

FINAL
AS-BUILT BASELINE
MONITORING REPORT

**NEIGHBORS BRANCH/WALTON CRAWLEY BRANCH
STREAM & WETLAND RESTORATION SITE**

NCDMS Project No. 92872
Contract No. D09023S
USACE Action ID No. SAW-2009-917 & NCDWR Project No. 10-0122
SCO No. 08-07308-01
McDowell County, North Carolina

Data Collection: April 2016
Submission: July 2016



PREPARED FOR:

**N.C. DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1601 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1601**

FINAL
AS-BUILT BASELINE
MONITORING REPORT

**NEIGHBORS BRANCH/WALTON CRAWLEY BRANCH
STREAM & WETLAND RESTORATION SITE**

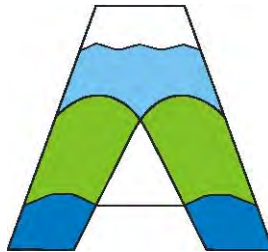
NCDMS Project No. 92872
Contract No. D09023S
USACE Action ID No. SAW-2009-917 & NCDWR Project No. 10-0122
SCO No. 08-07308-01
McDowell County, North Carolina

Data Collection: April 2016
Submission: July 2016



PREPARED BY:

AXIOM ENVIRONMENTAL, INC.
218 SNOW AVENUE
RALEIGH, NORTH CAROLINA 27603



JULY 2016

PROJECT SUMMARY

The North Carolina Division of Mitigation Services (NCDMS) has established the Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site (Site). The primary goals of the project focused on improving water quality and long term stability by reducing nutrient loading from the on-site cattle and horse operation, reducing excess sedimentation input from Site channel banks and contributing non-jurisdictional tributaries/drainages, reducing excess sedimentation from Site access roads and deteriorated crossings, increasing the attenuation of floodwater flows, reintroducing natural watershed flows to Walton Crawley Branch by removing a pond and restoring the channel through its natural valley, and restoring and enhancing aquatic and riparian habitat. Long term stability will be evidenced by channels maintaining stable inverts and banks over an extended period of time.

These goals were accomplished through the following objectives.

- Reduce point (i.e. cattle/horses directly accessing the channel) and non-point source (i.e. stormwater runoff through pastures) pollution associated with an on-site cattle and horse operation by exclusionary fencing from the stream and riparian buffer, and by providing a vegetative buffer on stream banks and adjacent floodplains to treat nutrient enriched surface runoff from adjacent pastureland.
- Stabilize degraded portions of on-site streams, eroding ephemeral/stormwater channels, and existing maintained dirt roads to reduce sediment inputs. Stabilization methods included:
 - Restoring a stable dimension, pattern, and profile to selected sections of channels to ensure the channel will transport and attenuate watershed flows and sediment loads without aggrading or degrading.
 - Stabilize selected channel banks by excavating bankfull benches, placing stream structures to reduce shearing forces on outside meander bends, and planting native vegetative species to provide soil stability.
 - Stabilize ephemeral/stormwater channels by planting native vegetation along eroded banks and floodplain and constructing stabilization weirs through the channel valley to lower facet slopes and decrease erosion.
 - Place gravel along existing degraded soil roads that are situated adjacent to Site streams.
- Reintroduce natural watershed flows to Walton Crawley Branch by restoring the channel through the low point of the natural valley and removing a dam that impedes natural down valley flows.
- Improve aquatic habitat by enhancing stream bed variability, providing shading/cover areas within the stream channel, and introducing woody debris in the form of rootwads, log vanes, and log sills.
- Enhance fish passage within Neighbors Branch and Walton Crawley Creek. This was accomplished by eliminating a pond and restoring the stream through the natural valley and by restoring Neighbors Branch and replacing an existing perched culvert to allow fish passage upstream.
- Enhance riparian wildlife habitat by:
 - Fencing cattle out of existing wetlands and planting impacted wetlands with native vegetative species. Wetlands were also restored by raising Site stream inverts to allow groundwater tables to rise throughout the affected valleys.
 - Fencing livestock out of existing and restored riparian buffers as well as installing alternative watering devices that will ensure livestock have sufficient watering areas. This is detailed further in the Farm Management Plans completed for the Site by NCDMS.
 - Vegetating the existing fescue dominated riparian buffers with native trees, shrubs, herbs, and grasses. Forest vegetation species were selected by studying a Reference Forest Ecosystem located on-site and reviewing Montane Alluvial Forest species listed in *Classification of the Natural Communities of North Carolina: Third Approximation* (Schafale and Weakley 1990).
- Creating wildlife corridors through agricultural lands which have significantly dissected the landscape. The corridors will provide connectivity to a diversity of habitats including mature forest, early successional forest, stream-side forest, riparian wetlands, and uplands.

Stream Success Criteria: Success criteria for stream restoration will include 1) successful classification of the reach as a functioning stream system (Rosgen 1996) and 2) channel variables indicative of a stable stream system.

Collected data will be utilized to determine the success in restoring stream channel stability. Specifically, the width-to-depth ratio and bank-height ratios should be indicative of a stable or moderately unstable channel with minimal changes in cross-sectional area, channel width, and/or bank erosion along the monitoring reach. In addition, channel abandonment and/or shoot cutoffs must not occur and sinuosity values must remain relatively constant. Visual assessment of instream structures will be conducted to determine if failure has occurred. Failure of a structure may be indicated by collapse of the structure, undermining of the structure, abandonment of the channel around the structure, and/or stream flow beneath the structure.

Stream Dimension: General maintenance of a stable cross-section and hydrologic access to the floodplain features over the course of the monitoring period will generally represent success in dimensional stability. Some changes in dimension (such as lowering of bankfull width) should be expected. Riffle cross-sections should generally maintain a bank-height ratio approaching 1.0, with some variation in this ratio naturally occurring. Pool cross-sections naturally adjust based on recent flows and time between flows, therefore more leeway on pool cross-section geometry is expected.

Stream Pattern and Profile: The profile should not demonstrate significant trends towards degradation or aggradation over a significant portion of a reach. Additionally, bed form variables should remain noticeably intact and consistent with original design parameters that were based off of reference conditions. Pattern features should show little adjustment over the standard 5-year monitoring period and will be monitored to ensure adjustment is minor prior to close out.

Substrate: Substrate measurements should indicate the progression towards or the maintenance of the known distributions from the design phase.

Sediment Transport: There should be an absence of any significant trend in the aggradational or depositional potential of the channel.

Hydraulics: A minimum of two bankfull events must be documented within the standard 5-year monitoring period. The two bankfull events shall occur within separate years.

Vegetation Success Criteria: Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria are dependent upon the density and growth of characteristic forest species. An average density of 320 stems per acre of planted stems must be surviving in the first three monitoring years. Subsequently, 290 planted stems per acre must be surviving in year 4 and 260 planted stems per acre in year 5.

Wetland Hydrology Success Criteria: Target hydrological characteristics include saturation or inundation for 5 to 12.5 percent of the growing season, during average climatic conditions. During growing seasons with atypical climatic conditions, groundwater gauges in reference wetlands may dictate threshold hydrology success criteria (75 percent of reference). These areas are expected to support hydrophytic vegetation. If wetland parameters are marginal as indicated by vegetation and/or hydrology monitoring, a jurisdictional determination will be performed.

The Site is located approximately six miles southeast of the town of Marion (Figure 1, Appendix B). The Site is situated due southwest of the intersection of Deer Park Road and Harmony Grove Road in McDowell County, North Carolina and is located within the United States Geological Survey (USGS) Hydrologic Unit

and Targeted Local Watershed 03050101040010 (North Carolina Division of Water Quality Subbasin 03-08-30) of the Catawba River Basin and will service USGS 8-digit Cataloging Unit 03050101.

The contributing watersheds are characterized primarily by forest land (approximately 84 percent of the total area) with pasture at the lower elevations (approximately 10 percent of the total area) and low-density residential development scattered along the outer fringes of the watershed. Impervious surfaces appear to account for approximately one percent of the watershed land surface. Prior to Site construction, riparian vegetation had been removed, stream channels were manipulated, and hoof shear from livestock on stream banks and floodplain soils was responsible for degraded water quality and unstable channel characteristics (stream entrenchment, erosion, and bank collapse).

Project mitigation efforts resulted in the following:

- Restore 2456 linear feet of Site streams
- Enhance (Level I) 202 linear feet of Site streams
- Enhance (Level II) 1863 linear feet of Site streams
- Preserve 3139 linear feet of Site streams
- Restore 0.52 acre of existing hydric soils to riparian wetlands
- Enhance 1.62 acres of riparian wetlands
- Preserve 1.29 acres of riparian wetlands

The Muddy Creek Restoration Partnership (Partnership) was formed in 1998 to address impacts to the Muddy Creek Watershed. The Partnership completed the *Muddy Creek Watershed Restoration Initiative Feasibility Report and Restoration Plan* (Watershed Plan) for the Muddy Creek Watershed in December of 2003 (MCRP 2003). Since 2004 NCDMS has informally participated in the Partnership by implementing priority projects named by the partnership and adopted the 2003 report as part of its Local Watershed Plan (LWP). The NCDMS's *Upper Catawba River Basin Restoration Priorities* (2009) identifies North Muddy Creek as a Targeted Local Watershed (TLW). The Site is located within the North Muddy Creek Watershed. In 2008 NCDMS contracted with a consulting firm to conduct outreach programs with landowners and identify additional project sites in the Muddy Creek Watershed.

The primary goals identified by the Partnership's Watershed Plan include the following.

1. Restore the Watershed to its Full Intended Use
2. Restore Riparian Buffers
3. Enhance Open Space Preservation
4. Improve Water Quality
5. Restore Physical Habitat
6. Establish a Trout Fishery

The Watershed Plan listed the following components of watershed restoration to be expected:

1. Natural Channel Design Stream Restoration
2. Riparian Reforestation
3. Livestock Exclusion
4. Riparian Forest Preservation

These four components were included within the *Neighbors Branch/Walton Crawley Branch Site Mitigation Plan* (NCDMS 2013). The project restored the watershed to its full intended use by restoring a stream, floodplain, and riparian wetland ecosystem through stream and wetland restoration, enhancement and preservation. The project restored riparian buffers through revegetation of buffer zones with native riparian and wetland species along all Site streams. The project enhanced open space preservation by placing Site streams, wetlands, and their buffers into a permanent conservation easement. The overall Site

helps improve water quality by reducing sedimentation in on-Site streams and planted a vegetated riparian buffer that filters nutrients from adjacent pasturelands. Additionally, exclusionary fencing and alternate watering devices removed livestock from accessing on-site channels and riparian buffers. The project restored and enhanced physical habitat for both aquatic and terrestrial species by planting native vegetation along stream banks and riparian buffers, creating wildlife corridors through a dissected landscape, and restoring bedform variability to Site streams. The stabilization of streams and buffers in the project area enhanced water quality in downstream receiving waters, which should help in the re-establishment of the watershed's ability to host trout and enhance their ability to propagate.

Site design was completed on March 7, 2013. Site construction and planting were completed in December 2015. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A).

TABLE OF CONTENTS

PROJECT SUMMARY	i
1.0 METHODS	1
2.0 REFERENCES	2

APPENDICES

Appendix A. Background Tables

Table 1. Project Components and Mitigation Units

Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Attributes Table

Appendix B. Visual Assessment Data

Figure 1. Site Location

Figures 2, 2A-2B. Current Conditions Plan View

Figures 3, 3A-3B. Project Assets

Stream Fixed Station Photo Points

Vegetation Plot Photographs

Appendix C. Vegetation Data

Table 5. Planted Bare Root Woody Vegetation

Table 6. Total Planted Stems by Plot and Species

Appendix D. Stream Measurement and Geomorphology Data

Cross-section Plots

Longitudinal Profile Plots

Substrate Plots

Tables 7A-7B. Baseline Morphology and Hydraulic Summary

Tables 8A-8D. Morphology and Hydraulic Monitoring Summary

Appendix E. As-built Plan Sheets

1.0 METHODS

Monitoring of restoration efforts will be performed for five years, or until success criteria are fulfilled. Monitoring is proposed for the stream channel, vegetation, and wetland hydrology. In general, the restoration success criteria, and required remediation actions, are based on the *Stream Mitigation Guidelines* (USACE et al. 2003). Monitoring features are described below and are depicted on Figure 2 (Appendix B).

Streams

The restored stream reaches are proposed to be monitored for geometric activity as follows.

- 1750 linear feet of stream profile
- 5 riffle cross-sections
- 3 pool cross-section

The data will be presented in graphic and tabular format. Data to be presented will include 1) cross-sectional area, 2) bankfull width, 3) average depth, 4) maximum depth, 5) width-to-depth ratio, 6) meander wavelength, 7) belt-width, 8) water surface slope, and 9) sinuosity. Substrate analysis will be evaluated through pebble counts at five cross sections and data presented as a D50 for stream classification and tracking purposes. The stream will subsequently be classified according to stream geometry and substrate (Rosgen 1996). Significant changes in channel morphology will be tracked and reported by comparing data in each successive monitoring year. Annual photographs will include 43 fixed station photographs (Appendix B). In addition, the Site contains two stream crest gauges to assist with documentation of bankfull events.

Vegetation

Restoration monitoring procedures for vegetation will monitor plant survival and species diversity. Planted areas within the Site include approximately 12.3 acres. After planting of the area was completed, eight vegetation plots were installed and monitored at the Site; baseline results can be found in Appendix C. Annual measurements of vegetation will consist of the following.

- 10 plant warranty inspection plots (only monitoring years 1-3)
- 8 CVS vegetation plots

A photographic record of plant growth should be included in each annual monitoring report; baseline photographs are included in Appendix B. During the first year, vegetation will receive a cursory, visual evaluation on a periodic basis to ascertain the degree of overtopping of planted elements by nuisance species. Subsequently, quantitative sampling of vegetation will be performed as outlined in the *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008) in September of the first monitoring year and annually between June 1 and September 30 for the remainder of the monitoring period until vegetation success criteria are achieved.

Wetland Hydrology

Two groundwater monitoring gauges were installed to take measurements after hydrological modifications were performed at the Site. Hydrological sampling will occur quarterly throughout the growing season. Approximate locations of gauges are depicted on Figure 2 (Appendix B).

2.0 REFERENCES

- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.
- Muddy Creek Restoration Partners (MCRP), 2003. Feasibility Report and Restoration Plan for the Muddy Creek Watershed.
- North Carolina Division of Mitigation Services (NCDMS). 2013. Neighbor Branch/Walton Crawley Branch Stream and Wetland Mitigation Site Mitigation Plan. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.
- North Carolina Ecosystem Enhancement Program (NCEEP). 2009. Upper Catawba River Basin Restoration Priorities 2009 (online). Available: http://www.nceep.net/services/restplans/Upper_Catawba_RBRP_2009.pdf [March 12, 2009]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.
- Rosgen D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.
- Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.
- United States Army Corps of Engineers (USACE), United States Environmental Protection Agency (USEPA), North Carolina Wildlife Resources Commission (NCWRC), Natural Resources Conservation Service (NRCS), and North Carolina Division of Water Quality (NCDWQ). 2003. Stream Mitigation Guidelines. State of North Carolina.

Appendix A.
Background Tables

- Table 1. Project Mitigation Components
Table 2. Project Activity and Reporting History
Table 3. Project Contacts Table
Table 4. Project Attributes Table

Table 1. Project Components and Mitigation Credits

Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site/ DMS Number 92872

Mitigation Credit Summations							
Stream	Riparian Wetland	Nonriparian Wetland	Buffer		Nitrogen Offset	Phosphorous Offset	
3964	1.59	---	---		---	---	
Projects Components							
Project Component –or–Reach ID	Stationing	Existing Footage or Acreage	Restoration Footage or Acreage	Restoration Level/Equivalent	Mitigation Ratio	Mitigation Credits	Comment
Walton Crawley	15+40 – 27+36 (09+37 – 21+68)	2498	1196 1231-35 = 1196	Restoration (PI)	1:1	1196	Channel returned to natural valley. The easement break at the road crossing has been removed from credit summation. Removed 35 feet from credit calculations for road crossing.
Walton Crawley	29+11 – 29+23		12	Enhance I	1.5:1	8	Bank grading and stabilization.
Walton Crawley	27+36 – 29+11 29+23 – 29+90		242	Enhance II	2.5:1	97	Fence cattle out of easement area and remove invasive plants. The easement break at 29+90 has been removed from credit summation.
Walton Crawley	10+00 – 15+40 29+90 – 35+01		1051	Preservation	5:1	210	The easement break has been removed from credit summation.
UT 1 Walton Crawley As-built Plan Stationing	18+13 – 20+01 (10+00 – 11+88)	872	188 188	Restoration (PI)	1:1	188	Restore channel through existing pond and reconnect to Walton Crawley.
UT 1 Walton Crawley	14+83 – 18+13		330	Enhance II	2.5:1	132	Fence cattle out of easement area and remove invasive plants.
UT 1 Walton Crawley	10+00 – 14+83		483	Preservation	5:1	97	The easement break has been removed from credit summation.
UT 2 Walton Crawley As-built Plan Stationing	10+00 – 13+83 (10+00 – 13+83) 16+36 – 18+02 (10+00 – 11+66)	600	549 549	Restoration (PI)	1:1	549	Channel routed to the center of the valley, away from toe of slope.
UT 2 Walton Crawley	13+83 – 16+36		253	Enhance II	2.5:1	101	Fence cattle out of easement area and remove invasive plants.
Neighbors Branch As-built Plan Stationing	24+74 – 29+97 (09+93 – 15+52)	2262	523 559 – 36 = 523	Restoration (PI)	1:1	523	Channel routed through low point of valley and invert raised from perched culvert. The easement break at the road crossing has been removed from credit summation. Removed 36 feet from credit calculations for road crossing.
Neighbors Branch	18+89 – 19+09		20	Enhance I	1.5:1	13	Place channel structure and stabilize bank. The easement break has been removed from credit summation.

