tributary geometry: **Meandering**
 Tributary gradient (approximate average slope): 0-2 %

(c) Flow:

Tributary provides for: **Pick List**
 Estimate average number of flow events in review area/year: **1**
 Describe flow regime: The channel exhibited strong perennial baseflow.
 Other information on duration and volume: N/A.

Surface flow is: **Discrete and confined.** Characteristics: Baseflow is readily observed and occupies the majority of the channel bed.

Subsurface flow: **Unknown.** Explain findings:
 Dye (or other) test performed:

Tributary has (check all that apply):

Bed and banks
 OHWM⁶ (check all indicators that apply):
 clear, natural line impressed on the bank the presence of litter and debris
 changes in the character of soil destruction of terrestrial vegetation
 shelving the presence of wrack line
 vegetation matted down, bent, or absent sediment sorting
 leaf litter disturbed or washed away scour
 sediment deposition multiple observed or predicted flow events
 water staining abrupt change in plant community
 other (list):
 Discontinuous OHWM.⁷ Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

High Tide Line indicated by: Mean High Water Mark indicated by:
 oil or scum line along shore objects survey to available datum;
 fine shell or debris deposits (foreshore) physical markings;
 physical markings/characteristics vegetation lines/changes in vegetation types.
 tidal gauges
 other (list):

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: UT to Pine Hill Branch drains a rural watershed. The water was clear during the delineation.

Identify specific pollutants, if known: .

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width): 50.
- Wetland fringe. Characteristics:
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: 0.308 acres

Wetland type. Explain: Using the NCWAM key Wetlands C and D were classified as a bottomland hardwood forest.

Wetland type is based on observers best professional judgement of what the wetlands would become if the area wasn't maintained.

Wetland quality. Explain: Wetlands C and D are impacted by active cattle grazing. Wetland have evidence of trampling and manure was observed in the wetland. Wetland C and D have been ditched to improve drainage to the UT to Pine Hill Branch.

Project wetlands cross or serve as state boundaries. Explain: No.

(b) General Flow Relationship with Non-TNW:

Flow is: **Ephemeral flow**. Explain: During large rainfall events Wetland C and D drain to UT to Pine Hill Branch.

Surface flow is: **Discrete and confined**

Characteristics: Ditched.

Subsurface flow: **Unknown**. Explain findings:

Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:

Directly abutting

Not directly abutting

Discrete wetland hydrologic connection. Explain: A short non-jurisdictional ditch connects Wetland C to UT to

Pine Hill Branch.

Ecological connection. Explain:

Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are **10-15** river miles from TNW.

Project waters are **5-10** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters**.

Estimate approximate location of wetland as within the **5 - 10-year** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: Surface water in Wetland C was a brownish green color with a high algae content. The wetland is actively grazed.

Identify specific pollutants, if known:

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

Riparian buffer. Characteristics (type, average width):

Vegetation type/percent cover. Explain: Wetland C is partially wooded and partially covered by herbaceous species.

Wetland D is primarily covered in herbaceous species.

Habitat for:

Federally Listed species. Explain findings:

Fish/spawn areas. Explain findings:

Other environmentally-sensitive species. Explain findings:

Aquatic/wildlife diversity. Explain findings:

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **2**

Approximately (0.308) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>	<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>
Wetland C - N	0.092		
Wetland D - Y	0.216		

Summarize overall biological, chemical and physical functions being performed: Wetlands C and D features provide water treatment and flood storage. In addition they serve as aquatic habitat for organisms within the UT to Pine Hill Branch floodplain .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: Wetland C doesn't directly abut UT to Pine Hill Branch but is connected to UT to Pine Hill Branch by a non-jurisdictional ditch.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 TNWs: linear feet width (ft), Or, acres.
 Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: UT to Pine Hill Branch exhibited average bankfull widths of 15 to 20 feet, well-defined bed and bank, and soil-based evidence of a high water (hydric soils). During biological sampling within the channel fish, amphibians, crayfish, macroinvertebrates and algae were present. UT to Pine Hill Branch scored 72 out of a possible 100 points on the

USACE Stream Assessment Form and scored a 44.5 out of 61.5 possible points on the NCDWQ Stream Classification Form, indicating perennial status (SCP1).

- Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: **3,524** linear feet **15-20** width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters: .

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters: .

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
 Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Wetlands D directly abuts the top of bank of UT to Pine Hill Branch.**
- Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **0.216** acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: **0.092** acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
 Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
 Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

⁸See Footnote # 3.

⁹To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

¹⁰ Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- which are or could be used by interstate or foreign travelers for recreational or other purposes.
- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- 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: Crutchfield Crossroads, NC 7.5 Quadrangle.
- USDA Natural Resources Conservation Service Soil Survey. Citation: Alamance County Soils.
- 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): see attached report.
- Previous determination(s). File no. and date of response letter: .

- Applicable/supporting case law: .
- Applicable/supporting scientific literature: .
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

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

Action Id. SAW-2015-00019 County: Alamance U.S.G.S. Quad: NC-CRUTCHFIELD CROSSROADS

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: NC Ecosystem Enhancement Program

attn: Jeff Schaffer

Address: 1652 Mail Service Center
Raleigh, NC, 27699-1699

Size (acres) ~32

Nearest Waterway UT to Pine Hill Branch

USGS HUC 3030002

Nearest Town Snow Camp

River Basin Haw. North Carolina

Coordinates 35.852137 N, -79.385406 W

Location description: The project area is located along approximately 8500 linear feet of unnamed tributaries to Pine Hill Branch, in the northeast quadrant of the intersection of Holman Mill Road and Clark Road near Snow Camp, Alamance County, North Carolina

Indicate Which of the Following Apply:

A. Preliminary Determination

- Based on preliminary information, there may be waters of the U.S. including wetlands on the above described project area. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). 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.

B. Approved Determination

- There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. 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 waters of the U.S. including wetlands on the above described 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 strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.
 - The waters of the U.S. including wetlands on your project area have been delineated and the delineation has been verified by the Corps. We strongly 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 of the U.S. including wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. 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 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 to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **David Bailey** at **919-554-4884 ext 30** or **David.E.Bailey2@usace.army.mil**.

C. Basis For Determination:

The project area exhibits water bodies with ordinary high water and wetland criteria as defined in the applicable regional supplement to the 1987 wetland delineation manual. The water bodies on the site include Unnamed Tributaries (UTs) to Pine Hill Branch, all Relatively Permanent Waters (RPWs), which flow via Pine Hill Branch (RPW), South Fork Cane Creek (RPW), and Cane Creek (RPW) to the Haw River, a Traditionally Navigable Water – and abutting and adjacent wetlands. This determination is based on a field verification by David E. Bailey (USACE) on 10/23/2014.

D. Remarks:

The wetlands and other Waters of the US on the property were flagged by Wildlands Engineering with changes made in the field by David E. Bailey (USACE) and are approximated on the attached sheet titled “Figure 3: Site Map.”

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 **March 6, 2015**.

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: 

Date: **January 5, 2015**

Expiration Date: **January 5, 2019**

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 our Customer Satisfaction Survey, located online at <http://regulatory.usacesurvey.com/>.

Copy furnished:

Ian Eckardt, Wildlands Engineering, Inc., 1430 S. Mint Street, Suite 104, Charlotte, NC 28203
Sue Homewood, NCDENR-DWR, 450 W. Hanes Mill Rd, Suite 300, Winston-Salem, NC 27105

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

Applicant: NCEEP	File Number: SAW-2015-00019	Date: January 5, 2015
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 checked="" type="checkbox"/> APPROVED JURISDICTIONAL DETERMINATION		D
<input 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 <http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx> or 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.

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: **David E. Bailey**
Raleigh Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587

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.

_____	Date:	Telephone number:
Signature of appellant or agent.		

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn: David Bailey, 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

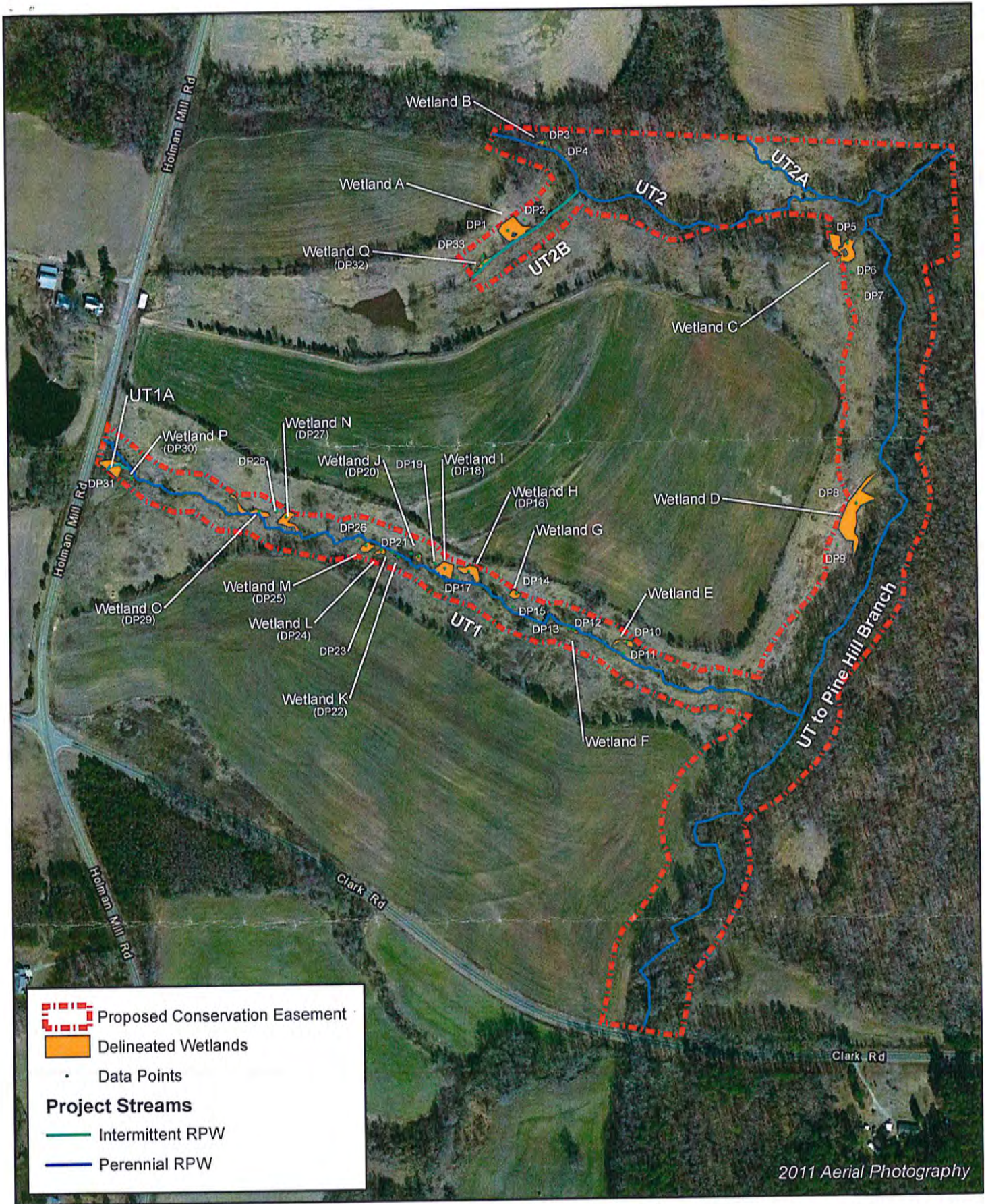


Figure 3: Site Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002

Appendix 4

Project Site Photographs



Photo 1. UT to Pine Hill Branch



Photo 2. Old Mill Dam facing downstream (UT to Pine Hill Branch)



Photo 3: Old Mill Dam (UT to Pine Hill Branch)



Photo 4. Damage on UT1 due to cattle



Photo 5. Damage to UT1 due to cattle



Photo 6. Damage to UT1 due to cattle



Photo 7. Damage to UT1 due to cattle



Photo 8. Damage to UT1 due to cattle



Photo 9. Cattle wading area on UT2A



Photo 10. UT2B project reach



Photo 11. UT2 Reach 1

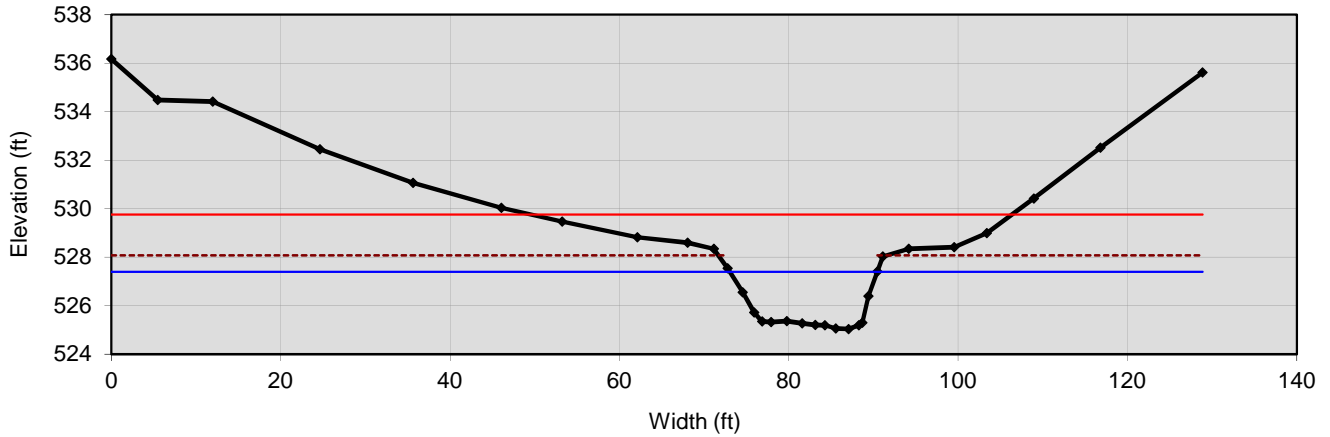
Appendix 5

Existing Geomorphic Survey Data

&

Reference Reach Data

Pine Hill Branch XS1, Riffle



Bankfull Dimensions

31.5	x-section area (ft.sq.)
17.4	width (ft)
1.8	mean depth (ft)
2.4	max depth (ft)
19.0	wetted parimeter (ft)
1.7	hyd radi (ft)
9.6	width-depth ratio

Flood Dimensions

82.5	W flood prone area (ft)
4.7	entrenchment ratio
3.0	low bank height (ft)
1.3	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
25	threshold grain size (mm):

Bankfull Flow

3.3	velocity (ft/s)
103.3	discharge rate (cfs)
0.45	Froude number

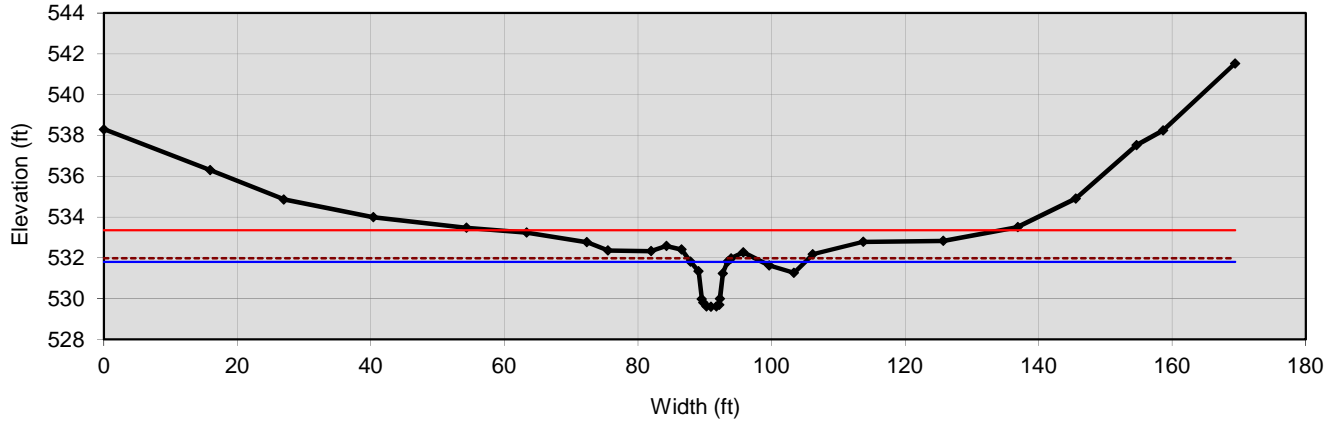
Flow Resistance

0.045	Manning's roughness
0.20	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

0.5	channel slope (%)
0.52	shear stress (lb/sq.ft.)
0.52	shear velocity (ft/s)
1.85	unit strm power (lb/ft/s)

UT1 XS2, Pool



Bankfull Dimensions

7.4	x-section area (ft.sq.)
5.5	width (ft)
1.3	mean depth (ft)
2.2	max depth (ft)
7.9	wetted parimeter (ft)
0.9	hyd radi (ft)
4.1	width-depth ratio

Flood Dimensions

66.4	W flood prone area (ft)
12.1	entrenchment ratio
2.4	low bank height (ft)
1.1	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
---	threshold grain size (mm):

Bankfull Flow

---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

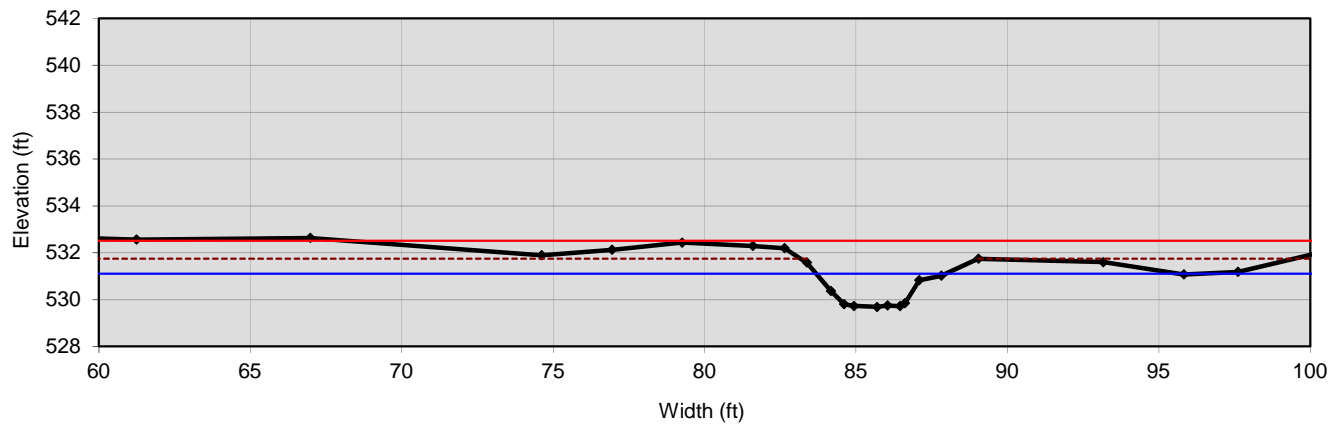
Flow Resistance

---	Manning's roughness
---	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

UT1 XS3, Riffle



Bankfull Dimensions

3.9	x-section area (ft.sq.)
4.3	width (ft)
0.9	mean depth (ft)
1.4	max depth (ft)
5.6	wetted parimeter (ft)
0.7	hyd radi (ft)
4.7	width-depth ratio

Flood Dimensions

34.9	W flood prone area (ft)
8.2	entrenchment ratio
2.1	low bank height (ft)
1.5	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
26	threshold grain size (mm):

Bankfull Flow

3.2	velocity (ft/s)
12.4	discharge rate (cfs)
0.69	Froude number

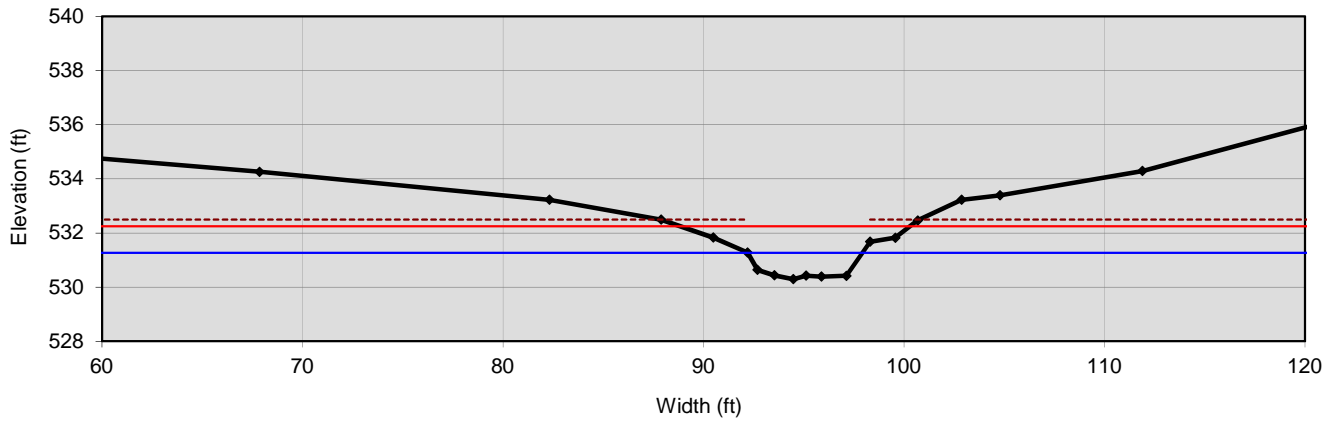
Flow Resistance

0.040	Manning's roughness
0.21	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

1.24	channel slope (%)
0.53	shear stress (lb/sq.ft.)
0.52	shear velocity (ft/s)
2.3	unit strm power (lb/ft/s)

UT2 Reach 1 XS4, Riffle



Bankfull Dimensions

4.3	x-section area (ft.sq.)
5.7	width (ft)
0.7	mean depth (ft)
1.0	max depth (ft)
6.5	wetted parimeter (ft)
0.7	hyd radi (ft)
7.6	width-depth ratio

Flood Dimensions

11.5	W flood prone area (ft)
2.0	entrenchment ratio
2.2	low bank height (ft)
2.2	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
29	threshold grain size (mm):

Bankfull Flow

3.0	velocity (ft/s)
12.8	discharge rate (cfs)
0.65	Froude number

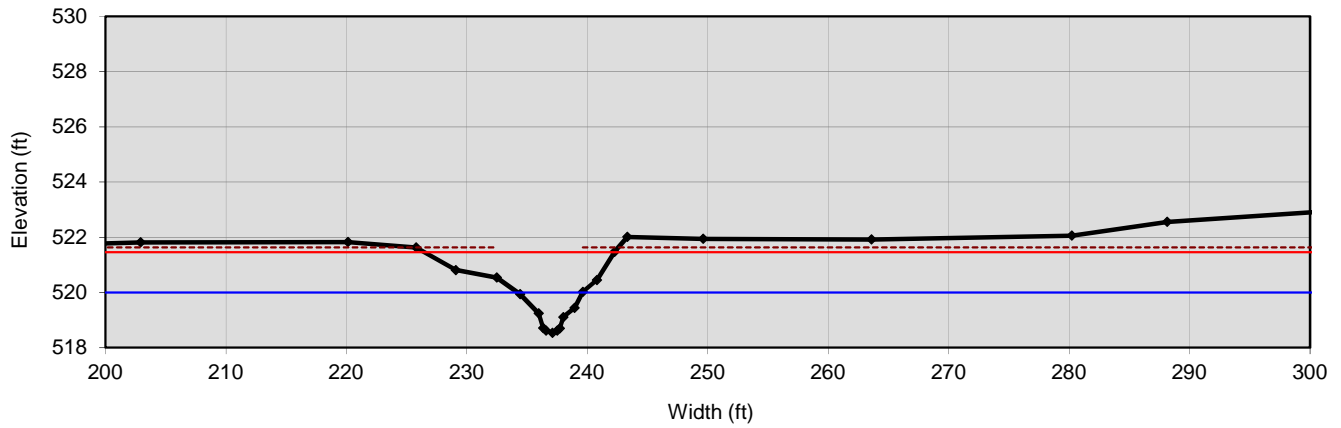
Flow Resistance

0.045	Manning's roughness
0.27	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

1.4	channel slope (%)
0.58	shear stress (lb/sq.ft.)
0.55	shear velocity (ft/s)
1.95	unit strm power (lb/ft/s)

UT2 Reach 2 XS5, Riffle



Bankfull Dimensions

4.1	x-section area (ft.sq.)
5.4	width (ft)
0.8	mean depth (ft)
1.5	max depth (ft)
6.3	wetted parimeter (ft)
0.7	hyd radi (ft)
7.0	width-depth ratio

Flood Dimensions

25.6	W flood prone area (ft)
4.8	entrenchment ratio
3.1	low bank height (ft)
2.1	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
28	threshold grain size (mm):

Bankfull Flow

2.9	velocity (ft/s)
12.2	discharge rate (cfs)
0.64	Froude number

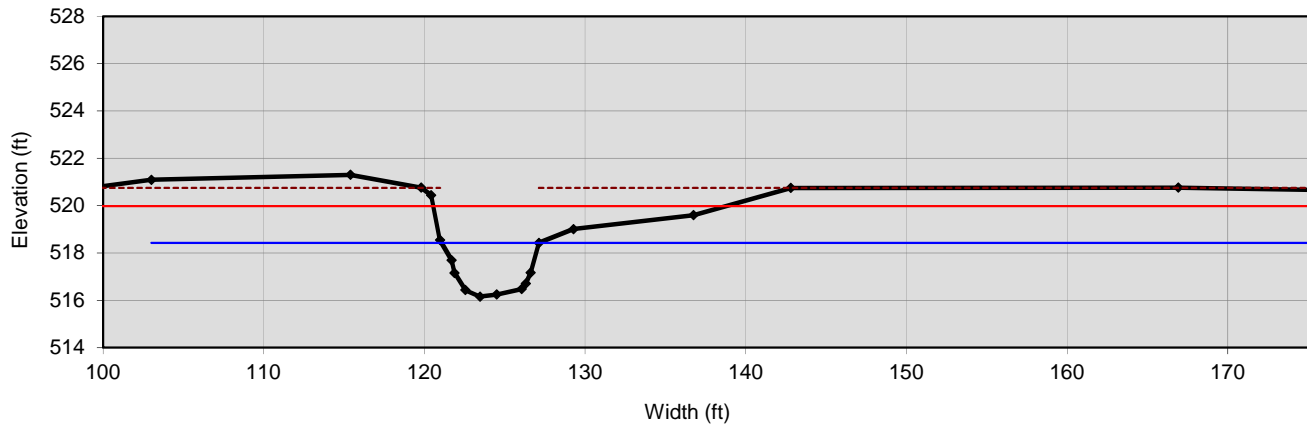
Flow Resistance

0.045	Manning's roughness
0.27	D'Arcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power

1.4	channel slope (%)
0.57	shear stress (lb/sq.ft.)
0.54	shear velocity (ft/s)
1.98	unit strm power (lb/ft/s)

UT2 Reach 2 XS6, Pool



Bankfull Dimensions

10.2	x-section area (ft.sq.)
6.1	width (ft)
1.7	mean depth (ft)
2.3	max depth (ft)
8.3	wetted parimeter (ft)
1.2	hyd radi (ft)
3.6	width-depth ratio

Flood Dimensions

33.3	W flood prone area (ft)
5.5	entrenchment ratio
4.6	low bank height (ft)
2.0	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
---	threshold grain size (mm):

Bankfull Flow

---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

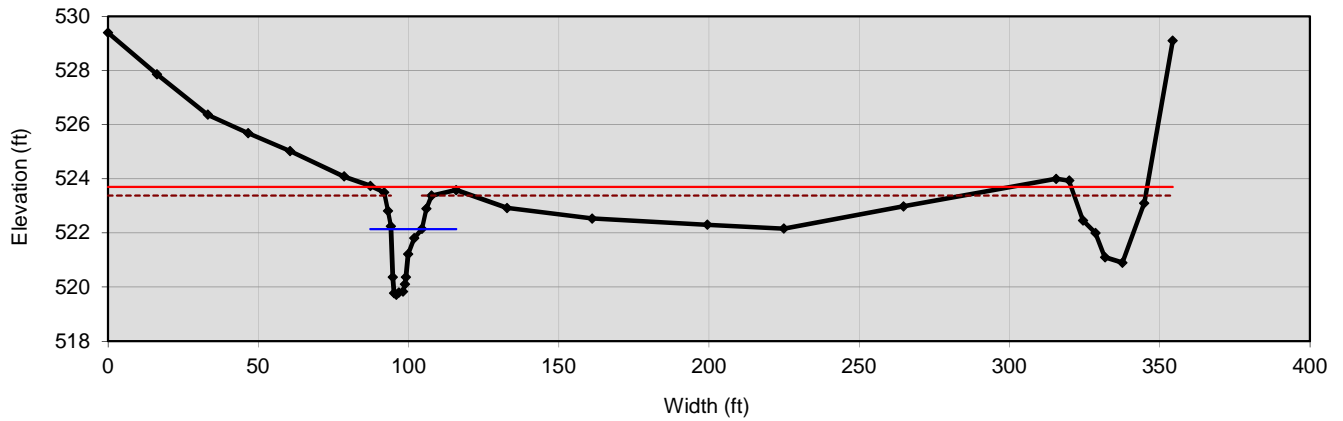
Flow Resistance

---	Manning's roughness
---	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

UT2A XS7, Pool



Bankfull Dimensions

13.2	x-section area (ft.sq.)
10.3	width (ft)
1.3	mean depth (ft)
2.4	max depth (ft)
12.6	wetted parimeter (ft)
1.0	hyd radi (ft)
8.1	width-depth ratio

Flood Dimensions

237.3	W flood prone area (ft)
23.0	entrenchment ratio
3.7	low bank height (ft)
1.5	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
---	threshold grain size (mm):

Bankfull Flow

---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

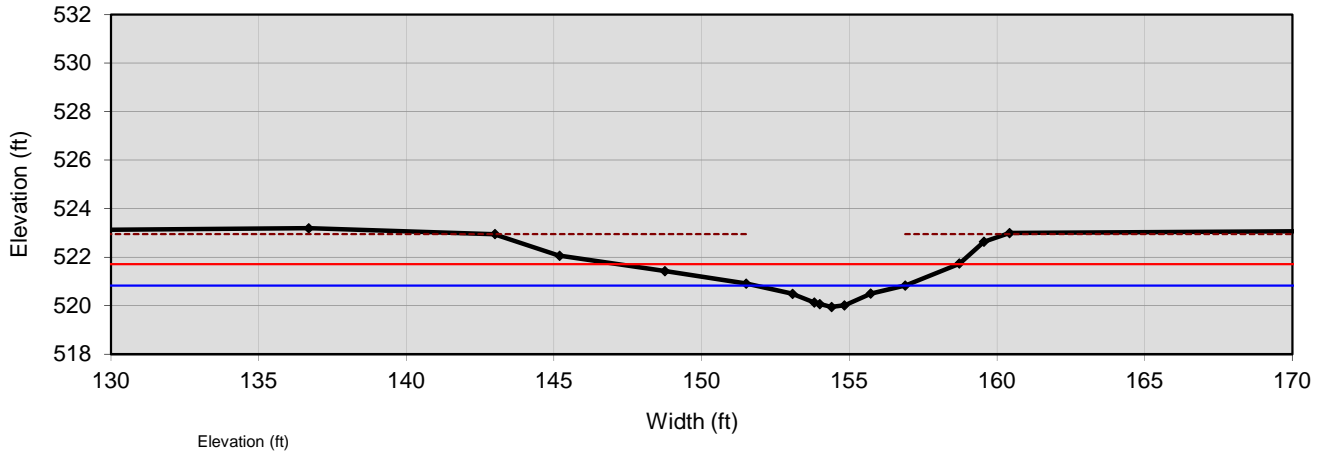
Flow Resistance

---	Manning's roughness
---	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

UT2A XS8, Riffle



Bankfull Dimensions

2.1	x-section area (ft.sq.)
5.1	width (ft)
0.4	mean depth (ft)
0.9	max depth (ft)
5.4	wetted parimeter (ft)
0.4	hyd radi (ft)
12.0	width-depth ratio

Flood Dimensions

11.5	W flood prone area (ft)
2.3	entrenchment ratio
3.0	low bank height (ft)
3.4	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
24	threshold grain size (mm):

Bankfull Flow

2.8	velocity (ft/s)
6.1	discharge rate (cfs)
0.79	Froude number

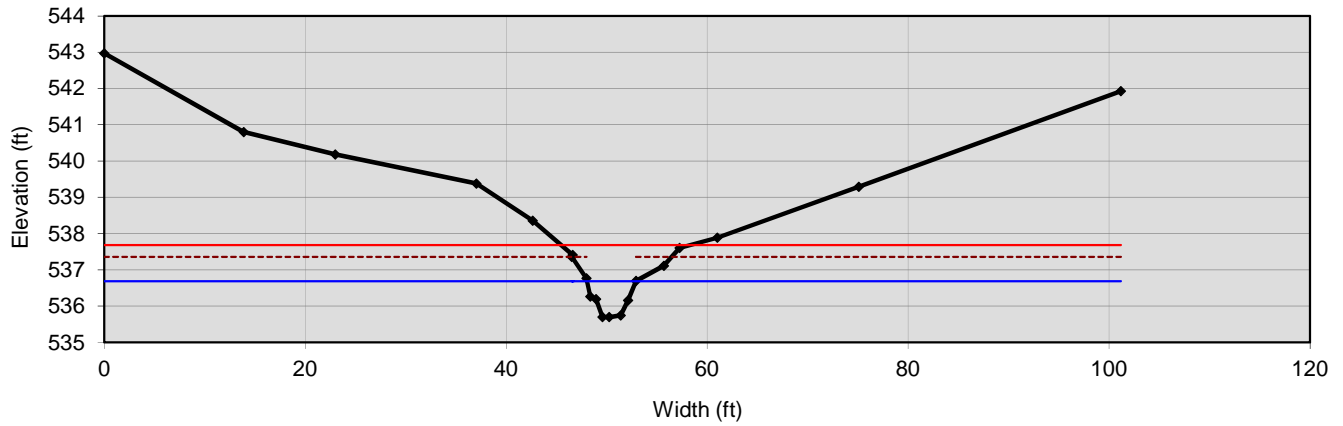
Flow Resistance

0.040	Manning's roughness
0.25	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

1.98	channel slope (%)
0.49	shear stress (lb/sq.ft.)
0.50	shear velocity (ft/s)
1.48	unit strm power (lb/ft/s)

UT2B XS9, Riffle



Bankfull Dimensions

3.3	x-section area (ft.sq.)
4.9	width (ft)
0.7	mean depth (ft)
1.0	max depth (ft)
5.5	wetted parimeter (ft)
0.6	hyd radi (ft)
7.1	width-depth ratio

Flood Dimensions

12.9	W flood prone area (ft)
2.6	entrenchment ratio
1.7	low bank height (ft)
1.7	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
---	threshold grain size (mm):

Bankfull Flow

---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

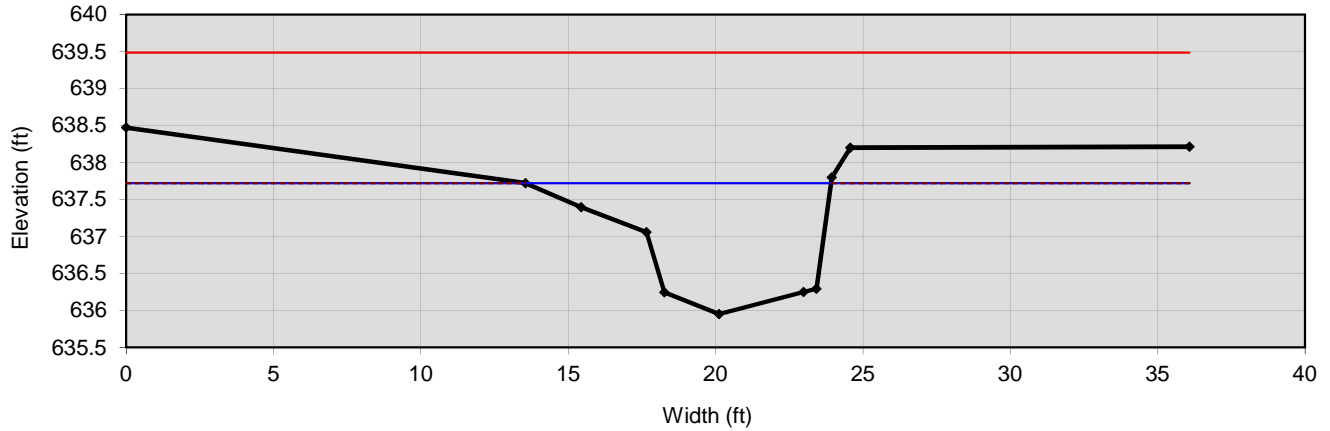
Flow Resistance

---	Manning's roughness
---	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

Agony Acres UT1A Reach 2 XS1, Riffle



Bankfull Dimensions

10.7	x-section area (ft.sq.)
10.4	width (ft)
1.0	mean depth (ft)
1.8	max depth (ft)
11.9	wetted parimeter (ft)
0.9	hyd radi (ft)
10.1	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.8	low bank height (ft)
1.0	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
11	threshold grain size (mm):