Neighbors Branch	18+69 – 18+89 19+09 – 24+74 29+97 – 33+39	281	927	Enhance II	2.5:1	371	Fence cattle out of easement area and matt, seed, and plant vegetation on scoured banks.
Neighbors Branch	09+67 – 18+69		902	Preservation	5:1	180	The easement break has been removed from credit summation.
UT 1 Neighbors Branch As-built Plan Stationing	10+56 – 10+95 11+50 – 12+81 (10+06 – 10+44 10+77 – 12+09)		170 170	Enhance I	1.5:1	113	Bank grading and stabilization.
UT 1 Neighbors Branch	10+00 – 10+56 10+95 – 11+50		111	Enhance II	2.5:1	44	Fence cattle out of easement area and plant vegetation.
UT 3 Neighbors Branch	11+72 – 18+75	703	703	Preservation	5:1	141	---
Riparian Wetland	---	0.0	0.52	Restoration	1:1	0.52	Restore hydrology to hydric soils adjacent to Neighbors Branch.
Riparian Wetland	---	1.62	1.62	Enhancement	2:1	0.81	Plant native vegetation on impacted wetlands and fence cattle.
Riparian Wetland	---	1.29	1.29	Preservation	5:1	0.26	---
Length and Area Summations							
Restoration Level	Stream (linear footage)	Riparian Wetland (acreage)		Nonriparian Wetland (acreage)	Buffer (square feet)	Upland (acres)	
		Riverine	Non-Riverine				
Restoration	2,456	0.52		--			
Enhancement (Level I)	202	1.62		--			
Enhancement (Level II)	1,863	--		--			
Preservation	3,139	1.29		--			
Totals	7,660	3.43		--			
Mitigation Units	3,964 SMUs	1.59 Riparian WMUs		0.00 Nonriparian WMUs			
BMP Elements							
Element	Location		Purpose/Function		Notes		

Table 2. Project Activity and Reporting History**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site / DMS Number 92872**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Project Institution		
Mitigation Plan	April 2009	March 7, 2013
Permits Issued		
Final Design – Construction Plans		April 2014
Construction	--	December 2015
Temporary S&E Mix applied to Entire Project Site	--	December 2015
Permanent Seed Mix applied to the Entire Project Site	--	December 2015
Bare Root; Containerized; and B&B Plantings for the Entire Project Site	--	December 2015
Baseline Monitoring Document (Year 0 Monitoring Baseline)	April 2016	July 2016
Year 1 Monitoring		
Year 2 Monitoring		
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

Table 3. Project Contact Table**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site / DMS Number 92872**

Designer	Florence & Hutcheson Engineering (Now HDR) 5121 Kingdom Way, Suite 100 Raleigh, NC 27607 Kevin Williams (919) 851-6066
Construction Plans and Sediment and Erosion Control Plans	Florence & Hutcheson Engineering (Now HDR) 5121 Kingdom Way, Suite 100 Raleigh, NC 27607 Kevin Williams (919) 851-6066
Construction Contractor	Carolina Environmental Contracting, Inc. Mount Airy, NC (336) 320-3849
Planting Contractor	Keller Environmental 7291 Haymarket Lane Raleigh, NC 27615 Jay Keller (919) 749-8259
As-built Surveyor	Turner Land Surveying, PLLC 3719 Benson Drive Raleigh, NC 27609 Elisabeth Turner (919) 827-0745
Baseline Data Collection	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis (919) 215-1693

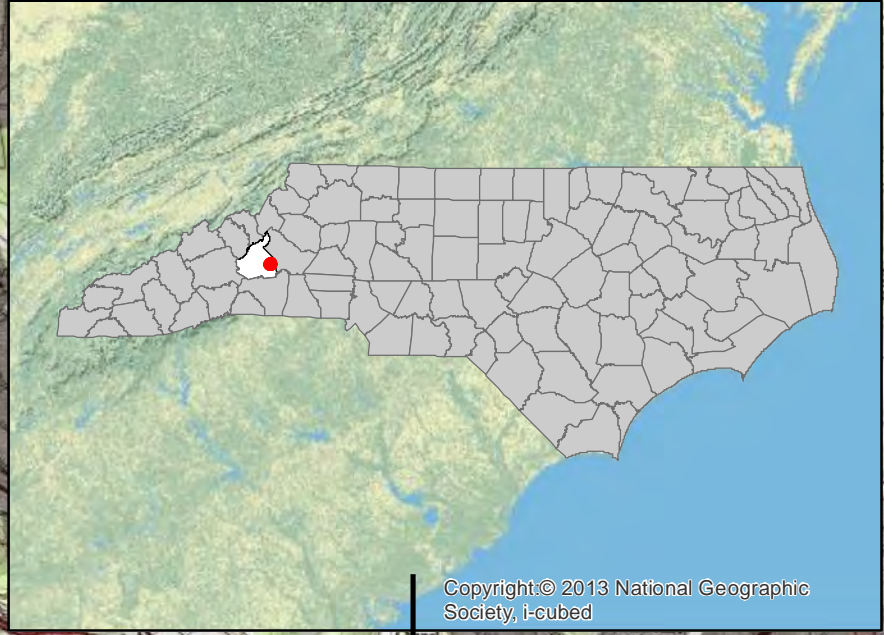
Table 4. Project Baseline Information and Attributes**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site / DMS Number 92872**

Project Information						
Project name	Neighbors Branch/Walton Crawley Branch Mitigation Site					
Project county	McDowell County, North Carolina					
Project area (Acres)	33.4					
Project coordinates (lat/long)	35.6599°N, 81.9002°W					
Project Watershed Summary Information						
Physiographic region	Blue Ridge					
Project river basin	Catawba River Basin					
USGS hydrologic unit (8 digit)	03050101					
NCDWQ Sub-basin	03-08-30					
Project drainage area (acres)	678					
% Drainage area impervious	< 1%					
CGIA land use classification	----					
Reach Summary Information						
Parameters	Walton Crawley Branch	UTs to Walton Crawley Branch		Neighbors Branch	UTs to Neighbors Branch	
		UT 1	UT 2		UT 1	UT 3
Length of reach (linear feet)	2529	1001	802	2339	281	875
Valley classification	VIII	II	II	VIII	II	II
Drainage area (acres)	458	29	20	220	13	15
NCDWQ stream identification score	18.5	25	25	33.5	23.5	16.5
NCDWQ water quality classification	C	C	C	C	C	C
Morphological description (stream type)	B4/5c-G4/5	E5	E5-G5	E5/4-G5/4	E5/4	E5
Design Rosgen stream type	C4	E/C5	E/C5	C4	E5/4	E5
Evolutionary trend						
Design approach (P1, P2, P3, E, etc.)	PI, EI, EII, & P	PI, EII, & P	PI & EII	PI, EI, EII, & P	EI & EII	P
Underlying mapped soils	Elsinboro, Evard, Hayesville	Evard	Evard, Hayesville	Hayesville, Iotla	Evard	Hayesville
Drainage class	Well	Well	Well	Well / SW Poorly	Well	Well
Soil hydric status	Nonhydric	Nonhydric	Nonhydric	Nonhydric / Hydric	Nonhydric	Nonhydric
Slope	0.0340	0.0380	0.0545	0.0260	0.0820	0.0656
FEMA classification	Not Mapped	Not Mapped	Not Mapped	Not Mapped	Not Mapped	Not Mapped
Native vegetation community	Forest / Pasture	Forest	Forest	Forest / Pasture	Forest	Forest
% Composition of exotic invasive spp.	<5	<5	<5	<5	<5	<5

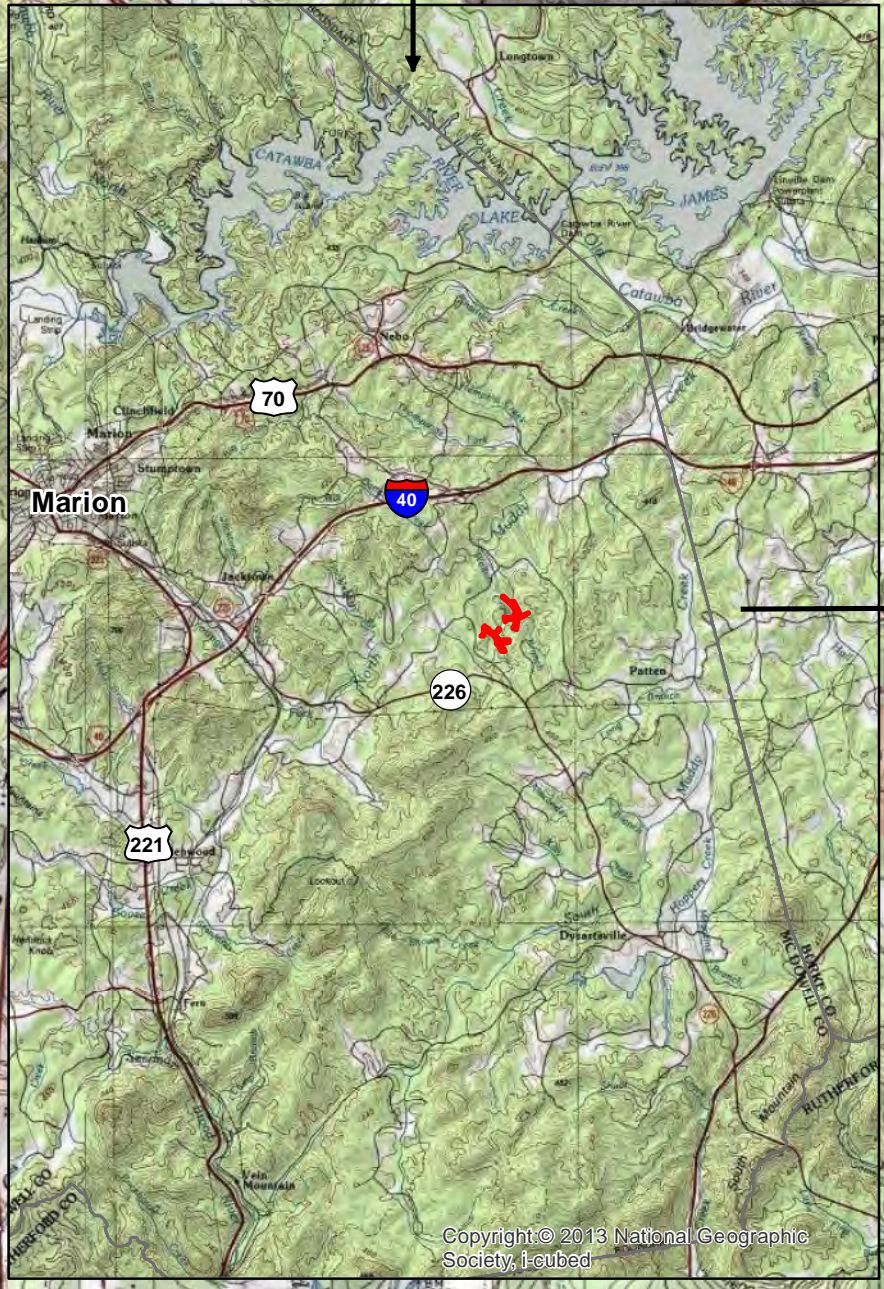
Wetland Summary Information						
Parameters	Walton Crawley Branch	UTs to Walton Crawley Branch		Neighbors Branch	UTs to Neighbors Branch	
		UT 1	UT 2		UT 1	UT 3
Size of wetland (acres)	0.95	0.37	N/A	1.88	0.23	N/A
Wetland type	Riparian Riverine	Riparian Riverine	N/A	Riparian Riverine	Riparian Riverine	N/A
Mapped soil series	Wehadkee	Wehadkee	N/A	Wehadkee	Wehadkee	N/A
Drainage class	poorly	poorly	N/A	poorly	poorly	N/A
Soil hydric status	hydric	hydric	N/A	hydric	hydric	N/A
Source of hydrology	Overbank and springs	Overbank and springs	N/A	Overbank and springs	Overbank and springs	N/A
Hydrologic impairment	Cleared	Invasives	N/A	Drained/ Cleared/ Invasives	Invasives	N/A
Native vegetation community	Forest / Pasture	Forest	N/A	Forest / Pasture	Forest	N/A
% Composition of exotic invasive spp.	<5	<5	N/A	<5	<5	N/A
Regulatory Considerations						
Regulation	Applicable?	Resolved?		Supporting Documentation		
Waters of the US – Section 404	Yes	Yes		SAW-2009-917		
Waters of the US – Section 401	Yes	Yes		SAW-2009-917		
Endangered Species Act	Yes	Yes		No Effect – CE Document		
Historic Preservation Act	Yes	Yes		CE Document		
Coastal Zone Management Act (CZMA/CAMA)	No	NA		NA		
FEMA Floodplain Compliance	No	NA		NA		
Essential Fisheries Habitat	No	NA		NA		

Appendix B
Visual Assessment Data

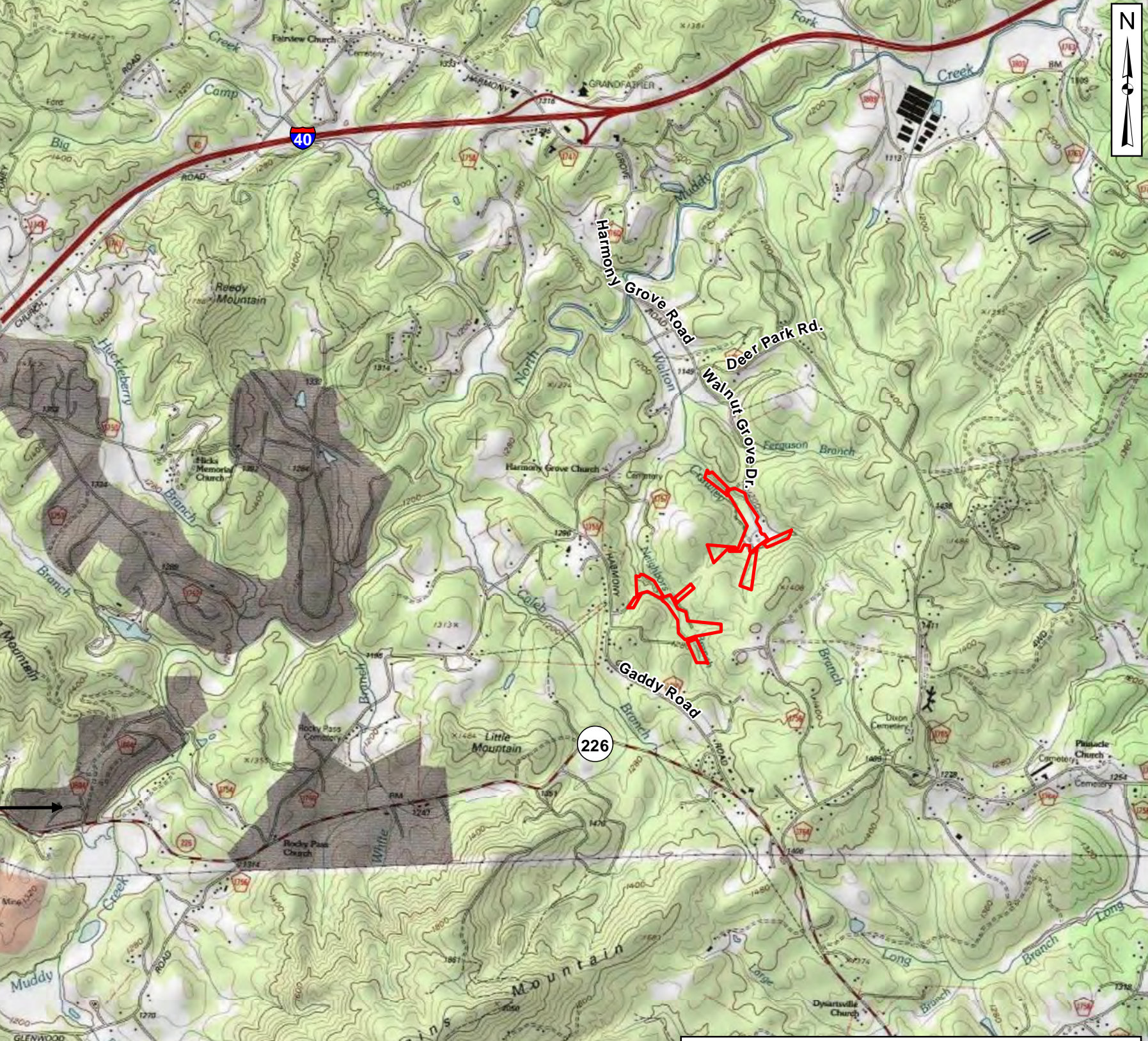
Figure 1. Site Location
Figures 2, 2A-2B. Current Conditions Plan View
Figures 3, 3A-3B. Project Assets
Stream Fixed Station Photo Points
Vegetation Plot Photos



Copyright © 2013 National Geographic Society, i-cubed



Copyright © 2013 National Geographic Society, i-cubed



Prepared for:
NC Department of Environmental Quality
 Division of Mitigation Services

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**

**DMS Project
 # 92872**
 McDowell County, NC

Title:
Site Location

Drawn by: **KRJ**

Date: **JUN 2016**

Scale: **1:30000**

Project No.: **12-004.21**

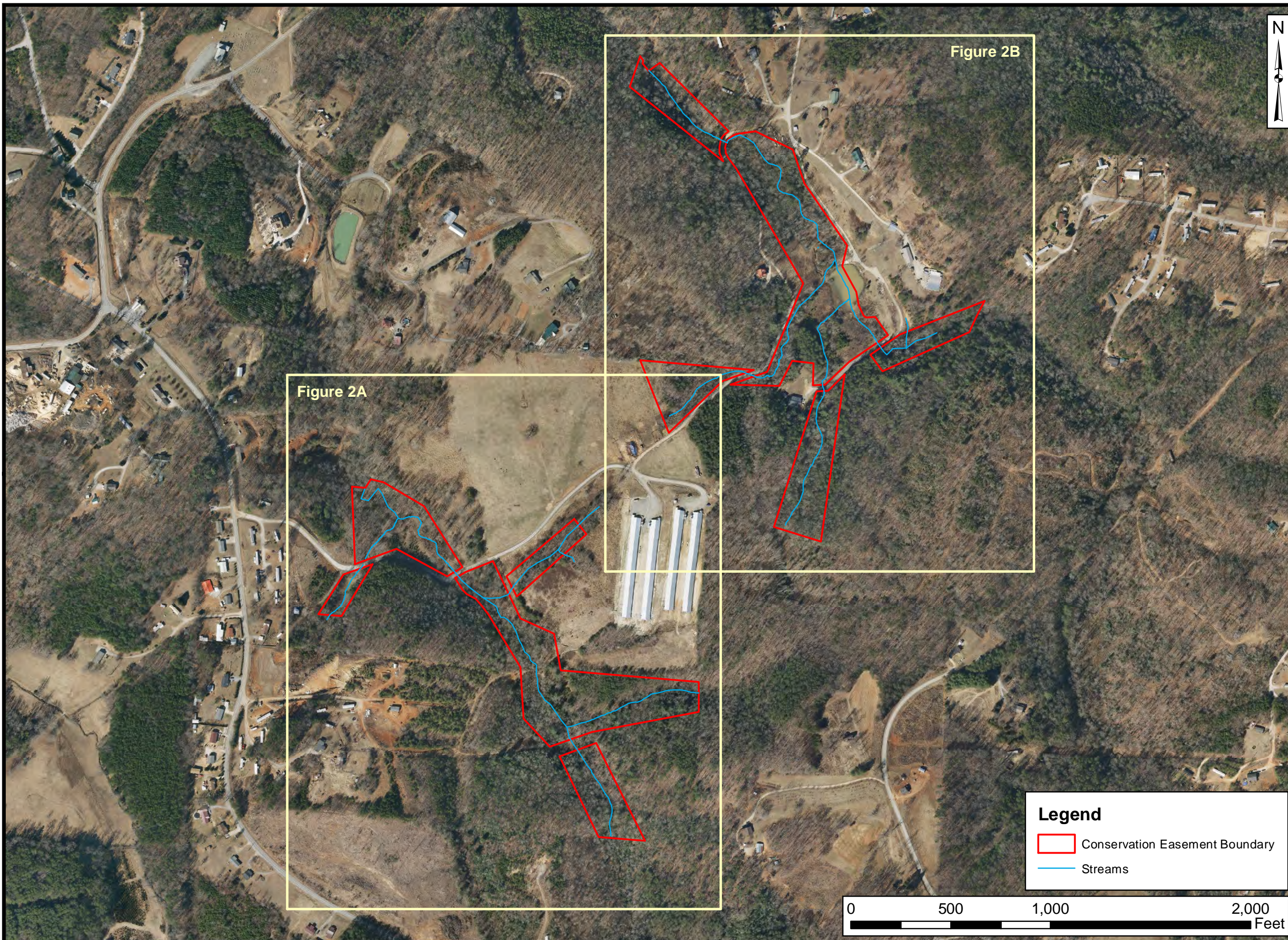
USGS 7.5 Minute Topographic Map (Marion E, NC Quad)

Directions to the Site from Raleigh:

- Follow Interstate 40 West for approximately 193.8 miles,
- From Interstate 40 take exit 90 (towards Nebo/Lake James) onto Harmony Grove Road (SR1760),
- Head southeast on Harmony Grove Road (SR 1760) for approximately 1.5 miles,
- Continue onto Walnut Grove Drive (gravel road) at the intersection with Deer Park Road,
- Follow Walnut Grove Drive for approximately 0.5 mile to the Site.
- Site Latitude/Longitude: 35.6599°N, 81.9002°W (NAD83/WGS84)

FIGURE

1



Prepared for:
**NC Department of
 Environmental
 Quality**
**Division of
 Mitigation
 Services**

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**
**DMS Project
 # 92872**

McDowell County, NC



Title:
**Current Conditions
 Plan View**

Drawn by: KRJ

Date: APR 2016

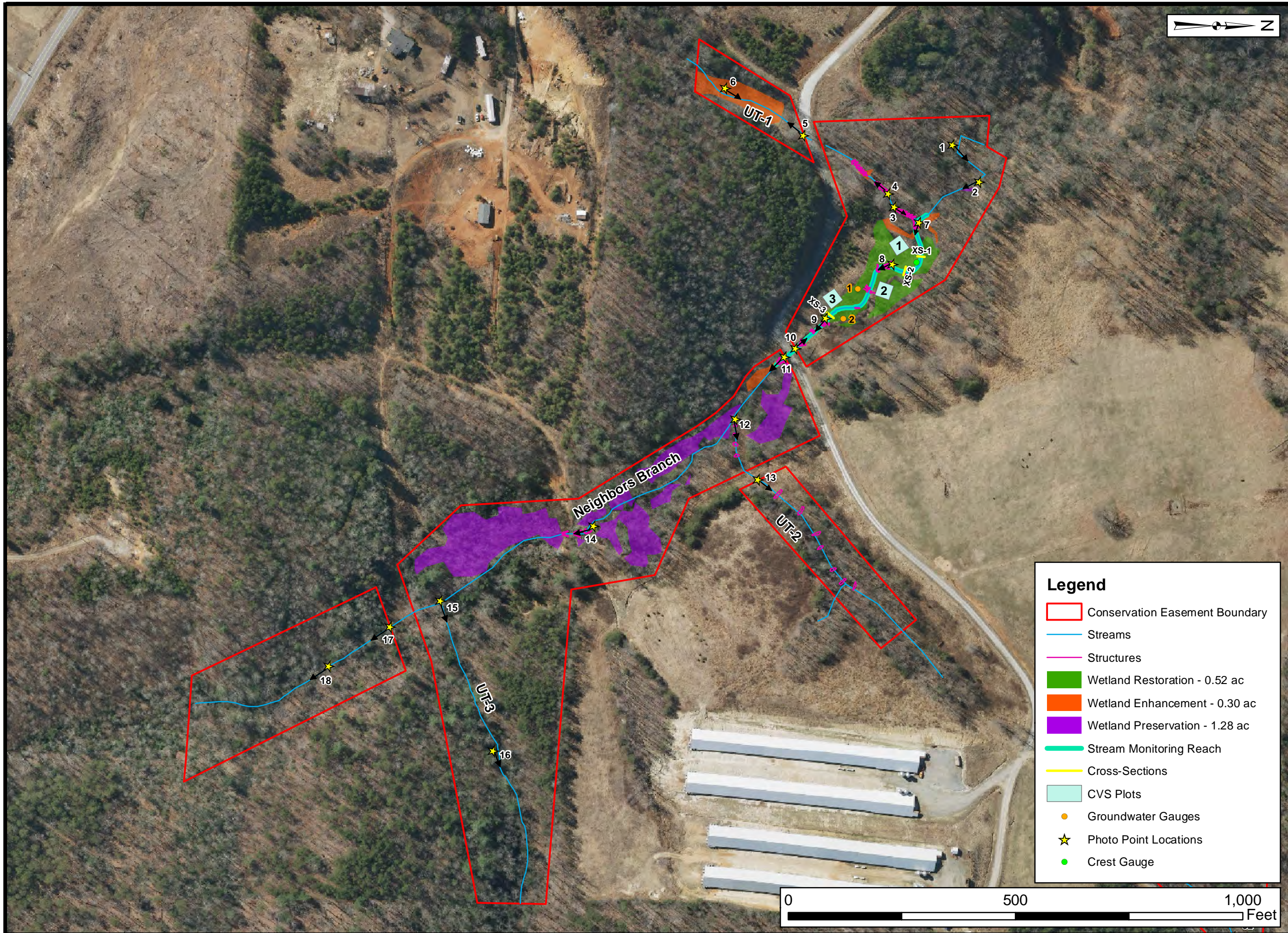
Scale: 1:5500

Project No.: 12-004.21

Legend
 Conservation Easement Boundary
 Streams

0 500 1,000 2,000
 Feet

FIGURE
2



Prepared for:
NC Department of Environmental Quality
 Division of Mitigation Services

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**

**DMS Project
 # 92872**

McDowell County, NC

Title:
**Current Conditions
 Plan View**

Drawn by:
 KRJ

Date:
 APR 2016

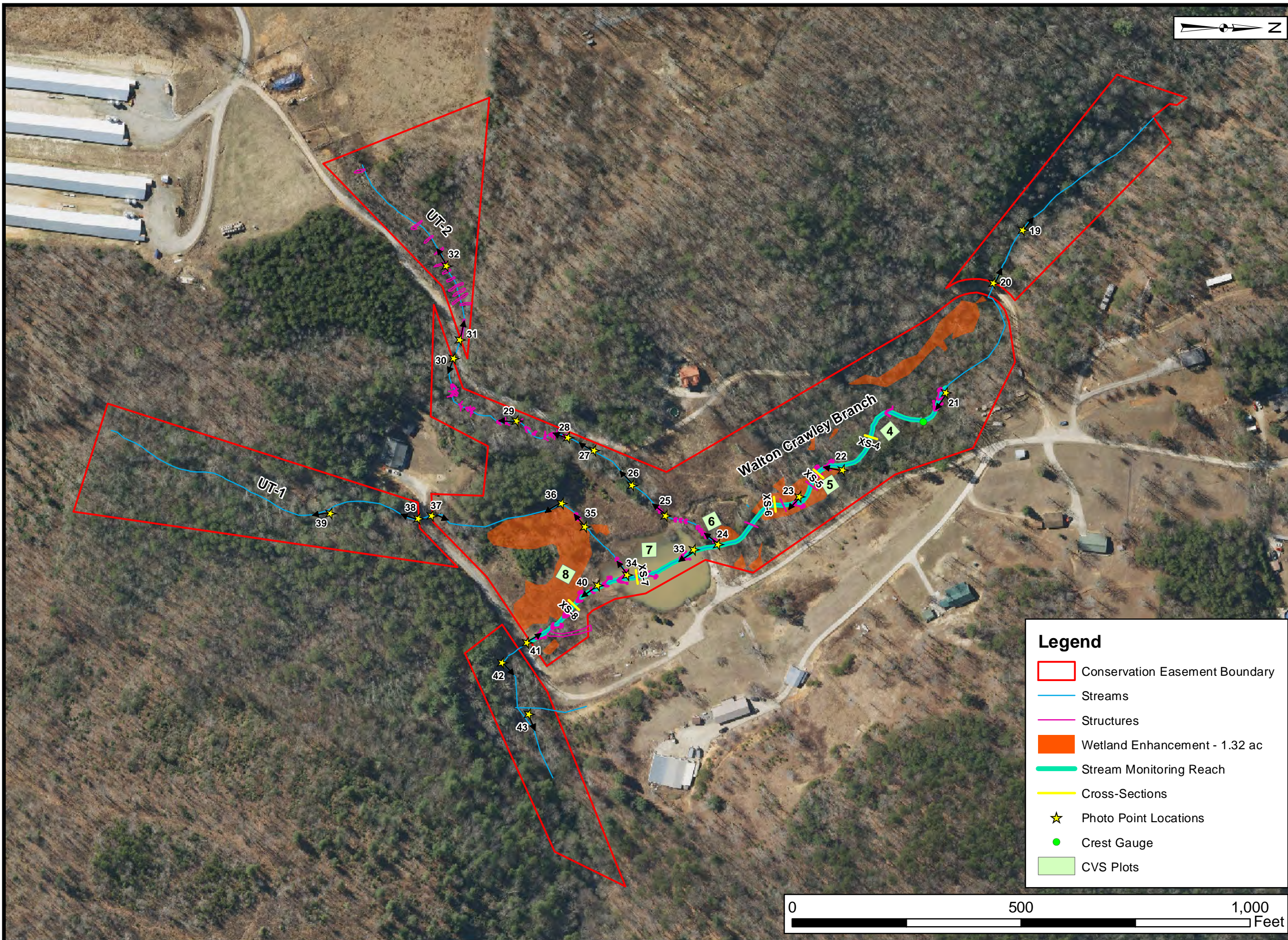
Scale:
 1:2400

Project No.:
 12-004.21

- Legend**
- Conservation Easement Boundary
 - Streams
 - Structures
 - Wetland Restoration - 0.52 ac
 - Wetland Enhancement - 0.30 ac
 - Wetland Preservation - 1.28 ac
 - Stream Monitoring Reach
 - Cross-Sections
 - CVS Plots
 - Groundwater Gauges
 - Photo Point Locations
 - Crest Gauge



FIGURE
2A



Prepared for:
NC Department of Environmental Quality
 Division of Mitigation Services

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**

**DMS Project
 # 92872**
 McDowell County, NC

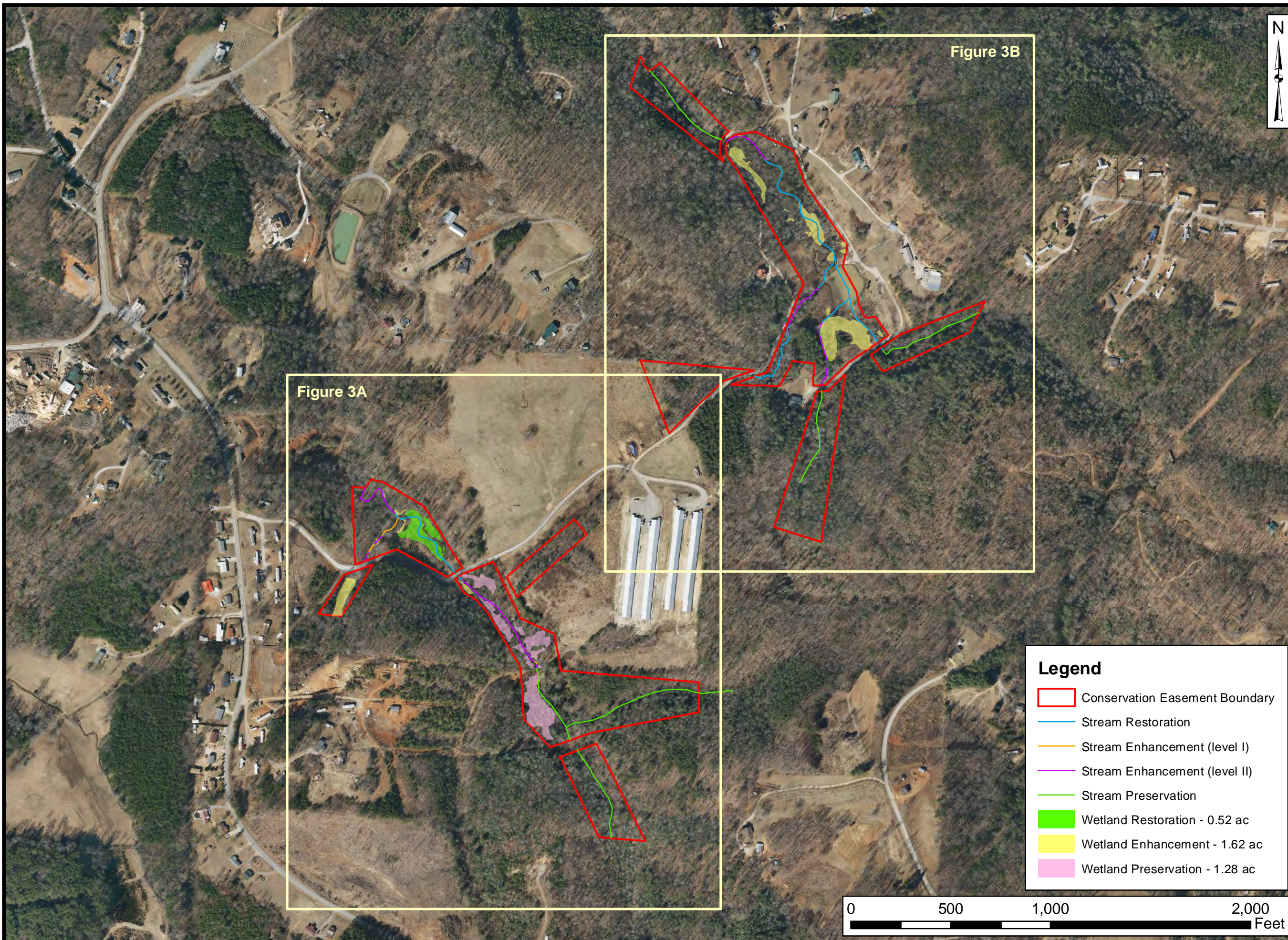
Title:
**Current Conditions
 Plan View**

Drawn by: KRJ
 Date: APR 2016
 Scale: 1:2400
 Project No.: 12-004.21

Legend

- Conservation Easement Boundary
- Streams
- Structures
- Wetland Enhancement - 1.32 ac
- Stream Monitoring Reach
- Cross-Sections
- ★ Photo Point Locations
- Crest Gauge
- CVS Plots

FIGURE
2B



Prepared for:
**NC Department of
 Environmental
 Quality**
**Division of
 Mitigation
 Services**