Bankfull Flow

2.2	velocity (ft/s)
23.1	discharge rate (cfs)
0.40	Froude number

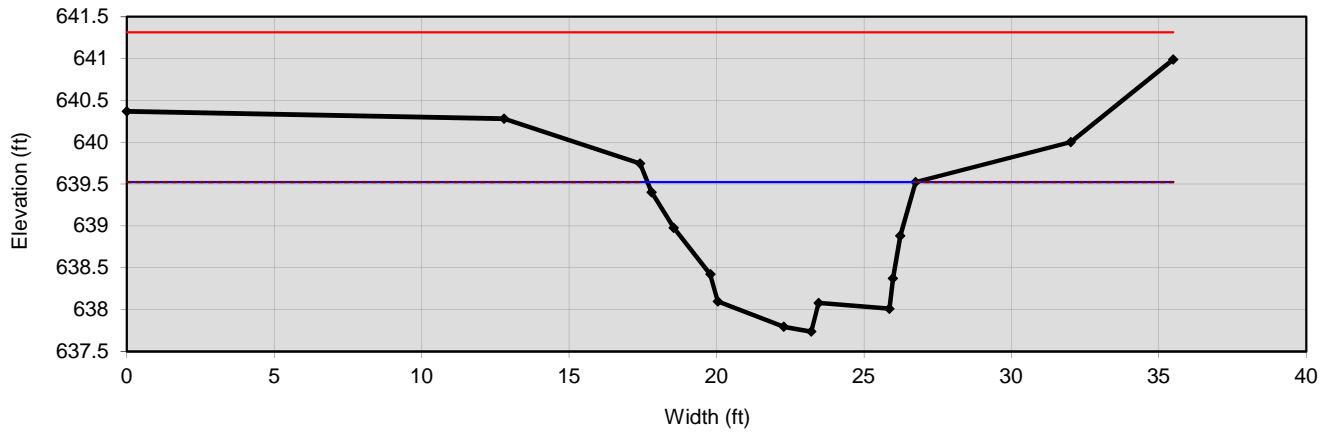
Flow Resistance

0.040	Manning's roughness
0.19	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

0.39	channel slope (%)
0.22	shear stress (lb/sq.ft.)
0.34	shear velocity (ft/s)
0.54	unit strm power (lb/ft/s)

Agony Acres UT1A Reach 2 XS1, Riffle



Bankfull Dimensions

11.3	x-section area (ft.sq.)
9.1	width (ft)
1.2	mean depth (ft)
1.8	max depth (ft)
10.6	wetted parimeter (ft)
1.1	hyd radi (ft)
7.3	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.8	low bank height (ft)
1.0	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
13	threshold grain size (mm):

Bankfull Flow

2.4	velocity (ft/s)
27.4	discharge rate (cfs)
0.41	Froude number

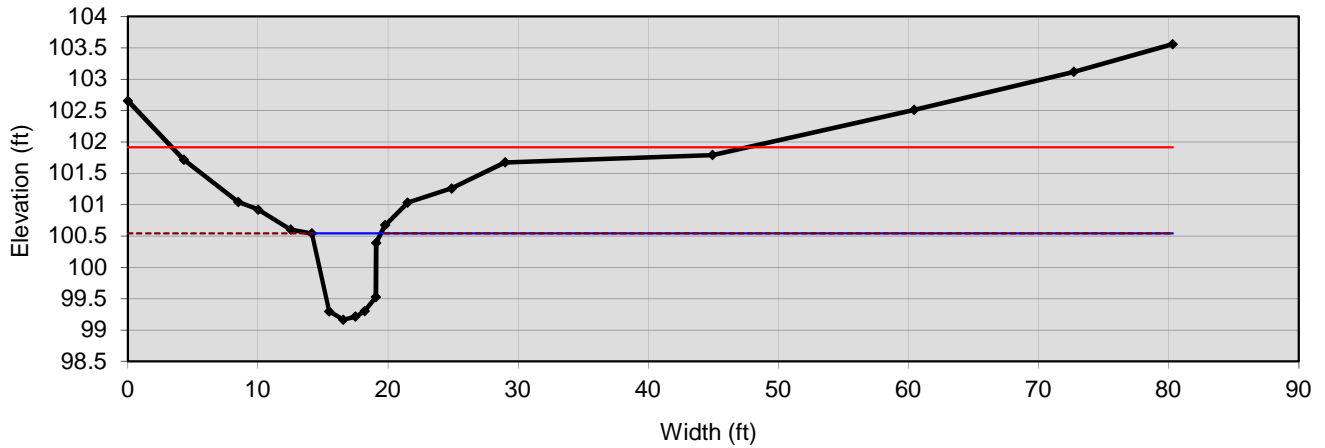
Flow Resistance

0.040	Manning's roughness
0.18	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

0.39	channel slope (%)
0.26	shear stress (lb/sq.ft.)
0.37	shear velocity (ft/s)
0.73	unit strm power (lb/ft/s)

UT to Polecat Creek XS1, Riffle



Bankfull Dimensions

5.4	x-section area (ft.sq.)
5.3	width (ft)
1.0	mean depth (ft)
1.4	max depth (ft)
6.7	wetted parimeter (ft)
0.8	hyd radi (ft)
5.2	width-depth ratio

Flood Dimensions

44.2	W flood prone area (ft)
8.3	entrenchment ratio
1.4	low bank height (ft)
1.0	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
29	threshold grain size (mm):

Bankfull Flow

3.5	velocity (ft/s)
18.9	discharge rate (cfs)
0.68	Froude number

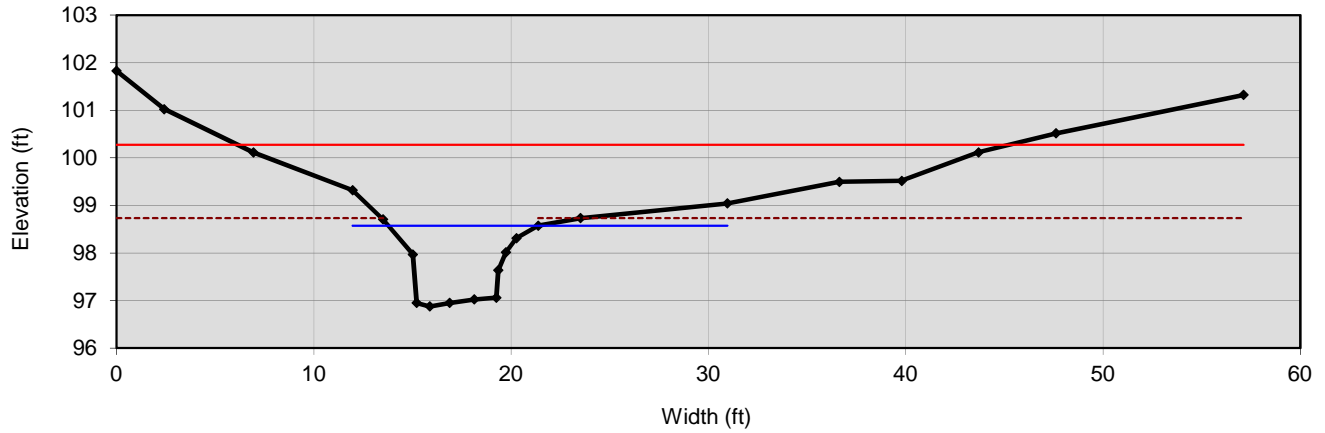
Flow Resistance

0.040	Manning's roughness
0.20	D'Arcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power

1.154	channel slope (%)
0.58	shear stress (lb/sq.ft.)
0.55	shear velocity (ft/s)
2.6	unit strm power (lb/ft/s)

UT to Polecat Creek XS2, Riffle



Bankfull Dimensions

7.8	x-section area (ft.sq.)
7.6	width (ft)
1.0	mean depth (ft)
1.7	max depth (ft)
9.3	wetted parimeter (ft)
0.8	hyd radi (ft)
7.4	width-depth ratio

Flood Dimensions

39.1	W flood prone area (ft)
5.1	entrenchment ratio
1.9	low bank height (ft)
1.1	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
9	threshold grain size (mm):

Bankfull Flow

2.0	velocity (ft/s)
15.3	discharge rate (cfs)
0.38	Froude number

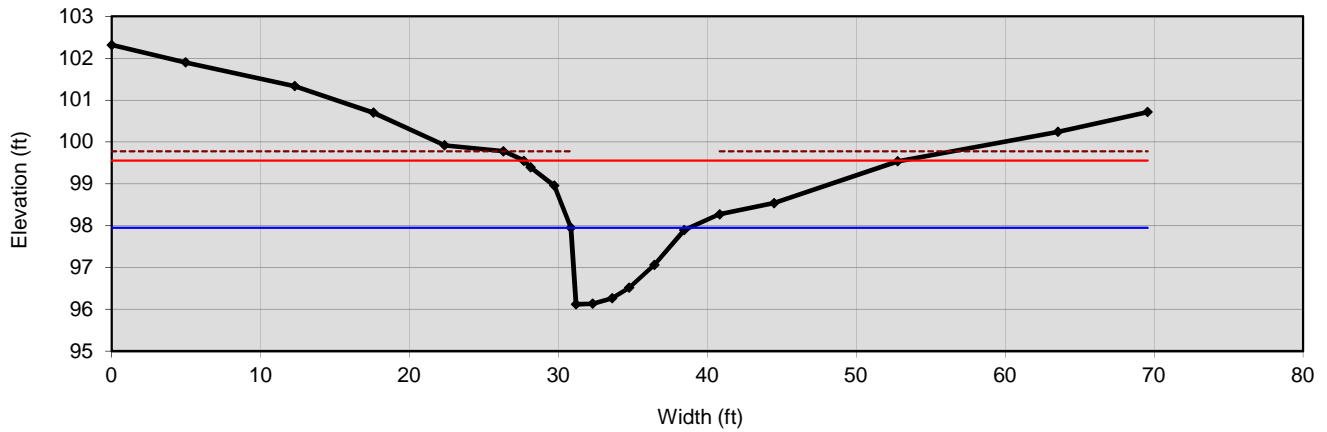
Flow Resistance

0.040	Manning's roughness
0.20	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

0.348	channel slope (%)
0.18	shear stress (lb/sq.ft.)
0.31	shear velocity (ft/s)
0.44	unit strm power (lb/ft/s)

UT to Polecat Creek XS3, Pool



Bankfull Dimensions

12.4	x-section area (ft.sq.)
10.9	width (ft)
1.1	mean depth (ft)
1.8	max depth (ft)
12.7	wetted parimeter (ft)
1.0	hyd radi (ft)
9.6	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.8	low bank height (ft)
1.0	low bank height ratio

Materials

---	D50 (mm)
---	D84 (mm)
10	threshold grain size (mm):

Bankfull Flow

2.2	velocity (ft/s)
26.7	discharge rate (cfs)
0.39	Froude number

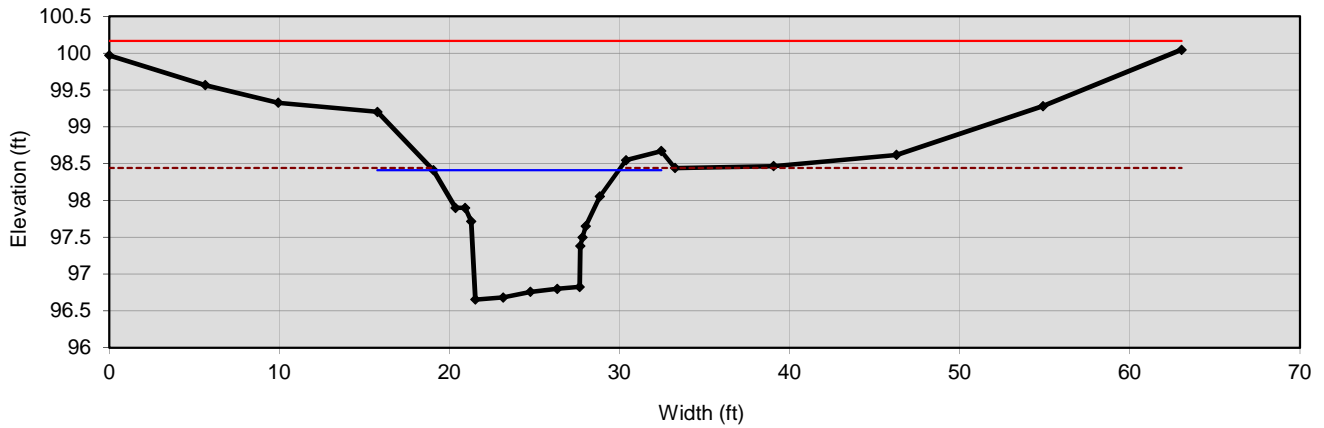
Flow Resistance

0.040	Manning's roughness
0.19	D'Arcy-Weisbach fric.
---	resistance factor u/u^*
---	relative roughness

Forces & Power

0.348	channel slope (%)
0.21	shear stress (lb/sq.ft.)
0.33	shear velocity (ft/s)
0.53	unit strm power (lb/ft/s)

UT to Polecat Creek XS4, Riffle



Bankfull Dimensions

11.8	x-section area (ft.sq.)
10.5	width (ft)
1.1	mean depth (ft)
1.5	max depth (ft)
11.6	wetted parimeter (ft)
1.0	hyd radi (ft)
9.3	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.7	low bank height (ft)
1.1	low bank height ratio

Materials

16	D50 Riffle (mm)
94	D84 Riffle (mm)
53	threshold grain size (mm):

Rosgen Stream Type

C4/E4

Bankfull Flow

4.6	velocity (ft/s)
54.0	discharge rate (cfs)
0.80	Froude number

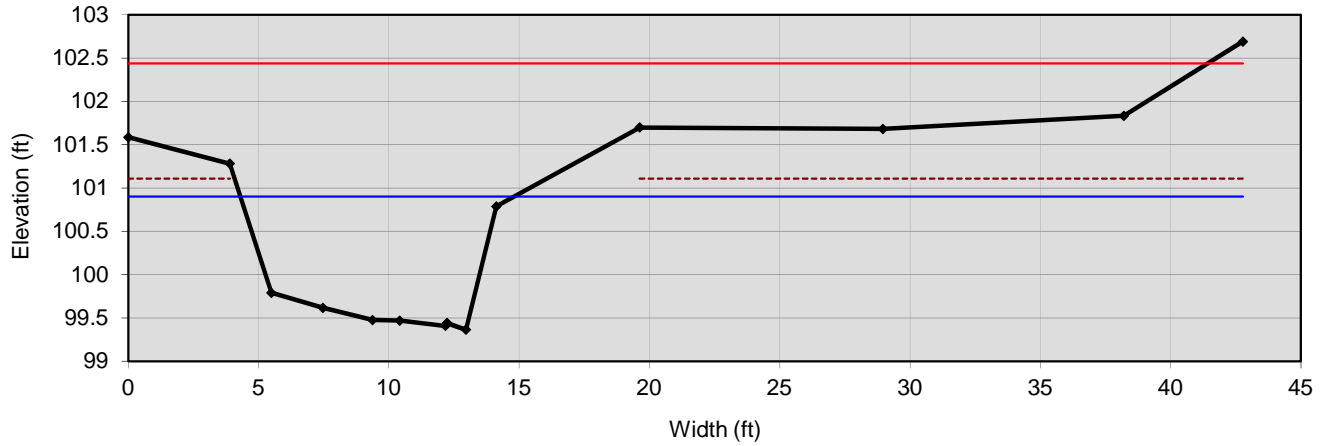
Flow Resistance

0.043	Manning's roughness
0.21	D'Arcy-Weisbach fric.
6.2	resistance factor u/u^*
3.7	relative roughness

Forces & Power

1.7	channel slope (%)
1.08	shear stress (lb/sq.ft.)
0.75	shear velocity (ft/s)
5.5	unit strm power (lb/ft/s)

UT to Varnals Creek XS1, Riffle



Bankfull Dimensions

22.0	x-section area (ft.sq.)
15.1	width (ft)
1.5	mean depth (ft)
2.5	max depth (ft)
17.5	wetted parimeter (ft)
1.3	hyd radi (ft)
10.4	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
2.4	low bank height (ft)
1.0	low bank height ratio

Materials

16	D50 Riffle (mm)
94	D84 Riffle (mm)
65	threshold grain size (mm):

Rosgen Stream Type

Bankfull Flow

5.7	velocity (ft/s)
125.8	discharge rate (cfs)
0.90	Froude number

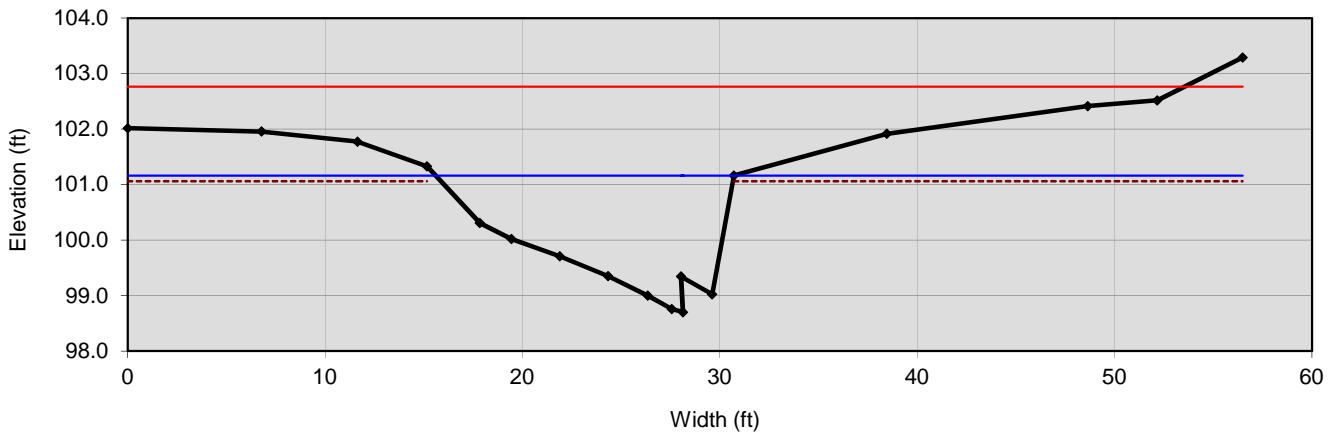
Flow Resistance

0.039	Manning's roughness
0.17	D'Arcy-Weisbach fric.
6.9	resistance factor u/u^*
4.7	relative roughness

Forces & Power

1.7	channel slope (%)
1.33	shear stress (lb/sq.ft.)
0.83	shear velocity (ft/s)
8.8	unit strm power (lb/ft/s)

UT to Varnals Creek XS2, Pool



Bankfull Dimensions

22.7	x-section area (ft.sq.)
18.6	width (ft)
1.2	mean depth (ft)
2.6	max depth (ft)
20.0	wetted parimeter (ft)
1.1	hyd radi (ft)
15.2	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
2.2	low bank height (ft)
0.8	low bank height ratio

Materials

16	D50 Riffle (mm)
94	D84 Riffle (mm)
59	threshold grain size (mm):

Rosgen Stream Type

Bankfull Flow

5.4	velocity (ft/s)
122.1	discharge rate (cfs)
0.89	Froude number

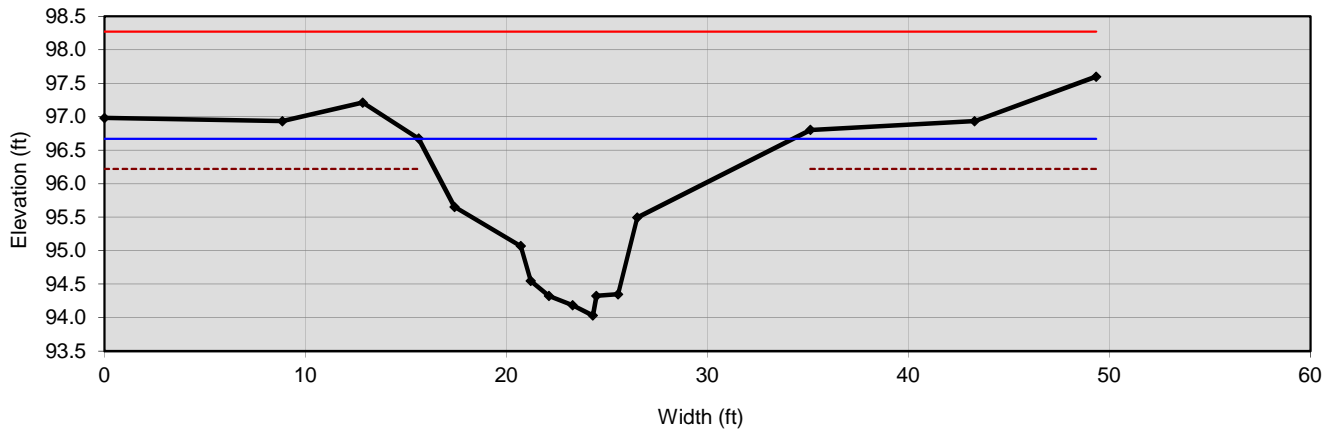
Flow Resistance

0.039	Manning's roughness
0.17	D'Arcy-Weisbach fric.
6.8	resistance factor u/u^*
4.0	relative roughness

Forces & Power

1.7	channel slope (%)
1.21	shear stress (lb/sq.ft.)
0.79	shear velocity (ft/s)
7	unit strm power (lb/ft/s)

UT to Varnals Creek XS3, Pool



Bankfull Dimensions

10.3	x-section area (ft.sq.)
9.3	width (ft)
1.1	mean depth (ft)
1.7	max depth (ft)
10.9	wetted parimeter (ft)
0.9	hyd radi (ft)
8.4	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.7	low bank height (ft)
1.0	low bank height ratio

Materials

16	D50 Riffle (mm)
94	D84 Riffle (mm)
49	threshold grain size (mm):

Rosgen Stream Type

C4/E4

Bankfull Flow

0.4	velocity (ft/s)
4.6	discharge rate (cfs)
0.08	Froude number

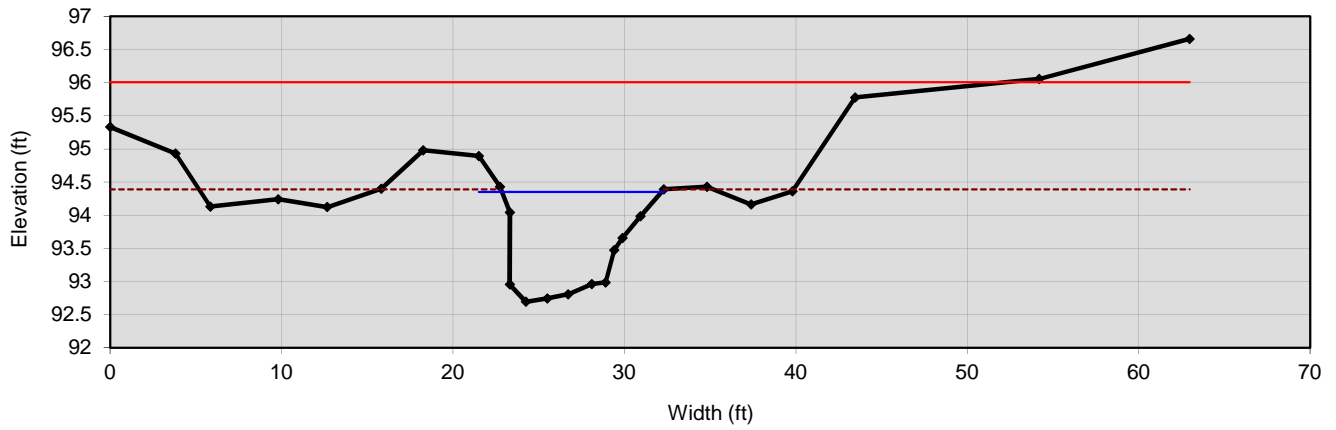
Flow Resistance

0.420	Manning's roughness
20.82	D'Arcy-Weisbach fric.
6.1	resistance factor u/u^*
3.6	relative roughness

Forces & Power

1.7	channel slope (%)
1.01	shear stress (lb/sq.ft.)
0.72	shear velocity (ft/s)
0.53	unit strm power (lb/ft/s)

UT to Varnals Creek XS4, Riffle



Bankfull Dimensions

12.3	x-section area (ft.sq.)
10.0	width (ft)
1.2	mean depth (ft)
1.6	max depth (ft)
10.9	wetted parimeter (ft)
1.1	hyd radi (ft)
8.1	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.6	low bank height (ft)
1.0	low bank height ratio

Materials

16	D50 Riffle (mm)
94	D84 Riffle (mm)
59	threshold grain size (mm):

Rosgen Stream Type

C4/E4

Bankfull Flow

5.0	velocity (ft/s)
61.7	discharge rate (cfs)
0.83	Froude number

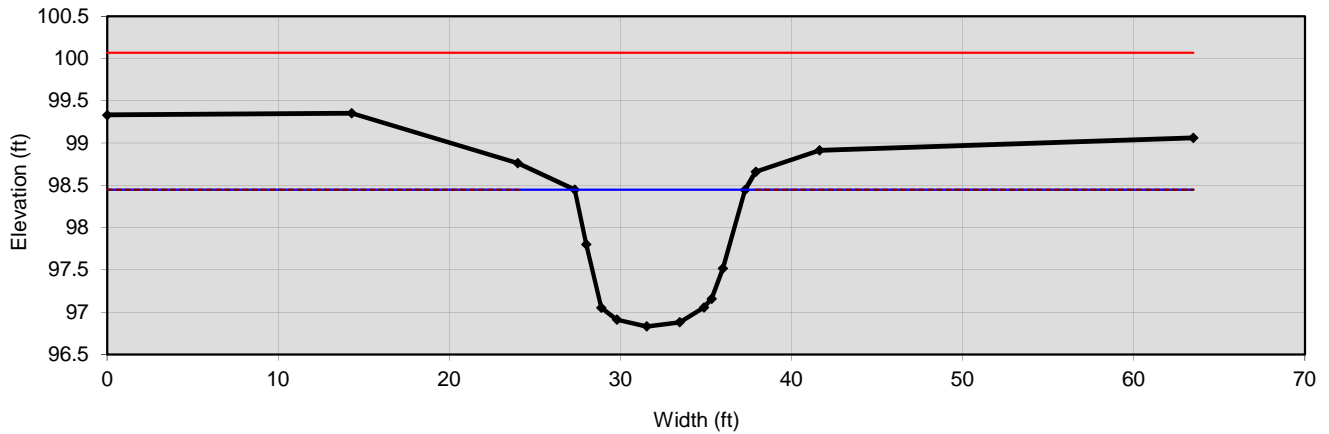
Flow Resistance

0.042	Manning's roughness
0.20	D'Arcy-Weisbach fric.
6.4	resistance factor u/u^*
4.0	relative roughness

Forces & Power

1.7	channel slope (%)
1.20	shear stress (lb/sq.ft.)
0.79	shear velocity (ft/s)
6.6	unit strm power (lb/ft/s)

UT to Varnals Creek XS5, Riffle



Bankfull Dimensions

12.3	x-section area (ft.sq.)
10.0	width (ft)
1.2	mean depth (ft)
1.6	max depth (ft)
10.9	wetted parimeter (ft)
1.1	hyd radi (ft)
8.1	width-depth ratio

Flood Dimensions

---	W flood prone area (ft)
---	entrenchment ratio
1.6	low bank height (ft)
1.0	low bank height ratio

Materials

16	D50 Riffle (mm)
94	D84 Riffle (mm)
59	threshold grain size (mm):

Rosgen Stream Type

C4/E4

Bankfull Flow

5.0	velocity (ft/s)
61.7	discharge rate (cfs)
0.83	Froude number

Flow Resistance

0.042	Manning's roughness
0.20	D'Arcy-Weisbach fric.
6.4	resistance factor u/u^*
4.0	relative roughness

Forces & Power

1.7	channel slope (%)
1.20	shear stress (lb/sq.ft.)
0.79	shear velocity (ft/s)
6.6	unit strm power (lb/ft/s)

Appendix 6

HEC-20 Channel Stability Assessment Data

Stream:
Reach:
Date:
Weather:
Location:

Observers:
Project:
Drainage Area:
Stream Type

Stability Indicator	Score		
	Excellent (1 - 3)	Fair (7 - 9)	Poor (10 - 12)
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed
2. Flow habit	Perennial stream with no flashy behavior	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development	For S < 0.02 and wly > 12, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and wly are < 12, no bars are evident	For S < 0.02 and wly > 12, bars tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and wly < 12	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and wly > 12
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen

Stability Indicator	Excellent (1 - 3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay, cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 80-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	
13. Upstream distance to bridge from incisioner impact point and alignment	More than 35 m; bridge is well-aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow, or flow alignment is otherwise not centered in reach triangle	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, w/y = width-to-depth ratio

Total Score

UT to
 Stream: Pine Hill Branch
 Reach:
 Date: 6/13/14
 Weather: Partly Cloudy
 Location:

Observers: IEckert/C McKenzie
 Project: Holman Mill
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	8
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream	2
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	3
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge	4
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	9
6. Bar development	For $S < 0.02$ and $w/y > 12$, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For $S > 0.02$ and w/y are < 12, no bars are evident	For $S < 0.02$ and $w/y > 12$, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For $S > 0.02$ and $w/y < 12$, no bars are evident	For $S < 0.02$ and $w/y > 12$, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for $S > 0.02$ and $w/y < 12$	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for $S < 0.02$ and $w/y > 12$	3
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Occasional, causing cross currents and minor bank and bottom erosion	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen	5

Check aerial

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	4
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	8
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 80-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	6
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	6
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	6
13. Upstream distance to bridge from meander impact point and alignment	More than 35 m; bridge is well-aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow, or flow alignment is otherwise not centered beneath bridge	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, w/y = width-to-depth ratio

Total Score

30

64

Stream: UT1
 Reach:
 Date: 6-13-14
 Weather: Partly Cloudy, 85°
 Location:

Observers: I Eckardt / C McKenzie
 Project: Holman Mill
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	8
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream	2
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	3
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge	4
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	10
6. Bar development	For S < 0.02 and wly > 12, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and wly are < 12, no bars are evident	For S < 0.02 and wly > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and wly < 12, no bars are evident	For S < 0.02 and wly > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and wly < 12	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and wly > 12	3
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Occasional, causing cross currents and minor bank and bottom erosion	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen	4

Check aerial

No man-made manipulation but cattle have imposed pattern.
 No evidence of out of bank floodplain connection

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay, cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	4
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	10
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 80-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	9
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	7
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	7
13. Upstream distance to bridge from meander impact point and alignment	More than 35 m; bridge is well-aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow, or flow alignment is otherwise not centered beneath bridge	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, w/d = width-to-depth ratio

Total Score

37

71

Stream: **UTIA**
 Reach:
 Date: **6/13/14**
 Weather: **Partly Cloudy**
 Location:

Observers: **J. Eckardt**
 Project: **Holman Mill**
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	8
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent; mode of discharge; ephemeral stream other than first-order stream	2
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	3
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge	1
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	10
6. Bar development	For $S < 0.02$ and $w/y > 12$, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For $S > 0.02$ and w/y are < 12, no bars are evident	For $S < 0.02$ and $w/y > 12$, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For $S > 0.02$ and $w/y < 12$, no bars are evident	For $S < 0.02$ and $w/y > 12$, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for $S > 0.02$ and $w/y < 12$	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for $S < 0.02$ and $w/y > 12$	1
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Occasional, causing cross currents and minor bank and bottom erosion	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen	1

Stability Indicator	Excellent (1 -3)	Good (4 -6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	4
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (16°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.8:1 (80°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	10
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 60-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	11
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	6
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	3
13. Upstream distance to bridge from meander impact point and alignment	More than 35 m; bridge is well aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow, or flow alignment is otherwise not centered beneath bridge	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, wly = width-to-depth ratio

Total Score

60

Stream: UTZ
 Reach: Reach 1
 Date: 6/13/14
 Weather: Partly Cloudy
 Location:

Observers: J Eckwold
 Project: Holman Mill
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1 - 3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	6
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream	2
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	3
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge	5
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	4
6. Bar development	For S < 0.02 and wly > 12, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and wly are < 12, no bars are evident	For S < 0.02 and wly > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and wly < 12, no bars are evident	For S < 0.02 and wly > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and wly < 12	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and wly > 12	5
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Occasional, causing cross currents and minor bank and bottom erosion	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen	7

Narrow valley
 no evidence of
 floodplain corridors
 few benches forming

Bedrock is
 frequent but
 little impact on
 instability

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	5
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	10
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 80-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	4
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	4
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	4
13. Upstream distance to bridge from meander impact point and alignment	More than 35 m; bridge is well-aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow, or flow alignment is otherwise not centered beneath bridge	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, wly = width-to-depth ratio

Total Score

27

59

Stream: UT2
 Reach: R2
 Date: 6/13/14
 Weather: Partly Cloudy
 Location:

Observers: J Eckardt
 Project: Holman Mill
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	7
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream	7.2
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	3
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge	9
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	9
6. Bar development	For S < 0.02 and wly > 12, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and wly are < 12, no bars are evident	For S < 0.02 and wly > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and wly < 12, no bars are evident	For S < 0.02 and wly > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and wly < 12	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and wly > 12	3
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Occasional, causing cross currents and minor bank and bottom erosion	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen	6

Open pasture vs forested above.

No evidence of channelization

Channel because incised w/ no attachment to floodplain

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	5
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	12
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 80-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	9
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	8
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	9
13. Upstream distance to bridge from meander impact point and alignment	More than 35 m; bridge is well aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow; or flow alignment is otherwise not centered beneath bridge	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, w/y = width-to-depth ratio

Total Score

43

82

Stream: **UT2 A**
 Reach:
 Date: **6-13-14**
 Weather: **Partly Cloudy**
 Location:

Observers: **J Eckardt**
 Project: **Halman Mill**
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	7
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream	2
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	9
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ration small; deeply confined; no active flood plain; levees are high and along the channel edge	9
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	7
6. Bar development	For S < 0.02 and wly > 12, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and wly are < 12, no bars are evident	For S < 0.02 and wly > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and wly < 12, no bars are evident	For S < 0.02 and wly > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and wly < 12	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and wly > 12	3
7. Obstructions, including bedrock outcrops, armor layer, LED jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present	Occasional, causing cross currents and minor bank and bottom erosion	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions	Frequent and often unstable, causing a continual shift of sediment and flow. Traps are easily filled, causing channel to migrate and/or widen	5

Check aerial in office

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	5
9. Average bank slope angle (where 90° is a vertical bank)	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks	Bank slopes over 45° in noncohesive or unconsolidated materials or over 60° in clays common on one or both banks	12
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Wood vegetation oriented 80-90% from horizontal with minimal root exposure. Partial lining or armoring of one or both banks	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80% from horizontal, often with evident root exposure. No lining of banks, but some armoring may be in place on one bank	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70% from horizontal with extensive root exposure. No lining or armoring of banks	11
11. Bank cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank	Some intermittently along channel bends and at prominent constrictions. Raw banks comprise minor portion of bank in vertical direction	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs	8
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular, and scalloping of banks is evident	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping is considerable. Channel width is highly irregular, and banks are scalloped	10
13. Upstream distance to bridge from meander impact point and alignment	More than 35 m; bridge is well aligned with river flow	20-35 m; bridge is aligned with flow	10-20 m; bridge is skewed to flow, or flow alignment is otherwise not centered beneath bridge	Less than 10 m; bridge is poorly aligned with flow	

H = horizontal, V = vertical, Fs = fraction of sand, S = slope, w/y = width-to-depth ratio

Total Score

46

88

Stream: UT2B
 Reach:
 Date: 6/13/14
 Weather: Partly Cloudy
 Location:

Observers: J Eckardt
 Project: Holman Mill
 Drainage Area:
 Stream Type

Stability Indicator	Excellent (1 - 3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
1. Watershed and flood plain activity and characteristics	Stable, forested, undisturbed watershed	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities	Frequent disturbances in the watershed, including cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed	Continual disturbances in the watershed. Significant cattle activity, landslides, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed	8
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral first-order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than first-order stream	3
3. Channel pattern	No evidence of channelization. Meandering, stable channel or straight (step-pool system, narrow valley), stable channel.	Appears to have previously been channelized. Stream is relatively stable. Channel has some meanders due to previous channel adjustment.	Appears to have previously been channelized. Stream is actively adjusting (meandering); localized areas of instability and/or erosion around bends. Straightened, stable channel.	Appears to have previously been channelized. Stream is actively adjusting (laterally and/or vertically) with few bends. Straight, unstable reach.	4
4. Entrenchment/ channel confinement	Active flood plain exists at top of banks; no sign of undercutting infrastructure; no levees	Active flood plain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; flood plain abandoned; levees are moderate in size and have minimal setback from the river	Knickpoints visible downstream; exposed water lines or other infrastructure; channel-width-to-top-of-banks ratio small; deeply confined; no active flood plain; levees are high and along the channel edge	4
5. Bed material Fs = approximate portion of sand in the bed	Assorted sized tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%	8
6. Bar development	For $S < 0.02$ and $w/y > 12$, bars are mature, narrow relative to stream width at low flow, well-vegetated, and composed of coarse gravel to cobbles. For $S > 0.02$ and w/y are < 12, no bars are evident	For $S < 0.02$ and $w/y > 12$, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For $S > 0.02$ and $w/y < 12$, no bars are evident	For $S < 0.02$ and $w/y > 12$, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for $S > 0.02$ and $w/y < 12$	Bar widths are generally greater than 1/2 the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for $S < 0.02$ and $w/y > 12$	3
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Intermittent
but not flashy

Stability Indicator	Excellent (1 -3)	Good (4 - 6)	Fair (7 - 9)	Poor (10 - 12)	Score
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers of lenses that include noncohesive sands and gravels	4
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H = horizontal, V = vertical, Fs = fraction of sand, S = slope, wly = width-to-depth ratio

Total Score

34

68

Appendix 7

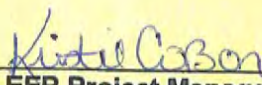
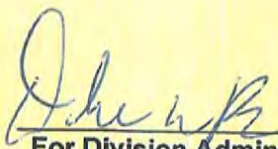
Categorical Exclusion with Resource Agency Correspondence

&

IRT Correspondence

Categorical Exclusion Form for Ecosystem Enhancement Program 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:	Holman Mill Stream Mitigation Site
County Name:	Alamance County
EEP Number:	96316
Project Sponsor:	Wildlands Engineering, Inc.
Project Contact Name:	Andrea S. Eckardt
Project Contact Address:	1430 S. Mint Street, Suite 104, Charlotte, NC 28203
Project Contact E-mail:	aeckardt@wildlandseng.com
EEP Project Manager:	Kristie Corson
Project Description	
<p>The Holman Mill Stream Mitigation Site is a stream mitigation project located in Alamance County, NC. The project is located on several unnamed tributaries in the Cane Creek Targeted Local Watershed, approximately 4 miles southeast of the Town of Snow Camp. The project will provide stream mitigation units to NCEEP in the Cape Fear River Basin (03030002).</p>	
For Official Use Only	
Reviewed By:	
<div style="border-bottom: 1px solid black; width: 100%; text-align: center;">4-16-14</div>	<div style="border-bottom: 1px solid black; width: 100%; text-align: center;">  EEP Project Manager </div>
Date	
Conditional Approved By:	
<div style="border-bottom: 1px solid black; width: 100%;"></div>	<div style="border-bottom: 1px solid black; width: 100%; text-align: center;"> For Division Administrator FHWA </div>
Date	
<input type="checkbox"/> Check this box if there are outstanding issues	
Final Approval By:	
<div style="border-bottom: 1px solid black; width: 100%; text-align: center;">4-16-14</div>	<div style="border-bottom: 1px solid black; width: 100%; text-align: center;">  For Division Administrator FHWA </div>
Date	

Part 2: All Projects Regulation/Question		Response
Coastal Zone Management Act (CZMA)		
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 NCDRCM 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
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)		
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
National Historic Preservation Act (Section 106)		
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
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)		
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

Part 3: Ground-Disturbing Activities Regulation/Question		Response
American Indian Religious Freedom Act (AIRFA)		
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	
Antiquities Act (AA)		
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	
Archaeological Resources Protection Act (ARPA)		
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	
Endangered Species Act (ESA)		
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
2. Is Designated Critical Habitat or suitable habitat present for listed species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" 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 type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
4. Is the project "likely to adversely affect" the species 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	

Executive Order 13007 (Indian Sacred Sites)	
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
Farmland Protection Policy Act (FPPA)	
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
Fish and Wildlife Coordination Act (FWCA)	
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
Land and Water Conservation Fund Act (Section 6(f))	
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
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
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
Migratory Bird Treaty Act (MBTA)	
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
Wilderness Act	
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

**Holman Mill Mitigation Site
Categorical Exclusion
Summary**

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.