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**

**DMS Project
 # 92872**

McDowell County, NC

Title:
Project Assets

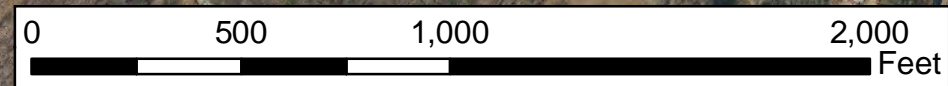
Drawn by: **KRJ**

Date: **JUL 2016**

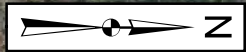
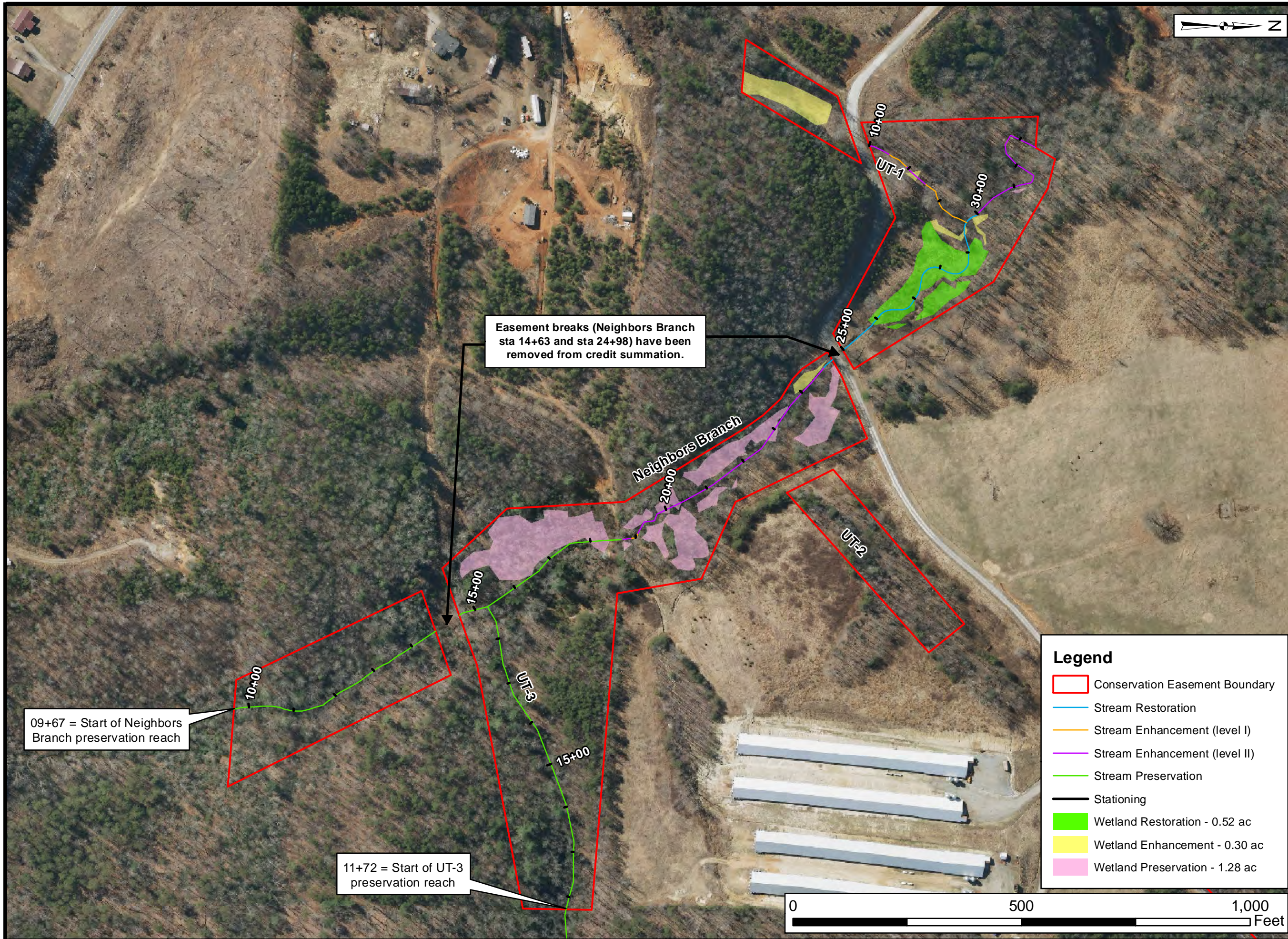
Scale: **1:5500**

Project No.: **12-004.21**

- Legend**
- Conservation Easement Boundary
 - Stream Restoration
 - Stream Enhancement (level I)
 - Stream Enhancement (level II)
 - Stream Preservation
 - Wetland Restoration - 0.52 ac
 - Wetland Enhancement - 1.62 ac
 - Wetland Preservation - 1.28 ac



**FIGURE
 3**



Prepared for:
NC Department of Environmental Quality
 Division of Mitigation Services

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**

**DMS Project
 # 92872**

McDowell County, NC

Title:
Project Assets

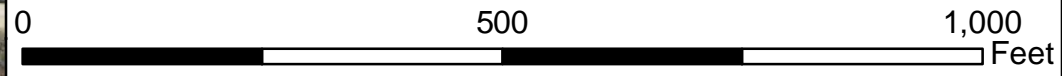
Drawn by: KRJ

Date: JUL 2016

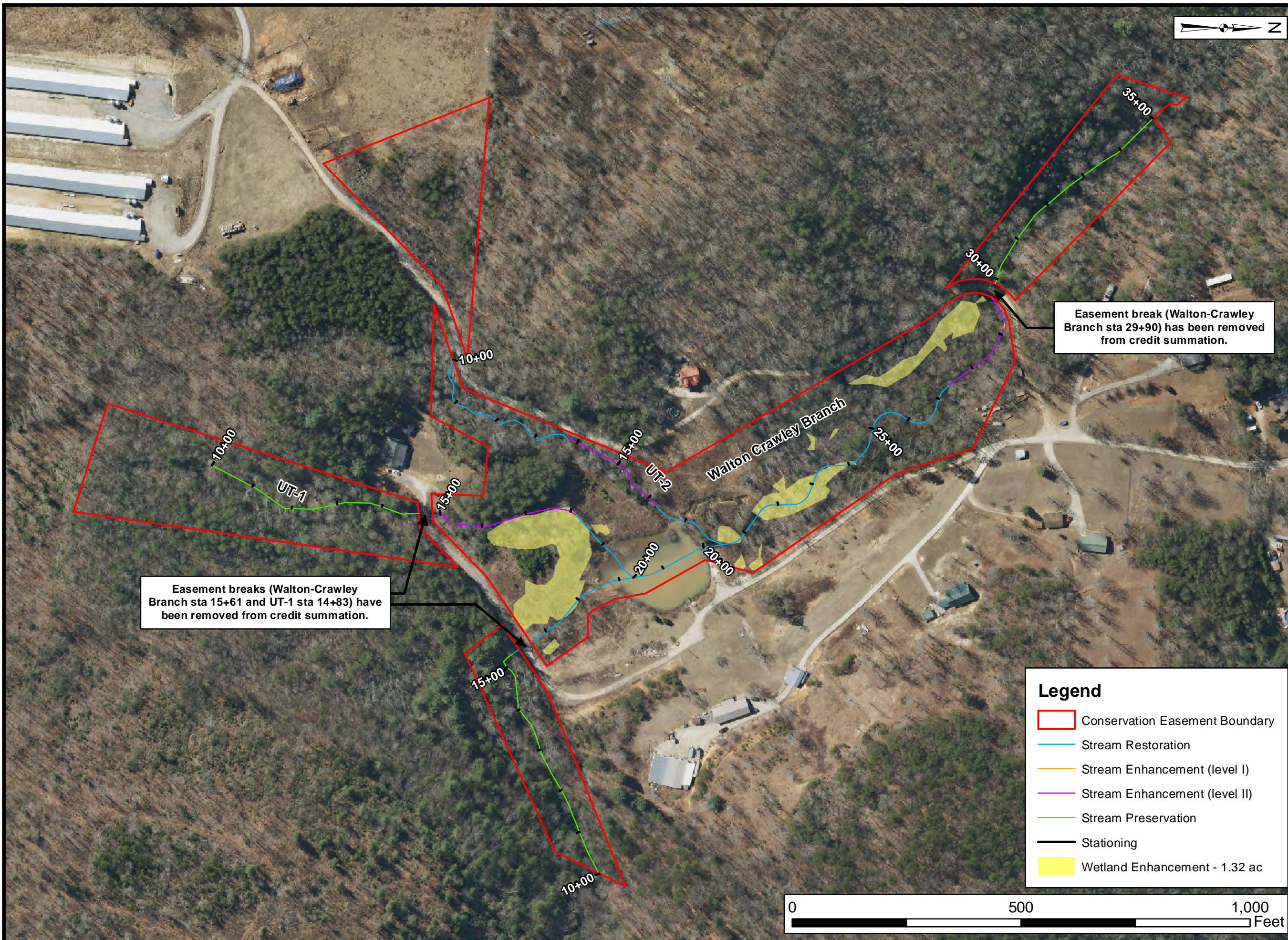
Scale: 1:2400

Project No.: 12-004.21

- Legend**
- Conservation Easement Boundary
 - Stream Restoration
 - Stream Enhancement (level I)
 - Stream Enhancement (level II)
 - Stream Preservation
 - Stationing
 - Wetland Restoration - 0.52 ac
 - Wetland Enhancement - 0.30 ac
 - Wetland Preservation - 1.28 ac



**FIGURE
 3A**



Prepared for:
NC Department of Environmental Quality
 Division of Mitigation Services

Project:
**Neighbors Branch/
 Walton Crawley
 Branch Stream
 and Wetland
 Restoration Site**

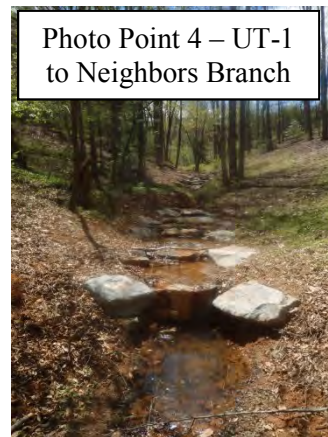
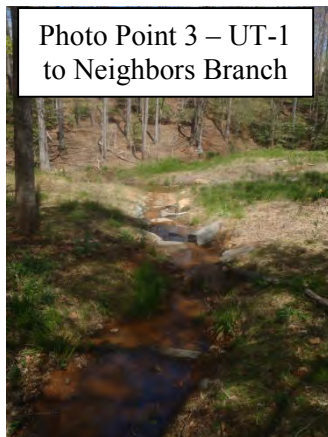
**DMS Project
 # 92872**
 McDowell County, NC

Title:
Project Assets

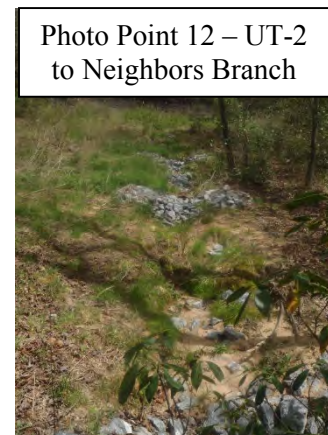
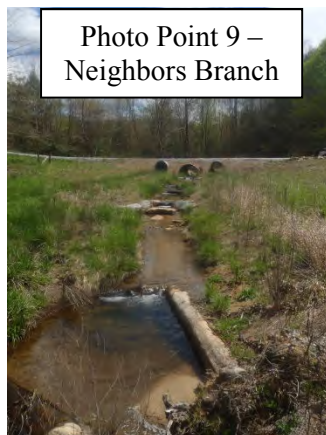
Drawn by: KRJ
 Date: JUL 2016
 Scale: 1:2400
 Project No.: 12-004.21

**FIGURE
 3B**

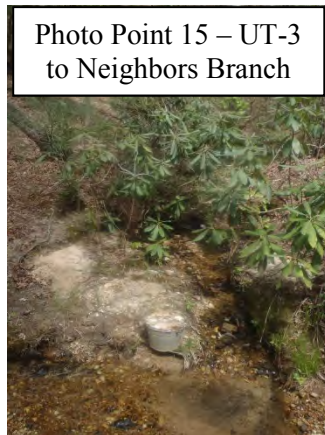
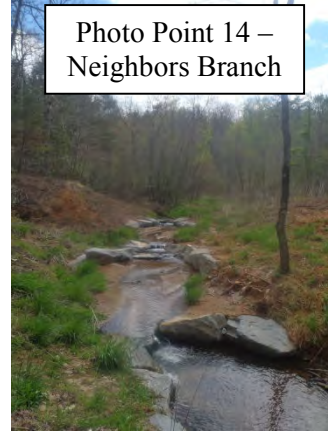
**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016**



**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)**



Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)



**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)**

Photo Point 19 – Walton
Crawley Branch

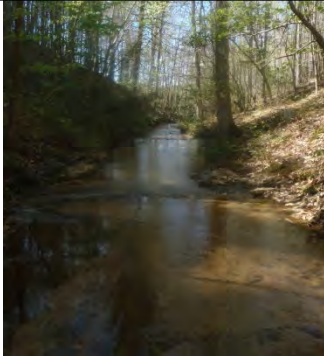


Photo Point 20 - Walton
Crawley Branch



Photo Point 21 - Walton
Crawley Branch



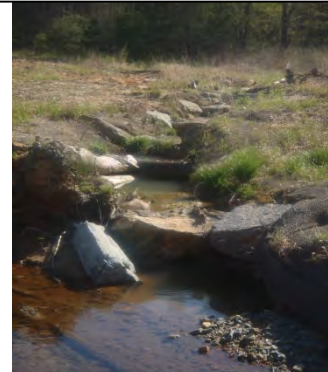
Photo Point 22 - Walton
Crawley Branch



Photo Point 23 - Walton
Crawley Branch



Photo Point 24 – UT-2 to
Walton Crawley Branch



Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)

Photo Point 25 – UT-2 to
Walton Crawley Branch



Photo Point 26 – UT-2 to
Walton Crawley Branch

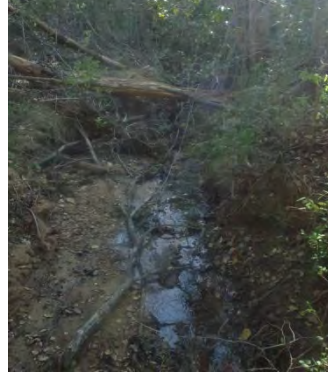


Photo Point 27 – UT-2 to
Walton Crawley Branch

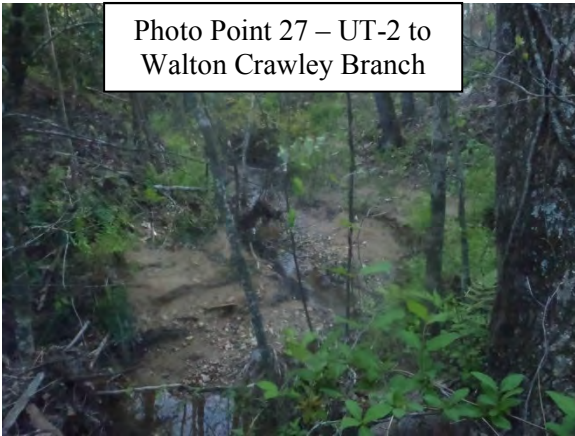


Photo Point 28 – UT-2 to
Walton Crawley Branch

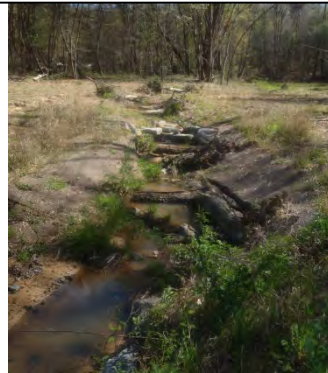


Photo Point 29 – UT-2 to
Walton Crawley Branch



Photo Point 30 – UT-2 to
Walton Crawley Branch



Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)

Photo Point 31 – UT-2 to
Walton Crawley Branch

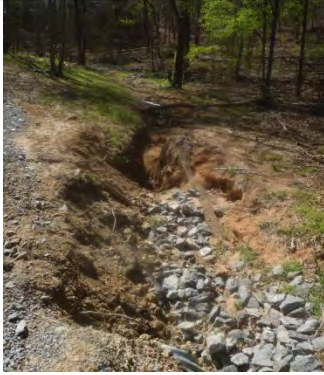


Photo Point 32 – UT-2 to
Walton Crawley Branch



Photo Point 33 - Walton
Crawley Branch



Photo Point 34 – UT-1 to
Walton Crawley Branch

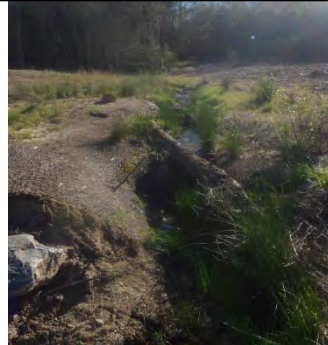


Photo Point 35 – UT-1 to
Walton Crawley Branch



Photo Point 36 – UT-1 to
Walton Crawley Branch



Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)

Photo Point 37 – UT-1 to
Walton Crawley Branch



Photo Point 38 – UT-1 to
Walton Crawley Branch

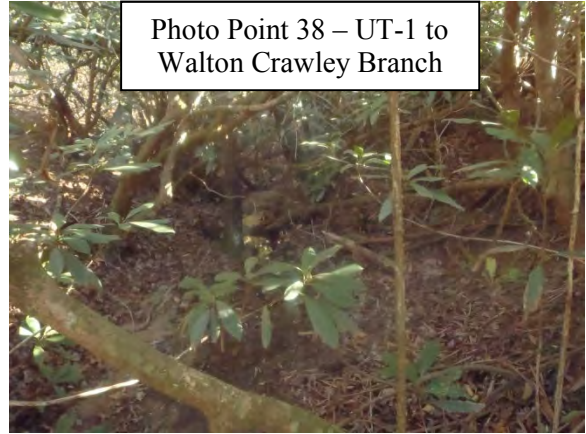


Photo Point 39 – UT-1 to
Walton Crawley Branch



Photo Point 40 - Walton
Crawley Branch



Photo Point 41 - Walton
Crawley Branch

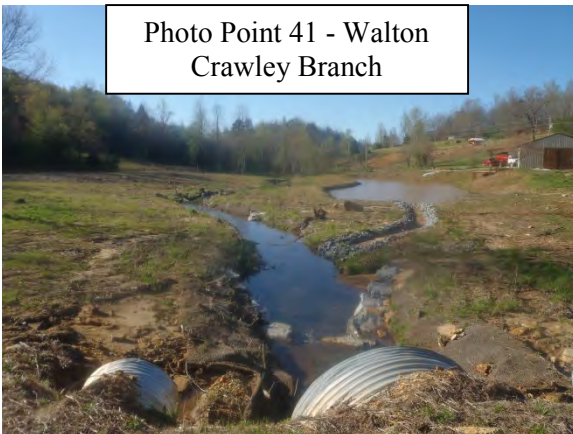
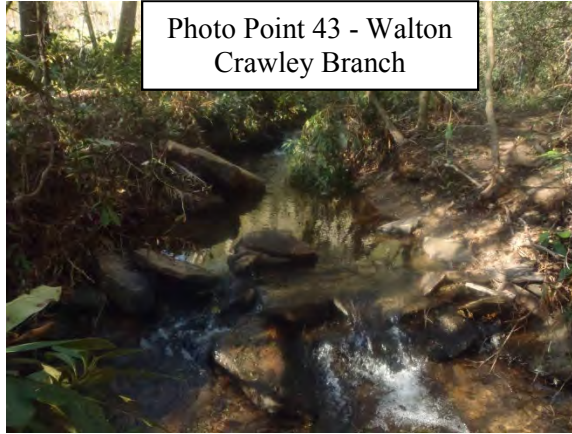