As the Holman Mill Mitigation Site is a full-delivery project; an EDR Radius Map Report with Geotcheck was ordered for the site through Environmental Data Resources, Inc on August 26, 2013. Neither the target property nor the adjacent properties were listed in any of the Federal, State, or Tribal environmental databases searched by EDR. There were no known or potential hazardous waste sites identified within or immediately adjacent to the project area. The Executive Summary of the EDR report is included in the Appendix. The full report is available if needed.

National Historic Preservation Act (Section 106)

The National Historic Preservation Act declares a national policy of historic preservation to protect, rehabilitate, restore, and reuse districts, sites, buildings, structures, and objects significant in American architecture, history, archaeology, and culture, and Section 106 mandates that federal agencies take into account the effect of an undertaking on a property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

Wildlands Engineering, Inc. (Wildlands) requested review and comment from the State Historic Preservation Office (SHPO) with respect to any archeological and architectural resources related to the Holman Mill Mitigation Site on February 27, 2014. SHPO responded on March 24, 2014 and stated they were aware of no historic resources that would be affected by the project. All correspondence related to Section 106 is included in the Appendix.

Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)

These acts, collectively known as the Uniform Act, provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establish uniform and equitable land acquisition policies.

Holman Mill Mitigation Site is a full-delivery project that includes land acquisition. Notification of the fair market value of the project property and the lack of condemnation authority by Wildlands was included in the signed option agreement for the project property. A copy of the relevant section of the option agreement is included in the Appendix.

Endangered Species Act (ESA)

Section 7 of the ESA requires federal agencies, in consultation with and with the assistance of the Secretary of the Interior or of Commerce, as appropriate, to ensure that actions they authorize, fund or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species.

There are no federal endangered or threatened species listed for Alamance County. The US Fish and Wildlife Service (USFWS) list of Endangered Species, Threatened Species, Federal Species of Concern, and Candidate Species for Alamance County is included in the Appendix.

Farmland Protection Policy Act (FPPA)

The FPPA requires that, before taking or approving any federal action that would result in conversion of farmland, the agency must examine the effects of the action using the criteria set forth in the FPPA, and, if there are adverse effects, must consider alternatives to lessen them.

The Holman Mill Mitigation Site includes the conversion of prime farmland. As such, Form AD-1006 has been completed and submitted to the Natural Resources Conservation Service (NRCS). The completed form and correspondence documenting its submittal is included in the Appendix.

Fish and Wildlife Coordination Act (FWCA)

The FWCA requires consultation with the USFWS and the appropriate state wildlife agency on projects that alter or modify a water body. Reports and recommendations prepared by these agencies document project effects on wildlife and identify measures that may be adopted to prevent loss or damage to wildlife resources.

The Holman Mill Mitigation Site includes stream restoration. Wildlands requested comment on the project from both the USFWS and the North Carolina Wildlife Resources Commission (NCWRC) on February 27, 2014. NCWRC responded on March 14, 2014 and stated they “do not anticipate the project to result in significant adverse impacts to aquatic and terrestrial wildlife resources”. The USFWS has not responded at this time. All correspondence with the two agencies is included in the Appendix.

Migratory Bird Treaty Act (MBTA)

The MBTA makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. The indirect killing of birds by destroying their nests and eggs is covered by the MBTA, so construction in nesting areas during nesting seasons can constitute a taking.

Wildlands requested comment on the Holman Mill Mitigation Site from the USFWS in regards to migratory birds on February 27, 2014. USFWS has not responded at this time. All correspondence with USFWS is included in the Appendix.

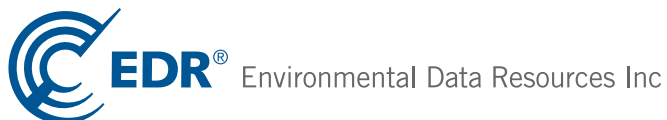
**Holman Mill Mitigation Site
Categorical Exclusion
Appendix**

Holman Mill

810-1007 CLARK RD
Snow Camp, NC 27349

Inquiry Number: 3865900.2s
February 26, 2014

The EDR Radius Map™ Report with GeoCheck®



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
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

810-1007 CLARK RD
SNOW CAMP, NC 27349

COORDINATES

Latitude (North): 35.8523000 - 35° 51' 8.28"
Longitude (West): 79.3866000 - 79° 23' 11.76"
Universal Transverse Mercator: Zone 17
UTM X (Meters): 645692.1
UTM Y (Meters): 3968568.2
Elevation: 574 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 35079-G4 CRUTCHFIELD CROSSROADS, NC
Most Recent Revision: 1974

East Map: 35079-G3 SILK HOPE, NC
Most Recent Revision: 1974

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year: 2012
Source: USDA

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

EXECUTIVE SUMMARY

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

Federal Delisted NPL site list

Delisted NPL..... National Priority List Deletions

Federal CERCLIS list

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

Federal CERCLIS NFRAP site List

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

Federal RCRA CORRACTS facilities list

CORRACTS..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

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

Federal RCRA generators list

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

Federal institutional controls / engineering controls registries

US ENG CONTROLS..... Engineering Controls Sites List
US INST CONTROL..... Sites with Institutional Controls
LUCIS..... Land Use Control Information System

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

EXECUTIVE SUMMARY

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

State and tribal registered storage tank lists

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

State and tribal institutional control / engineering control registries

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

State and tribal voluntary cleanup sites

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

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Projects Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

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

Local Lists of Landfill / Solid Waste Disposal Sites

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

Local Lists of Hazardous waste / Contaminated Sites

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

Local Land Records

LIENS 2..... CERCLA Lien Information

Records of Emergency Release Reports

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

Other Ascertainable Records

RCRA NonGen / NLR..... RCRA - Non Generators

EXECUTIVE SUMMARY

DOT OPS.....	Incident and Accident Data
DOD.....	Department of Defense Sites
FUDS.....	Formerly Used Defense Sites
CONSENT.....	Superfund (CERCLA) Consent Decrees
ROD.....	Records Of Decision
UMTRA.....	Uranium Mill Tailings Sites
US MINES.....	Mines Master Index File
TRIS.....	Toxic Chemical Release Inventory System
TSCA.....	Toxic Substances Control Act
FTTS.....	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS.....	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS.....	Section 7 Tracking Systems
ICIS.....	Integrated Compliance Information System
PADS.....	PCB Activity Database System
MLTS.....	Material Licensing Tracking System
RADINFO.....	Radiation Information Database
FINDS.....	Facility Index System/Facility Registry System
RAATS.....	RCRA Administrative Action Tracking System
RMP.....	Risk Management Plans
UIC.....	Underground Injection Wells Listing
DRYCLEANERS.....	Drycleaning Sites
NPDES.....	NPDES Facility Location Listing
INDIAN RESERV.....	Indian Reservations
SCRD DRYCLEANERS.....	State Coalition for Remediation of Drycleaners Listing
2020 COR ACTION.....	2020 Corrective Action Program List
LEAD SMELTERS.....	Lead Smelter Sites
US AIRS.....	Aerometric Information Retrieval System Facility Subsystem
PRP.....	Potentially Responsible Parties
COAL ASH DOE.....	Steam-Electric Plant Operation Data
COAL ASH.....	Coal Ash Disposal Sites
US FIN ASSUR.....	Financial Assurance Information
COAL ASH EPA.....	Coal Combustion Residues Surface Impoundments List
Financial Assurance.....	Financial Assurance Information Listing
PCB TRANSFORMER.....	PCB Transformer Registration Database
EPA WATCH LIST.....	EPA WATCH LIST

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

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

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

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

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were not identified.

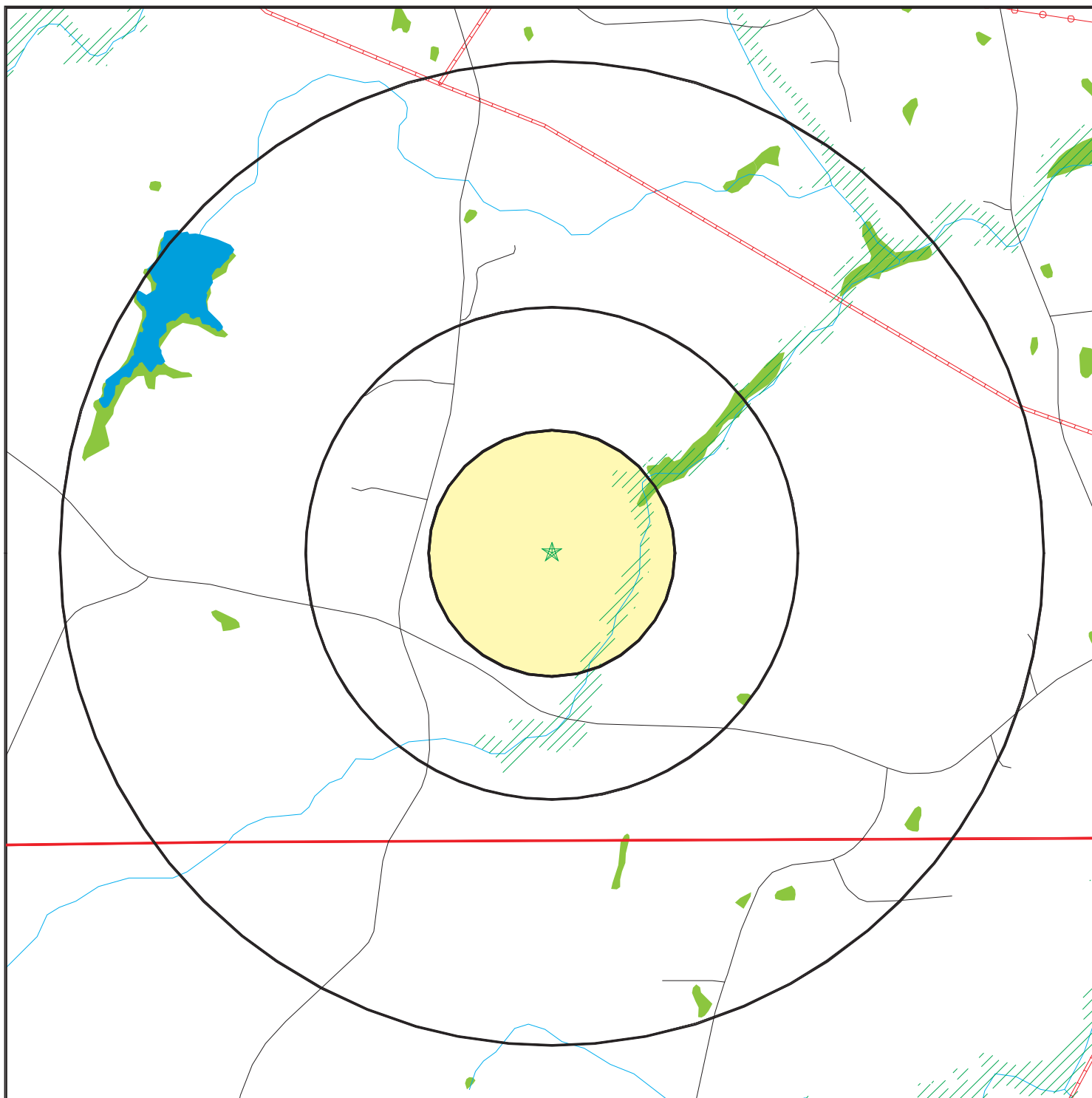
Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 6 records.

<u>Site Name</u>	<u>Database(s)</u>
SNOW CAMP	IMD, LAST
RAY'S QUICK STOP	LUST
KING PROPERTY, EDWARD	LUST, RGA LUST
WALL'S GARAGE	UST
N C FOREST SERVICE	UST
INEZ FOGLEMAN SERVICE	UST

OVERVIEW MAP - 3865900.2s



- ★ 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
- ▲ County Boundary
- ⚡ Power transmission lines
- ⚡ Oil & Gas pipelines from USGS
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- National Wetland Inventory
- State Wetlands
- ☒ Hazardous Substance Disposal Sites

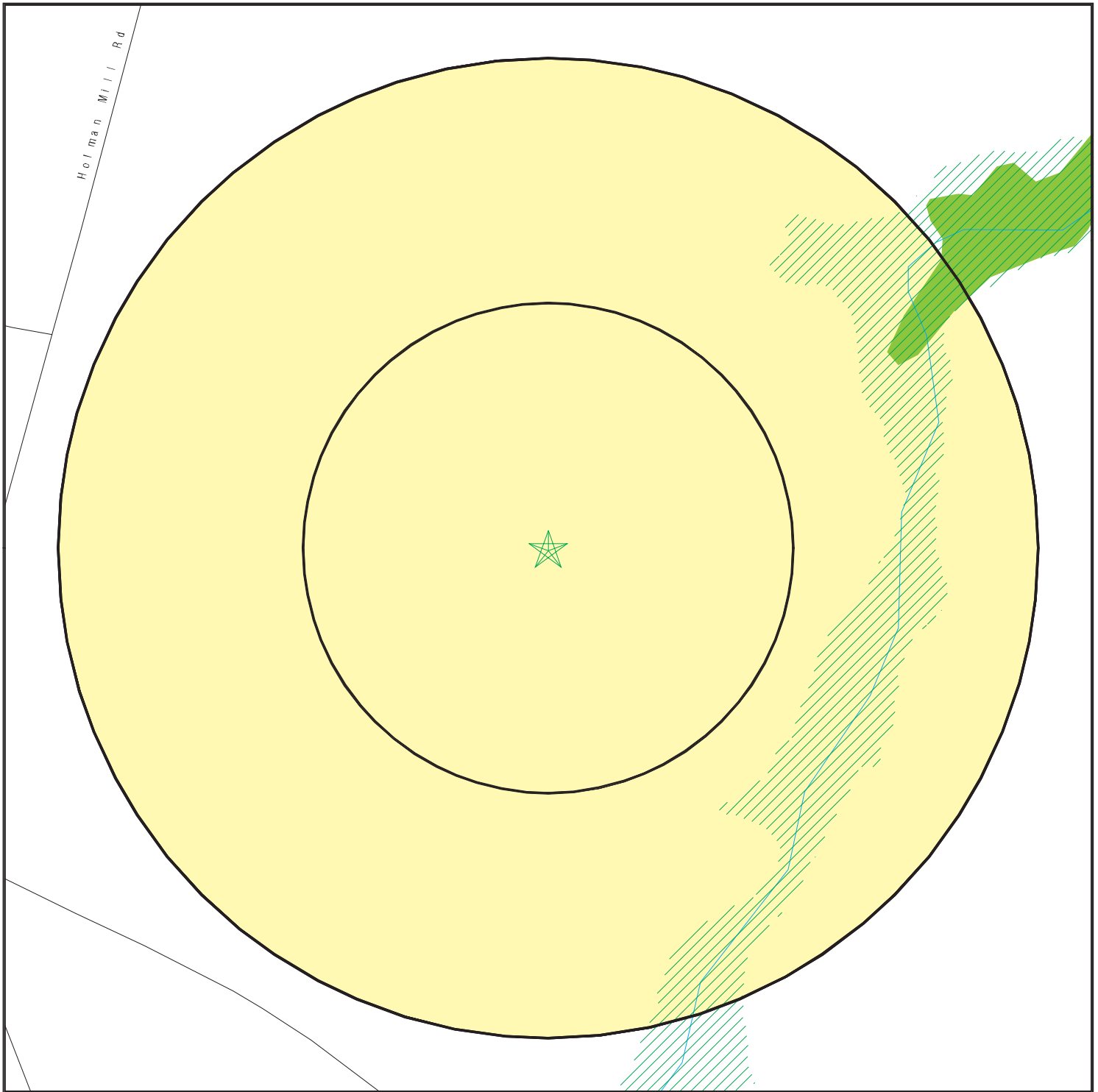


This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Holman Mill
 ADDRESS: 810-1007 CLARK RD
 Snow Camp NC 27349
 LAT/LONG: 35.8523 / 79.3866

CLIENT: Wildlands Eng, Inc.
 CONTACT: Andrea Eckardt
 INQUIRY #: 3865900.2s
 DATE: February 26, 2014 1:33 pm

DETAIL MAP - 3865900.2s



- ★ 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

- 0 1/16 1/8 1/4 Miles
- ☒ Indian Reservations BIA
- ⚡ Oil & Gas pipelines from USGS
- ▨ 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: Holman Mill
 ADDRESS: 810-1007 CLARK RD
 Snow Camp NC 27349
 LAT/LONG: 35.8523 / 79.3866

CLIENT: Wildlands Eng, Inc.
 CONTACT: Andrea Eckardt
 INQUIRY #: 3865900.2s
 DATE: February 26, 2014 1:36 pm

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
STANDARD ENVIRONMENTAL RECORDS								
<i>Federal NPL site list</i>								
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
<i>Federal Delisted NPL site list</i>								
Delisted NPL	1.000		0	0	0	0	NR	0
<i>Federal CERCLIS list</i>								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
<i>Federal CERCLIS NFRAP site List</i>								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
<i>Federal RCRA CORRACTS facilities list</i>								
CORRACTS	1.000		0	0	0	0	NR	0
<i>Federal RCRA non-CORRACTS TSD facilities list</i>								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
<i>Federal RCRA generators list</i>								
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
<i>Federal institutional controls / engineering controls registries</i>								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
<i>Federal ERNS list</i>								
ERNS	TP		NR	NR	NR	NR	NR	0
<i>State- and tribal - equivalent NPL</i>								
NC HSDS	1.000		0	0	0	0	NR	0
<i>State- and tribal - equivalent CERCLIS</i>								
SHWS	1.000		0	0	0	0	NR	0
<i>State and tribal landfill and/or solid waste disposal site lists</i>								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
<i>State and tribal leaking storage tank lists</i>								
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
LUST TRUST	0.500		0	0	0	NR	NR	0
LAST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
<i>State and tribal registered storage tank lists</i>								
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
<i>State and tribal institutional control / engineering control registries</i>								
INST CONTROL	0.500		0	0	0	NR	NR	0
<i>State and tribal voluntary cleanup sites</i>								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
<i>State and tribal Brownfields sites</i>								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
<u>ADDITIONAL ENVIRONMENTAL RECORDS</u>								
<i>Local Brownfield lists</i>								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
<i>Local Lists of Landfill / Solid Waste Disposal Sites</i>								
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
<i>Local Lists of Hazardous waste / Contaminated Sites</i>								
US CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
<i>Local Land Records</i>								
LIENS 2	TP		NR	NR	NR	NR	NR	0
<i>Records of Emergency Release Reports</i>								
HMIRS	TP		NR	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
<i>Other Ascertainable Records</i>								
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
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	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 US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LUST	TP		NR	NR	NR	NR	NR	0
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA HWS	TP		NR	NR	NR	NR	NR	0



February 27, 2014

Renee Gledhill-Earley
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: EEP Stream mitigation project in Alamance County, NC
Holman Mill Stream Mitigation Site

Dear Ms. Gledhill-Earley,

The Ecosystem Enhancement Program (EEP) requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with a potential stream restoration project on the attached site (USGS site map and aerial map with approximate areas of potential ground disturbance are enclosed).

The Holman Mill site has been identified for the purpose of providing in-kind mitigation for unavoidable stream channel impacts. Several sections of channel have been identified as significantly degraded. The site has historically been disturbed due agricultural use, primarily as cattle pasture. No architectural structures or archaeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes.

We ask that you review this site based on the attached information to determine the presence of any historic properties.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

A handwritten signature in black ink that reads "Andrea S. Eckardt".

Andrea S. Eckardt
Senior Environmental Planner
aeckardt@wildlandseng.com



North Carolina Department of Cultural Resources
State Historic Preservation Office
Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

March 24, 2014

Andrea Eckardt
Wildlands Engineering
1430 South Mint Street, Suite 104
Charlotte, NC 28203

Re: Holman Mill Stream Mitigation Site, Alamance County, ER 14-0409

Dear Ms. Eckardt:

Thank you for your letter of February 27, 2014, 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, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or 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".

for Ramona M. Bartos

agents and representatives harmless from and against any and all losses, claims, demands, damages, costs and expenses of whatever nature, including, without limitation, attorneys' fees, relating to or arising out of a breach of Optionor's representations and warranties set forth in this Agreement. The covenants contained in this Section 2.7.7 shall survive the Closing.

ARTICLE 3

MISCELLANEOUS

3.1 Liquidated Damages. Optionee recognizes that the Property will be removed by Optionor from the market during the existence of this agreement. If the purchase of the Conservation Easement is not consummated because of Optionee's default, the parties have determined and agreed that the actual amount of damages that would be suffered by Optionor as a result of any such default would be very difficult or impracticable to determine as of the date of this Agreement. As a result, the parties have agreed that the Option Consideration paid by Optionee to Optionor as of the date of Optionee's default is sufficient to cover any estimated damages that may be incurred by Optionor. For these reasons, the parties agree that if the purchase of the Conservation Easement is not consummated because of Optionee's default, Optionor shall be entitled to retain the Option Consideration paid by Optionee as of the date of Optionee's default as its sole remedy, and Optionor waives any and all right to seek other rights or remedies against Optionee, including without limitation, specific performance. Nothing set forth in this section 3.1 shall preclude any action under any indemnification, defense or hold harmless provision in this Agreement, nor for the award of attorney's fees and costs in conjunction with any action relating to this Agreement.

3.2 Notices. All notices required to or permitted to be given pursuant to this Agreement shall be in writing, shall be given only in accordance with the provisions of this Section, shall be addressed to the parties in the manner set forth below, and shall be conclusively deemed to have been properly delivered: (a) upon receipt when hand delivered during normal business hours; (b) upon receipt when sent by facsimile prior to 5:00 p.m. of a given business day; provided, however, that notices given by facsimile shall not be effective unless the sending party's machine provides written confirmation of successful delivery thereof; (c) upon the day of delivery if the notice has been deposited in a authorized receptacle of the United States Postal Service as first-class, registered or certified mail, postage prepaid, with a return receipt requested; or (d) one (1) business day after the notice has been deposited with either FedEx or United Parcel Service to be delivered by overnight delivery. The addresses of the parties to receive notices are as follows:

TO OPTIONEE: Wildlands Engineering, Inc.
1430 S. Mint Street, Suite 104
Charlotte, North Carolina 28203
Attention: Robert W. Bugg
eMail: rbugg@wildlandseng.com
Facsimile: (704) 332-3306

TO OPTIONOR: Darryl Lindley
1140 Moon Lindley Road
Snow Camp, NC 27349

Notice of change of address shall be given by written notice in the manner described in this Paragraph.

3.3 Assignment. Optionee shall have the right to assign this Agreement without the consent of Optionor. No assignment shall be effective, however, unless the assignee has delivered to Optionor a written assumption of Optionee's obligations under this Agreement. Optionor hereby releases Optionee from any obligations under this Agreement arising after the effective date of any assignment of this Agreement by Optionee.

3.4 Binding Effect. The terms and conditions of this Agreement shall apply and bind the heirs, executors, administrators, successors, and assigns of the Optionor and Holder.

3.5 Value of Conservation Easement; No Power of Eminent Domain. in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Optionee hereby notifies Optionor that: (i) Optionee believes that the fair market value of the Conservation Easement is an amount equal to the Purchase Price; and (ii) Optionee does not have the power of eminent domain.



February 27, 2014

Dale Suiter
US Fish and Wildlife Service
Raleigh Field Office
PO Box 33726
Raleigh, NC 27636

**Subject: Holman Mill Stream Mitigation Site
Alamance County, North Carolina**

Dear Mr. Suiter,

The Holman Mill Stream Mitigation Site has been identified for the purpose of providing in-kind mitigation for unavoidable stream channel impacts. Several sections of stream channels throughout the site have been identified as significantly degraded as a result of agricultural activities, including its use as a cattle pasture.

According to your website (http://www.fws.gov/raleigh/species/cntylist/nc_counties.html), there are no federally-listed species in Alamance County. We are requesting that you please provide any known information for any species in the county that we are unaware of.

Please provide comments on any possible issues that might emerge with respect to endangered species, migratory birds or other trust resources from the construction of a stream restoration project on the subject property. A USGS map showing the approximate area of potential ground disturbance is enclosed. The figure was prepared from the Crutchfield Crossroads, 7.5-Minute USGS Topographic Quadrangle. An aerial map is also attached.

If we have not heard from you in 30 days we will assume that you do not have any comments regarding associated laws and that you do not have any information relevant to this project at the current time.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

A handwritten signature in black ink that reads "Andrea S. Eckardt".

Andrea S. Eckardt
Senior Environmental Planner

U.S. Fish & Wildlife Service

Endangered Species, Threatened Species, Federal Species of Concern, and Candidate Species,

Alamance County, North Carolina



Updated: 09-22-2010

Common Name	Scientific name	Federal Status	Record Status
Vertebrate:			
American eel	<i>Anguilla rostrata</i>	FSC	Current
Carolina darter	<i>Etheostoma collis lepidinion</i>	FSC	Probable/potential
Invertebrate:			
Carolina creekshell	<i>Villosa vaughaniana</i>	FSC	Current
Yellow lampmussel	<i>Lampsilis cariosa</i>	FSC	Historic
Vascular Plant:			
Buttercup phacelia	<i>Phacelia covillei</i>	FSC	Current
Sweet pinesap	<i>Monotropis odorata</i>	FSC	Obscure

Nonvascular Plant:

Lichen:

Definitions of Federal Status Codes:

E = endangered. A taxon "in danger of extinction throughout all or a significant portion of its range."

T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

C = candidate. A taxon under consideration for official listing for which there is sufficient information to support listing. (Formerly "C1" candidate species.)

BGPA = Bald and Golden Eagle Protection Act. See below.

FSC = federal species of concern. A species under consideration for listing, for which there is insufficient information to support listing at this time. These species may or may not be listed in the future, and many of these species were formerly recognized as "C2" candidate species.

T(S/A) = threatened due to similarity of appearance. A taxon that is threatened due to similarity of appearance with another listed species and is listed for its protection. Taxa listed as T(S/A) are not biologically

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)		Date Of Land Evaluation Request 02/26/2014				
Name of Project Holman Mill Stream Mitigation Site		Federal Agency Involved FHWA - NCEEP				
Proposed Land Use Stream Restoration		County and State Alamance County, NC				
PART II (To be completed by NRCS)		Date Request Received By NRCS 02/26/2014		Person Completing Form: <i>Milton Cortes</i>		
Does the site contain Prime, Unique, Statewide or Local Important Farmland? <i>(If no, the FPPA does not apply - do not complete additional parts of this form)</i>		YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	Acres Irrigated N/A	Average Farm Size 117	
Major Crop(s) Corn	Farmable Land In Govt. Jurisdiction Acres: 86 % 240,623		Amount of Farmland As Defined in FPPA Acres: 64 % 179,301			
Name of Land Evaluation System Used Alamance Co., NC LESA	Name of State or Local Site Assessment System N/A		Date Land Evaluation Returned by NRCS 02/28/2014			
PART III (To be completed by Federal Agency)		Alternative Site Rating				
		Site A	Site B	Site C	Site D	
A. Total Acres To Be Converted Directly		31.5				
B. Total Acres To Be Converted Indirectly						
C. Total Acres In Site		31.5				
PART IV (To be completed by NRCS) Land Evaluation Information						
A. Total Acres Prime And Unique Farmland		0.10				
B. Total Acres Statewide Important or Local Important Farmland		4.40				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted		0.0025				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value		86%				
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)		39				
PART VI (To be completed by Federal Agency) Site Assessment Criteria <i>(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)</i>		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)	15			
3. Percent Of Site Being Farmed		(20)	13			
4. Protection Provided By State and Local Government		(20)	20			
5. Distance From Urban Built-up Area		(15)	15			
6. Distance To Urban Support Services		(15)	15			
7. Size Of Present Farm Unit Compared To Average		(10)	10			
8. Creation Of Non-farmable Farmland		(10)	0			
9. Availability Of Farm Support Services		(5)	5			
10. On-Farm Investments		(20)	0			
11. Effects Of Conversion On Farm Support Services		(10)	0			
12. Compatibility With Existing Agricultural Use		(10)	0			
TOTAL SITE ASSESSMENT POINTS		160	108	0	0	0
PART VII (To be completed by Federal Agency)						
Relative Value Of Farmland (From Part V)		100	39	0	0	0
Total Site Assessment (From Part VI above or local site assessment)		160	108	0	0	0
TOTAL POINTS (Total of above 2 lines)		260	147	0	0	0
Site Selected:		Date Of Selection		Was A Local Site Assessment Used?		
				YES <input type="checkbox"/> NO <input type="checkbox"/>		
Reason For Selection:						
Name of Federal agency representative completing this form:					Date:	

Andrea Eckardt

From: Andrea Eckardt
Sent: Monday, March 24, 2014 10:39 AM
To: 'Cortes, Milton - NRCS, Raleigh, NC'
Subject: RE: Completed AD1006 for Candy Creek, Holman Mill and Maney Projects
Attachments: Maney AD1006_completed_NRCS-signed.pdf; Candy_Creek_AD1006_Completed_by_NRCS-signed.pdf; Holman Mill AD1006_Completed_by_NRCS-signed.pdf

Sensitivity: Confidential

Milton-

Attached are the final AD1006 forms for Candy Creek, Holman Mill and Maney Farms Mitigation Sites for your files. I have completed Parts 6 and 7.

Thanks so much for your help.

Andrea

Andrea S. Eckardt
Wildlands Engineering, Inc.
704-332-7754 ext 101

From: Cortes, Milton - NRCS, Raleigh, NC [mailto:Milton.Cortes@nc.usda.gov]
Sent: Friday, February 28, 2014 4:08 PM
To: Andrea Eckardt
Subject: RE: Completed AD1006 for Candy Creek, Holman Mill and Maney Projects
Importance: High
Sensitivity: Confidential


Hi Andrea;

Attached requested AD1006 for the mentioned projects. If you have any question, please let me know.

You have a great weekend.

Milton Cortés

Assistant State Soil Scientist/
NC NRCS Hispanic Special Emphasis Program Manager

 Natural Resources Conservation Service
4407 Bland Rd., Suite 117
Raleigh, NC 27609

 (919) 873-2171 /  Fax (919) 873-2157

milton.cortes@nc.usda.gov

Helping People Help the Land...

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the



February 27, 2014

Shannon Deaton
North Carolina Wildlife Resource Commission
Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699

**Subject: Holman Mill Stream Mitigation Site
Alamance County, North Carolina**

Dear Ms. Deaton,

The purpose of this letter is to request review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with a potential stream restoration project on the attached site. A USGS map and an aerial map showing the approximate area of potential ground disturbance are enclosed. The topographic figure was prepared from the Crutchfield Crossroads, 7.5-Minute USGS Topographic Quadrangles.

The Holman Mill Stream Mitigation Site has been identified for the purpose of providing in-kind mitigation for unavoidable stream channel impacts. There are several stream channels located on the site that have been identified as significantly degraded due to past agricultural activities including its current use as a cattle pasture.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the extent of site disturbance associated with this project.

Sincerely,

A handwritten signature in black ink that reads "Andrea S. Eckardt".

Andrea S. Eckardt
Senior Environmental Planner

Attachment:
USGS Topographic Map
Aerial Map



☒ North Carolina Wildlife Resources Commission ☒

Gordon Myers, Executive Director

14 March 2014

Andrea Eckardt, Senior Environmental Planner
Wildlands Engineering
1430 South Mint Street, Suite 104
Charlotte, North Carolina 28203

Subject: Holman Mill Stream Mitigation Site, Alamance County

Dear Ms. Eckardt:

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) have reviewed the subject information. Our comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and North Carolina General Statutes (G.S. 113-131 et seq.).

The proposed project would provide in-kind mitigation for unavoidable stream impacts. Several stream channels have been identified as significantly degraded due to past agricultural activities including use as a cattle pasture. The project site includes unnamed tributaries to Pine Hill Branch in the Cape Fear River basin.

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 we can provide further assistance, please contact our office at (336) 449-7625 or shari.bryant@ncwildlife.org.




Sincerely,

A handwritten signature in cursive script that reads "Shari L. Bryant".