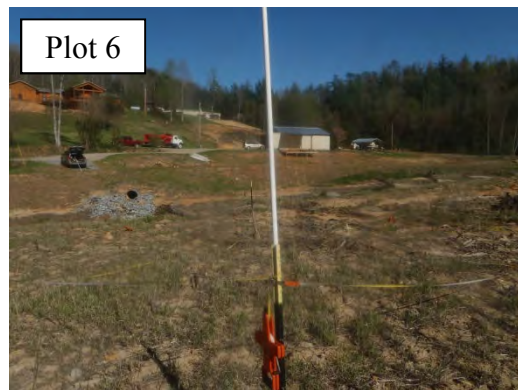
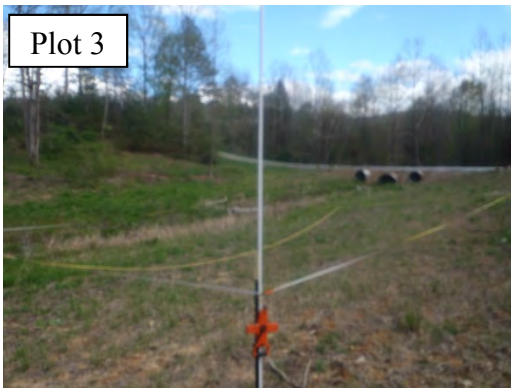
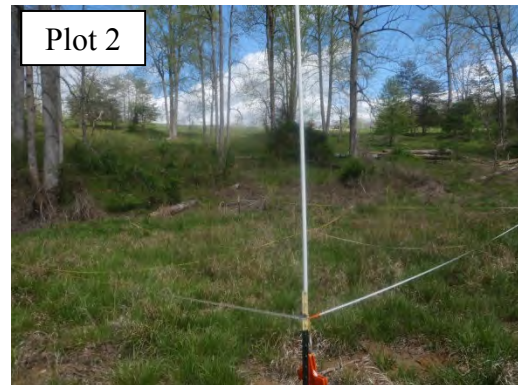
Photo Point 42 - Walton
Crawley Branch



Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Fixed Station Photographs
Taken April 12, 2016
(continued)



**Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site
Baseline Vegetation Monitoring Photographs
Taken April 12, 2016**



Appendix C.
Vegetation Plot Data

Table 5. Planted Woody Vegetation

Table 6. Total Planted Stems by Plot and Species

Table 5. Planted Bare Root Woody Vegetation

Species	Quantity
Black gum (<i>Nyssa sylvatica</i>)	700
Red maple (<i>Acer rubrum</i>)	1000
Persimmon (<i>Diospyros virginiana</i>)	800
River birch (<i>Betula nigra</i>)	1000
Water oak (<i>Quercus nigra</i>)	500
Willow oak (<i>Quercus phellos</i>)	1000
Green ash (<i>Fraxinus pennsylvanica</i>)	850
Sycamore (<i>Platanus occidentalis</i>)	1000
TOTAL	6850

Table 6. Total Planted Stems by Plot and Species

Project Name: Neighbors Branch/ Walton Crawley Branch

Scientific Name	Common Name	Species Type	Current Plot Data (MY0 2016)																								Annual Means					
			92872-01-0001			92872-01-0002			92872-01-0003			92872-01-0004			92872-01-0005			92872-01-0006			92872-01-0007			92872-01-0008			MY0 (2016)					
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
Acer rubrum	red maple	Tree	1	1	1				1	1	8	3	3	7	1	1	1													6	6	17
Betula nigra	river birch	Tree	1	1	1	2	2	2	6	6	6	4	4	4							2	2	2	1	1	1	1	1	1	16	16	16
Cornus amomum	silky dogwood	Shrub							1	1	1																			1	1	1
Diospyros virginiana	common persimmon	Tree																						1	1	1	1	1	1	1	1	1
Fraxinus pennsylvanica	green ash	Tree	3	3	3				5	5	5	4	4	4	6	6	6	10	10	10	2	2	2	1	1	1	1	1	1	31	31	31
Nyssa sylvatica	blackgum	Tree				2	2	2	1	1	1				2	2	2				1	1	1							6	6	6
Platanus occidentalis	American sycamore	Tree	8	8	8	5	5	5	6	6	6	1	1	1							6	6	6	3	3	3	3	3	3	29	29	29
Quercus nigra	water oak	Tree										1	1	1				1	1	1				2	2	2	2	2	2	4	4	4
Quercus phellos	willow oak	Tree	1	1	1							1	1	1	1	1	1	3	3	3	2	2	2	4	4	4	4	4	4	12	12	12
Quercus rubra	northern red oak	Tree																						1	1	1	1	1	1	1	1	1
Salix nigra	black willow	Tree						10																					10			
Sambucus canadensis	Common Elderberry	Shrub						4																					4			
Stem count			14	14	14	9	9	23	20	20	27	14	14	18	10	10	10	14	14	14	13	13	13	13	13	13	13	13	13	107	107	132
size (ares)			1			1			1			1			1			1			1			1			8					
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20					
Species count			5	5	5	3	3	5	6	6	6	6	6	6	4	4	4	3	3	3	5	5	5	7	7	7	7	7	7	10	10	12
Stems per ACRE			566.6	566.6	566.6	364.2	364.2	930.8	809.4	809.4	1093	566.6	566.6	728.4	404.7	404.7	404.7	566.6	566.6	566.6	526.1	526.1	526.1	526.1	526.1	526.1	541.3	541.3	667.7			

Appendix D.
Stream Measurements and Geomorphology Data

Cross Section Plots
Longitudinal Profile Plots
Substrate Plots

Tables 7A-7B. Baseline Stream Data Summary
Tables 8A-8D. Monitoring Data-Dimensional Data Summary

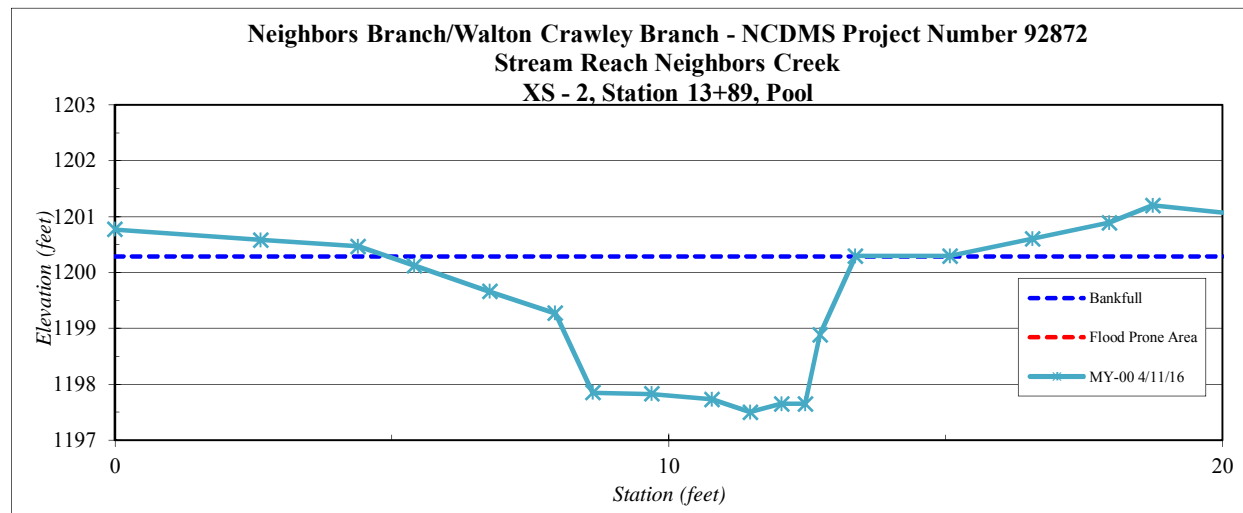
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 2, Pool
Reach	Neighbors Branch
Date:	4/11/2016
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.0	1200.8
2.6	1200.6
4.4	1200.5
5.4	1200.1
6.8	1199.7
8.0	1199.3
8.6	1197.9
9.7	1197.8
10.8	1197.7
11.5	1197.5
12.0	1197.6
12.5	1197.7
12.7	1198.9
13.4	1200.3
15.1	1200.3
16.6	1200.6
18.0	1200.9
18.7	1201.2
20.1	1201.1

SUMMARY DATA	
Bankfull Elevation:	1200.3
Bankfull Cross-Sectional Area:	13.6
Bankfull Width:	8.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.8
Mean Depth at Bankfull:	1.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0



Stream Type	E
--------------------	---



Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 4, Riffle
Reach	Walton Crawley Branch
Date:	4/11/2016
Field Crew:	Perkinson, Jernigan

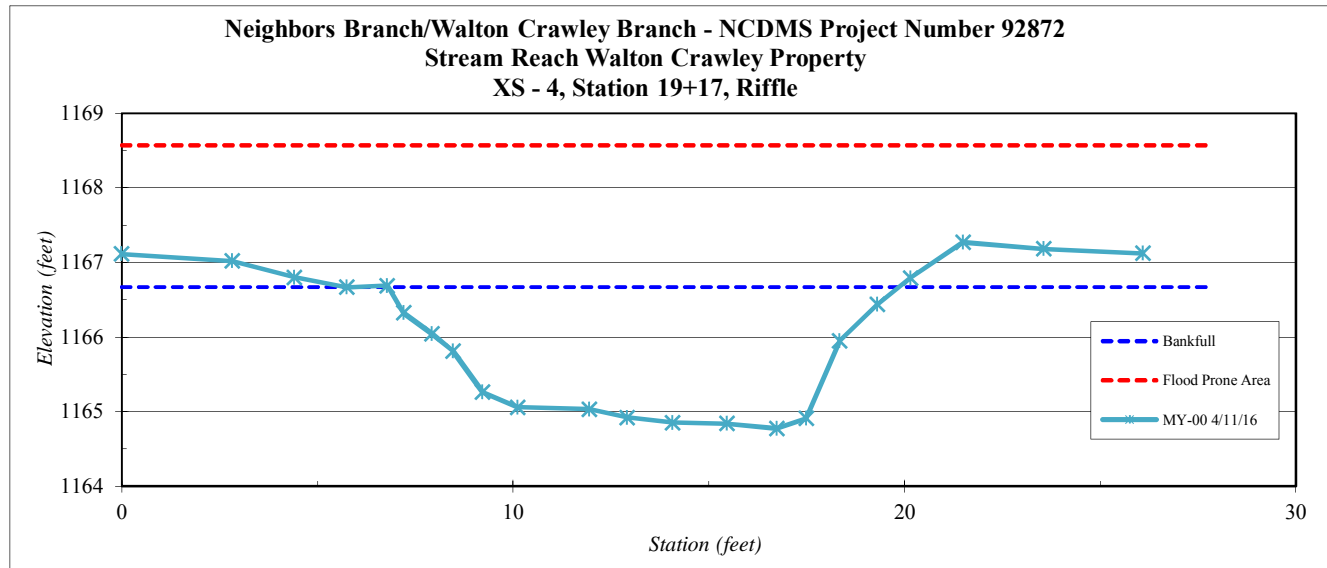
Station	Elevation
0.00	1167.11
2.83	1167.02
4.41	1166.80
5.75	1166.67
6.78	1166.69
7.20	1166.32
7.92	1166.05
8.46	1165.81
9.22	1165.26
10.11	1165.06
11.95	1165.03
12.91	1164.92
14.08	1164.85
15.46	1164.84
16.75	1164.77
17.5	1164.91
18.3	1165.95
19.3	1166.44
20.2	1166.79
21.5	1167.27
23.6	1167.18
26.1	1167.12
27.7	1167.12

SUMMARY DATA	
Bankfull Elevation:	1166.7
Bankfull Cross-Sectional Area:	17.6
Bankfull Width:	13.2
Flood Prone Area Elevation:	1168.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.9
Mean Depth at Bankfull:	1.3
W / D Ratio:	9.9
Entrenchment Ratio:	7.6
Bank Height Ratio:	1.0



XS 4 Looking Upstream

Stream Type	E
--------------------	---



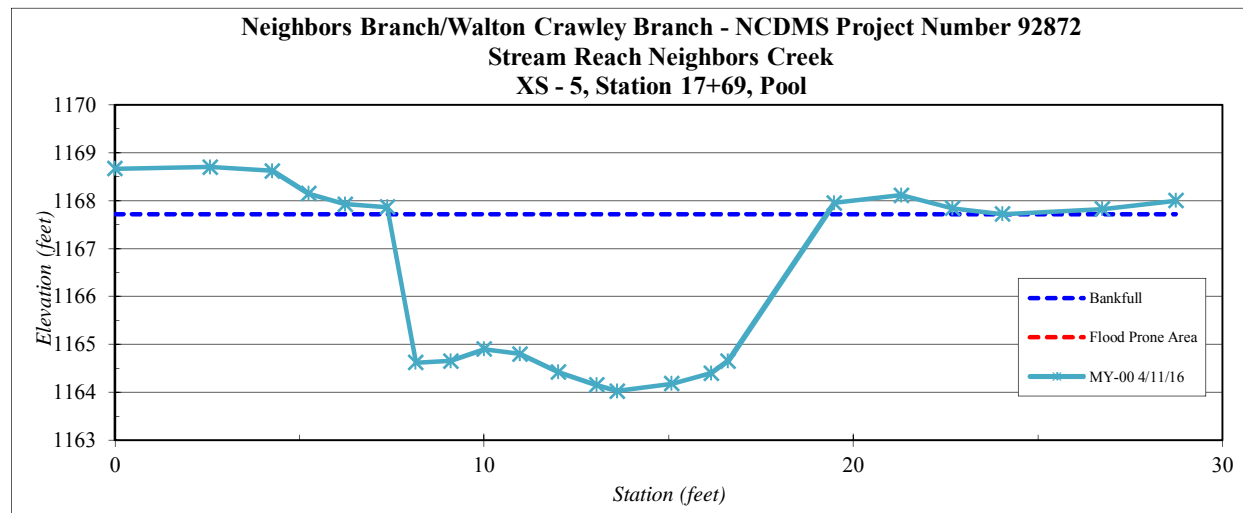
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 5, Pool
Reach	Walton Crawley Branch
Date:	4/11/2016
Field Crew:	Perkinson, Jernigan

Station	Elevation
0.0	1168.7
2.6	1168.7
4.3	1168.6
5.3	1168.1
6.2	1167.9
7.4	1167.9
8.1	1164.6
9.1	1164.7
10.0	1164.9
11.0	1164.8
12.0	1164.4
13.0	1164.1
13.6	1164.0
15.1	1164.2
16.2	1164.4
16.6	1164.7
19.5	1168.0
21.3	1168.1
22.7	1167.8
24.0	1167.7
26.7	1167.8
28.7	1168.0

SUMMARY DATA	
Bankfull Elevation:	1167.7
Bankfull Cross-Sectional Area:	32.9
Bankfull Width:	11.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.7
Mean Depth at Bankfull:	2.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0



Stream Type	E
--------------------	---



Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 6, Riffle
Reach	Walton Crawley Branch
Date:	4/11/2016
Field Crew:	Perkinson, Jernigan

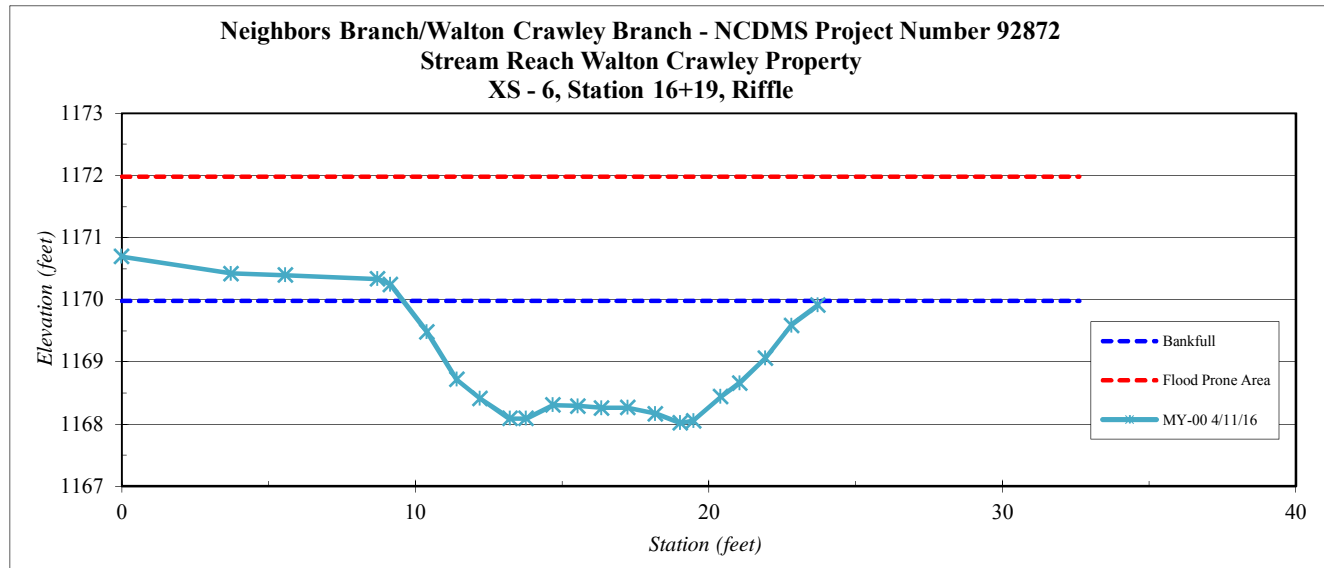


XS 6 Looking Upstream

Stream Type	E
-------------	---

SUMMARY DATA	
Bankfull Elevation:	1170.0
Bankfull Cross-Sectional Area:	19.4
Bankfull Width:	14.3
Flood Prone Area Elevation:	1172.0
Flood Prone Width:	100.0
Max Depth at Bankfull:	2.0
Mean Depth at Bankfull:	1.4
W / D Ratio:	10.5
Entrenchment Ratio:	7.0
Bank Height Ratio:	1.0

Station	Elevation
0.00	1170.69
3.72	1170.42
5.56	1170.40
8.72	1170.34
9.15	1170.25
10.40	1169.49
11.41	1168.72
12.19	1168.41
13.22	1168.09
13.78	1168.09
14.69	1168.31
15.54	1168.29
16.35	1168.26
17.23	1168.27
18.18	1168.17
19.0	1168.02
19.5	1168.06
20.4	1168.44
21.1	1168.66
21.9	1169.06
22.8	1169.59
23.7	1169.91
24.1	1170.12
26.1	1170.20
28.1	1170.10
30.3	1169.98
32.6	1170.15



Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 7, Pool
Reach	Walton Crawley Branch
Date:	4/11/2016
Field Crew:	Perkinson, Jernigan