Shari L. Bryant
Piedmont Region Coordinator
Habitat Conservation Program

Holman Mill Mitigation Site
Categorical Exclusion
Figures



 Proposed Conservation Easement
Project Streams
 Intermittent
 Perennial

2011 Aerial Photography

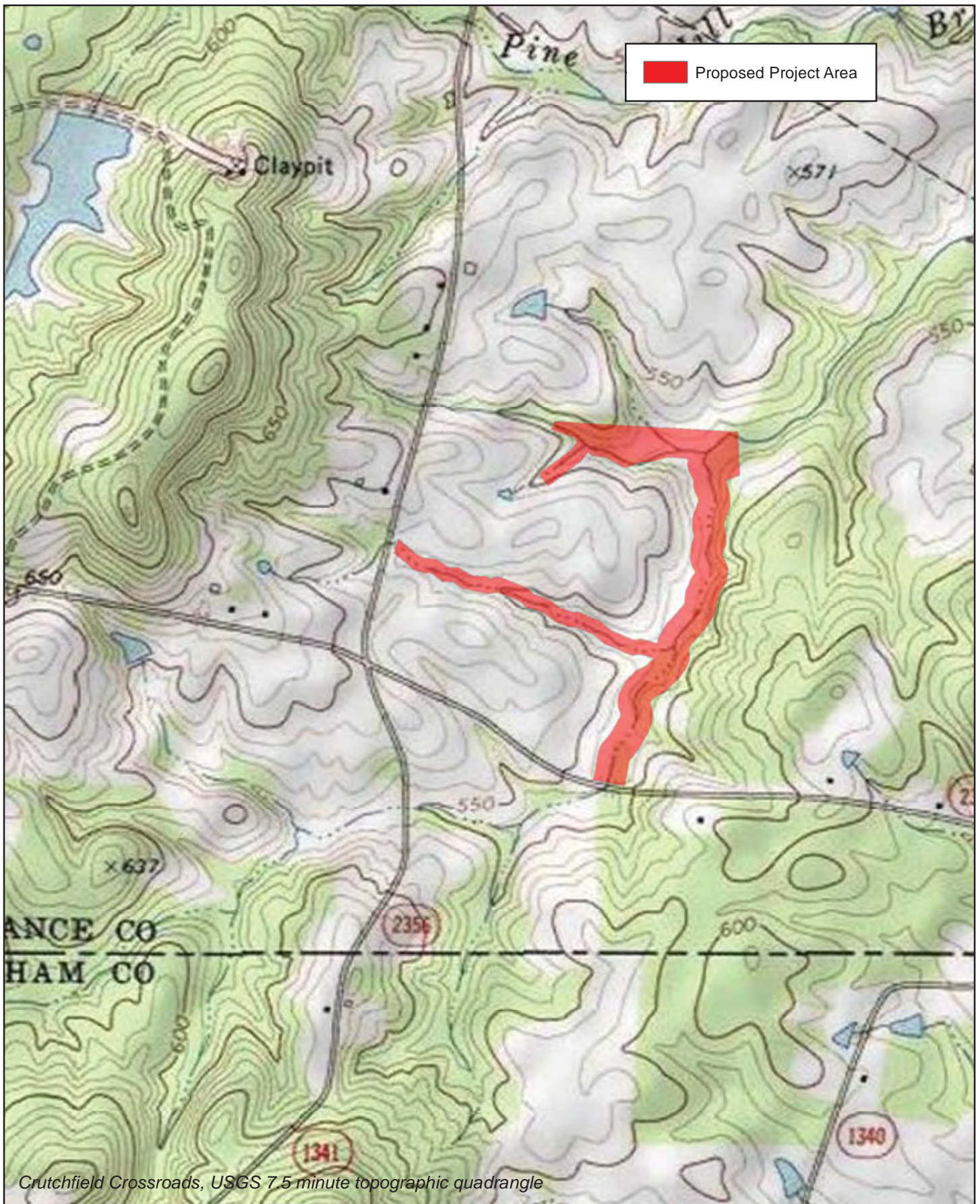


0 400 Feet



Site Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002

Alamance County, NC

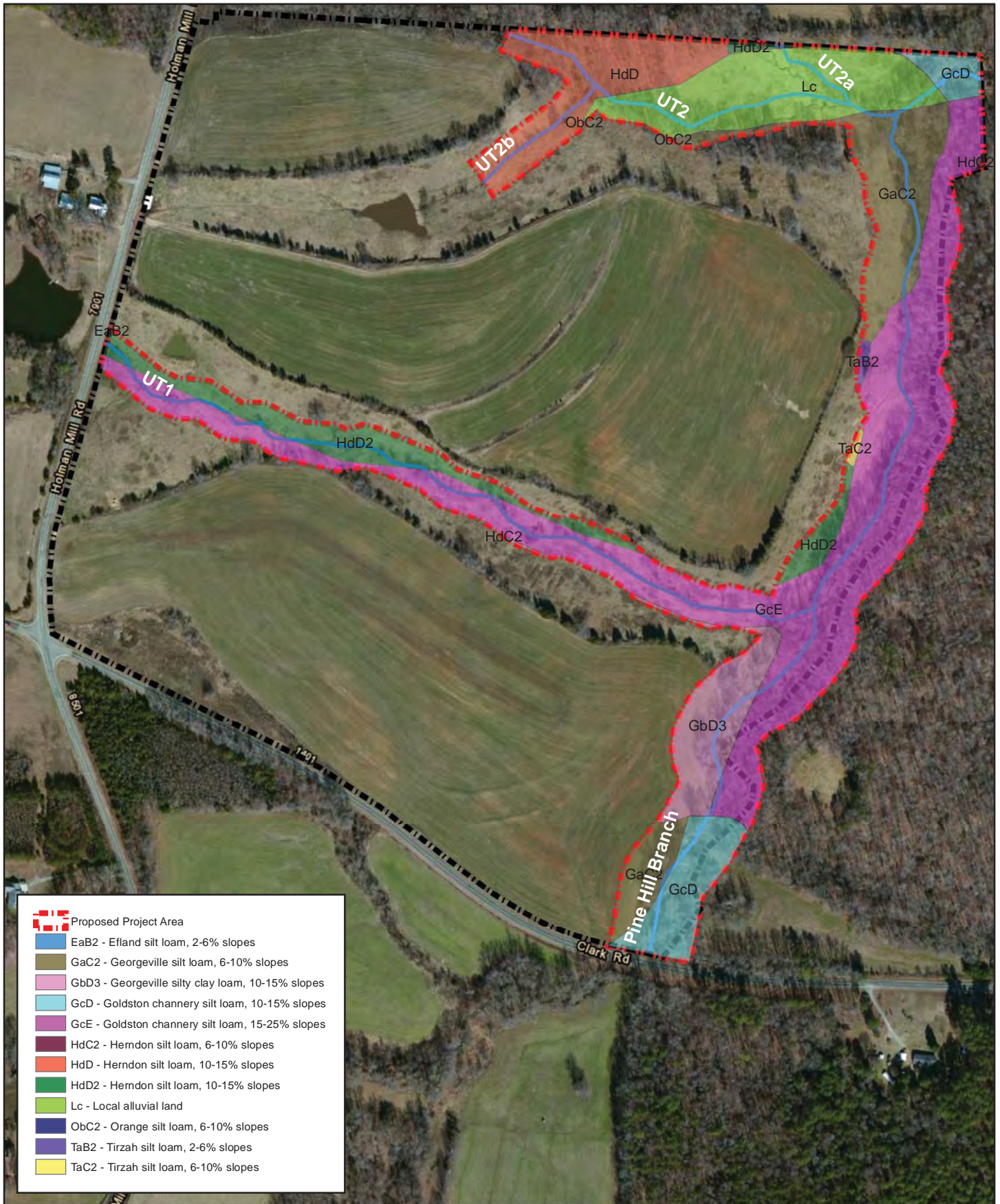


0 1,000 Feet



Topographic Map
Holman Mill Stream Mitigation Site
Cape Fear River Basin 03030002

Alameda County, NC



Soils Map
 Holman Mill Stream Mitigation Site
 Cape Fear River Basin 03030002

Alamance County, NC

Appendix 8

Project Site NCDWQ Stream Classification Forms

NC DWQ Stream Identification Form Version 4.11

Date: 10/11/13	Project/Site: Holman Mill Site	Latitude: 35.8418678° N
Evaluator: I. Eckardt	County: Alamance	Longitude: 79.385166° W
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 44.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SCP 1 - e.g. Quad Name: Mainstem

above UTI.

A. Geomorphology (Subtotal = 24)

	Absent	Weak	Moderate	Strong
1 ^a 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	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

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 = 11.5)

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:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 10/11/13	Project/Site: Holman Mill	Latitude: 35.850316° N
Evaluator: J. Eckardt	County: Alamance	Longitude: -79.385190° W
Total Points: 33.5 Stream is at least Intermittent if ≥ 19 or perennial if $\geq 30^*$	Stream Determination (circle one) Ephemeral Intermittent (Perennial)	Other SCP2-UT1 e.g. Quad Name: Downstream

A. Geomorphology (Subtotal = 13)

	Absent	Weak	Moderate	Strong
1 ^a . 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	1	2	3
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	0	0.5	1	1.5
		No = 0	Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10)

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

C. Biology (Subtotal = 10.5)

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	0	0.5	1	1.5
		FACW = 0.75; OBL = 1.5	Other = 0	

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

Notes:

Sketch: Observed caddisfly, dragonfly, scuds.
Numerous crayfish (5+)

NC DWQ Stream Identification Form Version 4.11

Date: 10/11/13	Project/Site: Holman Mill	Latitude: 35.852250° N
Evaluator: J. Eckardt	County: Alamance	Longitude: -79.391134° W
Total Points: 30.5 <small>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</small>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SCP 3 - UT 1 e.g. Quad Name: Upstream En!

A. Geomorphology (Subtotal = 11)

	Absent	Weak	Moderate	Strong
1 ^a . 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	1	2	3
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	0	0.5	1	1.5
		No = 0	Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

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

C. Biology (Subtotal = 10.5)

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	1	2	3
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	0	0.5	1	1.5

FACW = 0.75; OBL = 1.5 Other = 0

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 10/11/13	Project/Site: Holman Mill	Latitude: 35.855054° N
Evaluator: I. Eckardt	County: Alamance	Longitude: -79.387019° W
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 35	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other SCP4-UT2 e.g. Quad Name: Above UT2B

A. Geomorphology (Subtotal = 18)

	Absent	Weak	Moderate	Strong
1 ^a . 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	1	2	3
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	0	0.5	1	1.5
		No = 0	Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

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 = 9)

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	0	0.5	1	1.5
		FACW = 0.75; OBL = 1.5	Other = 0	

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 10/11/13	Project/Site: Holman Mill	Latitude: 35.855004° N
Evaluator: IJE	County: Alamance	Longitude: -79.384699° W
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 36.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other <u>UT2A-SCP5</u> e.g. Quad Name:

A. Geomorphology (Subtotal = 16.5)

	Absent	Weak	Moderate	Strong
1 ^a . 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 <u>Bedrock - especially at top</u>	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	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

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 = 11.75)

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 <u>3+</u>	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 <u>Spartina</u>	FACW = 0.75, OBL = 1.5 Other = 0			

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 10-11-13	Project/Site: Holman Mill	Latitude: 35.854126° N
Evaluator: I. Eckardt	County: Alamance	Longitude: -79.387268° W
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 26.5	Stream Determination (circle one) Ephemeral (Intermittent) Perennial	Other SCP6-UT2B e.g. Quad Name:

A. Geomorphology (Subtotal = 10.5)

	Absent	Weak	Moderate	Strong
1 ^a . 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	1	2	3
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	0	0.5	1	1.5
		No = 0	Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)

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 = 8.5)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (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 <i>Ludwigia sp.</i>	0	0.5	1	1.5

FACW = 0.75; OBL = 1.5 Other = 0

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

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Date: 6/11/14	Project/Site: Holman Mill	Latitude: 35.852286°N
Evaluator: IEckardt	County: Alamance	Longitude: -79.391428°W
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 25.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: SCP7 - UT1A

A. Geomorphology (Subtotal = 10)

	Absent	Weak	Moderate	Strong
1 ^a . 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	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

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 = 7.5)

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:

Sketch: Unmapped channel that drains from under Holman Mill Rd through a 24-30" CMP.

Appendix 9

Floodplain Check List



EEP Floodplain Requirements Checklist

This form was developed by the National Flood Insurance program, NC Floodplain Mapping program and Ecosystem Enhancement Program to be filled for all EEP 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 NC Ecosystem Enhancement Program.

Project Location

Name of project:	Holman Mill Mitigation Project
Name if stream or feature:	UT to Pine Hill Branch
County:	Alamance
Name of river basin:	
Is project urban or rural?	Rural
Name of Jurisdictional municipality/county:	Alamance county
DFIRM panel number for entire site:	
Consultant name:	Angela Allen at Wildlands Engineering, Inc
Phone number:	919-851-9986 ext 106
Address:	312 West Millbrook Rd Raleigh, NC 27604

Design Information

Provide a general description of project (one paragraph). Include project limits on a reference orthophotograph at a scale of 1" = 500".

Summarize stream reaches or wetland areas according to their restoration priority.

Example

Reach	Length	Priority
<i>Example: Reach A</i>	<i>1000</i>	<i>One (Restoration)</i>
<i>Example: Reach B</i>	<i>2000</i>	<i>Three (Enhancement)</i>

Floodplain Information

<p>Is project located in a Special Flood Hazard Area (SFHA)?</p> <p><input checked="" type="radio"/> Yes <input checked="" type="radio"/> No</p>
<p>If project is located in a SFHA, check how it was determined:</p> <p><input type="checkbox"/> Redelineation</p> <p><input type="checkbox"/> Detailed Study</p> <p><input type="checkbox"/> Limited Detail Study</p> <p><input type="checkbox"/> Approximate Study</p> <p><input type="checkbox"/> Don't know</p>
<p>List flood zone designation:</p>
<p>Check if applies:</p> <p><input checked="" type="checkbox"/> AE Zone</p> <p style="margin-left: 20px;"> <input checked="" type="radio"/> Floodway <input checked="" type="radio"/> Non-Encroachment <input checked="" type="radio"/> None </p> <p><input type="checkbox"/> A Zone</p> <p style="margin-left: 20px;"> <input checked="" type="radio"/> Local Setbacks Required <input checked="" type="radio"/> No Local Setbacks Required </p>
<p>If local setbacks are required, list how many feet:</p>
<p>Does proposed channel boundary encroach outside floodway/non-encroachment/setbacks?</p>

<input checked="" type="radio"/> Yes <input checked="" type="radio"/> No
<p>Land Acquisition (Check)</p> <p><input type="checkbox"/> State owned (fee simple)</p> <p><input type="checkbox"/> Conservation easment (Design Bid Build)</p> <p><input checked="" type="checkbox"/> Conservation Easement (Full Delivery Project)</p> <p>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)</p>
<p>Is community/county participating in the NFIP program?</p> <p style="text-align: center;"> <input checked="" type="radio"/> Yes <input checked="" type="radio"/> No </p> <p>Note: if community is not participating, then all requirements should be addressed to NFIP (attn: State NFIP Engineer, (919) 715-8000)</p>
<p>Name of Local Floodplain Administrator:</p> <p>Phone Number:</p>

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:

Comments:

Name: _____ Signature: _____

Title: _____ Date: _____

Angela Allen

From: Libby Hodges <libby.hodges@alamance-nc.com>
Sent: Tuesday, December 09, 2014 2:15 PM
To: Angela Allen
Cc: Alex Cameron
Subject: RE: Holman Mill Mitigation Plan

Ms. Allen,

The process you describe about a technical memo and a Floodplain Permit where appropriate is the appropriate requirement.

The Floodplain Permit is currently \$100 and only one should be required based on the information you've sent.

If you have more questions, please let me know.

Thank you,

Libby Hodges

Libby Hodges
Alamance County Planning Department
336-570-4052
libby.hodges@alamance-nc.com

We're Moving!

As of December 1, 2014, Planning's new address will be:

215 N. Graham Hopedale Rd.
Burlington, NC 27217

Please update your records!

Please note that email sent to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Angela Allen [mailto:aallen@wildlandseng.com]
Sent: Monday, December 08, 2014 4:33 PM
To: Libby Hodges
Subject: Holman Mill Mitigation Plan

Libby,

I wanted to get in touch with you about a project Wildlands Engineering, Inc. is doing in coordination with the NC Ecosystem Enhancement Program in Alamance County and decide on what the county will require in the way of permitting, modeling, etc. The project is located in the northeast quadrant of the intersection of Clark Road and Holman Mill Road on the UT to Pine Hill Branch stream system. No channel work is actually being done on UT to Pine Hill Branch

itself, however three unnamed tributaries discharging into UT to Pine Hill Branch are going to be restored. Portions of two tributaries are in the backwatered section of Zone AE where UT to Pine Hill Branch has a significant meander bend.

The tributaries being restored will be done using Priority 1 restoration techniques, meaning that no change will be made in the floodplain elevation. There will also be no alteration in the hydrology on the site, and the confluence locations with UT to Pine Hill Branch. The proposed work will entail taking the straightened channels and creating a natural meandering channel through the floodplain with habitat features. Riparian buffers will also be planted along all streams on site, including portions of UT to Pine Hill Branch that currently have no buffer.

In situations typical to these in the past, we have not been required to do any hydraulic modeling, but have instead submitted construction plans and a technical memo to the County describing all work being done and its influence on the FEMA floodplain. Then, if required, a floodplain development permit is issued.

I'd like to discuss with you what you intend the requirements to be on this site. I've attached a preliminary concept map for you to look at. The tributaries where restoration will occur within the Zone AE are UT2 and UT2A.

Please call me at your earliest convenience.

Thank you,
Angela Allen

.....
Angela Gardner Allen, PE, | *Water Resources Engineer*
O: 919.851.9986 x106 M: 703.655.6110

Wildlands Engineering, Inc.
312 W Millbrook Rd, Suite 225
Raleigh, NC 27609

Appendix 10

Pre-Construction Notification



Office Use Only: Corps action ID no. _____ DWQ project no. _____ Form Version 1.3 Dec 10 2008
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Pre-Construction Notification (PCN) Form

A. Applicant Information

1. Processing

1a. Type(s) of approval sought from the Corps:	<input checked="" type="checkbox"/> Section 404 Permit	<input type="checkbox"/> Section 10 Permit
1b. Specify Nationwide Permit (NWP) number: No. 27 or General Permit (GP) number:		
1c. Has the NWP or GP number been verified by the Corps?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1d. Type(s) of approval sought from the DWQ (check all that apply):		
<input checked="" type="checkbox"/> 401 Water Quality Certification – Regular <input type="checkbox"/> Non-404 Jurisdictional General Permit <input type="checkbox"/> 401 Water Quality Certification – Express <input type="checkbox"/> Riparian Buffer Authorization		
1e. Is this notification solely for the record because written approval is not required?	For the record only for DWQ 401 Certification: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	For the record only for Corps Permit: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
1f. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts? If so, attach the acceptance letter from mitigation bank or in-lieu fee program.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1g. Is the project located in any of NC's twenty coastal counties. If yes, answer 1h below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1h. Is the project located within a NC DCM Area of Environmental Concern (AEC)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

2. Project Information

2a. Name of project:	Holman Mill Mitigation Project
2b. County:	Alamance
2c. Nearest municipality / town:	Snow Camp, NC
2d. Subdivision name:	N/A
2e. NCDOT only, T.I.P. or state project no:	

3. Owner Information

3a. Name(s) on Recorded Deed:	M Darryl Lindley Revocable Trust
3b. Deed Book and Page No.	DB 666 PN 2959
3c. Responsible Party (for LLC if applicable):	NC DENR – Division of Mitigation Services Contact: Tim Baumgartner, Deputy Director
3d. Street address:	217 West Jones Street, Suite 3000A
3e. City, state, zip:	Raleigh, NC 27603
3f. Telephone no.:	919-707-8543
3g. Fax no.:	919-707-8976
3h. Email address:	Tim.Baumgartner@ncdenr.gov

4. Applicant Information (if different from owner)	
4a. Applicant is:	<input type="checkbox"/> Agent <input checked="" type="checkbox"/> Other, specify: State agency
4b. Name:	Tim Baumgartner
4c. Business name (if applicable):	NCDENR- Division of Mitigation Services
4d. Street address:	217 W. Jones St, Suite 3000A
4e. City, state, zip:	Raleigh, NC 27603
4f. Telephone no.:	919-707-8543
4g. Fax no.:	919-707-8976
4h. Email address:	Tim.Baumgartner@ncdenr.gov
5. Agent/Consultant Information (if applicable)	
5a. Name:	Ian Eckardt
5b. Business name (if applicable):	Wildlands Engineering, Inc.
5c. Street address:	1430 South Mint Street, Suite 104
5d. City, state, zip:	Charlotte, NC 28203
5e. Telephone no.:	704-332-7754
5f. Fax no.:	704-332-3306
5g. Email address:	ieckardt@wildlandseng.com

B. Project Information and Prior Project History	
1. Property Identification	
1a. Property identification no. (tax PIN or parcel ID):	PIN# 8786552224
1b. Site coordinates (in decimal degrees):	Latitude: 35.854054° N Longitude: 79.384383° W
1c. Property size:	Final protected easement acreage will be 27.9 Acres
2. Surface Waters	
2a. Name of nearest body of water (stream, river, etc.) to proposed project:	Pine Hill Branch
2b. Water Quality Classification of nearest receiving water:	Class WS-V; NSW
2c. River basin:	Cape Fear: 03030002
3. Project Description	
3a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: The project area is located within a rural watershed in southern Alamance County, NC. Land use in and immediate adjacent to the project area is primarily are a mix of open agriculture fields and woods used for livestock grazing. The eastern edge of the project is forest where the cattle are excluded. The majority of on-site streams have been impacted by cattle grazing and removal of the riparian buffer.	
3b. List the total estimated acreage of all existing wetlands on the property: The project site includes seventeen jurisdictional wetlands, approximately 0.74 acre in size.	
3c. List the total estimated linear feet of all existing streams (intermittent and perennial) on the property: Approximately 8,699 linear feet of intermittent and perennial channel within the project area.	
3d. Explain the purpose of the proposed project: The primary goal of the project is to reclaim the natural and beneficial functions of project stream channels and floodplains through enhancement and restoration activities and to establish/protect riparian buffers.	
3e. Describe the overall project in detail, including the type of equipment to be used: Stream enhancement and restoration would be achieved through natural channel design. Stream enhancement would include minor bank stabilization, habitat improvement through the installation of instream structures, fencing out cattle, and planting of a native riparian buffer as appropriate. Restoration activities would involve excavation of new channel and floodplain, installation of instream structures, planting a native riparian buffer and fencing out of cattle. Trackhoes will be used for in-stream work. A conservation easement will be recorded on the project streams and corresponding riparian buffer.	
4. Jurisdictional Determinations	
4a. Have jurisdictional wetland or stream determinations by the Corps or State been requested or obtained for this property / project (including all prior phases) in the past? Comments:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
4b. If the Corps made the jurisdictional determination, what type of determination was made?	<input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Final
4c. If yes, who delineated the jurisdictional areas? Name (if known): Ian Eckardt– Wildlands Eng.	Agency/Consultant Company: Other:
4d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation. A Jurisdictional Determination was issued by David Bailey of the USACE on January 5, 2015. A copy of the approved Jurisdictional Determination is included in Appendix 3 (Action Id. SAW-2015-00019).	

5. Project History	
5a. Have permits or certifications been requested or obtained for this project (including all prior phases) in the past?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown
5b. If yes, explain in detail according to "help file" instructions.	
6. Future Project Plans	
6a. Is this a phased project?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
6b. If yes, explain.	

C. Proposed Impacts Inventory

1. Impacts Summary

1a. Which sections were completed below for your project (check all that apply):

Wetlands Streams - tributaries Buffers
 Open Waters Pond Construction

2. Wetland Impacts

If there are wetland impacts proposed on the site, then complete this question for each wetland area impacted.

2a. Wetland impact number – Permanent (P) or Temporary (T)	2b. Type of impact	2c. Type of wetland (if known)	2d. Forested	2e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	2f. Area of impact (acres)
W1 – Wetland N <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Stream enhancement – minor bank grading	Seep	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	0.002
W2 – Wetland P <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Fill – Installation of rock outlet	Headwater forest	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	0.0005
2g. Total wetland impacts					0.0025

2h. Comments: Impacts to wetlands areas were avoided to the extent possible during the design phase. Minor bank grading to the left bank of UT1 at Station 107+47 would result in temporary impacts to the portion of Wetland N that directly abuts the channel. Less than 6 inches of grading is proposed in that impact area. A rock outlet structure is proposed where Wetland P drains into UT1 near Station 101+57. The rock outlet structure would stabilize the grade where Wetland P would reconnect to the new stream alignment and result in a permanent impact of 0.0005 acres.

3. Stream Impacts

If there are perennial or intermittent stream impacts (including temporary impacts) proposed on the site, then complete this question for all stream sites impacted.

3a. Stream impact number - Permanent (P) or Temporary (T)	3b. Type of impact	3c. Stream name	3d. Perennial (PER) or intermittent (INT)?	3e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	3f. Average stream width (feet)	3g. Impact length (linear feet)
S1 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Enhancement II	UT to Pine Hill Branch	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	15-20	3,526
S2 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Restoration	UT1	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	4-6	546
S3 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Enhancement II	UT1	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	6-10	2,122
S4 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Enhancement II	UT1A	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	1-3	84
S5 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Enhancement II	UT2 - Reach 1	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	10-15	588
S6 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Enhancement I	UT2 - Reach 2	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	10-15	298
S7 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Restoration	UT2 – Reach 3	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	10-15	396
S8 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Restoration	UT2 – Reach 4	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	10-15	242
S9 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Restoration	UT2A	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input checked="" type="checkbox"/> DWQ	10-15	468
S10 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Enhancement II	UT2B	<input type="checkbox"/> PER	<input checked="" type="checkbox"/> Corps	3-5	429

			<input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> DWQ				
3h. Total stream and tributary impacts						8,699		
3i. Comments: Impacts to on-site streams include temporary enhancement and restoration activities and will result in a net gain of 313 linear feet of perennial and/or intermittent stream channel.								
4. Open Water Impacts								
If there are proposed impacts to lakes, ponds, estuaries, tributaries, sounds, the Atlantic Ocean, or any other open water of the U.S. then individually list all open water impacts below.								
4a. Open water impact number – Permanent (P) or Temporary (T)	4b. Name of waterbody (if applicable)	4c. Type of impact			4d. Waterbody type	4e. Area of impact (acres)		
O1 <input type="checkbox"/> P <input type="checkbox"/> T								
O2 <input type="checkbox"/> P <input type="checkbox"/> T								
O3 <input type="checkbox"/> P <input type="checkbox"/> T								
4f. Total open water impacts								
4g. Comments:								
5. Pond or Lake Construction								
If pond or lake construction proposed, then complete the chart below.								
5a. Pond ID number	5b. Proposed use or purpose of pond	5c. Wetland Impacts (acres)			5d. Stream Impacts (feet)			5e. Upland (acres)
		Flooded	Filled	Excavated	Flooded	Filled	Excavated	Flooded
P1								
P2								
5f. Total								
5g. Comments:								
5h. Is a dam high hazard permit required?			<input type="checkbox"/> Yes		<input type="checkbox"/> No		If yes, permit ID no:	
5i. Expected pond surface area (acres):								
5j. Size of pond watershed (acres):								
5k. Method of construction:								

6. Buffer Impacts (for DWQ)

If project will impact a protected riparian buffer, then complete the chart below. If yes, then individually list all buffer impacts below. If any impacts require mitigation, then you **MUST** fill out Section D of this form.

6a. Project is in which protected basin?		<input type="checkbox"/> Neuse <input type="checkbox"/> Tar-Pamlico <input type="checkbox"/> Other: <input type="checkbox"/> Catawba <input type="checkbox"/> Randleman			
6b. Buffer impact number – Permanent (P) or Temporary (T)	6c. Reason for impact	6d. Stream name	6e. Buffer mitigation required?	6f. Zone 1 impact (square feet)	6g. Zone 2 impact (square feet)
B1 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No		
B2 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No		
B3 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No		
6h. Total buffer impacts					
6i. Comments:					

D. Impact Justification and Mitigation		
1. Avoidance and Minimization		
1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing project. Due to the nature of stream mitigation projects, impacts to on-site channels are necessary. The project will use natural channel design techniques throughout to have an overall positive impact, enhancing and restoring stream function and habitat by improving bed features in the streams and establishing flood storage. Biodegradable coir fiber matting and native vegetation will be used to stabilize the newly graded banks throughout the project. The project design focused on avoiding and minimizing wetland impacts as much as possible. Wetland areas inside the limits of disturbance will be flagged with safety fence during construction to avoid unintended impacts. This will be denoted in the final construction plans Erosion and Sediment Control sheets, details, and specifications.		
1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques. Construction practices will follow guidelines from the NC Erosion and Sediment Control Planning and Design Manual.		
2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State		
2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
2b. If yes, mitigation is required by (check all that apply):	<input type="checkbox"/> DWQ <input type="checkbox"/> Corps	
2c. If yes, which mitigation option will be used for this project?	<input type="checkbox"/> Mitigation bank <input type="checkbox"/> Payment to in-lieu fee program <input type="checkbox"/> Permittee Responsible Mitigation	
3. Complete if Using a Mitigation Bank		
3a. Name of Mitigation Bank:		
3b. Credits Purchased (attach receipt and letter)	Type	Quantity
3c. Comments:		
4. Complete if Making a Payment to In-lieu Fee Program		
4a. Approval letter from in-lieu fee program is attached.	<input type="checkbox"/> Yes	
4b. Stream mitigation requested:	linear feet	
4c. If using stream mitigation, stream temperature:	<input type="checkbox"/> warm <input type="checkbox"/> cool <input type="checkbox"/> cold	
4d. Buffer mitigation requested (DWQ only):	square feet	
4e. Riparian wetland mitigation requested:	acres	
4f. Non-riparian wetland mitigation requested:	acres	
4g. Coastal (tidal) wetland mitigation requested:	acres	
4h. Comments:		
5. Complete if Using a Permittee Responsible Mitigation Plan		
5a. If using a permittee responsible mitigation plan, provide a description of the proposed mitigation plan.		

6. Buffer Mitigation (State Regulated Riparian Buffer Rules) – required by DWQ

6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation?

Yes No

6b. If yes, then identify the square feet of impact to each zone of the riparian buffer that requires mitigation. Calculate the amount of mitigation required.

Zone	6c. Reason for impact	6d. Total impact (square feet)	Multiplier	6e. Required mitigation (square feet)
Zone 1			3 (2 for Catawba)	
Zone 2			1.5	
6f. Total buffer mitigation required:				

6g. If buffer mitigation is required, discuss what type of mitigation is proposed (e.g., payment to private mitigation bank, permittee responsible riparian buffer restoration, payment into an approved in-lieu fee fund).

6h. Comments:

E. Stormwater Management and Diffuse Flow Plan (required by DWQ)	
1. Diffuse Flow Plan	
1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
1b. If yes, then is a diffuse flow plan included? If no, explain why. Comments: The project is located in the Cape Fear River Watershed (HUC 03030002) which isn't within one the NC Riparian Buffer Protection Rules.	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Stormwater Management Plan	
2a. What is the overall percent imperviousness of this project?	0%
2b. Does this project require a Stormwater Management Plan?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2c. If this project DOES NOT require a Stormwater Management Plan, explain why: This project involves the restoration and enhancement of on-site jurisdictional stream channels, no increase in impervious cover will result from the construction of this project.	
2d. If this project DOES require a Stormwater Management Plan, then provide a brief, narrative description of the plan:	
2e. Who will be responsible for the review of the Stormwater Management Plan?	<input type="checkbox"/> Certified Local Government <input type="checkbox"/> DWQ Stormwater Program <input type="checkbox"/> DWQ 401 Unit
3. Certified Local Government Stormwater Review	
3a. In which local government's jurisdiction is this project?	
3b. Which of the following locally-implemented stormwater management programs apply (check all that apply):	<input type="checkbox"/> Phase II <input type="checkbox"/> NSW <input type="checkbox"/> USMP <input type="checkbox"/> Water Supply Watershed <input type="checkbox"/> Other:
3c. Has the approved Stormwater Management Plan with proof of approval been attached?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4. DWQ Stormwater Program Review	
4a. Which of the following state-implemented stormwater management programs apply (check all that apply):	<input type="checkbox"/> Coastal counties <input type="checkbox"/> HQW <input type="checkbox"/> ORW <input type="checkbox"/> Session Law 2006-246 <input type="checkbox"/> Other:
4b. Has the approved Stormwater Management Plan with proof of approval been attached?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. DWQ 401 Unit Stormwater Review	
5a. Does the Stormwater Management Plan meet the appropriate requirements?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5b. Have all of the 401 Unit submittal requirements been met?	<input type="checkbox"/> Yes <input type="checkbox"/> No

F. Supplementary Information	
1. Environmental Documentation (DWQ Requirement)	
1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) Comments: The approved Categorical Exclusion is attached in Appendix 7 of the mitigation plan.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Violations (DWQ Requirement)	
2a. Is the site in violation of DWQ Wetland Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 2B .0200)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2b. Is this an after-the-fact permit application?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2c. If you answered "yes" to one or both of the above questions, provide an explanation of the violation(s):	
3. Cumulative Impacts (DWQ Requirement)	
3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
3b. If you answered "yes" to the above, submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent DWQ policy. If you answered "no," provide a short narrative description. This is a stream restoration and enhancement project and will not cause an increase in development nor will it negatively impact downstream water quality. The project area will be protected in perpetuity from future development through a conservation easement.	
4. Sewage Disposal (DWQ Requirement)	
4a. Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.	

5. Endangered Species and Designated Critical Habitat (Corps Requirement)	
5a. Will this project occur in or near an area with federally protected species or habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
5b. Have you checked with the USFWS concerning Endangered Species Act impacts?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
5c. If yes, indicate the USFWS Field Office you have contacted.	<input checked="" type="checkbox"/> Raleigh <input type="checkbox"/> Asheville
<p>5d. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat?</p> <p>Utilized the U.S. Fish and Wildlife Service (USFWS) and North Carolina Natural Heritage Program (NHP) databases in order to identify federally listed Threatened and Endangered plant and animal species for Alamance County, NC. There are no federal endangered or threatened species listed for Alamance County. Correspondence with the USFWS is included in Appendix 7 of the mitigation plan.</p>	
6. Essential Fish Habitat (Corps Requirement)	
6a. Will this project occur in or near an area designated as essential fish habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<p>6b. What data sources did you use to determine whether your site would impact Essential Fish Habitat?</p> <p>The National Oceanic and Atmospheric Administration (NOAA) – Essential Fish Habitat Mapper website was used to determine the project wasn't located in or near an area designated as Essential Fish Habitat. Designated Essential Fish Habitat in North Carolina includes salt marshes, oyster reefs, and seagrass. The NC Wildlife Resource Commission (NCWRC) was also contacted for comment related to fish and wildlife issues associated with the proposed stream mitigation project. The NCWRC responded on 3/14/14 and didn't anticipate the project to result in significant adverse impacts to aquatic or terrestrial wildlife resources (see correspondence in Appendix 7 of the mitigation plan).</p>	
7. Historic or Prehistoric Cultural Resources (Corps Requirement)	
7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<p>7b. What data sources did you use to determine whether your site would impact historic or archeological resources?</p> <p>The NC State Historic Preservation Office (SHPO) was contacted regarding the presence historic properties or cultural resources within the project area. SHPO responded on 3/24/14 and stated they were aware of no historic resources that would be affected by the project (see correspondence in Appendix 7 of the mitigation plan).</p>	

8. Flood Zone Designation (Corps Requirement)		
8a. Will this project occur in a FEMA-designated 100-year floodplain?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
8b. If yes, explain how project meets FEMA requirements: UT to Pine Hill Branch is mapped in a Zone AE Special Flood Hazard Area (SFHA) on Alamance County Flood Insurance Rate Map Panel 8786. Portions of UT2 and UT2A are located in the "flood fringe" of the UT to Pine Hill Branch floodplain but are not modeled systems. Wildlands coordinated with the Alamance County, NC Floodplain Administrator to determine what would be required for this project. They determined the County will require a technical memo stating all activities within Zone AE on the project, but that no FEMA modeling will be necessary. After review of the technical memo, the Floodplain Administrator will determine if a floodplain development permit is required and if so, will issue one at that time. The Floodplain Checklist is located in Appendix 9.		
8c. What source(s) did you use to make the floodplain determination? FIRM Panel 8788 and 8879		
<p style="text-align: center;">Tim Baumgartner Deputy Director, NCDENR - DMS Applicant/Agent's Printed Name</p>	<p style="text-align: center;">_____ Applicant/Agent's Signature (Agent's signature is valid only if an authorization letter from the applicant is provided.)</p>	<p style="text-align: center;">Date</p>

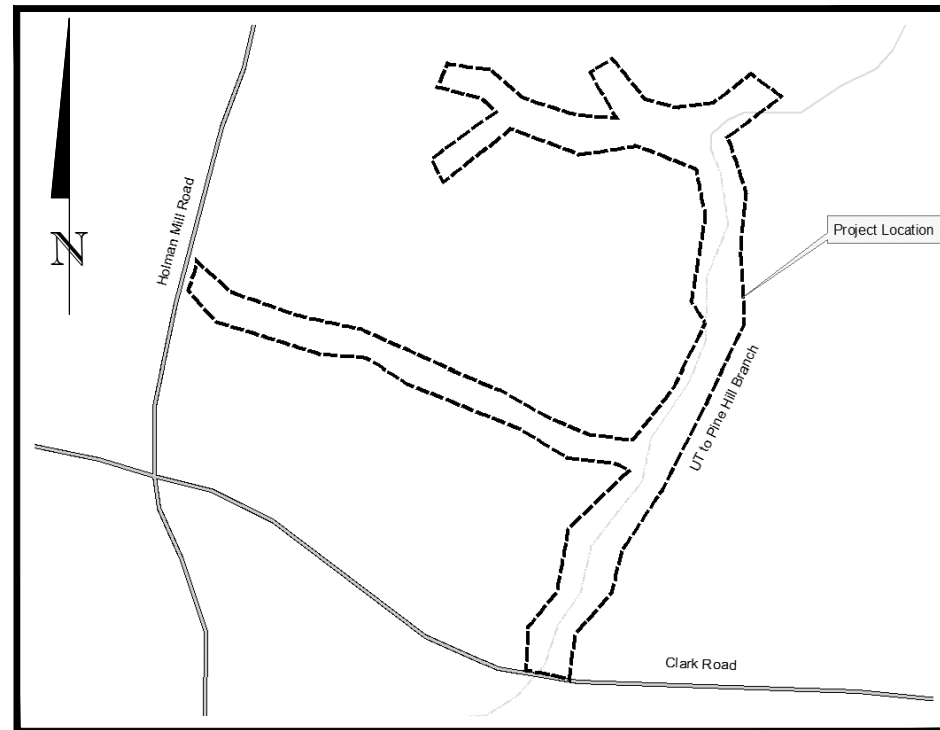
Holman Mill Mitigation Project

Cape Fear River Basin 03030002

Alamance County, North Carolina

for

North Carolina Ecosystem Enhancement Program



Vicinity Map
Not to Scale



Sheet Index

Title Sheet	0.1
Project Overview	0.2
General Notes and Symbols	0.3
Typical Sections	1.1-1.4
Stream Plan and Profile	2.1-2.12
Planting Plan	3.1
Erosion and Sediment Control	Not Included
Fencing Plan	Not Included
Details	6.1-6.5

Project Directory

Surveying:
Infinite Land Design, P.C.
117 North Chatham Avenue
Siler City, NC 27344
Charles O. Eliason, PLS
919-663-2708

Owner:
Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652
Jeff Schaffer
919-707-8976

Engineering:
Wildlands Engineering, Inc
License No. F-0831
312 West Millbrook Road, Suite 225
Raleigh, NC 27609
Angela N. Allen, PE
919-851-9986

DENR Contract No. 005795
EEP ID No. 96316

DRAFT PLANS
May, 2015

Stream Origins

Stream	Latitude	Longitude
UT1	N 35° 51' 09.14"	W 79° 23' 29.27"
UT2	N 35° 51' 18.47"	W 79° 23' 15.11"
UT2A	N 35° 51' 19.28"	W 79° 23' 06.82"



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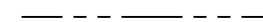
















Title Sheet

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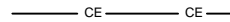
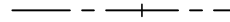
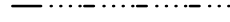






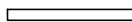


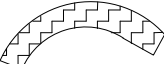


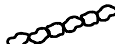
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Job Number: 005-0216
Project Engineer: ANA
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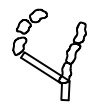
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Existing Features

-  Existing Property Boundary
-  Existing 1' Minor Contour
-  Existing 5' Major Contour
-  Existing Fenceline
-  Existing Thalweg
-  Existing Right of Way
-  Existing Overhead Electric Line
-  Existing Edge of Pavement
-  Existing Overhead Electric Pole
-  Existing Concrete Structure
-  Existing Ford Crossing
-  Existing Farm Road
-  Existing Bedrock/Boulders/Outcrop
-  Existing Wetlands
-  Existing Treeline
-  Existing Tree
-  Existing Telephone Box

Proposed Features

-  Proposed Limits of Disturbance
-  Proposed Conservation Easement
-  Proposed Stream Alignment
-  Proposed Bankfull
-  Proposed 5' Major Contour
-  Proposed 1' Minor Contour
-  Proposed Chunky Riffle
See Detail 4, Sheet 6.1
-  Proposed Jazz Riffle Structure
See Detail 3, Sheet 6.1
-  Proposed Native Material Constructed Riffle
See Detail 1, Sheet 6.1
-  Proposed Woody Riffle
See Detail 2, Sheet 6.1
-  Proposed Log Vane
See Detail 1, Sheet 6.2
-  Proposed Angled Log Drop
See Detail 2, Sheet 6.2
-  Proposed Log J-Hook
See Detail 3, Sheet 6.2
-  Proposed Brush Toe
See Detail 4, Sheet 6.2
-  Proposed Cover Log
See Detail 1, Sheet 6.3
-  Designed Channel Plug
See Detail 2, Sheet 6.3
-  Proposed Boulder Sill
See Detail 3, Sheet 6.3



Proposed Boulder J-Hook with Sill
See Detail 4, Sheet 6.3



Proposed Transplanted Sod Mats
See Detail 1, Sheet 6.4



Proposed Rock Outlet
See Detail 1, Sheet 6.5

Holman Mill Mitigation Project
Alamance County, NC

General Notes and Symbols

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Date: 05-08-15
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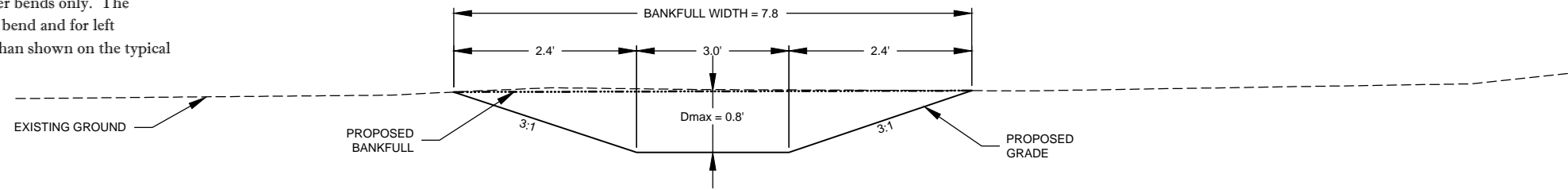
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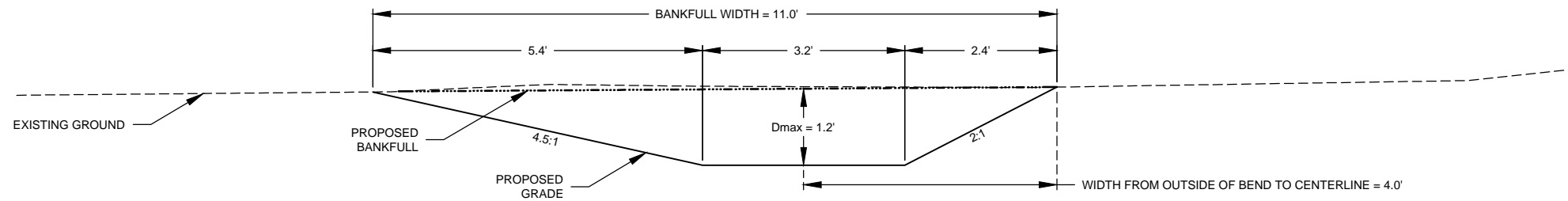
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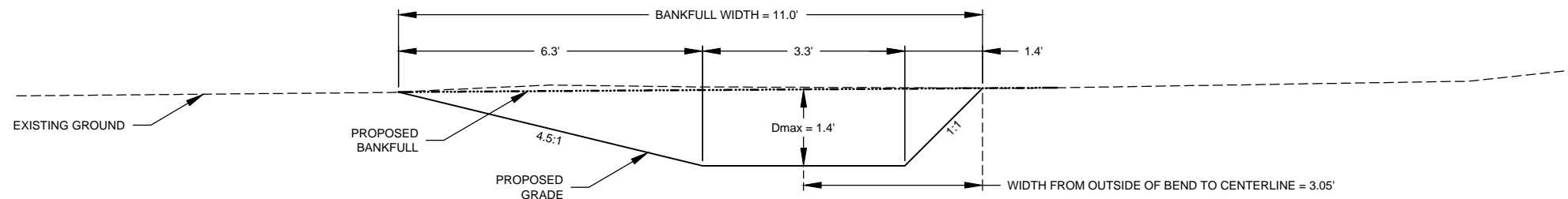
1. Typical sections are provided as a reference for in channel grading only. For floodplain grading and connection to existing ground elevations refer to Sheets 2.1 - 2.12.
2. Pool depth will vary per profile.
3. All deep pools shall have bank revetments on outside of bend.
4. Typical pool sections are shown as right meander bends only. The flatter side slope is on the inside of the meander bend and for left meander bends should be on the opposite side than shown on the typical sections.



UT1 Reach 1 & 3- Typical Section: Riffle
 STA: 100+00 to 102+02 & 106+34 to 109+35 Not To Scale



UT1 Reach 1 & 3 - Typical Section: Shallow Pool
 STA: 100+00 to 102+02 & 106+34 to 109+35 Not To Scale



UT1 Reach 1 & 3 - Typical Section: Deep Pool
 STA: 100+00 to 102+02 & 106+34 to 109+35 Not To Scale

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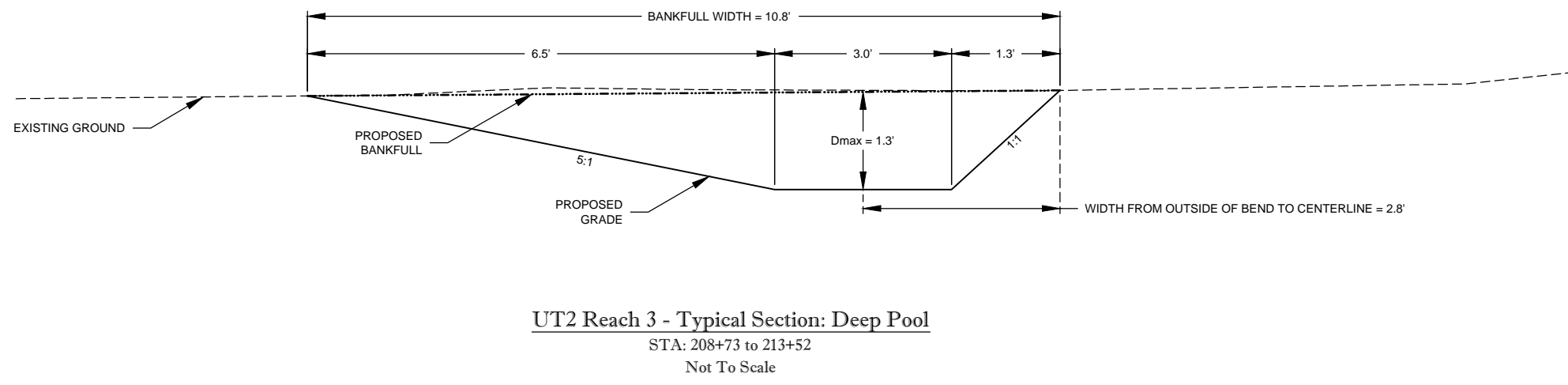
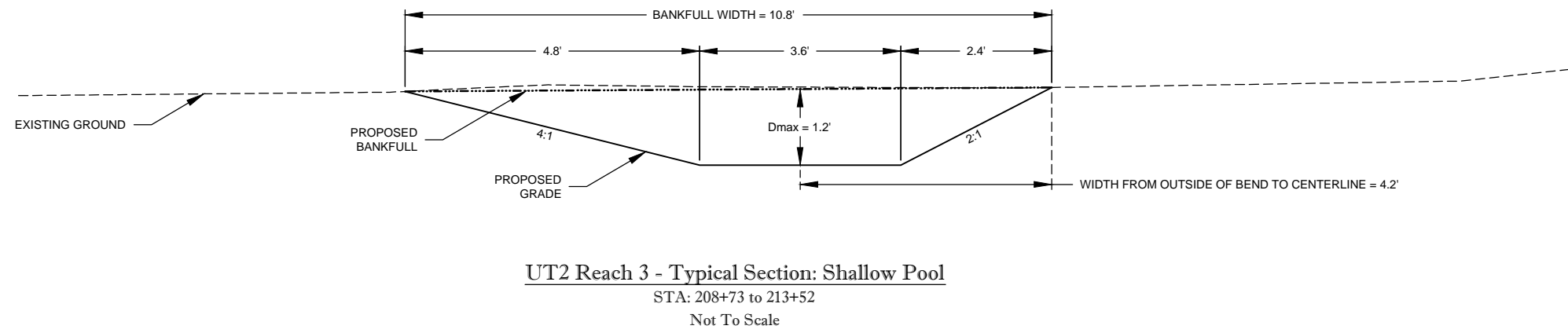
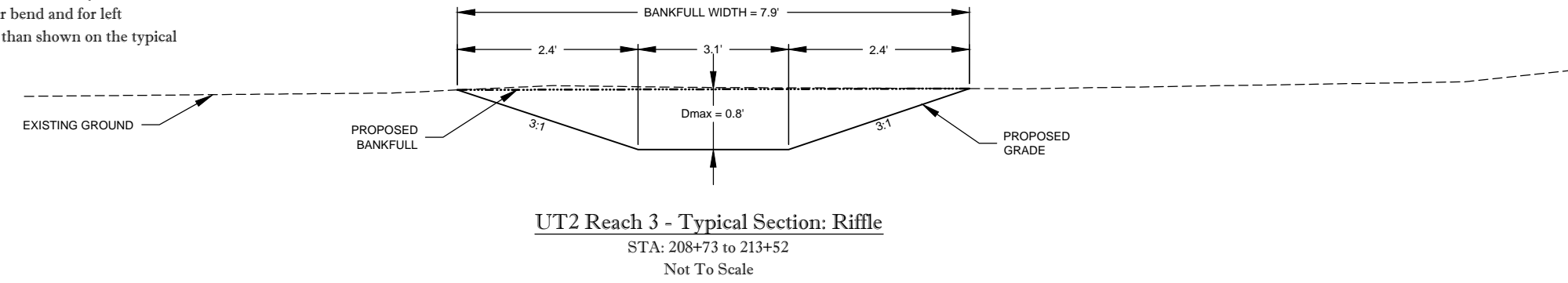
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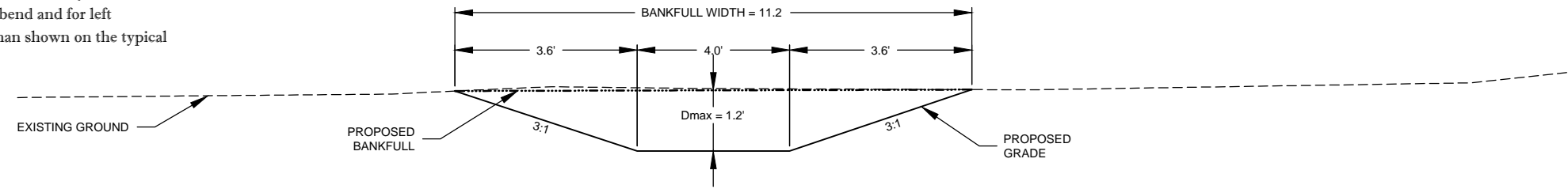
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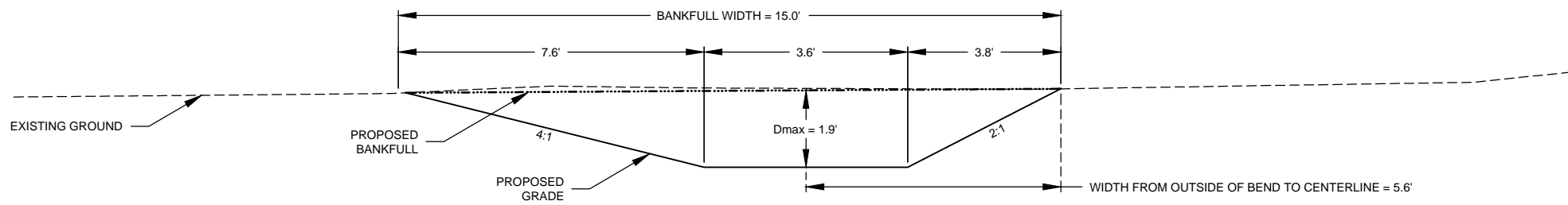
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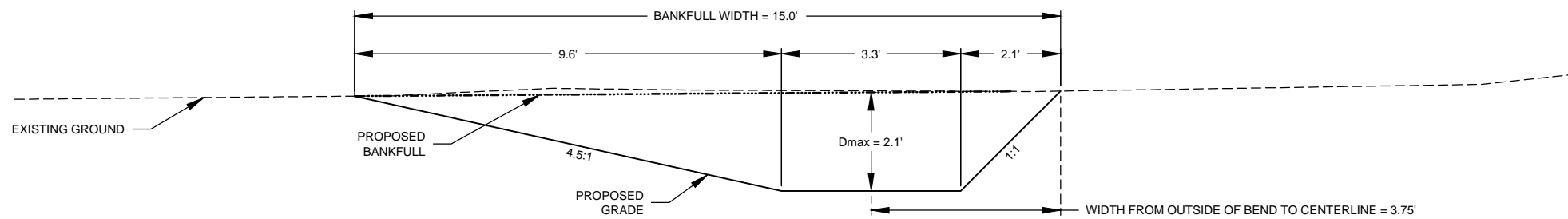
UT2 Reach 4 - Typical Section: Riffle

STA: 213+52 to 215+62
Not To Scale



UT2 Reach 4 - Typical Section: Shallow Pool

STA: 213+52 to 215+62
Not To Scale



UT2 Reach 4 - Typical Section: Deep Pool

STA: 213+52 to 215+62
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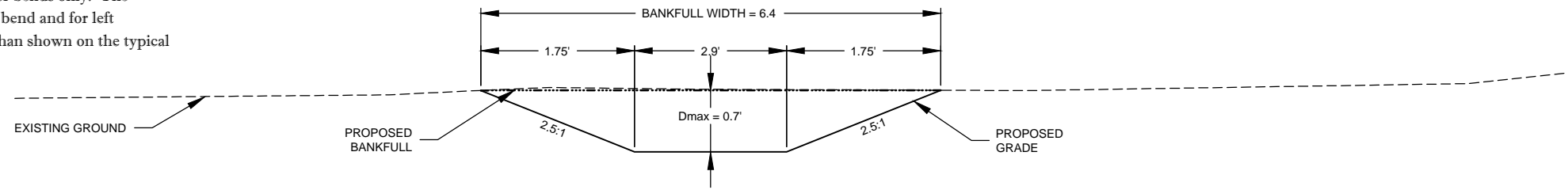
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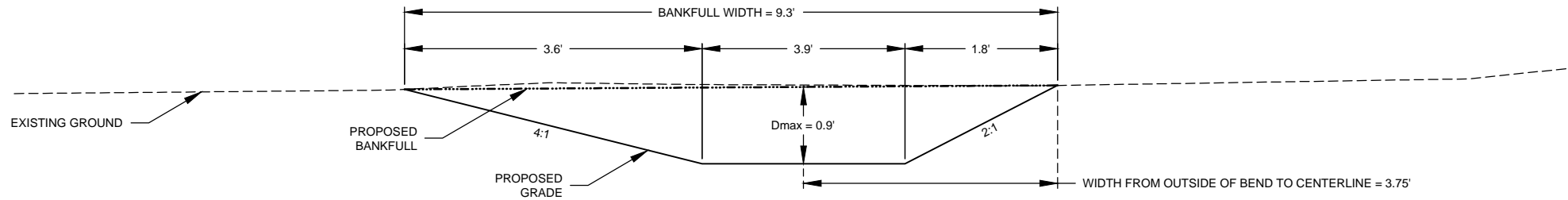
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UT2A - Typical Section: Riffle

STA: 300+65 to 306+18

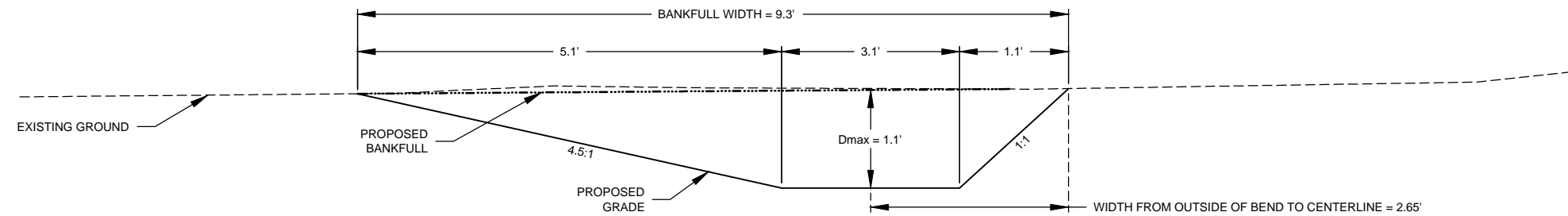
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UT2A - Typical Section: Shallow Pool

STA: 300+65 to 306+18

Not To Scale



UT2A - Typical Section: Deep Pool

STA: 300+65 to 306+18

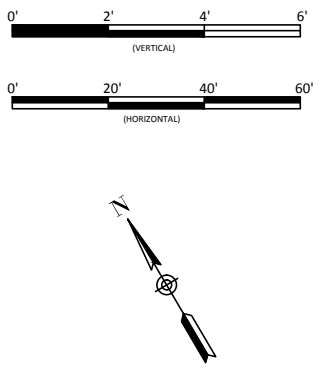
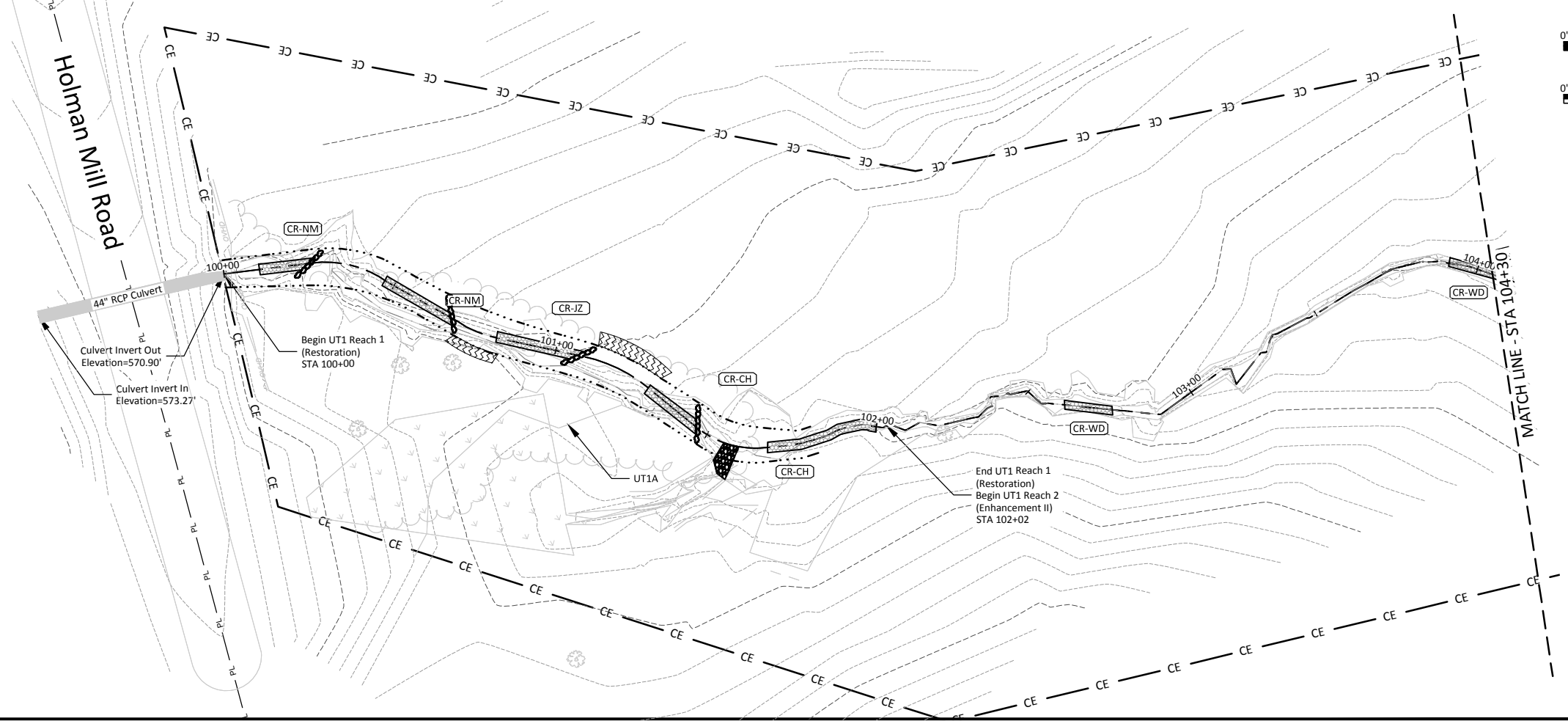
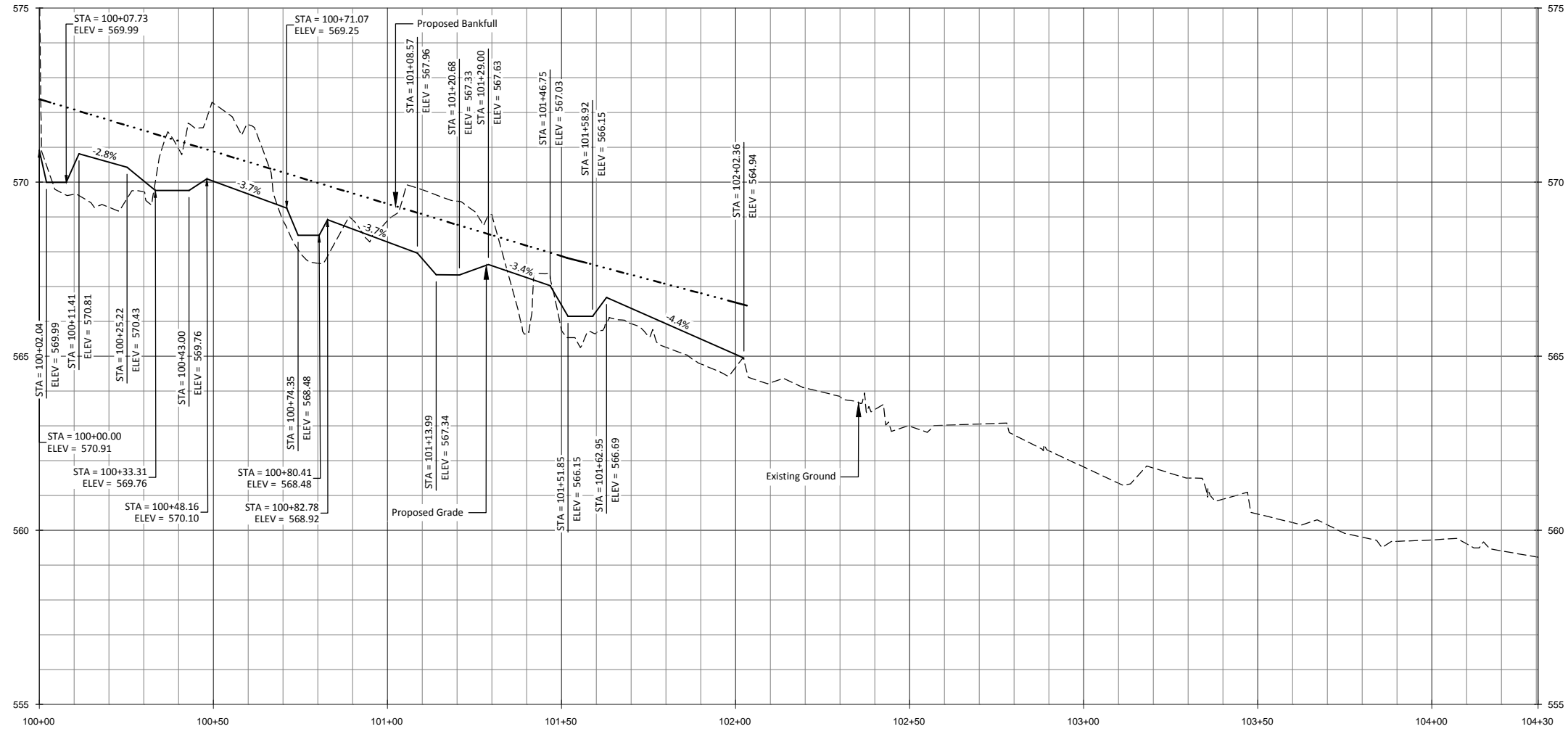
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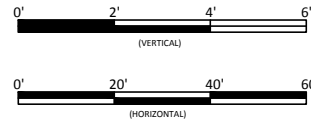
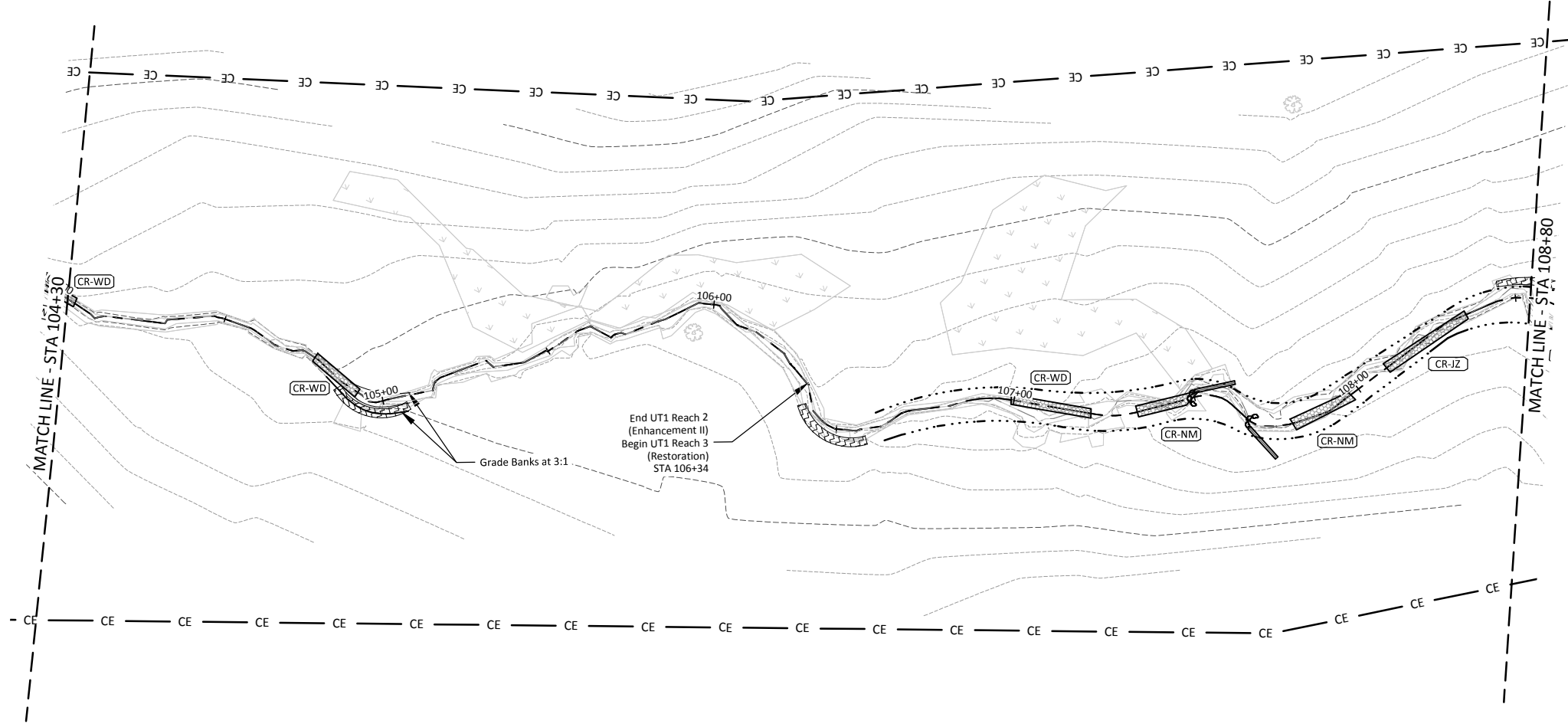
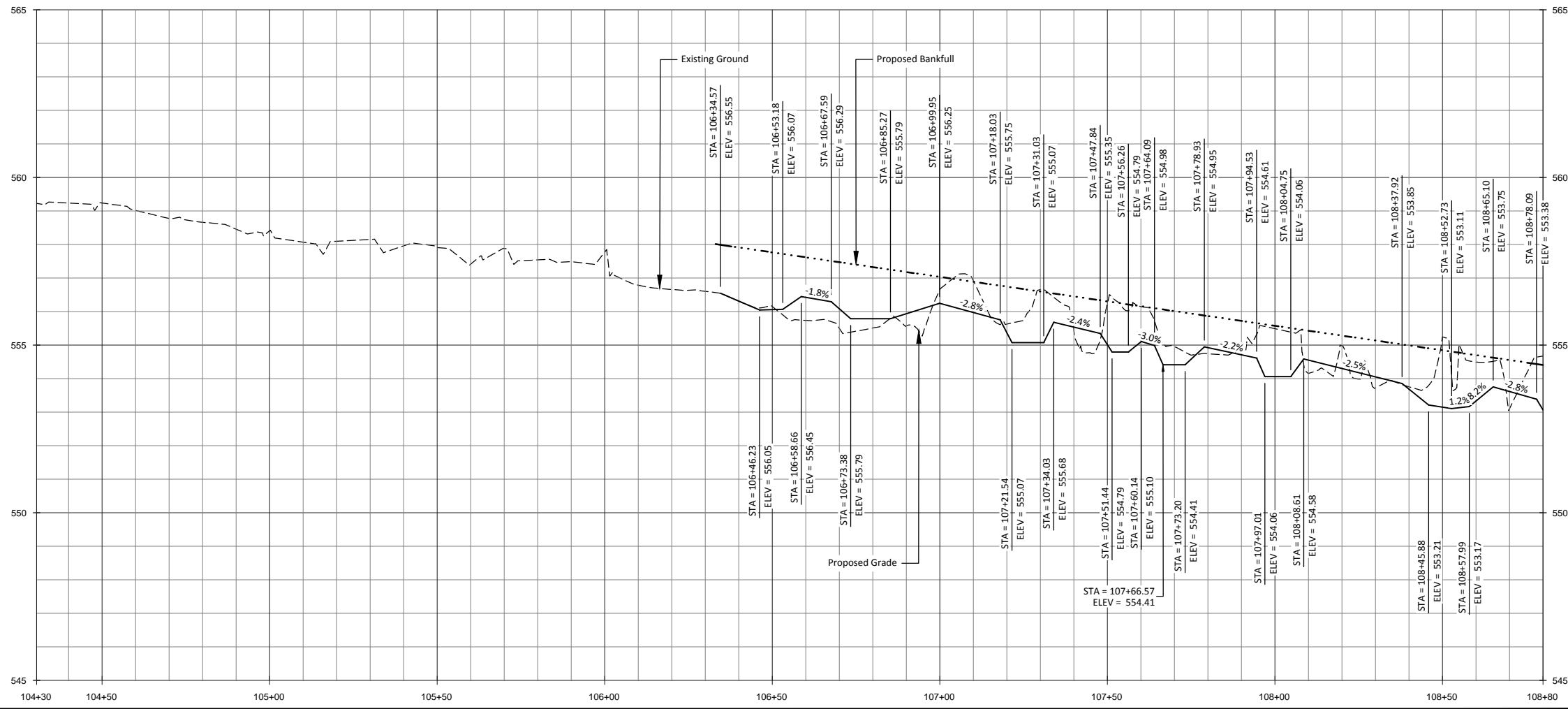
Holman Mill Mitigation Project
 Alamance County, NC
 UT1 Reaches 1 & 2
 Stream Plan and Profile

Revisions:

Date:	05-08-15
Job Number:	05-02116
Project Engineer:	ANA
Drawn By:	CLM
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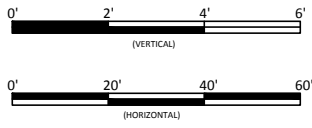
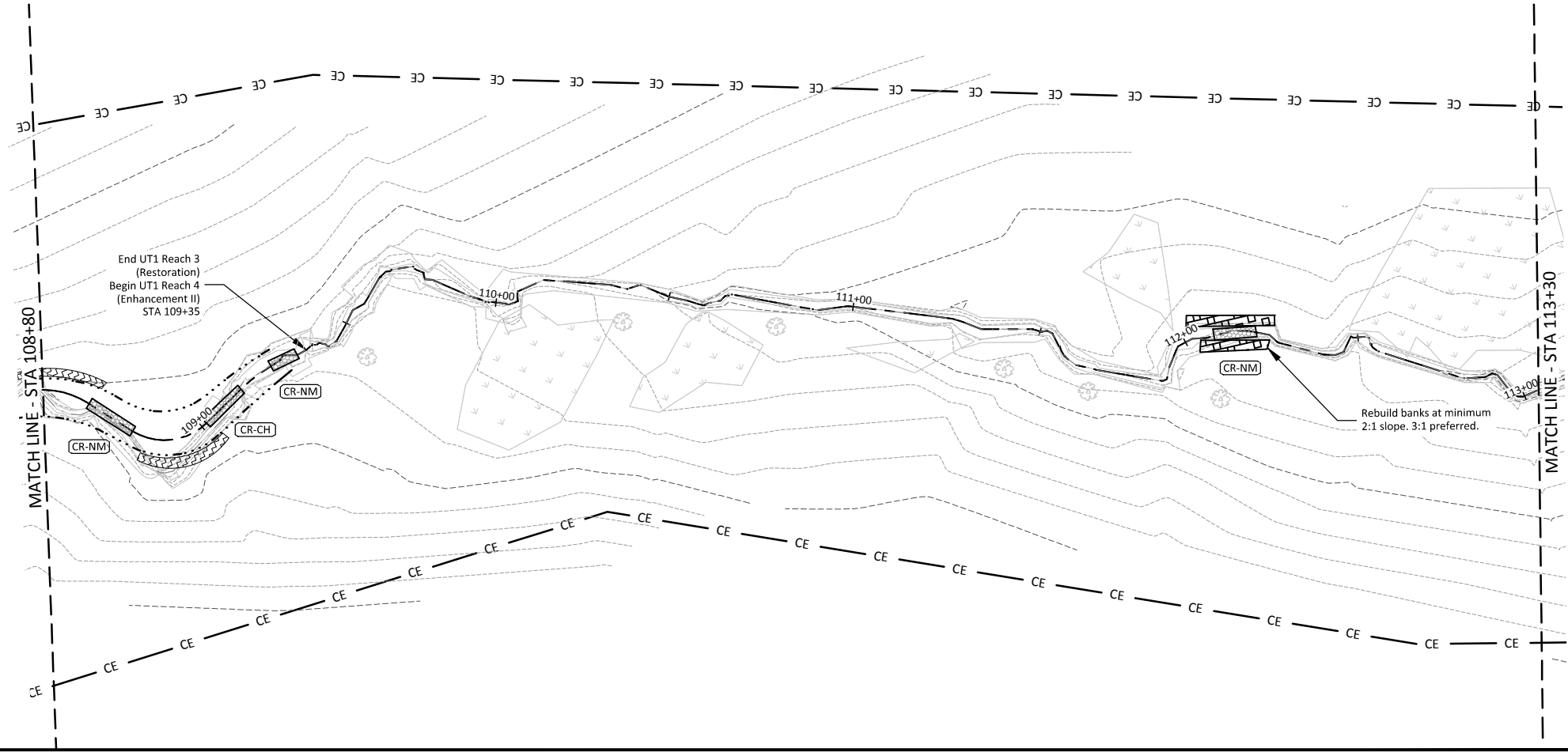
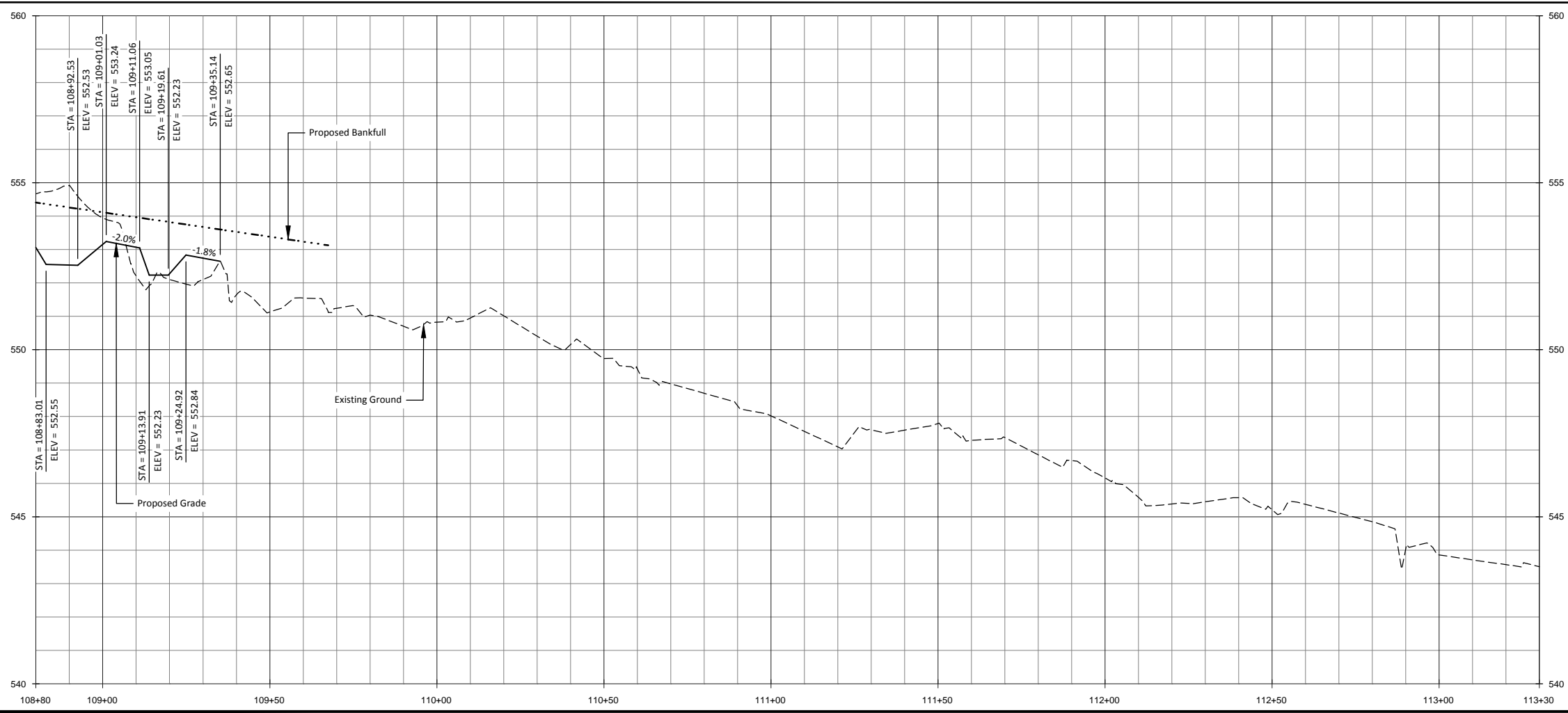
Holman Mill Mitigation Project
Alamance County, NC
UT1 Reaches 2 & 3
Stream Plan and Profile