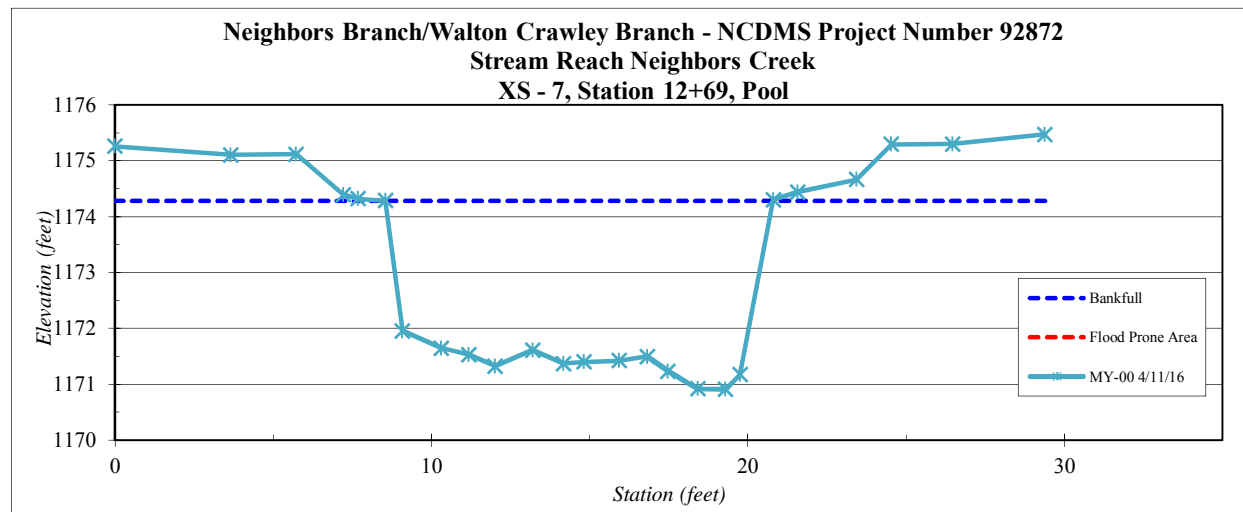
Station	Elevation
0.0	1175.3
3.7	1175.1
5.7	1175.1
7.2	1174.4
7.7	1174.3
8.5	1174.3
9.1	1172.0
10.3	1171.6
11.2	1171.5
12.0	1171.3
13.2	1171.6
14.2	1171.4
14.8	1171.4
15.9	1171.4
16.8	1171.5
17.5	1171.2
18.4	1170.9
19.3	1170.9
19.8	1171.2
20.8	1174.3
21.6	1174.4
23.4	1174.7
24.5	1175.3
26.5	1175.3
29.4	1175.5

SUMMARY DATA	
Bankfull Elevation:	1174.3
Bankfull Cross-Sectional Area:	33.0
Bankfull Width:	12.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.4
Mean Depth at Bankfull:	2.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0



XS 7 Looking Upstream

Stream Type	E
--------------------	---

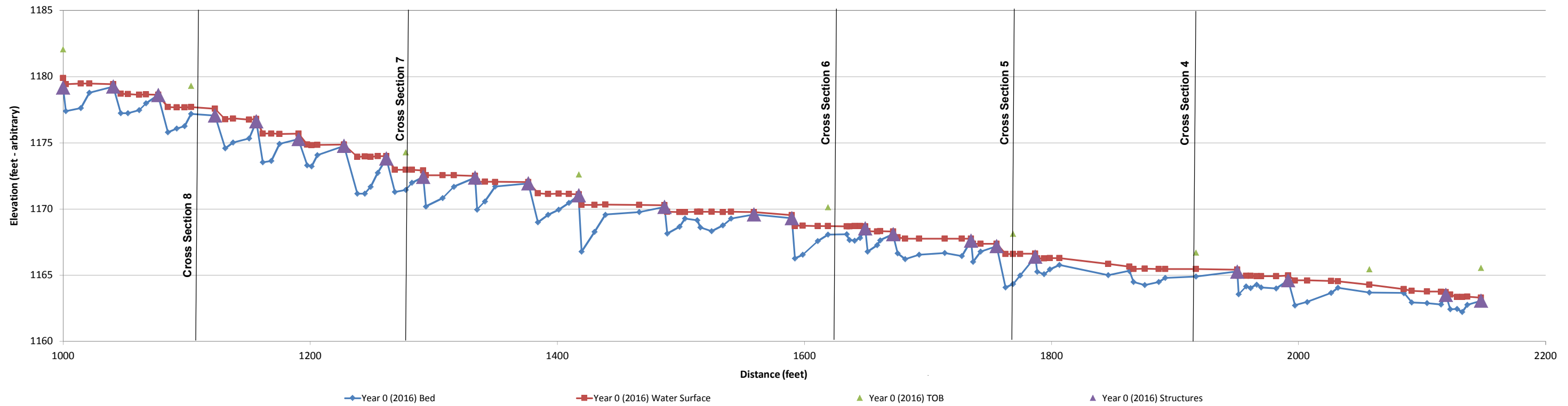


Project Name Neighbors Branch/Walton Crawley Branch - Profile
Reach Walton Crawley Branch, Station 10+00 - 22+00
Feature Profile
Date 4/11/16
Crew Perkinson, Jernigan

2016 Year 0 Monitoring \Survey			2016 Year 1 Monitoring \Survey			2017 Year 2 Monitoring \Survey			2018 Year 3 Monitoring \Survey			2019 Year 4 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
2147.7	1163.1	1163.3												
2136.7	1162.8	1163.4												
2132.5	1162.2	1163.3												
2128.3	1162.5	1163.3												
2122.8	1162.4	1163.5												
2119.2	1163.5	1163.7												
2115.3	1162.8	1163.7												
2104.0	1162.9	1163.8												
2091.7	1162.9	1163.8												
2085.1	1163.6	1163.9												
2057.2	1163.7	1164.3												
2031.9	1164.0	1164.5												
2026.5	1163.7	1164.6												
2007.1	1163.0	1164.6												
1997.2	1162.7	1164.6												
1991.6	1164.6	1165.0												
1981.9	1164.0	1164.9												
1969.8	1164.1	1164.9												
1966.1	1164.3	1164.9												
1961.1	1164.0	1165.0												
1957.7	1164.1	1164.9												
1951.6	1163.6	1165.0												
1950.3	1165.3	1165.4												
1916.9	1164.9	1165.5												
1892.2	1164.8	1165.5												
1886.9	1164.5	1165.5												
1875.7	1164.2	1165.5												
1866.4	1164.5	1165.5												

	2016	2016	2017	2018	2019
Avg. Water Surface Slope	0.0145				
Riffle Length	24				
Avg. Riffle Slope	0.0032				
Pool Length	25				
Pool to Pool Spacing	43				

Walton Crawley Branch Year 0 (2014) Profile - Station 10+00 to 22+00

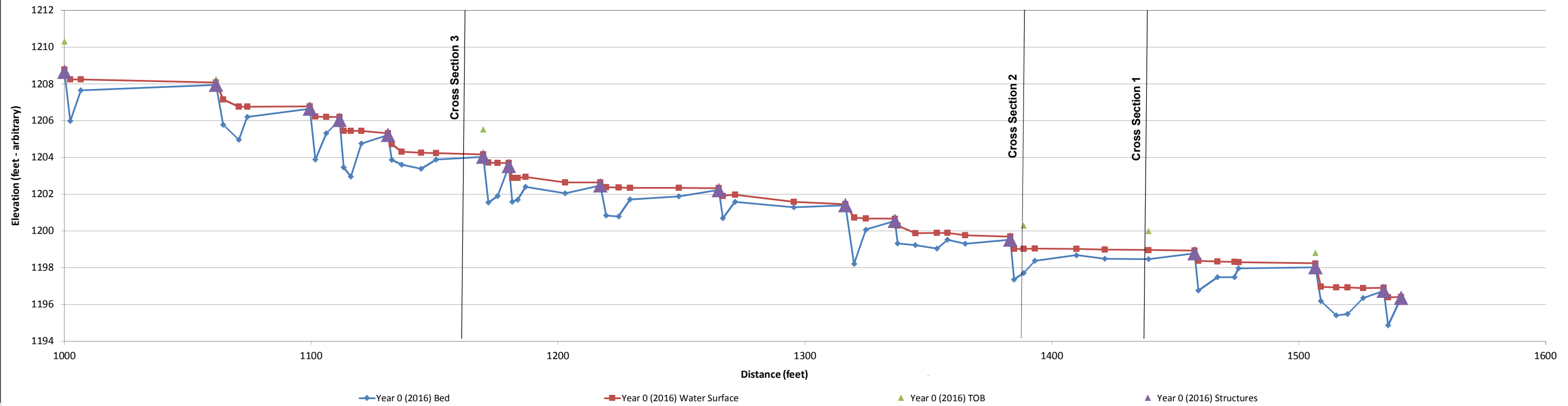


Project Name Neighbors Branch/Walton Crawley Branch - Profile
Reach Neighbors Branch, Station 10+00 - 16+00
Feature Profile
Date 4/11/16
Crew Perkinson, Jernigan

2016 Year 0 Monitoring \Survey			2016 Year 1 Monitoring \Survey			2017 Year 2 Monitoring \Survey			2018 Year 3 Monitoring \Survey			2019 Year 4 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
1541.4	1196.4	1196.4												
1536.2	1194.9	1196.4												
1534.4	1196.7	1196.9												
1526.1	1196.4	1196.9												
1519.8	1195.5	1196.9												
1515.2	1195.4	1196.9												
1508.9	1196.2	1197.0												
1506.7	1198.0	1198.2												
1475.6	1198.0	1198.3												
1473.9	1197.5	1198.3												
1467.1	1197.5	1198.3												
1459.3	1196.8	1198.4												
1457.8	1198.8	1198.9												
1439.1	1198.5	1199.0												
1421.5	1198.5	1199.0												
1410.0	1198.7	1199.0												
1393.1	1198.4	1199.1												
1388.5	1197.7	1199.0												
1384.7	1197.4	1199.0												
1383.2	1199.5	1199.7												
1364.9	1199.3	1199.8												
1357.6	1199.5	1199.9												
1353.4	1199.0	1199.9												
1344.8	1199.2	1199.9												
1337.5	1199.3	1200.3												
1336.4	1200.5	1200.7												
1324.7	1200.1	1200.7												
1319.9	1198.2	1200.7												

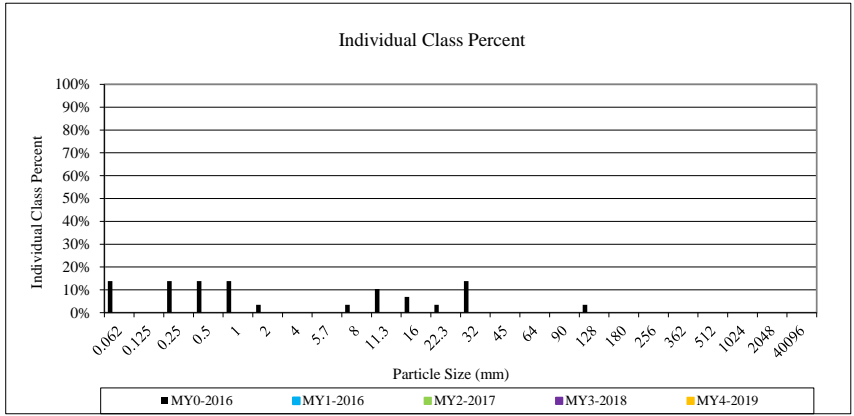
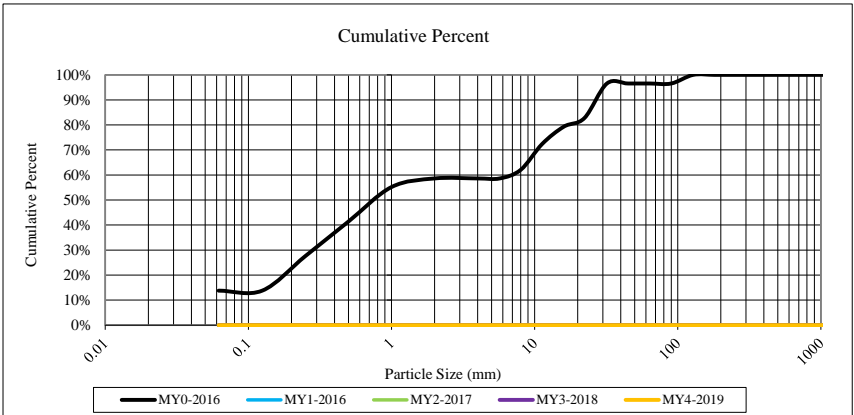
	2016	2016	2017	2018	2019
Avg. Water Surface Slope	0.0222				
Riffle Length	28				
Avg. Riffle Slope	0.0043				
Pool Length	12				
Pool to Pool Spacing	36				

Neighbors Branch Year 0 (2016) Profile - Station 10+00 to 16+00

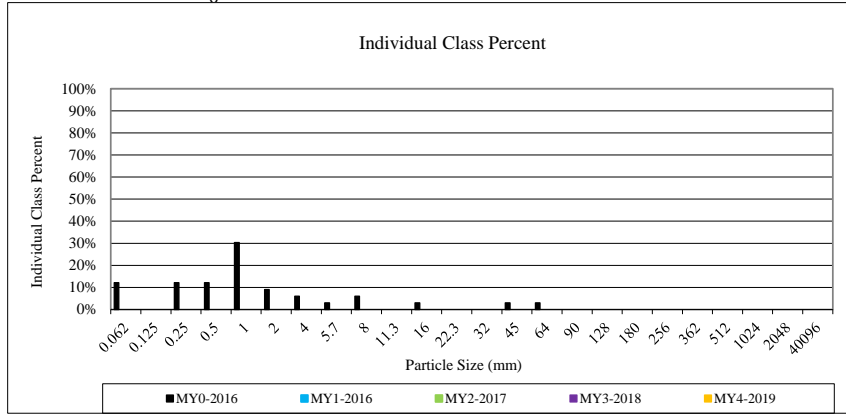
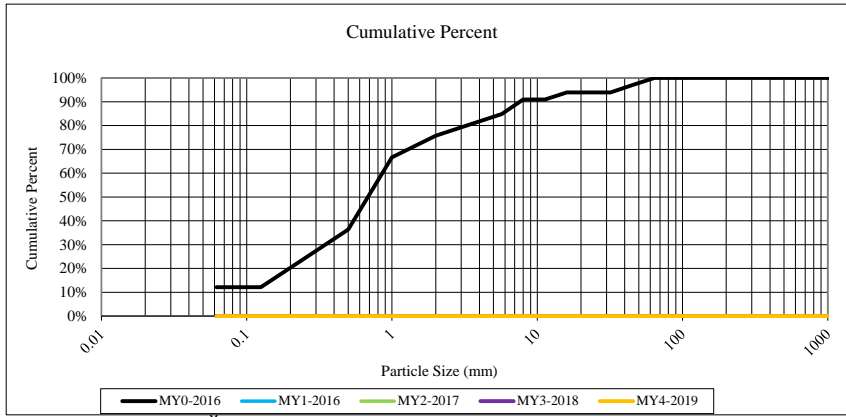


Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 1					
Feature: Riffle					
		2016			
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	36	36%	36%
Sand	very fine sand	0.125	8	8%	44%
	fine sand	0.250	4	4%	48%
	medium sand	0.50	0	0%	48%
	coarse sand	1.00	8	8%	56%
	very coarse sand	2.0	4	4%	60%
Gravel	very fine gravel	4.0	8	8%	68%
	fine gravel	5.7	4	4%	72%
	fine gravel	8.0	12	12%	84%
	medium gravel	11.3	8	8%	92%
	medium gravel	16.0	0	0%	92%
	course gravel	22.3	4	4%	96%
	course gravel	32.0	0	0%	96%
	very coarse gravel	45	0	0%	96%
	very coarse gravel	64	4	4%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.8
D84	23
D95	31

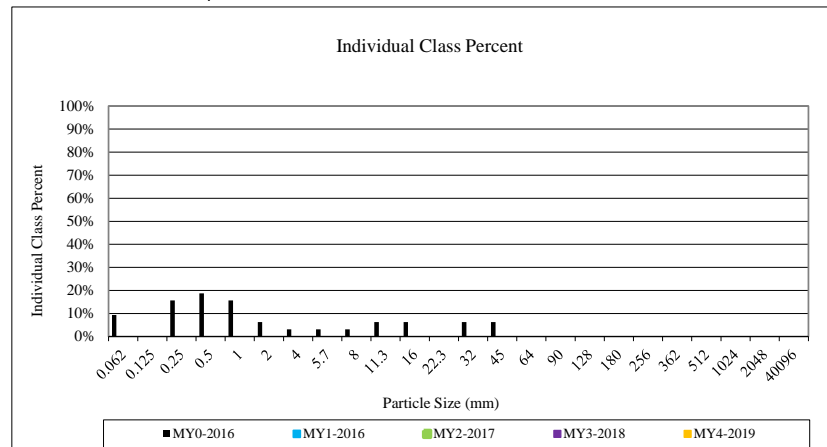
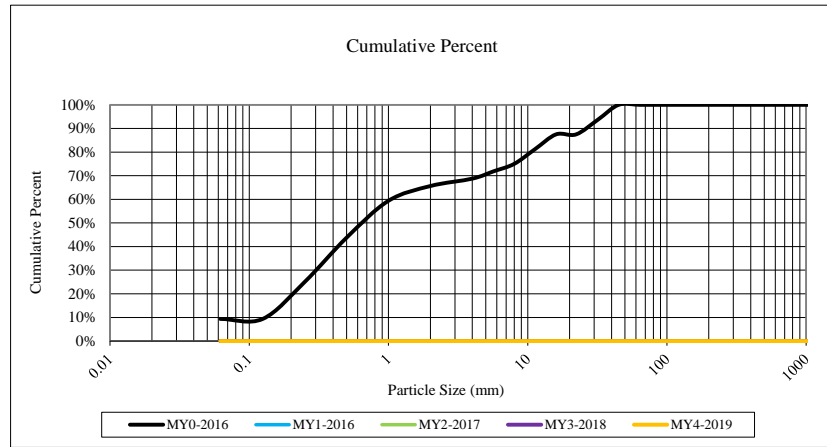


Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site						
Cross-Section: 3						
Feature: Riffle						
			2016			
Description	Material	Size (mm)	Total #	Item %	Cum %	
Silt/Clay	silt/clay	0.062	28	33%	33%	
	very fine sand	0.125	8	10%	43%	
Sand	fine sand	0.250	4	5%	48%	
	medium sand	0.50	4	5%	52%	
	coarse sand	1.00	8	10%	62%	
	very coarse sand	2.0	4	5%	67%	
	very fine gravel	4.0	0	0%	67%	
Gravel	fine gravel	5.7	0	0%	67%	
	fine gravel	8.0	4	5%	71%	
	medium gravel	11.3	4	5%	76%	
	medium gravel	16.0	8	10%	86%	
	course gravel	22.3	4	5%	90%	
	course gravel	32.0	4	5%	95%	
	very coarse gravel	45	0	0%	95%	
	very coarse gravel	64	0	0%	95%	
	Cobble	small cobble	90	4	5%	100%
		medium cobble	128	0	0%	100%
large cobble		180	0	0%	100%	
very large cobble		256	0	0%	100%	
Boulder		small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%	
	medium boulder	1024	0	0%	100%	
	large boulder	2048	0	0%	100%	
Bedrock	bedrock	40096	0	0%	100%	
TOTAL % of whole count			84	100%	100%	
Summary Data						
D50	0.7					
D84	5					
D95	36					



Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 4					
Feature: Riffle					
			2016		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	24	24%	24%
	very fine sand	0.125	8	8%	32%
Sand	fine sand	0.250	12	12%	44%
	medium sand	0.50	4	4%	48%
	coarse sand	1.00	8	8%	56%
	very coarse sand	2.0	4	4%	60%
	very fine gravel	4.0	8	8%	68%
Gravel	fine gravel	5.7	4	4%	72%
	fine gravel	8.0	8	8%	80%
	medium gravel	11.3	0	0%	80%
	medium gravel	16.0	4	4%	84%
	course gravel	22.3	12	12%	96%
	course gravel	32.0	0	0%	96%
	very coarse gravel	45	0	0%	96%
	very coarse gravel	64	4	4%	100%
	small cobble	90	0	0%	100%
Cobble	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
	small boulder	362	0	0%	100%
Boulder	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
	bedrock	bedrock	40096	0	0%
TOTAL % of whole count			100	100%	100%

Summary Data	
D50	0.7
D84	13
D95	34



4

Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site

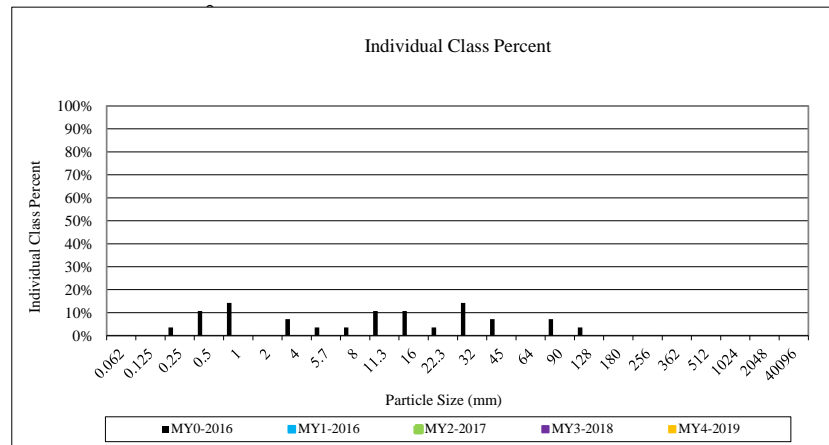
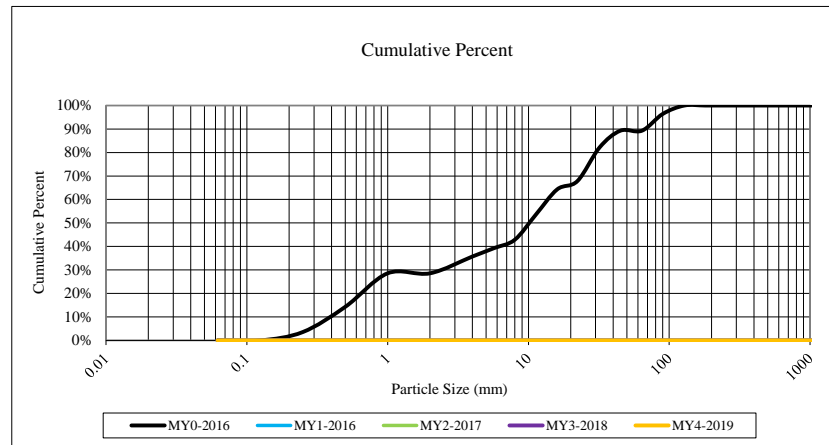
Cross-Section: 6

Feature: Riffle

Description	Material	Size (mm)	2016		
			Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	68	68%	68%
Sand	very fine sand	0.125	4	4%	72%
	fine sand	0.250	12	12%	84%
	medium sand	0.50	0	0%	84%
	coarse sand	1.00	4	4%	88%
	very coarse sand	2.0	4	4%	92%
Gravel	very fine gravel	4.0	8	8%	100%
	fine gravel	5.7	0	0%	100%
	fine gravel	8.0	0	0%	100%
	medium gravel	11.3	0	0%	100%
	medium gravel	16.0	0	0%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
	very coarse gravel	90	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%

Summary Data

D50	9.9
D84	35
D95	84



Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site						
Cross-Section: 8						
Feature: Riffle						
			2016			
Description	Material	Size (mm)	Total #	Item %	Cum %	
Silt/Clay	silt/clay	0.062	68	68%	68%	
	very fine sand	0.125	4	4%	72%	
Sand	fine sand	0.250	12	12%	84%	
	medium sand	0.50	0	0%	84%	
	coarse sand	1.00	4	4%	88%	
	very coarse sand	2.0	4	4%	92%	
	very fine gravel	4.0	8	8%	100%	
Gravel	fine gravel	5.7	0	0%	100%	
	fine gravel	8.0	0	0%	100%	
	medium gravel	11.3	0	0%	100%	
	medium gravel	16.0	0	0%	100%	
	course gravel	22.3	0	0%	100%	
	course gravel	32.0	0	0%	100%	
	very coarse gravel	45	0	0%	100%	
	very coarse gravel	64	0	0%	100%	
	Cobble	small cobble	90	0	0%	100%
		medium cobble	128	0	0%	100%
large cobble		180	0	0%	100%	
very large cobble		256	0	0%	100%	
Boulder		small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%	
	medium boulder	1024	0	0%	100%	
	large boulder	2048	0	0%	100%	
	Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			100	100%	100%	

Summary Data	
D50	26.5
D84	72
D95	109

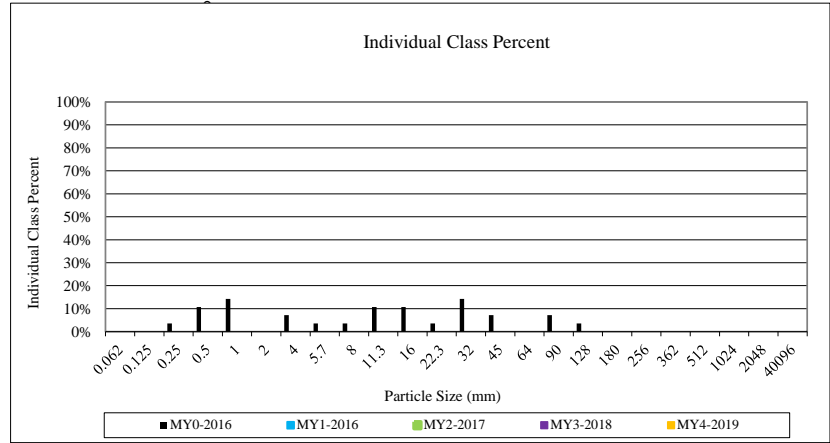
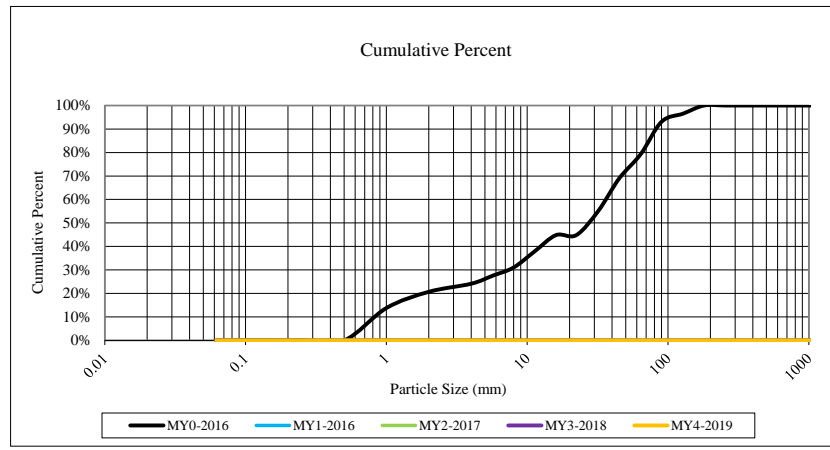


Table 7a. Baseline Stream Data Summary (Neighbors Creek)

Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Gauge	Regional Curve			Pre-Existing Condition (Neighbors Cr)					Reference Reach(es) Data					Design (Neighbors Cr)			Monitoring Baseline (Neighbors Cr)							
		LL	UL	Eq.	Min	Mean	Med	Max	SD	Min	Mean	Med	Max	SD	Min	Max	Med	Min	Mean	Med	Max	SD	n		
Dimension and Substrate - Riffle Only																									
BF Width (ft)					5.4			5.9			12.7						11.0	9.6		11.1	12.5		2		
Floodprone Width (ft)					7.4			17.1			150						70			100			2		
BF Mean Depth (ft)					0.9			1.1			0.9						0.8	0.8		0.8	0.8		2		
BF Max Depth (ft)					1.2			1.5			1.2						1.1	1.5		1.7	1.8		2		
BF Cross Sectional Area (ft ²)					4.9			6.5			11.4						8.3	8.0		9.0	9.9		2		
Width/Depth Ratio					5.3			5.8			14.1						14.0	12.0		13.8	15.6		2		
Entrenchment Ratio					1.4			2.9			11.8						6.4	8.0		9.2	10.4		2		
Bank Height Ratio					1.6			2.6			1.0						1.0			1.0			2		
Profile																									
Riffle length (ft)																			5.4	28.3	25.5	64.7	18.2	13	
Riffle slope (ft/ft)					0.025			0.035			0.0344						0.0120	0.0000	0.0043	0.0022	0.0121	0.0046		13	
Pool length (ft)																			6.5	11.9	10.4	21.3	5.2	15	
Pool Max depth (ft)					1.7			1.8			2.2						2.0	2.8		2.8	2.8			1	
Pool spacing (ft)					16.4			99.2			38.8						33.0	56.1		7.0	36.1	37.9	74.7	19.8	15
Pattern																									
Channel Beltwidth (ft)					8			22			30.5						27.5	66		27.5			66		2
Radius of Curvature (ft)					5			22			14.5						22	44		22			44		2
Rc:Bankfull width (ft/ft)					0.9			1.5			1.1						2	4		2			4		2
Meander Wavelength (ft)					30			128			95						44	110		44			110		2
Meander Width ratio					1.5			4.1			2.4						4	10		4			10		2
Transport parameters																									
Reach Shear Stress (competency) lbs/ft ²																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m ²																									
Additional Reach Parameters																									
Rosgen Classification					G5/4 - E5/4					C					C			E/C							
Bankfull Velocity (fps)					3.86 - 5.09																				
Bankfull Discharge (cfs)					25																				
Valley Length (ft)					----					----															
Channel Thalweg Length (ft)					----					----								541							
Sinuosity					1.01 - 1.21					1.22					1.18			1.18							
Water Surface Slope (ft/ft)					0.019 - 0.0204					0.0205					0.008			0.0222							
BF slope (ft/ft)					----					----															
Bankfull Floodplain Area (acres)					----					----															
% of Reach with Eroding Banks					----					----															
Channel Stability or Habitat Metric					----					----															
Biological or Other					----					----															

Table 7b. Baseline Stream Data Summary (Walton Crawley Property)
 Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Gauge	Regional Curve			Pre-Existing Condition (WC Property)					Reference Reach(es) Data					Design (WC Property)			Monitoring Baseline (WC Property)					
		LL	UL	Eq.	Min	Mean	Med	Max	SD	Min	Mean	Med	Max	SD	Min	Max	Med	Min	Mean	Med	Max	SD	n
Dimension and Substrate - Riffle Only																							
BF Width (ft)					7.9			9.4			12.7					15.5	13.2		14.3	16.8		3	
Floodprone Width (ft)					12.9			16.8			150				55	90			100			3	
BF Mean Depth (ft)					0.8			0.9			0.9						1.1	1.3	1.4	1.5		3	
BF Max Depth (ft)					0.9			1.1			1.2						1.4	1.9	2.0	2.0		3	
BF Cross Sectional Area (ft ²)					6.2			8.4			11.4					16.6	17.6		19.4	25.0		3	
Width/Depth Ratio					10.2			10.4			14.1					14.0	10.2		10.2	11.2		3	
Entrenchment Ratio					1.6			1.8			11.8					4.5	6.0		7.0	7.6		3	
Bank Height Ratio					1.0			2.8			1.0					1.0			1.0			3	
Profile																							
Riffle length (ft)																	6.7	23.9	16.2	58.1	18	20	
Riffle slope (ft/ft)					0.024			0.030			0.0344					0.0077	0.0000	0.0032	0.0018	0.0113	0.0036	20	
Pool length (ft)																	7.9	24.8	24.8	63.1	10.8	27	
Pool Max depth (ft)					1.9			2.1			2.2					2.4	1.3		1.4	1.5		2	
Pool spacing (ft)					6.0			40.8			38.8					64.7	15.5	79.2		14.9	42.5	27	
Pattern																							
Channel Beltwidth (ft)					16			25			30.5				32		38.8	93		38.8		2	
Radius of Curvature (ft)					5			14			14.5				20		31	62		31		2	
Rc:Bankfull width (ft/ft)					0.5			1.5			1.1				1.6		2	4		2		2	
Meander Wavelength (ft)					103			121			95				98		77.5	155		77.5		2	
Meander Width ratio					11			12.9			2.4				2.5		5	10		5		2	
Transport parameters																							
Reach Shear Stress (competency) lbs/ft ²																							
Max part size (mm) mobilized at bankfull																							
Stream Power (transport capacity) W/m ²																							
Additional Reach Parameters																							
Rosgen Classification					B/G					C					C			E/C					
Bankfull Velocity (fps)					3.9-7.5																		
Bankfull Discharge (cfs)					24-63																		
Valley Length (ft)					----					----													
Channel Thalweg Length (ft)					----					----								1148					
Sinuosity					1.01-1.2					1.22					1.1			1.1					
Water Surface Slope (ft/ft)					0.0135-0.0340					0.0205					0.0045			0.0145					
BF slope (ft/ft)					----					----					----			----					
Bankfull Floodplain Area (acres)					----					----					----			----					
% of Reach with Eroding Banks					----					----					----			----					
Channel Stability or Habitat Metric					----					----					----			----					
Biological or Other					----					----					----			----					

Appendix E.
As-built Plan Sheets

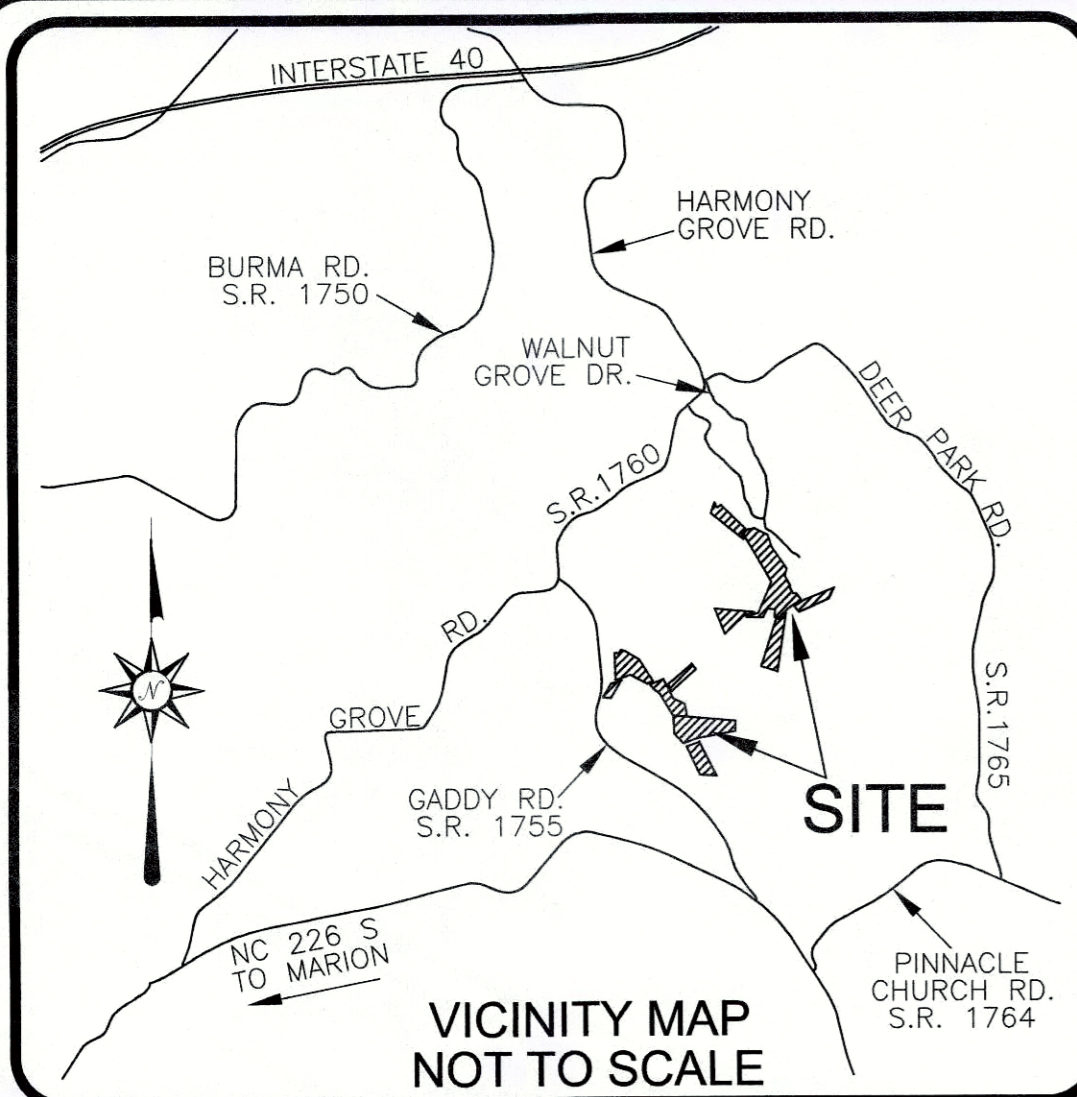
AS-BUILT SURVEY OF NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM RESTORATION PROJECT