Date: 05-08-15
Job Number: 005-02116
Project Engineer: ANA
Drawn By: CLM
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Revisions:

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Holman Mill Mitigation Project
Alamance County, NC
UT1 Reaches 3 & 4
Stream Plan and Profile

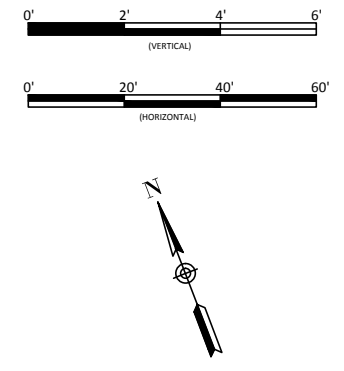
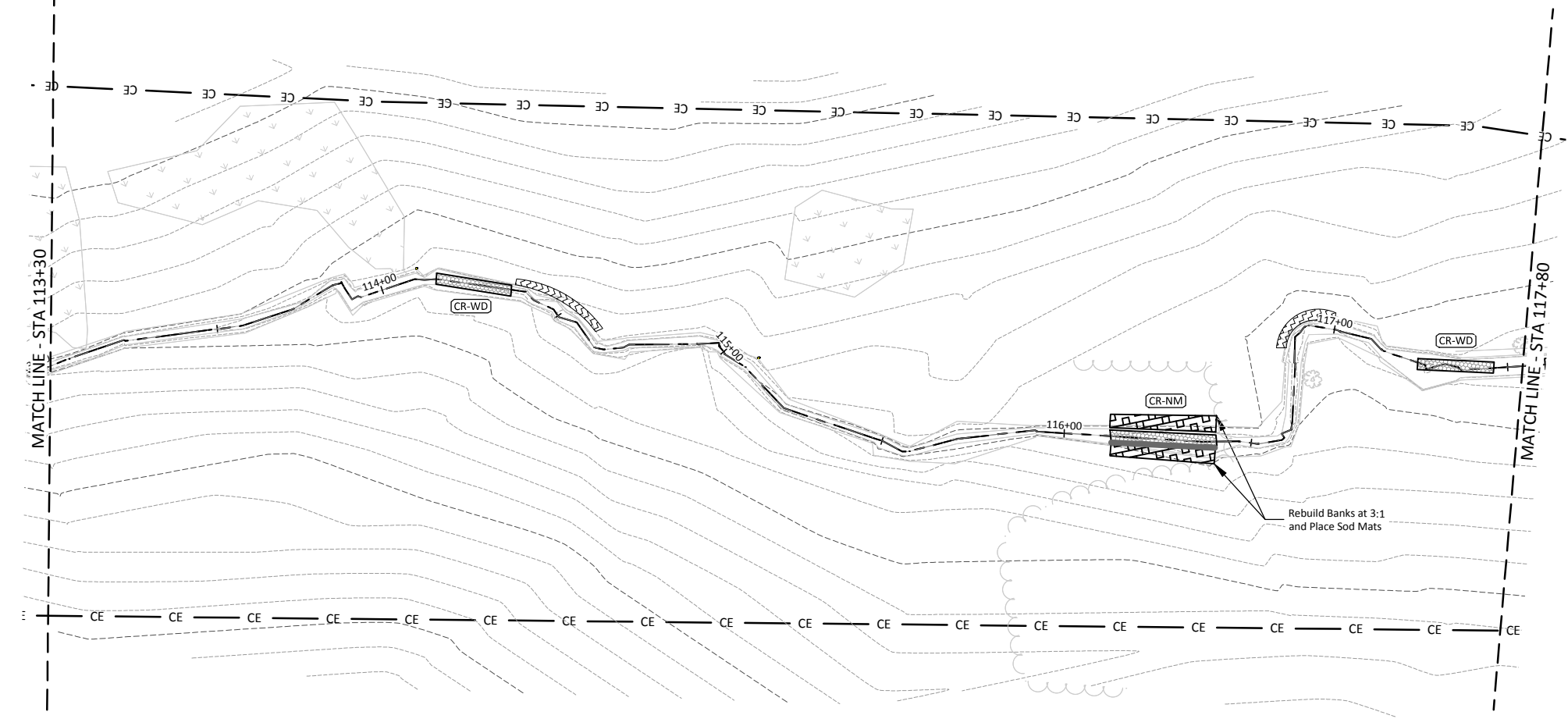
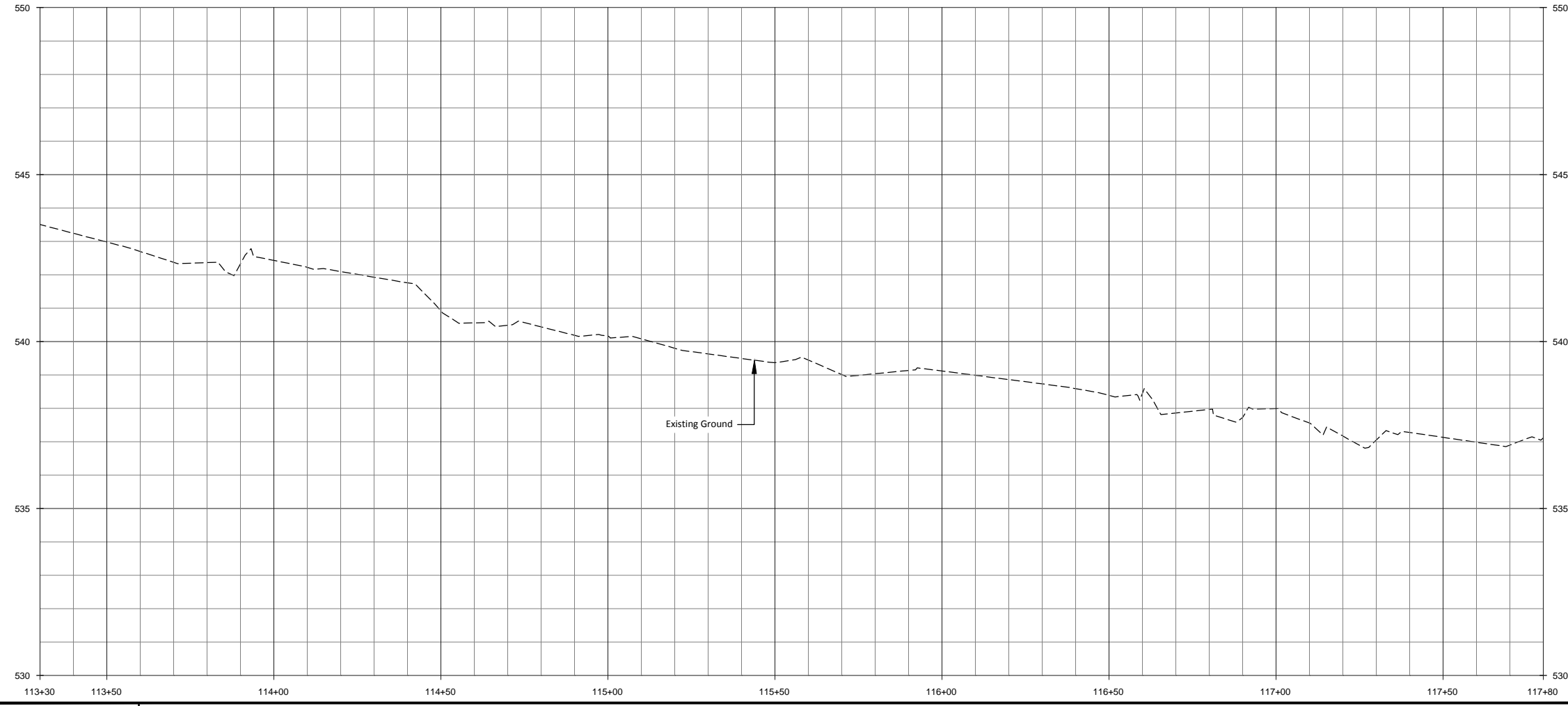
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05-08-15	005-02116	ANA	CLM	JWH

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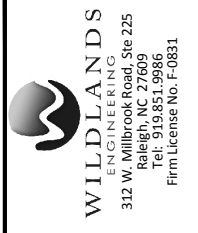


Date: 05-08-15
 Job Number: 05-02116
 Project Engineer: ANA
 Drawn By: CLM
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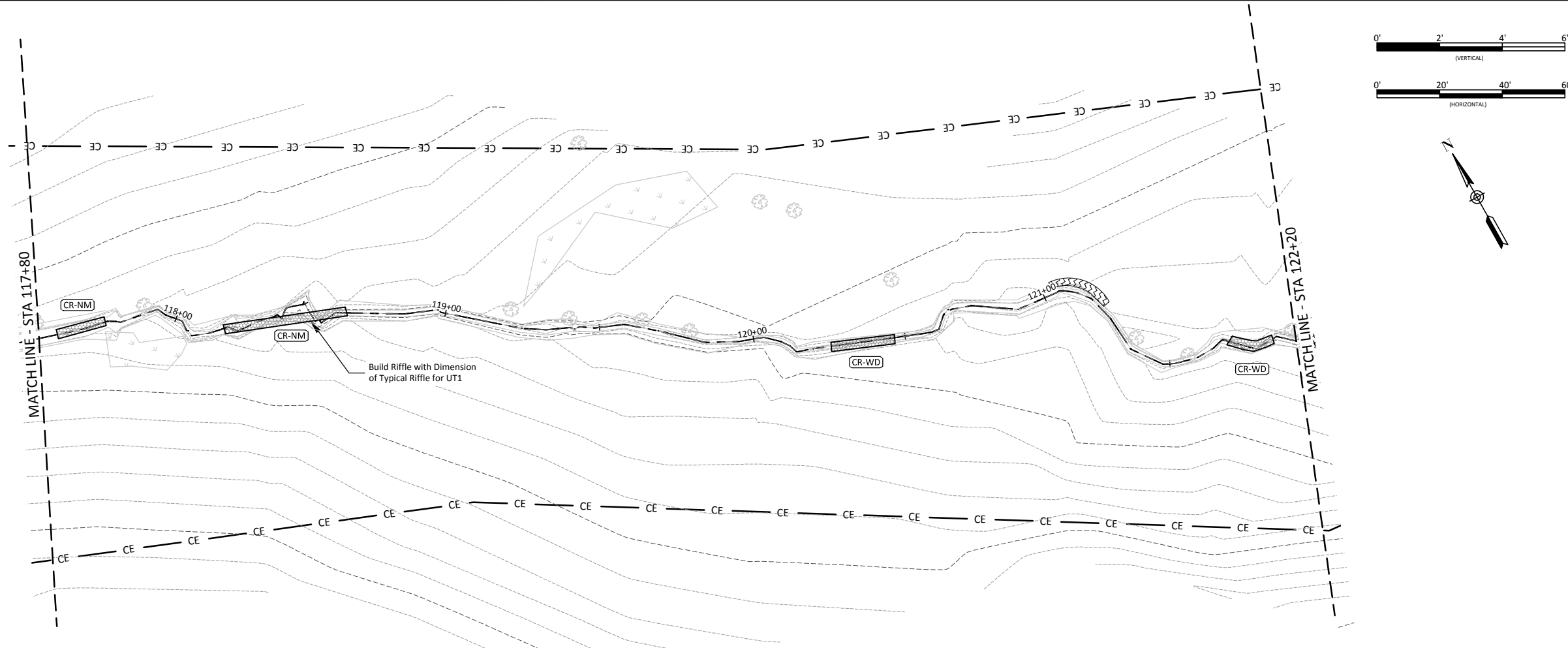
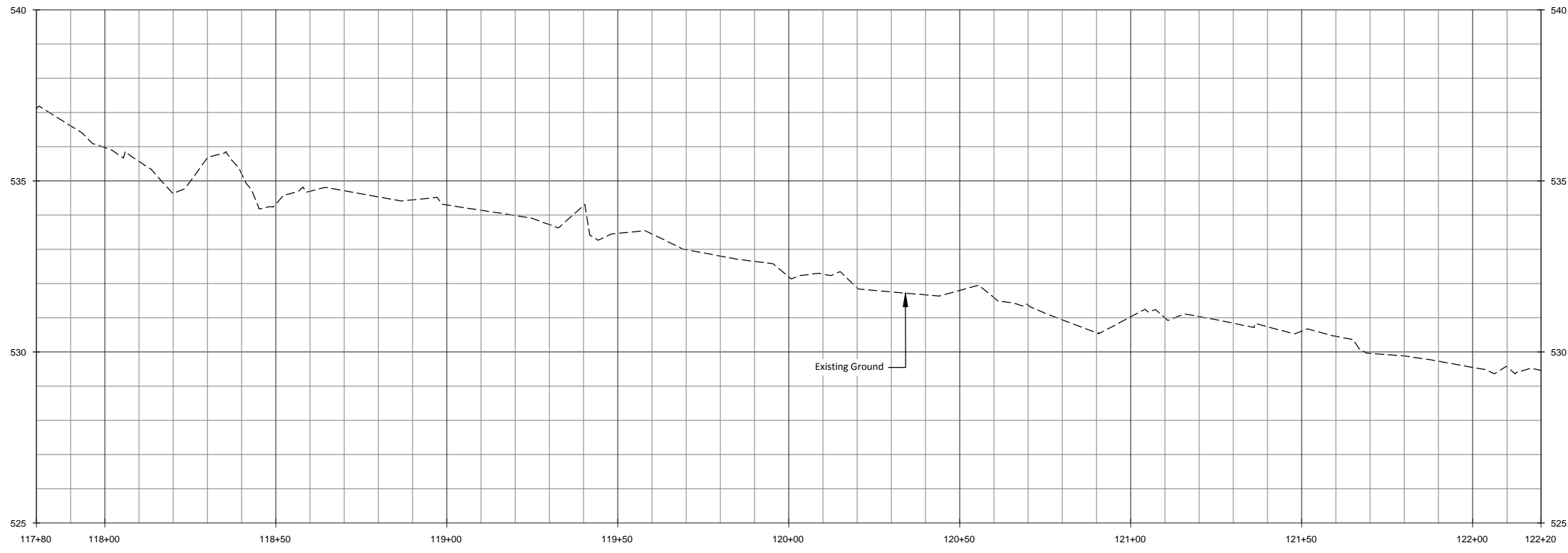
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Holman Mill Mitigation Project
 Alamance County, NC
 UT1 Reach 4
 Stream Plan and Profile

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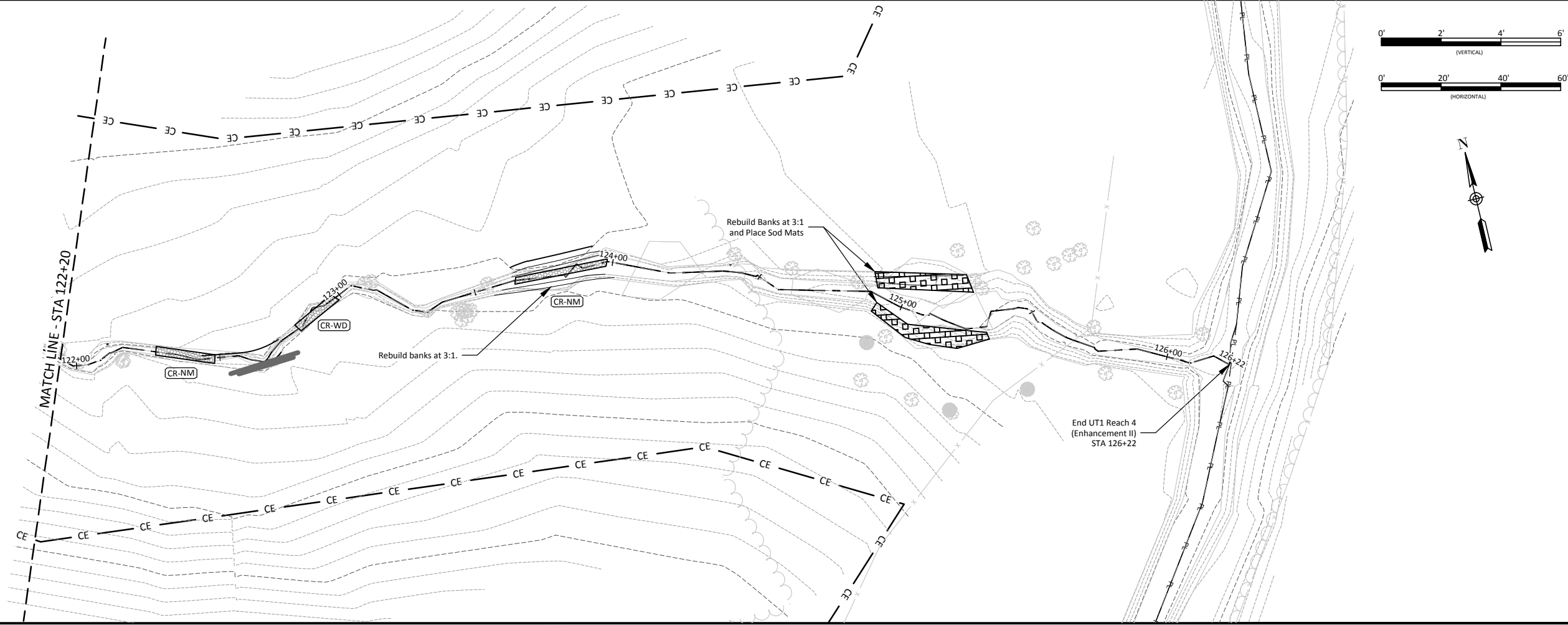
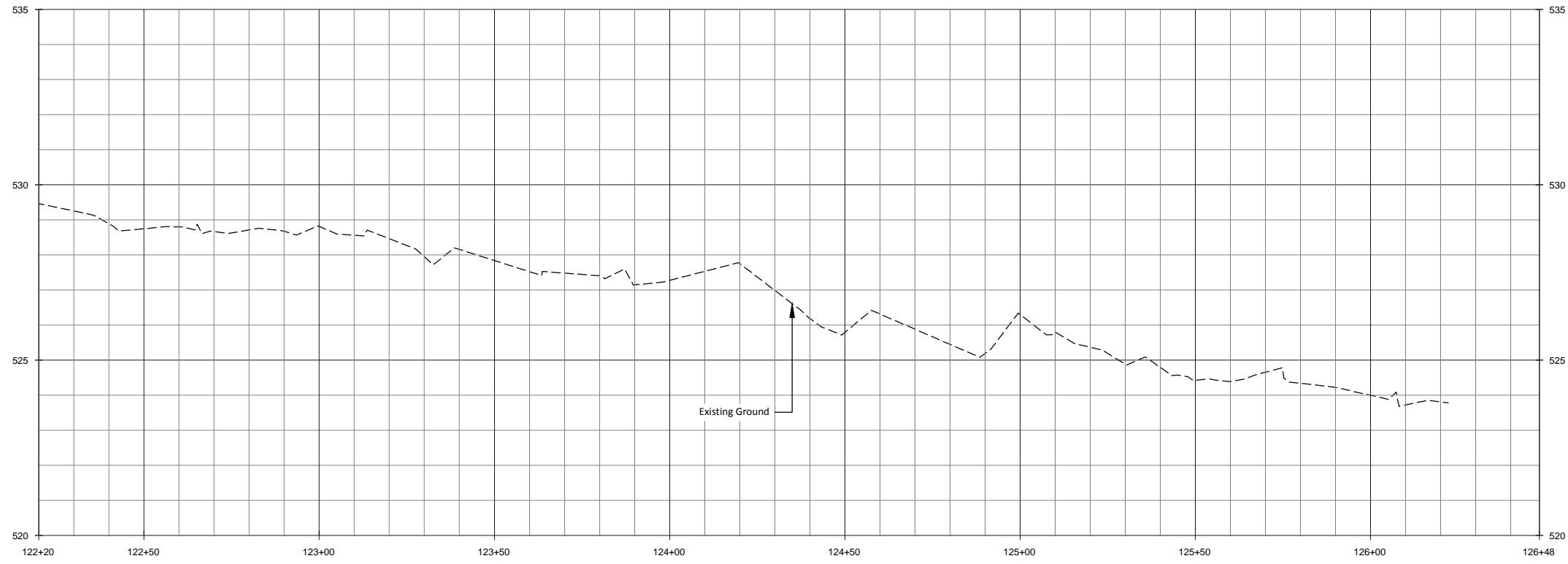


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 UT1 Reach 4
 Stream Plan and Profile

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Holman Mill Mitigation Project
Alamance County, NC
 UT1 Reach 4
 Stream Plan and Profile

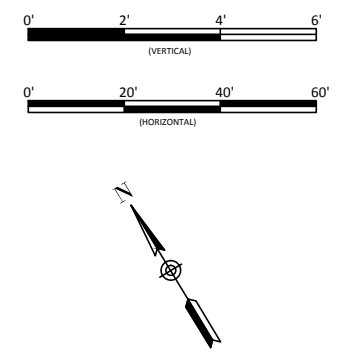
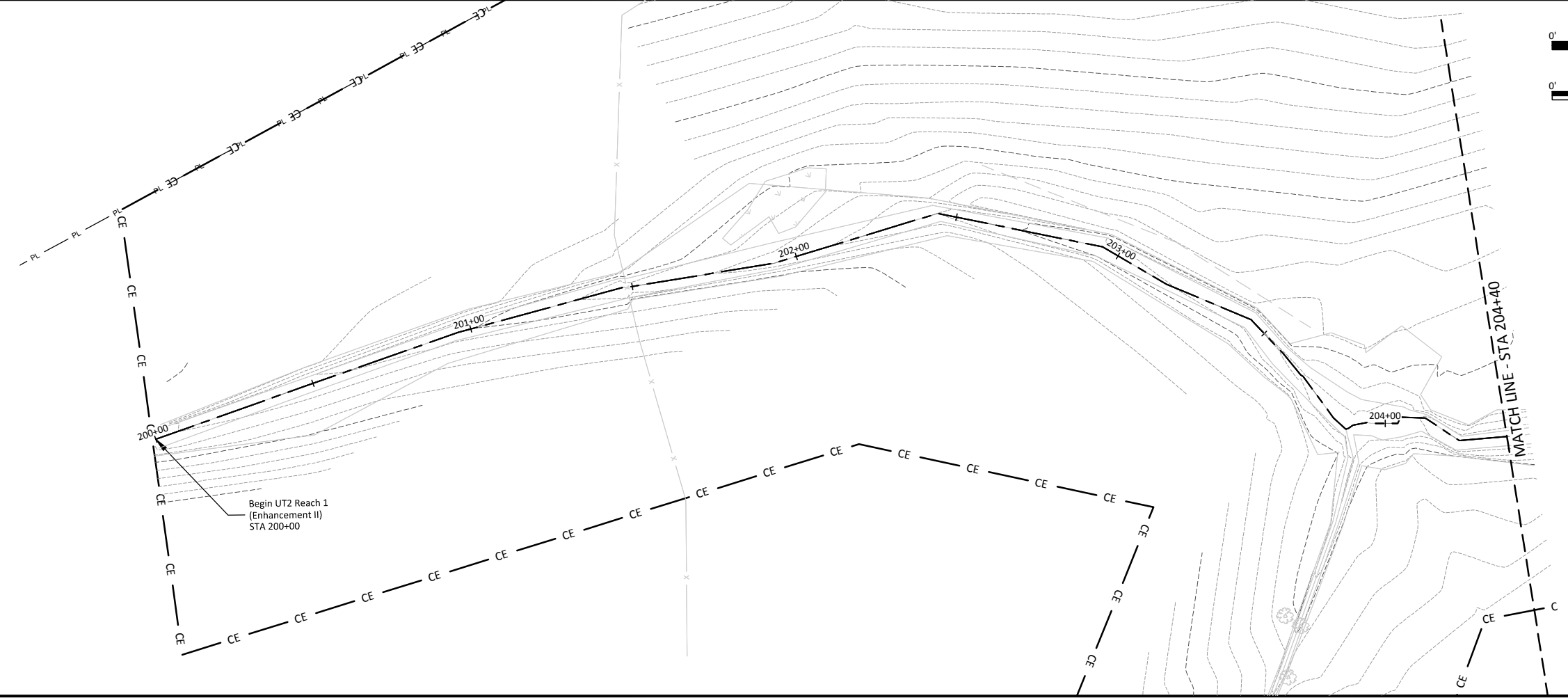
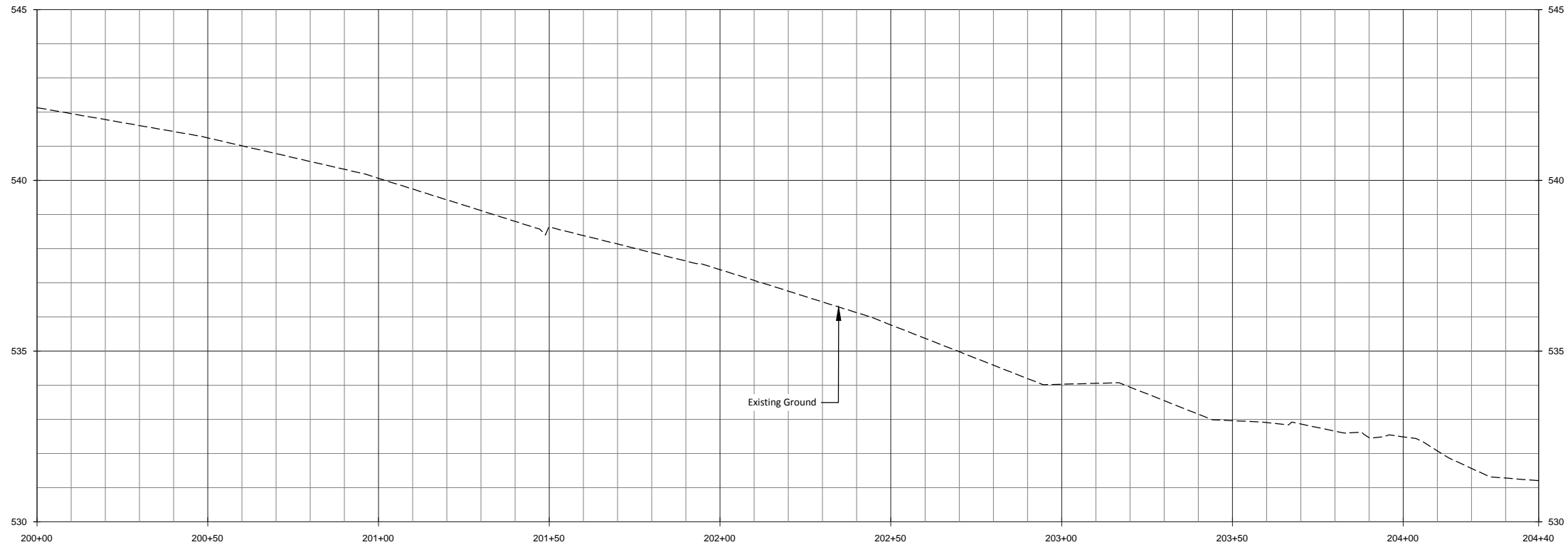
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UT2 Reach 1
 Stream Plan and Profile

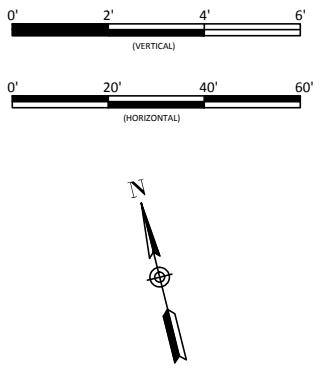
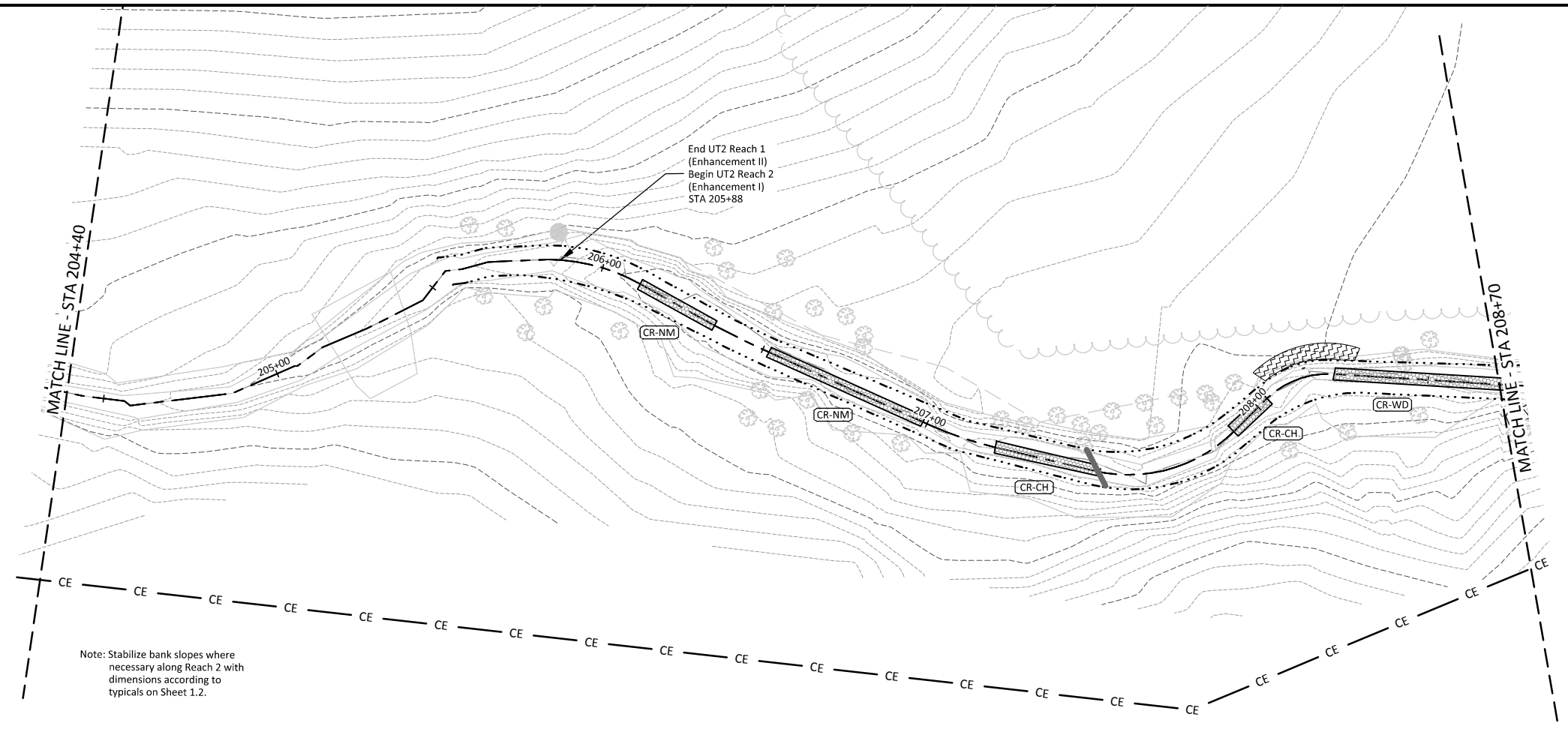
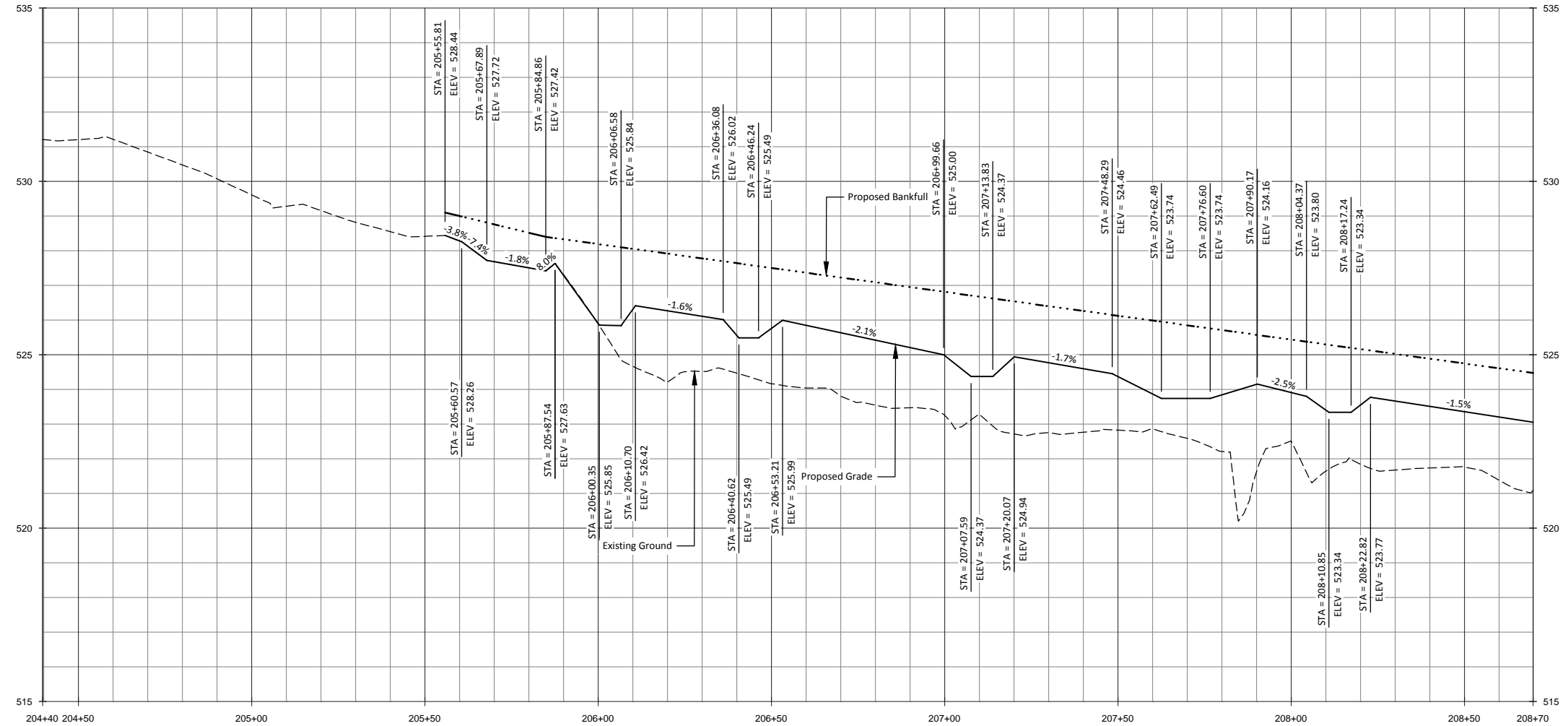
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 Job Number: 05-02116
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 Drawn By: CLM
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Alamance County, NC
 UT2 Reaches 1 & 2
 Stream Plan and Profile

Revisions:

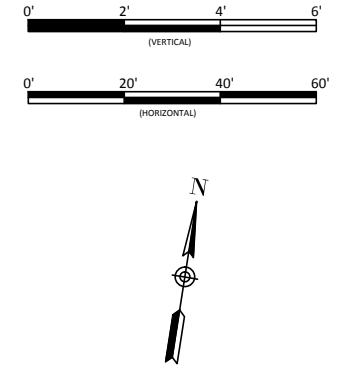
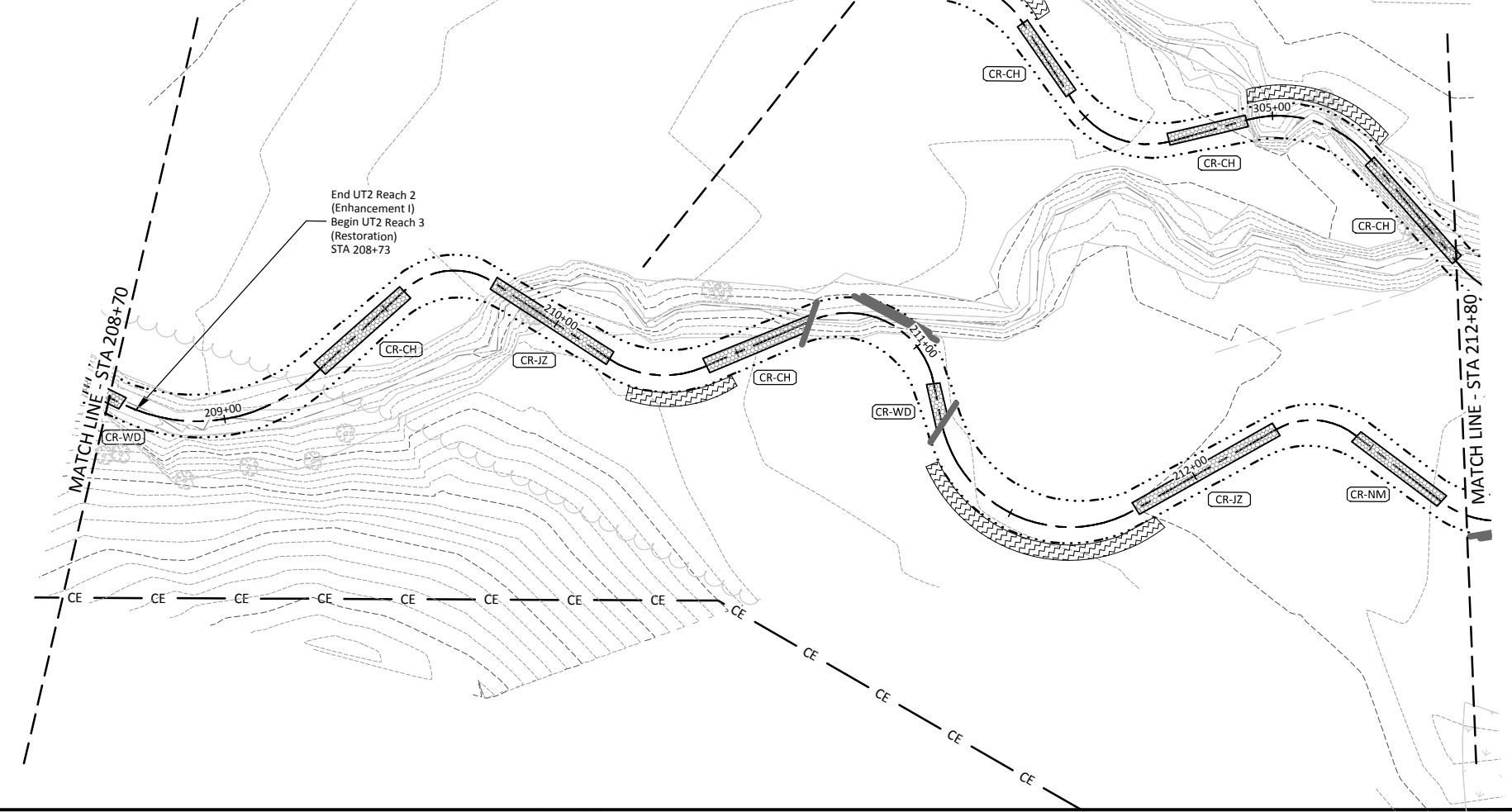
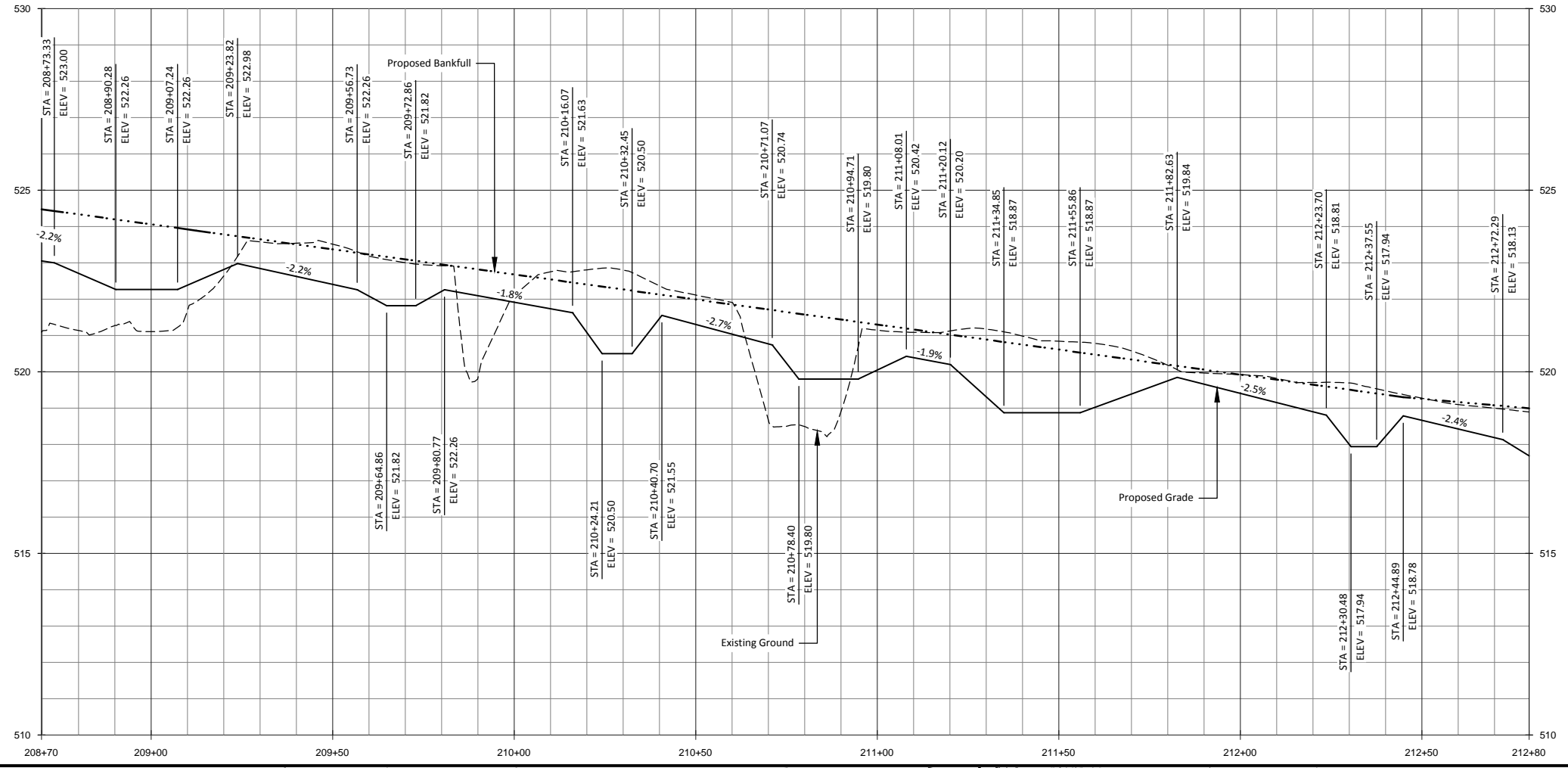
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Job Number:	005-02116
Project Engineer:	ANA
Drawn By:	CLM
Checked By:	JWH

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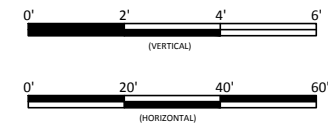
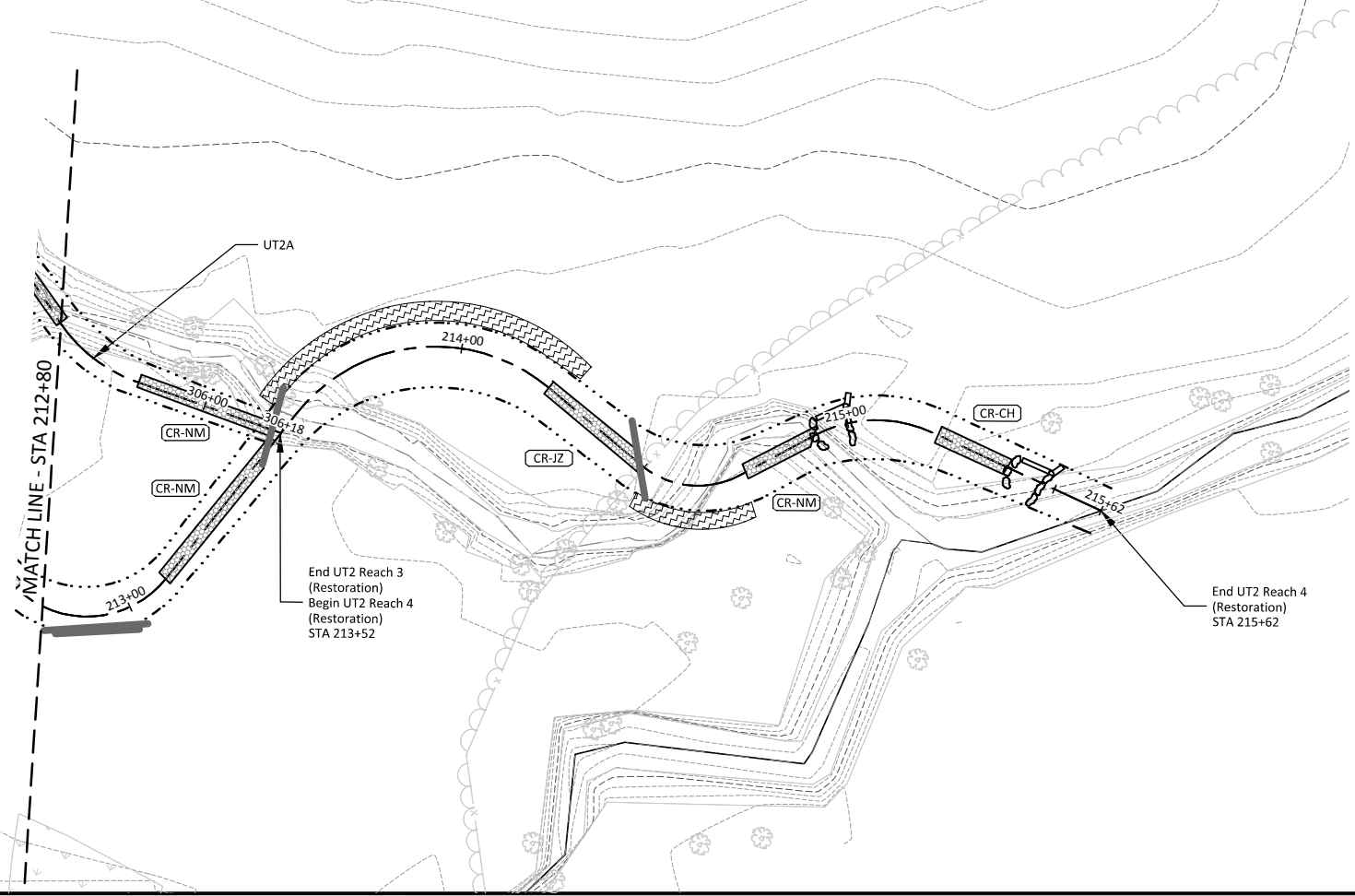
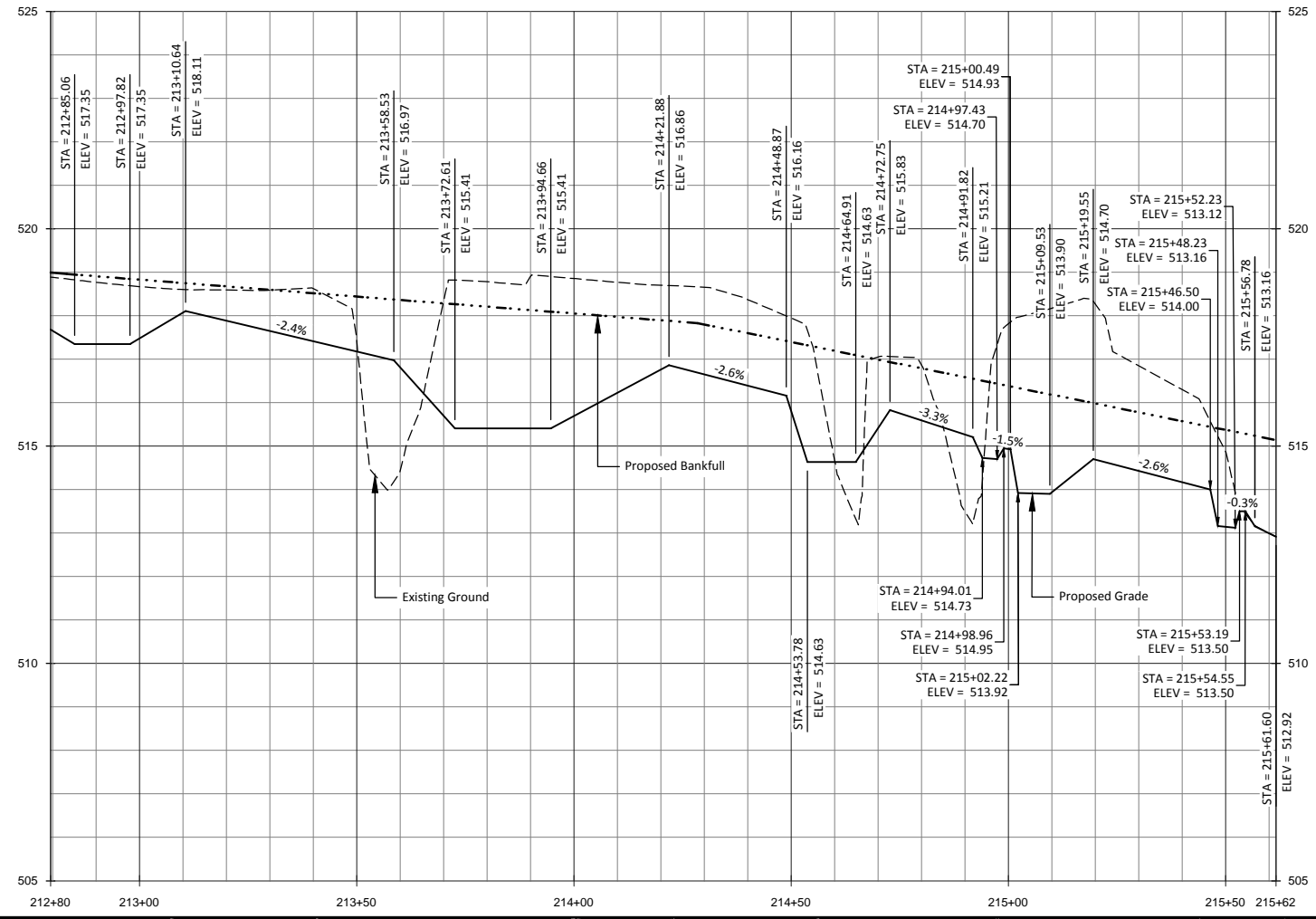
Holman Mill Mitigation Project
Alamance County, NC
 UT2 Reaches 2 & 3
 Stream Plan and Profile

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Date: 05-08-15 Job Number: 005-02116 Project Engineer: ANA Drawn By: CLM Checked By: JWH	<h1 style="font-size: 2em; margin: 0;">2.9</h1>								
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Date:	05-08-15
Job Number:	005-02116
Project Engineer:	ANA
Drawn By:	CLM
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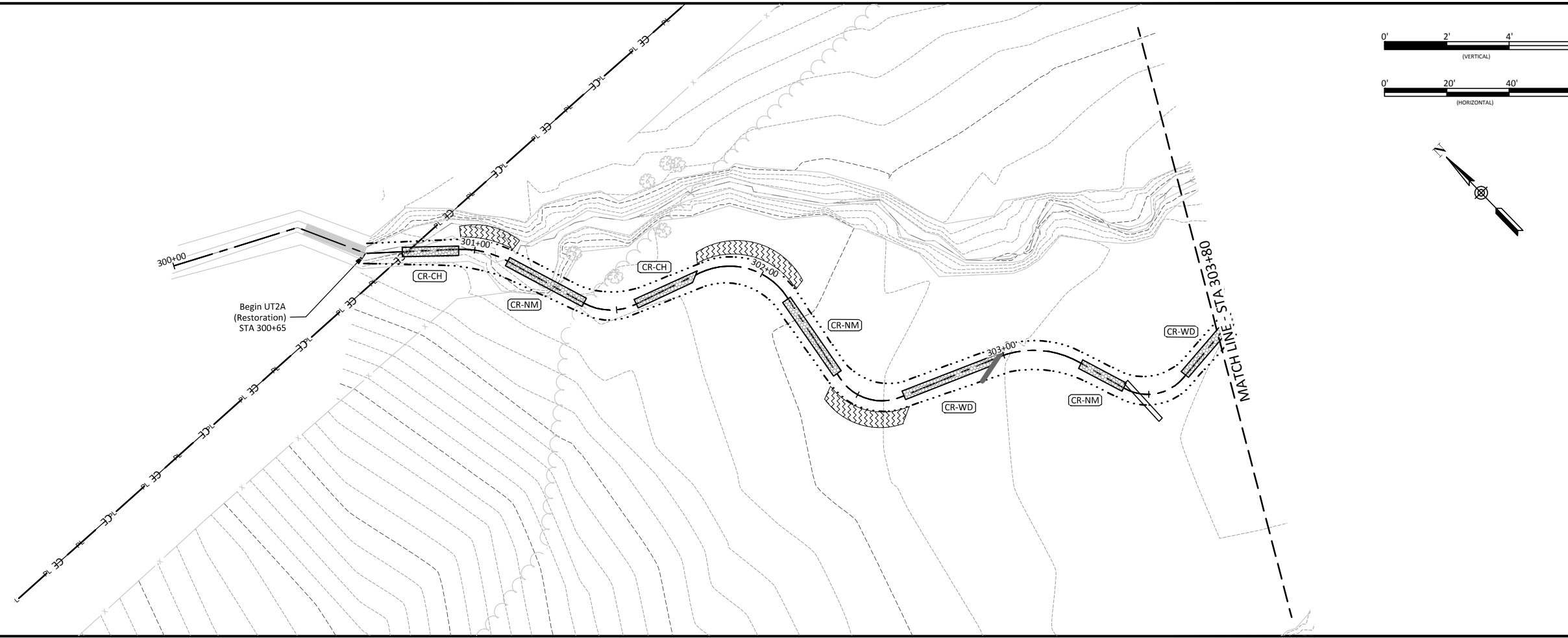
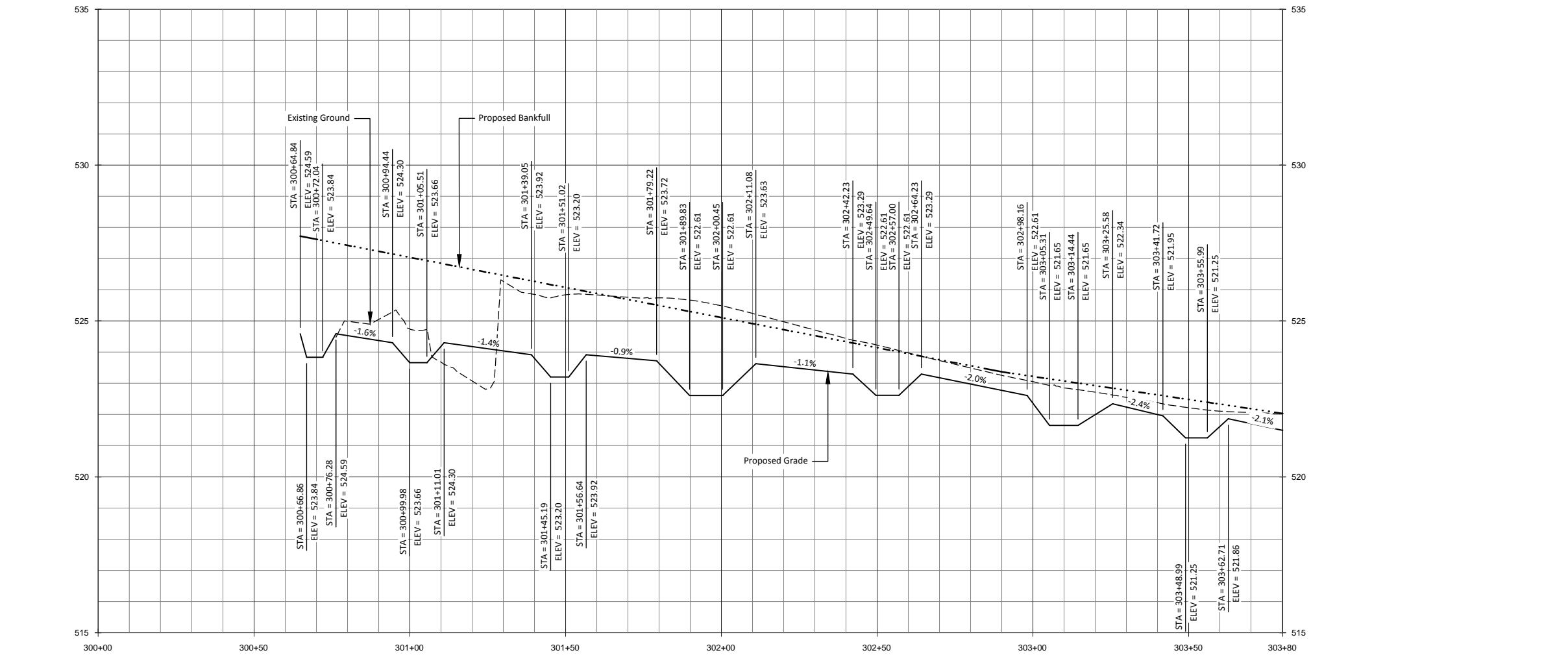
Holman Mill Mitigation Project
 Alamance County, NC

UT2 Reaches 3 & 4
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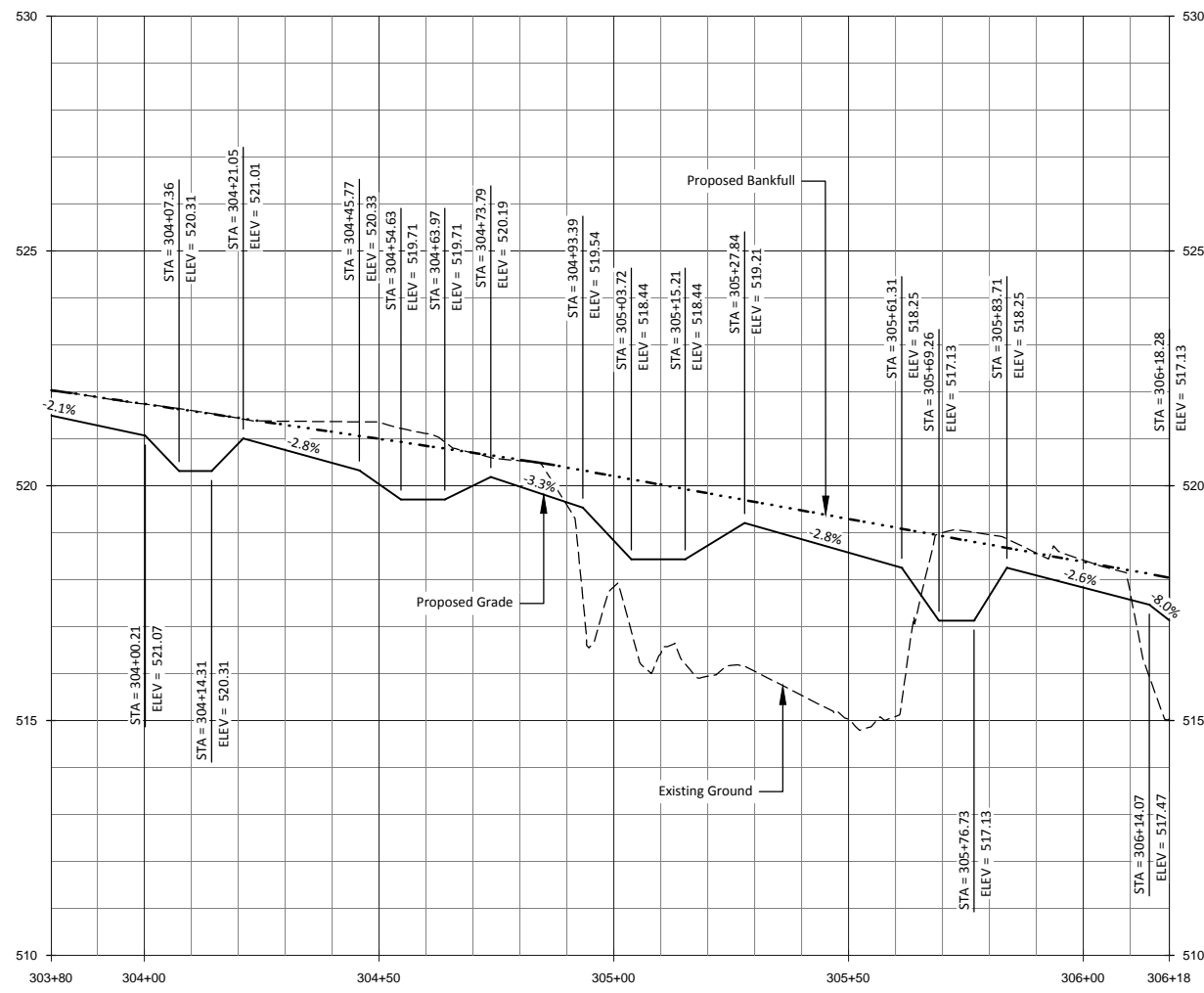
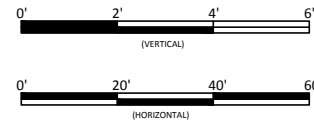
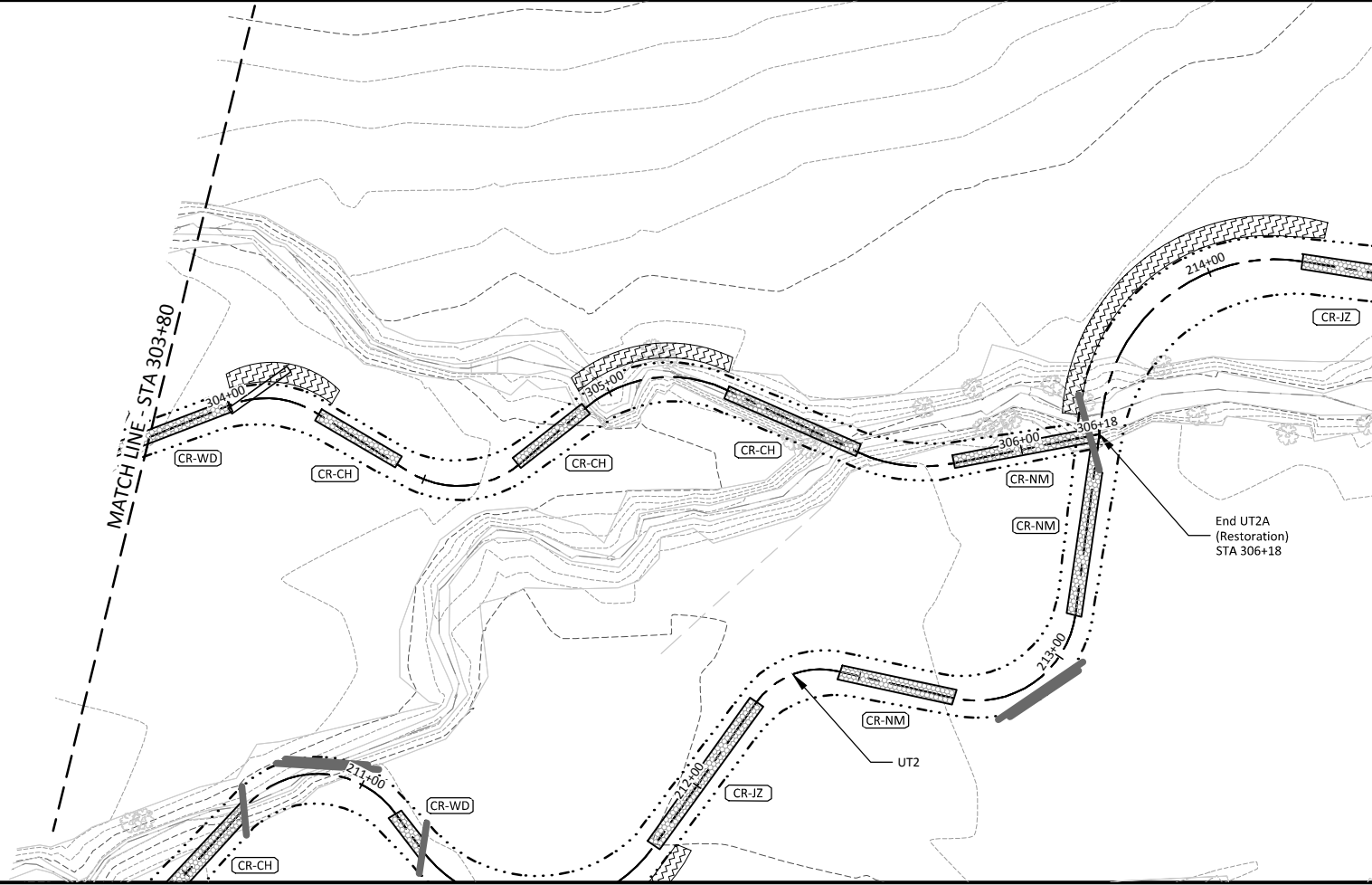
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Alamance County, NC
 UT2A
 Stream Plan and Profile

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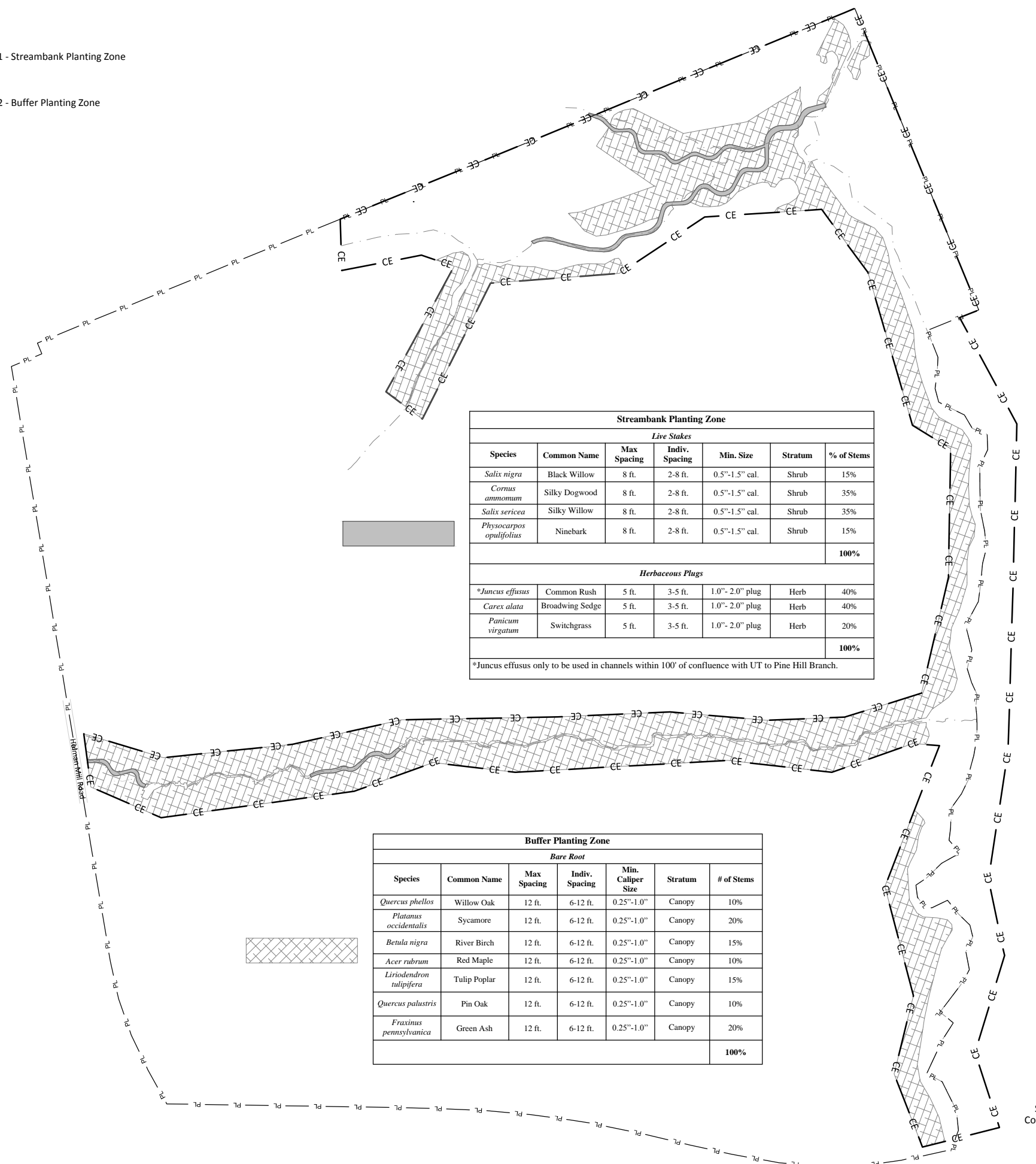
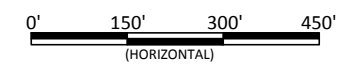
Holman Mill Mitigation Project
 Alamance County, NC
 UT2A
 Stream Plan and Profile

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Date: 05/08/15
Job Number: 005-02116
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 Zone 1 - Streambank Planting Zone

 Zone 2 - Buffer Planting Zone



Streambank Planting Zone						
Live Stakes						
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Size	Stratum	% of Stems
<i>Salix nigra</i>	Black Willow	8 ft.	2-8 ft.	0.5"-1.5" cal.	Shrub	15%
<i>Cornus amomum</i>	Silky Dogwood	8 ft.	2-8 ft.	0.5"-1.5" cal.	Shrub	35%
<i>Salix sericea</i>	Silky Willow	8 ft.	2-8 ft.	0.5"-1.5" cal.	Shrub	35%
<i>Physocarpus opulifolius</i>	Ninebark	8 ft.	2-8 ft.	0.5"-1.5" cal.	Shrub	15%
						100%
Herbaceous Plugs						
* <i>Juncus effusus</i>	Common Rush	5 ft.	3-5 ft.	1.0"- 2.0" plug	Herb	40%
<i>Carex alata</i>	Broadwing Sedge	5 ft.	3-5 ft.	1.0"- 2.0" plug	Herb	40%
<i>Panicum virgatum</i>	Switchgrass	5 ft.	3-5 ft.	1.0"- 2.0" plug	Herb	20%
						100%

**Juncus effusus* only to be used in channels within 100' of confluence with UT to Pine Hill Branch.

Buffer Planting Zone						
Bare Root						
Species	Common Name	Max Spacing	Indiv. Spacing	Min. Caliper Size	Stratum	# of Stems
<i>Quercus phellos</i>	Willow Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	10%
<i>Platanus occidentalis</i>	Sycamore	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	20%
<i>Betula nigra</i>	River Birch	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	15%
<i>Acer rubrum</i>	Red Maple	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	10%
<i>Liriodendron tulipifera</i>	Tulip Poplar	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	15%
<i>Quercus palustris</i>	Pin Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	10%
<i>Fraxinus pennsylvanica</i>	Green Ash	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	20%
						100%

Permanent Riparian Seeding				
Pure Live Seed (20 lbs/ acre)				
Approved Date	Species Name	Common Name	Stratum	Density (lbs/acre)
All Year	<i>Panicum rigidulum</i>	Redtop Panicgrass	Herb	1.5
All Year	<i>Agrostis hyemalis</i>	Winter Bentgrass	Herb	4.0
All Year	<i>Chasmanthium latifolium</i>	River Oats	Herb	2.0
All Year	<i>Rudbeckia hirta</i>	Blackeyed Susan	Herb	1.0
All Year	<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	Herb	1.0
All Year	<i>Carex vulpinoidea</i>	Fox Sedge	Herb	3.0
All Year	<i>Panicum clandestinum</i>	Deertongue	Herb	3.5
All Year	<i>Elymus virginicus</i>	Virginia Wild Rye	Herb	2.0
All Year	<i>Asclepias syriaca</i>	Common Milkweed	Herb	0.2
All Year	<i>Baptisia australis</i>	Blue False Indigo	Herb	0.2
All Year	<i>Gaillardia pulchella</i>	Annual Gaillardia	Herb	1.0
All Year	<i>Echinacea purpurea</i>	Pale Purple Coneflower	Herb	0.6

Permanent Seeding Outside Easement				
Approved Date	Species Name	Stratum	Common Name	Density (lbs/acre)
All Year	<i>Festuca arundinacea</i>	Herb	Tall Fescue	40

Holman Mill Mitigation Project
Alamance County, NC

Planting Plan

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No.	Description

Date: 05-08-15
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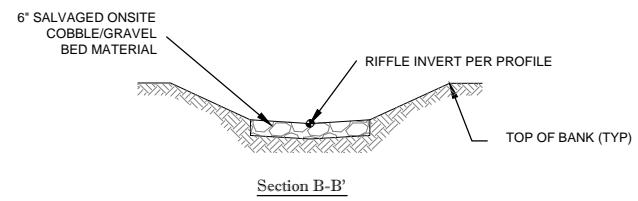
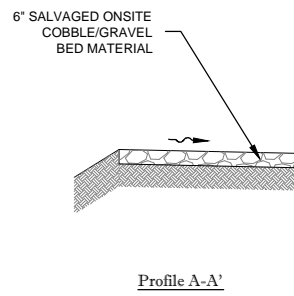
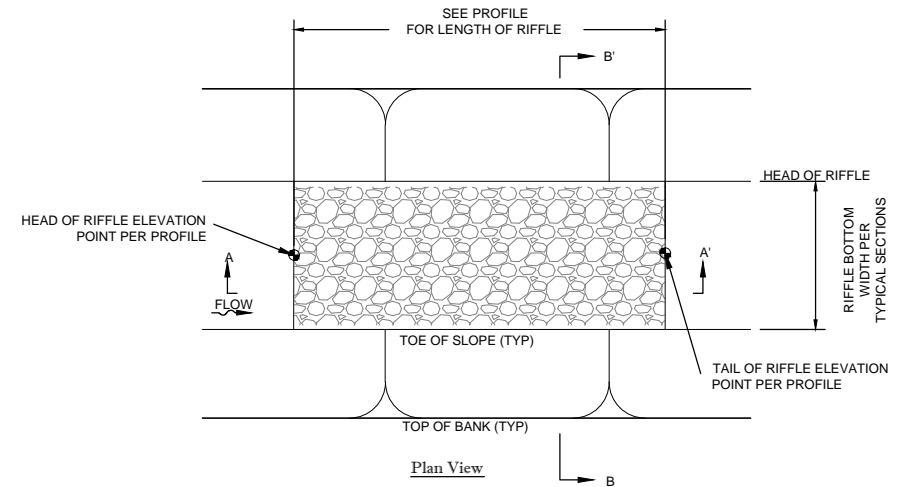
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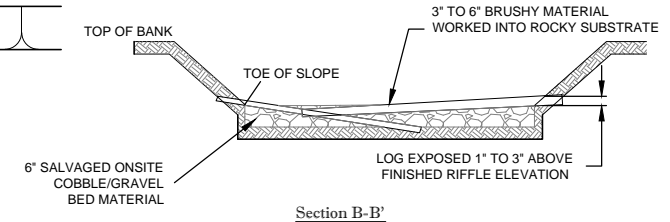
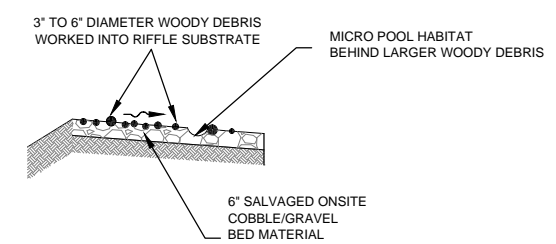
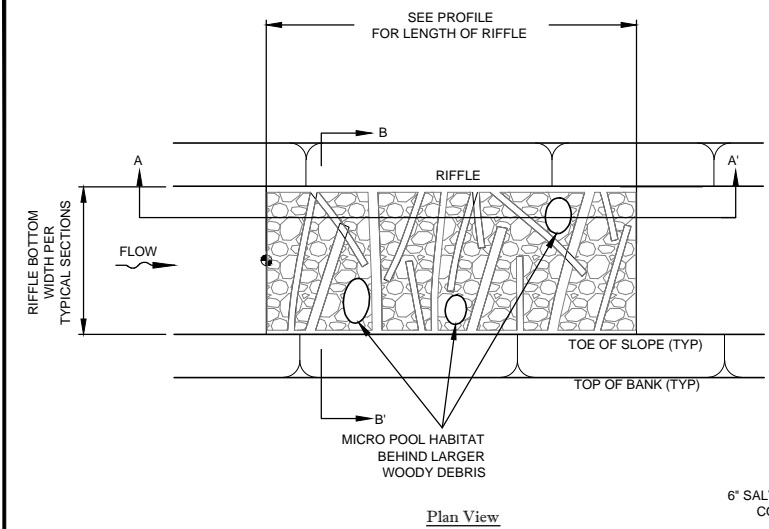

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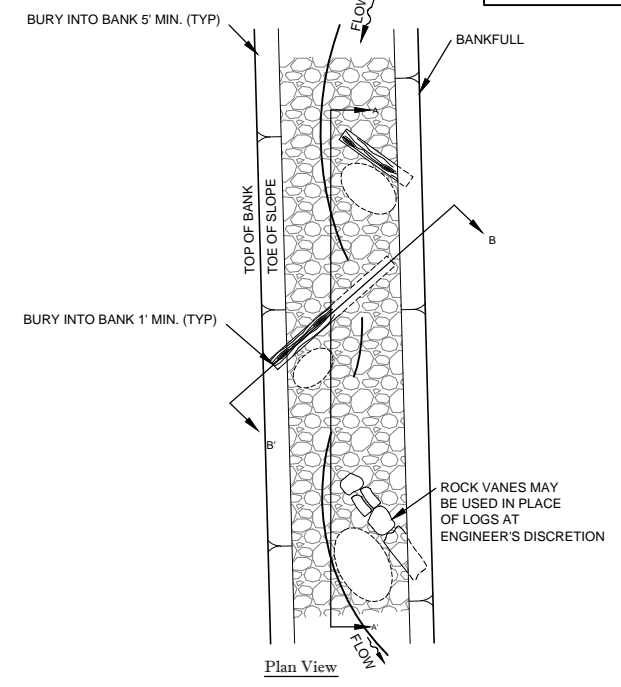
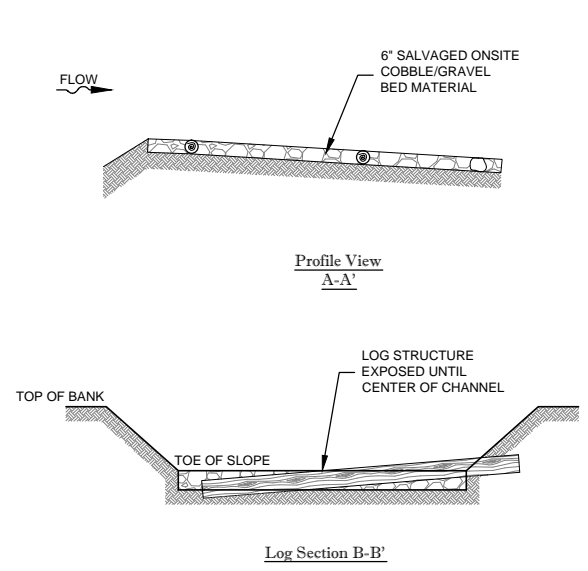


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6.1 Native Material Constructed Riffle
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CR-JZ		CR-CH	

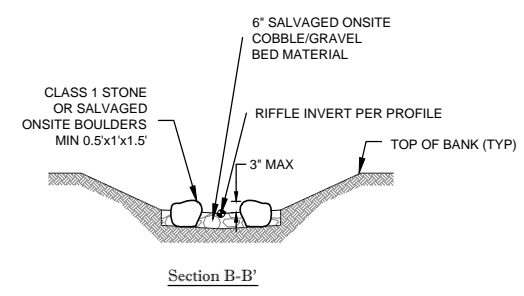
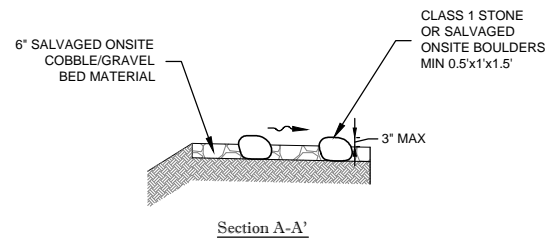
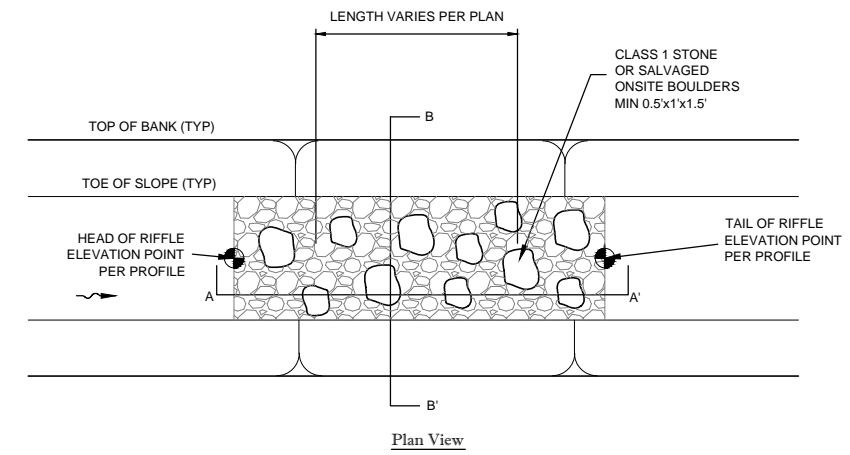


2
6.1 Woody Riffle
Not to Scale



- NOTES:**
- STRUCTURES SHOULD VARY IN SIZE AND TYPE WITHIN EACH RIFFLE.
 - ROCK MAY BE SUBSTITUTED FOR LOGS AT ENGINEER'S DISCRETION.

3
6.1 Jazz Riffle Structure
Not to Scale



4
6.1 Chunky Riffle
Not to Scale

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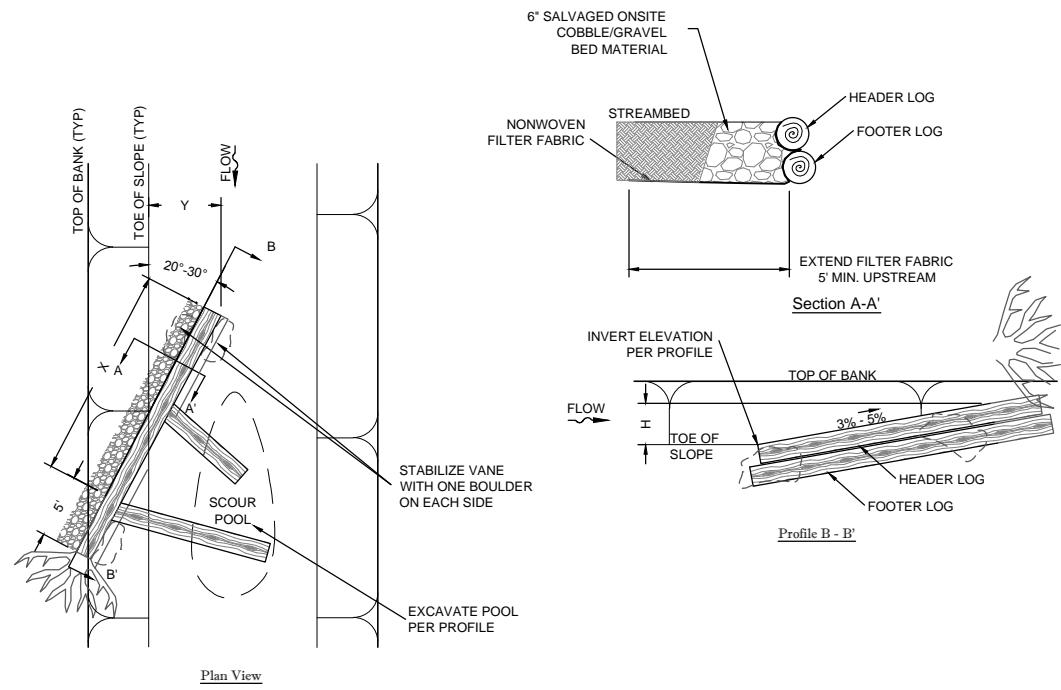
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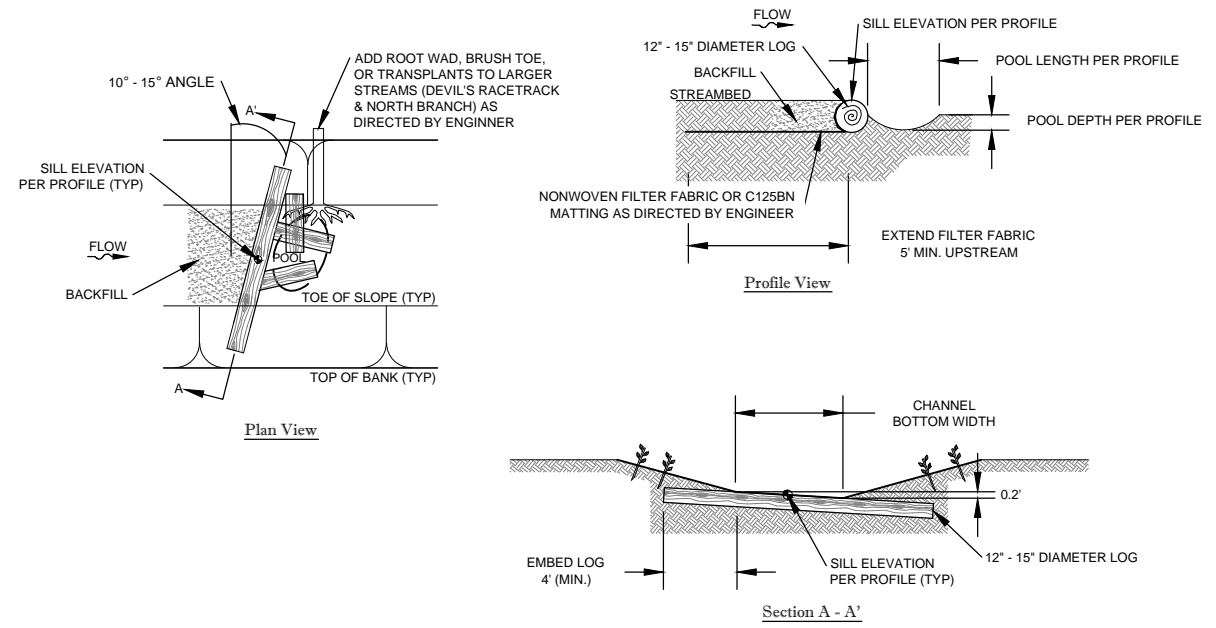
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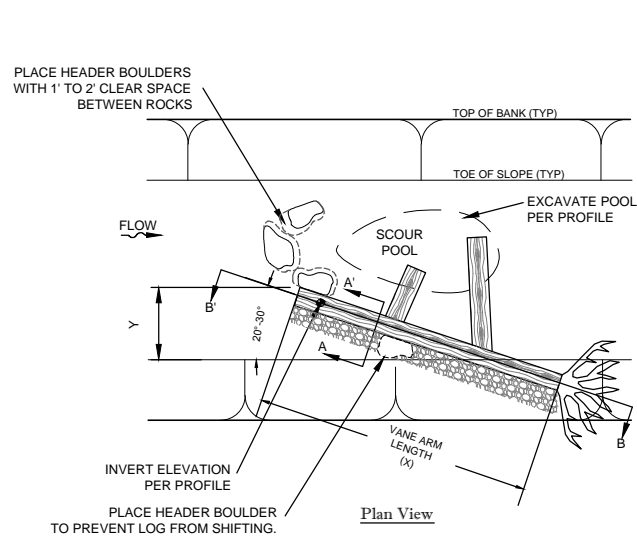
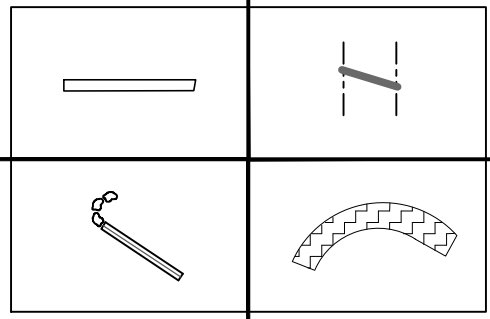
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6.2 Log Vane
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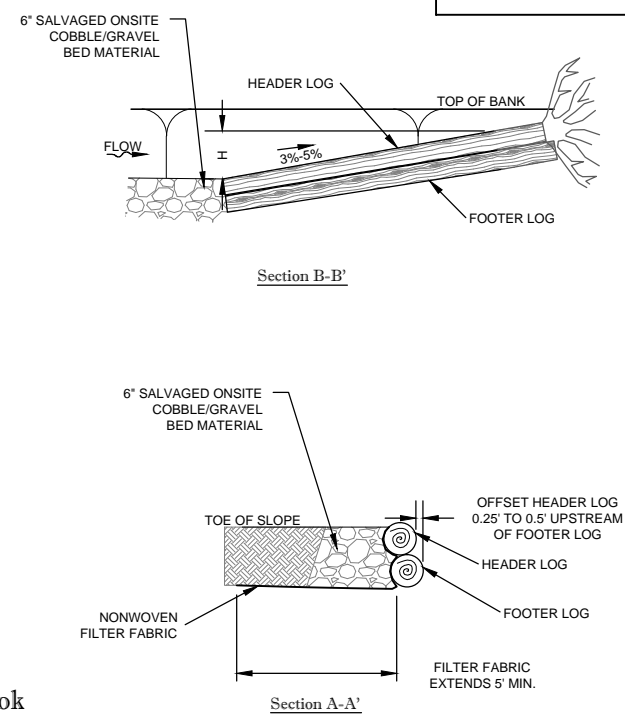


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6.2 Angled Log Drop Structure
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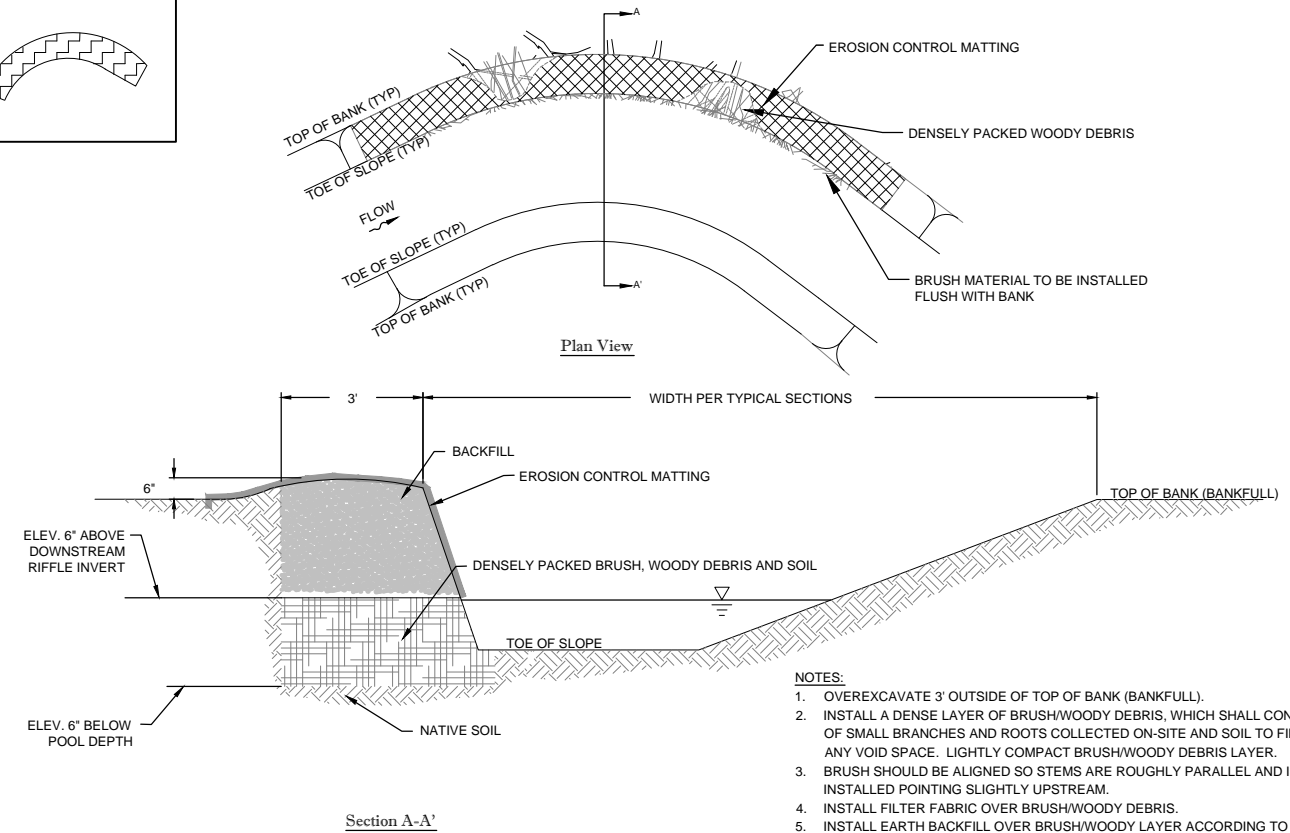


	Trib 1	Trib 2
H	x	x
X	x	x
Y	x	x

3
6.2 Log J-Hook
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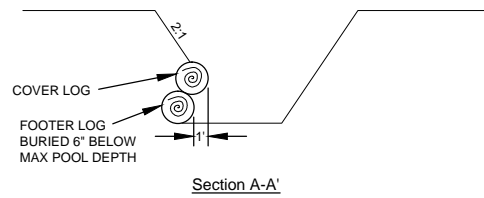
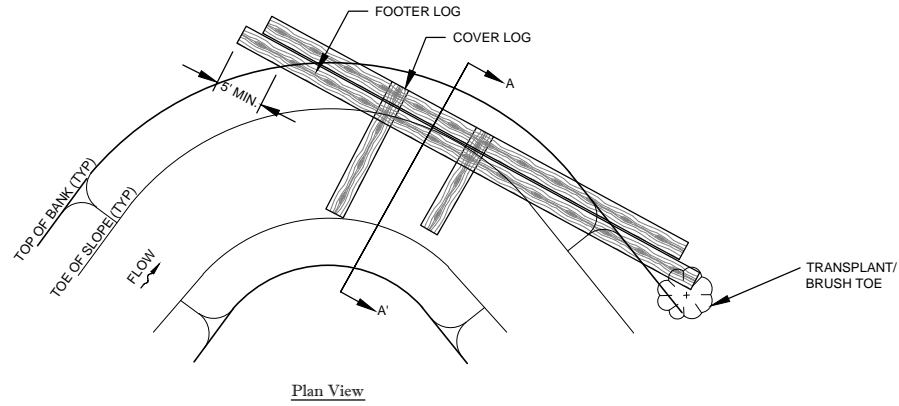


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Not to Scale

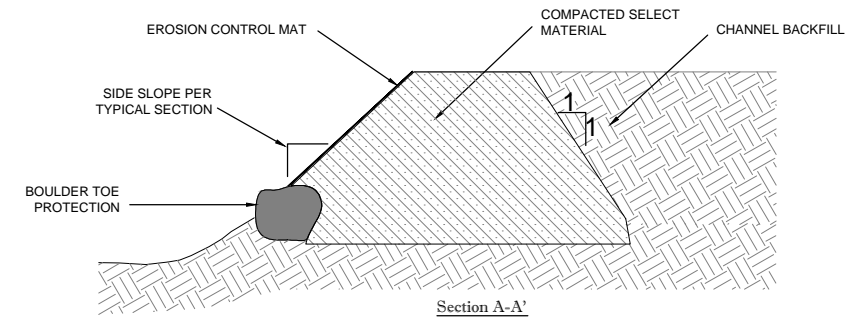
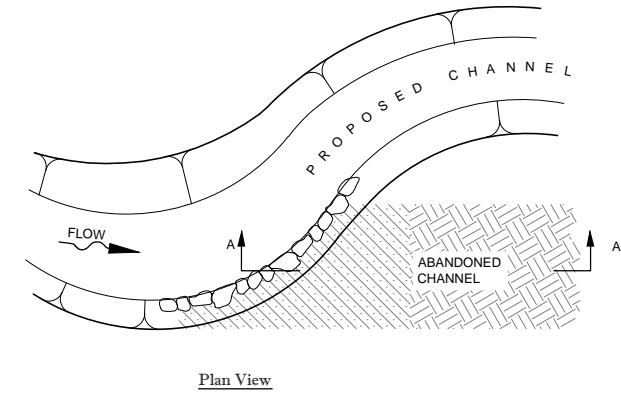
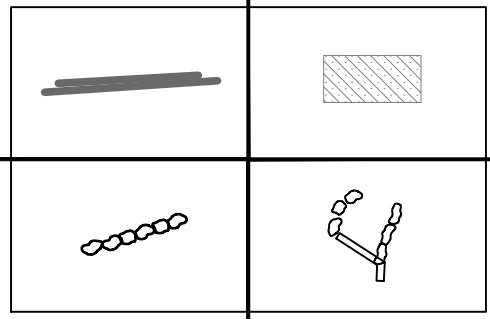


- NOTES:
- OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
 - INSTALL A DENSE LAYER OF BRUSH/WOODY DEBRIS, WHICH SHALL CONSIST OF SMALL BRANCHES AND ROOTS COLLECTED ON-SITE AND SOIL TO FILL ANY VOID SPACE. LIGHTLY COMPACT BRUSH/WOODY DEBRIS LAYER.
 - BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
 - INSTALL FILTER FABRIC OVER BRUSH/WOODY DEBRIS.
 - INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
 - SEED, MULCH AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.

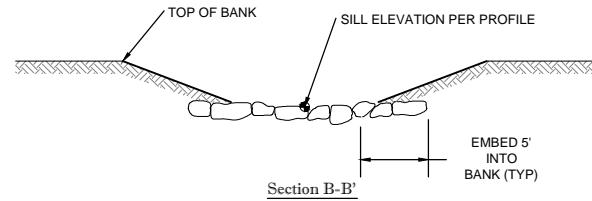
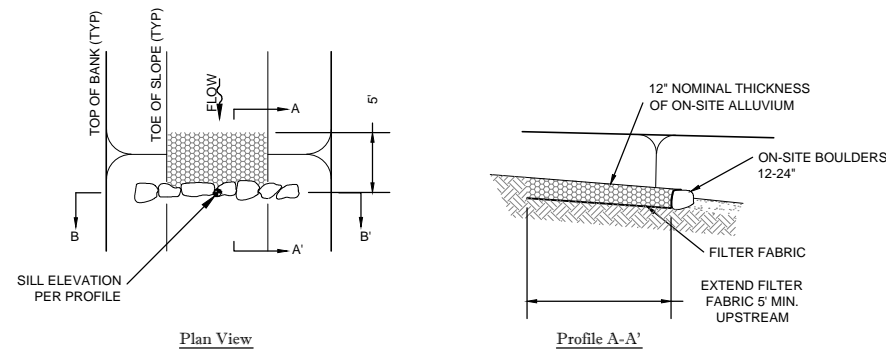
March 7, 2012



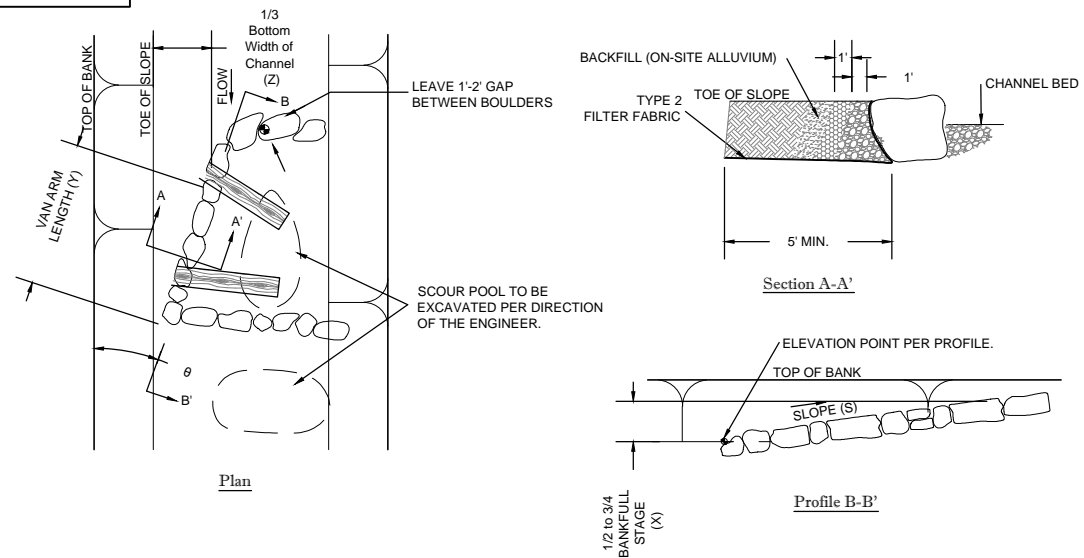
1
6.3 **Cover Log**
Not to Scale



2
6.3 **Channel Plug**
Not to Scale



3
6.3 **Boulder Sill**
Not to Scale



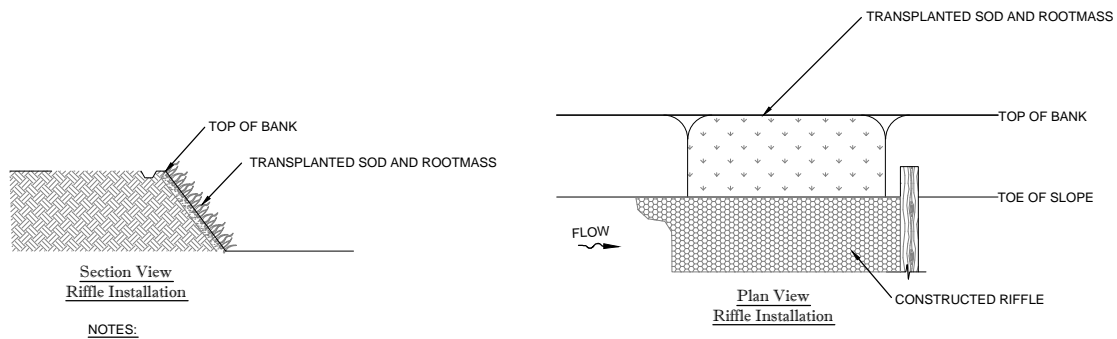
4
6.3 **Boulder J-Hook with Sill**
Not to Scale

- NOTE:
1. BOULDERS TO BE MINIMUM 2x2x1.
 2. DIMENSION TO BE DETERMINED ON SITE AS DIRECTED BY THE ENGINEER.

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

Revisions:

March 7, 2012
E:\Projects\05-08-15-Holman Mill\CAD\Planting\02.4.dwg Details.dwg



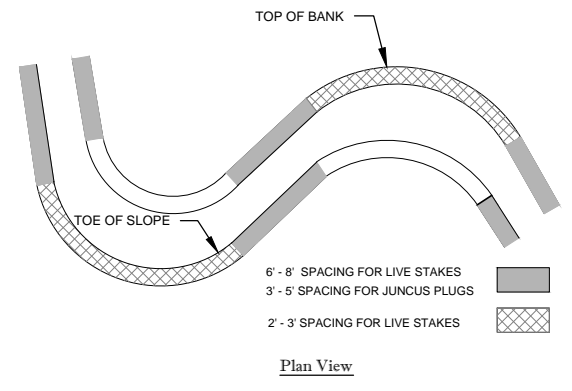
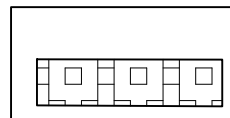
Section View
Riffle Installation

Plan View
Riffle Installation

NOTES:

1. PREPARE THE BANK WHERE THE SOD MAT WILL BE TRANSPANTED BY RAKING & FERTILIZING.
2. EXCAVATE TRANSPANT SOD MATS WITH A WIDE BUCKET AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE.
3. PLACE TRANSPANT ON THE BANK TO BE STABILIZED.
4. FILL IN ANY HOLES AROUND THE TRANSPANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. PLACE MULTIPLE TRANSPANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.
7. INSTALL EROSION CONTROL MATTING ABOVE TRANSPANTED SOD MATS.

1
6.4
Transplanted Sod Mats
Not to Scale

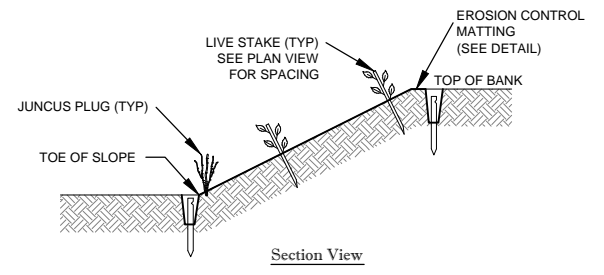


Plan View

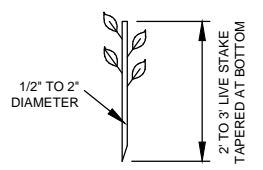
NOTE:

1. LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON PLANS AND DIRECTED BY THE ENGINEER.

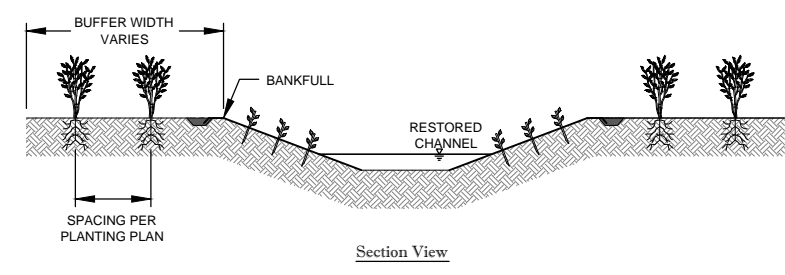
2
6.4
Live Staking & Juncus Plugs
Not to Scale



Section View



Live Stake Detail



Section View

DIBBLE BAR

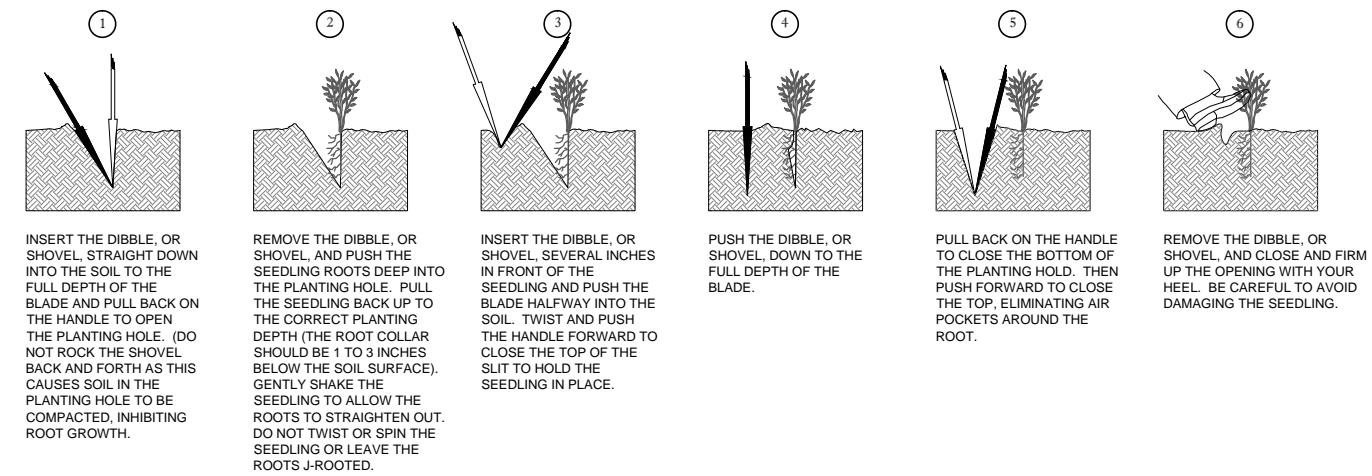
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS-SECTION, AND SHALL BE 12 INCHES LONG, 4 INCHES WIDE AND 1 INCH THICK AT CENTER.

ROOTING PRUNING

ALL ROOTS SHALL BE PRUNED TO AN APPROPRIATE LENGTH TO PREVENT J-ROOTING.

NOTES:

1. ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
2. ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.

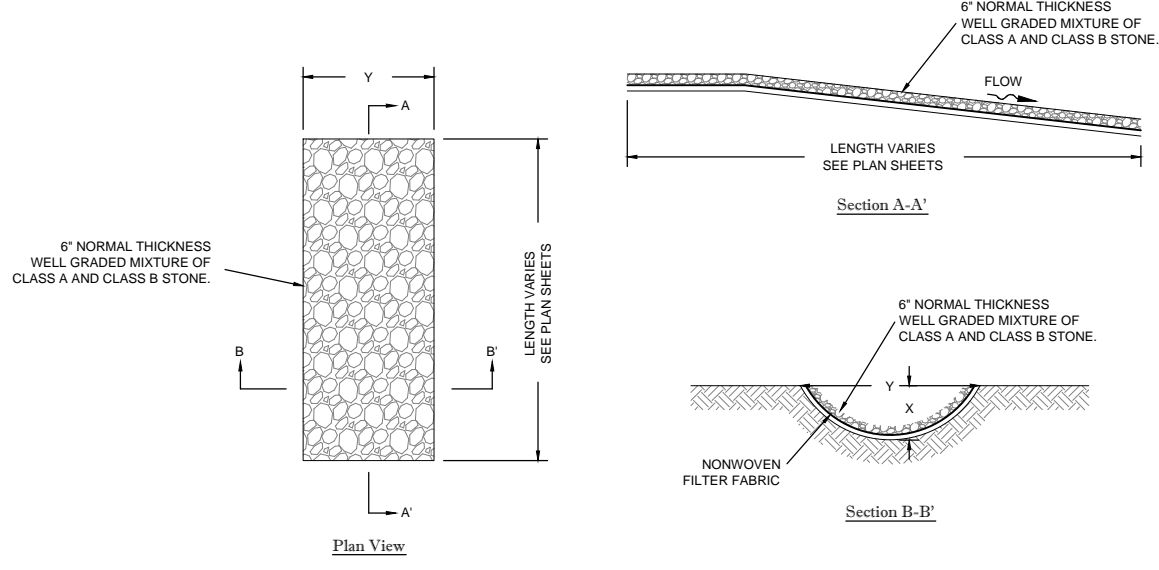


3
6.4
Bare Root Planting
Not to Scale

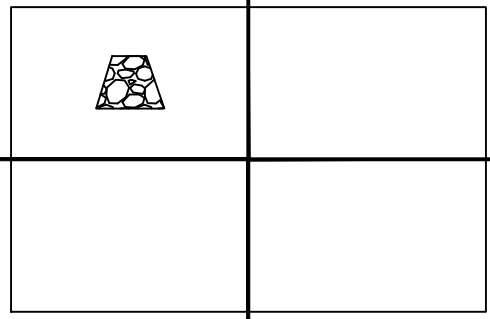
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CONSTRUCTION

Revisions:

Date:	05-08-15
Job Number:	005-0216
Project Engineer:	ANNA
Drawn By:	CLM
Checked By:	JWH



1
6.5
Rock Outlet
Not to Scale



PRELIMINARY
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CONSTRUCTION

Holman Mill Mitigation Project
Alamance County, NC

Details

Revisions:

Date: 05-08-15
Job Number: 005-02146
Project Engineer: ANA
Drawn By: CLM
Checked By: JWH

6.5