McDOWELL COUNTY, NC
SCO# 080730801
NCEEP PROJECT# 92872

REFERENCES:
OWNER:
NORTH CAROLINA DEPARTMENT
OF MITIGATION SERVICES
217 WEST JONES ST., SUITE 300A
RALEIGH, NC 27603
(919)707-8976
DMS PROJ. MANAGER: MATTHEW REID

DESIGNER:
ICA ENGINEERING
5121 KINGDOM WAY, SUITE 100
RALEIGH, NC 27607
(919)851-6066

CONTRACTOR:
CAROLINA ENVIRONMENTAL
CONTRACTING, INC
MOUNT AIRY, NC
(336)320-3849



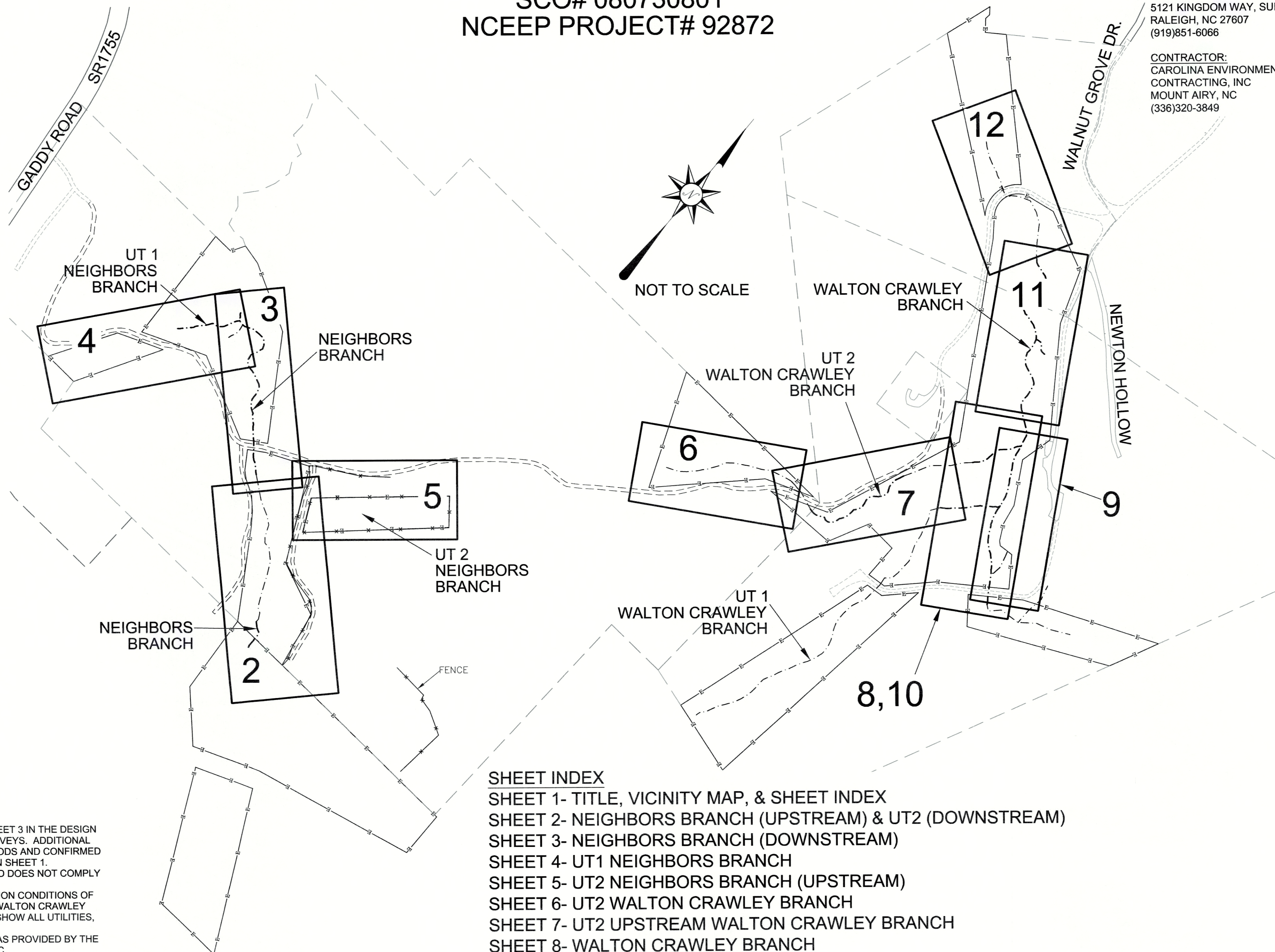
I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THIS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
ELISABETH G. TURNER, P.L.S. #L-4440
NORTH CAROLINA
PROFESSIONAL
LAND SURVEYOR
SEAL
L-4440
ELISABETH G. TURNER

PT#	Northing(Y)	Easting(X)	Elev(Z)	Description
36	707179.16	1137877.24	1240.70	TLS#36 NAIL
37	707133.84	1137556.83	1212.96	TLS#37 REBAR W/CAP
38	707266.94	1137379.58	1210.13	TLS#38 NAIL
39	707563.76	1137447.67	1238.08	TLS#39 NAIL
40	709275.45	1139310.53	1192.85	TLS#40 NAIL
49	707407.04	1137454.08	1200.31	TLS#49 NAIL
50	707333.21	1137324.95	1204.29	TLS#50 NAIL
52	707010.51	1137910.80	1225.32	TLS#52 NAIL
55	708694.17	1139628.08	1180.70	TLS#55 REBAR W/CAP
56	707183.04	1138101.26	1238.52	TLS#56 NAIL
59	706925.55	1137960.03	1227.68	TLS#59 NAIL
60	706852.87	1138075.27	1240.17	TLS#60 NAIL
61	706708.03	1138182.24	1247.94	TLS#61 REBAR W/CAP
62	706635.49	1138019.26	1226.29	TLS#62 NAIL
63	708144.17	1139248.92	1206.34	TLS#63 NAIL
64	708110.78	1139078.07	1224.82	TLS#64 NAIL
65	708104.06	1138979.07	1231.96	TLS#65 NAIL
66	708933.26	1139411.02	1168.12	TLS#66 NAIL
67	708368.26	1139592.73	1182.91	TLS#67 NAIL
68	709268.77	1139322.56	1194.55	TLS#68 NAIL
69	709293.36	1138994.83	1166.36	TLS#69 NAIL
71	708514.43	1139674.73	1180.24	TLS#71 NAIL
72	708962.33	1139337.50	1168.08	TLS#72 NAIL

GENERAL NOTES:

- ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
- HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
- CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
- THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
- THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
- INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
- NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.



SHEET INDEX

- SHEET 1- TITLE, VICINITY MAP, & SHEET INDEX
- SHEET 2- NEIGHBORS BRANCH (UPSTREAM) & UT2 (DOWNSTREAM)
- SHEET 3- NEIGHBORS BRANCH (DOWNSTREAM)
- SHEET 4- UT1 NEIGHBORS BRANCH
- SHEET 5- UT2 NEIGHBORS BRANCH (UPSTREAM)
- SHEET 6- UT2 WALTON CRAWLEY BRANCH
- SHEET 7- UT2 UPSTREAM WALTON CRAWLEY BRANCH
- SHEET 8- WALTON CRAWLEY BRANCH
- SHEET 9- WALTON CRAWLEY BRANCH POND
- SHEET 10- UT1 WALTON CRAWLEY BRANCH
UT2 DOWNSTREAM WALTON CRAWLEY BRANCH
- SHEET 11- WALTON CRAWLEY BRANCH
- SHEET 12- WALTON CRAWLEY BRANCH

REVISIONS, DATE AND INITIAL:

TITLE, VICINITY MAP, & SHEET INDEX
NEIGHBORS BRANCH & WALTON CRAWLEY
STREAM RESTORATION PROJECT
NCEEP PROJECT#92872
MCDOWELL COUNTY
NORTH CAROLINA

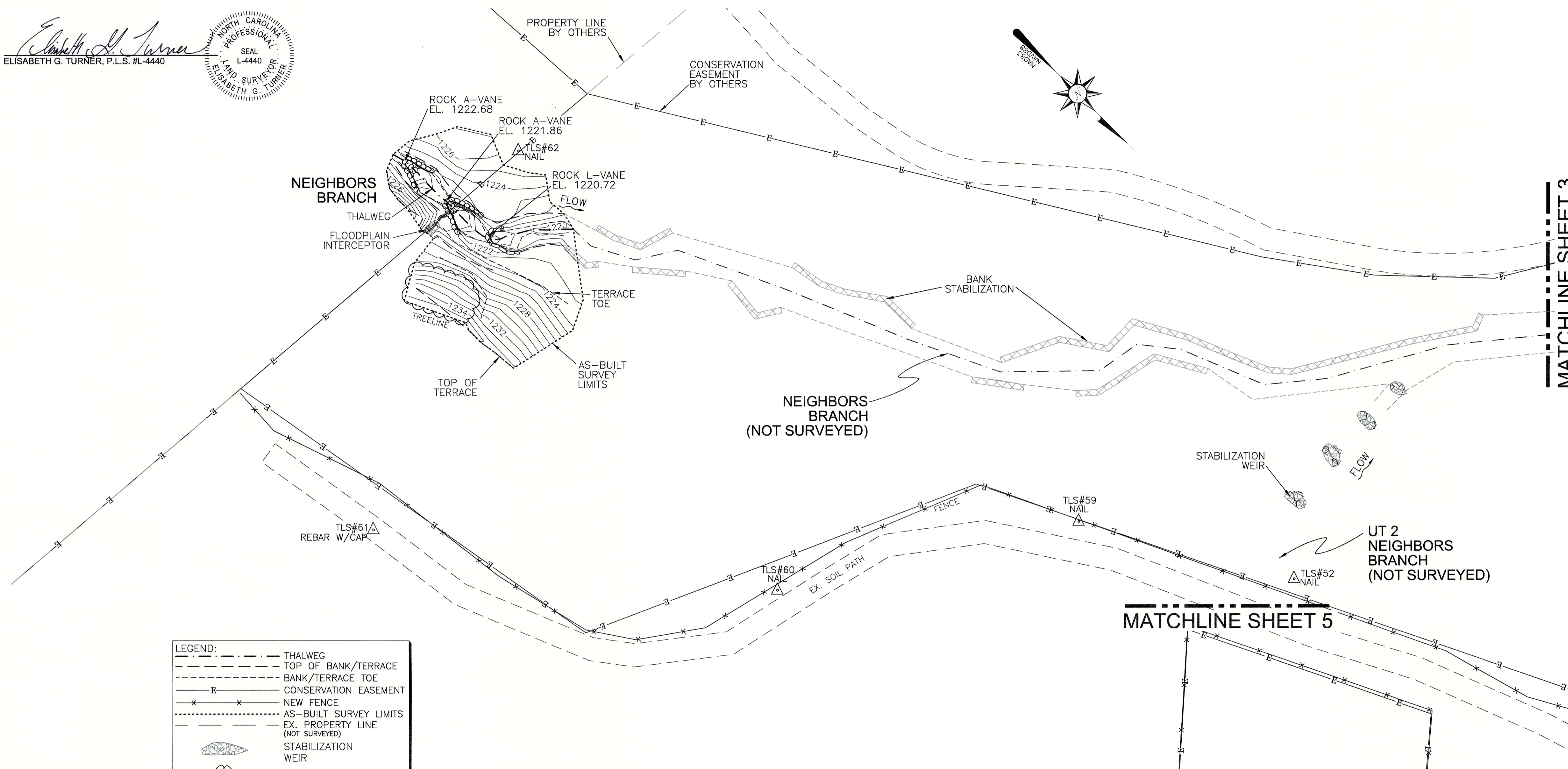
3719 BENSON DRIVE
RALEIGH, NC 27609
P-0702 (919) 827-0745
www.turnerlandsurveying.com
Certified DBE/WBE



DATE: 08/10/2015
SURVEYED BY: DST/JAP/DTH
DRAWN BY: ROB/DST
REVIEWED BY: DST/EGT
PROJECT: TLS-15-001
FILE: NEIGHBOR_CRAWLEY_92872_AB_TLS.D
SCALE: AS SHOWN
SHEET 1 of 12

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



LEGEND:

	THALWEG
	TOP OF BANK/TERRACE
	BANK/TERRACE TOE
	CONSERVATION EASEMENT
	NEW FENCE
	AS-BUILT SURVEY LIMITS
	EX. PROPERTY LINE (NOT SURVEYED)
	STABILIZATION WEIR
	ROCK L-VANE
	ROCK A-VANE

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

GENERAL NOTES:

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.

REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING
 3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE

NEIGHBORS BRANCH (UPSTREAM) & UT2 (DOWNSTREAM)
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT#92872

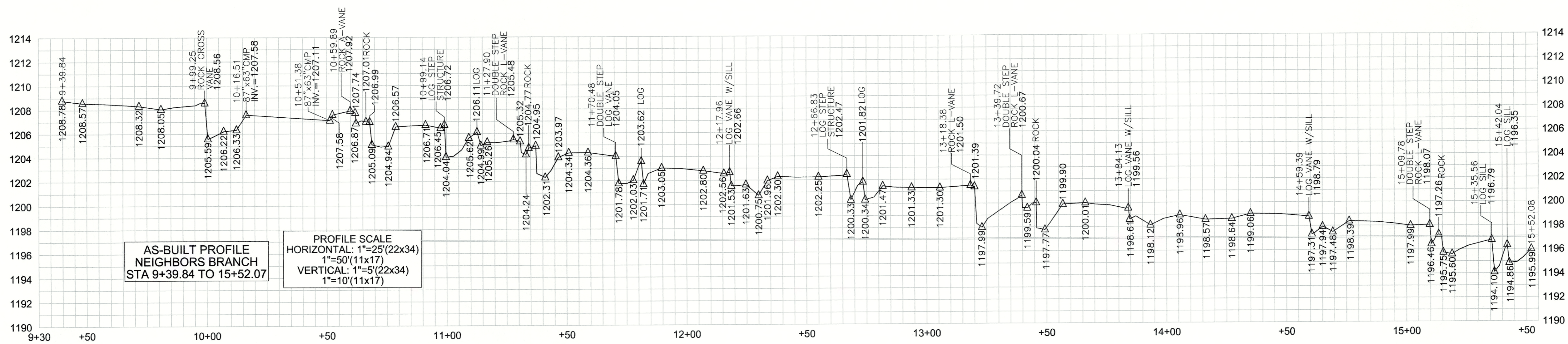
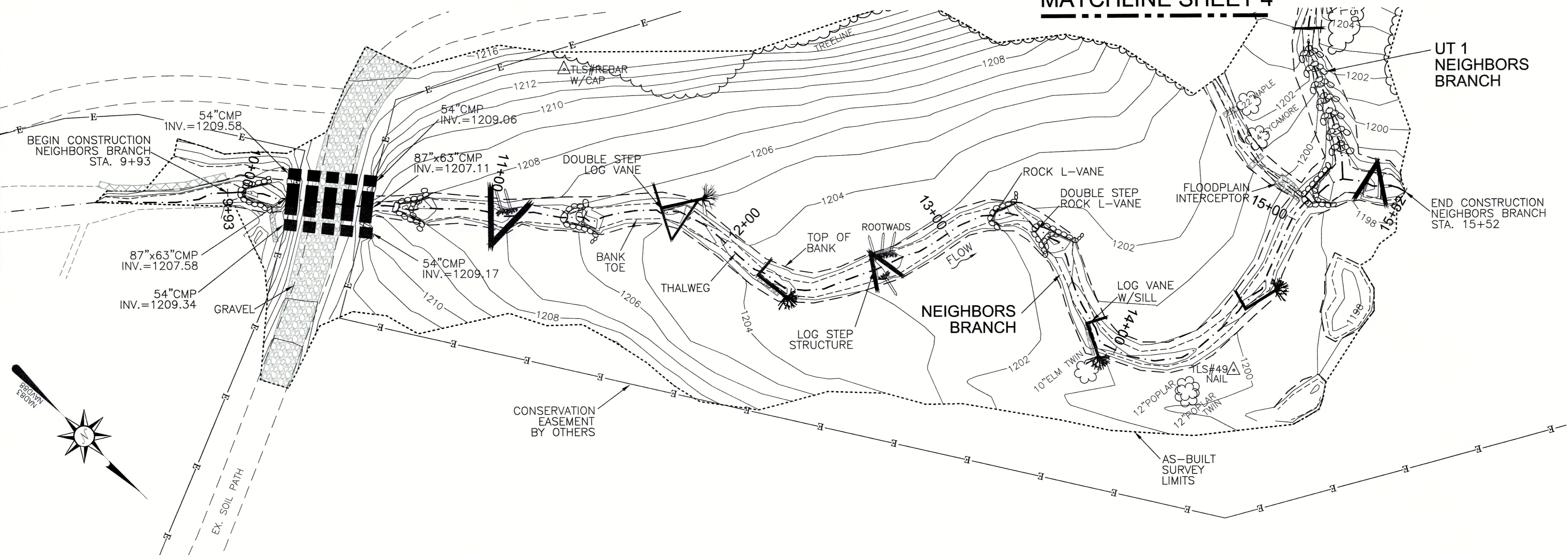
MCDOWELL COUNTY
 NORTH CAROLINA
 NEBO

DATE: 08/10/2015
 SURVEYED BY: DST/JAP/DTH
 DRAWN BY: ROB/DST
 REVIEWED BY: DST/EGT
 PROJECT: TLS-15-001
 FILE: NEIGHBOR_CRAWLEY_92872_AB_TLS_F
 SCALE: AS SHOWN

SHEET 2 of 12

MATCHLINE SHEET 2

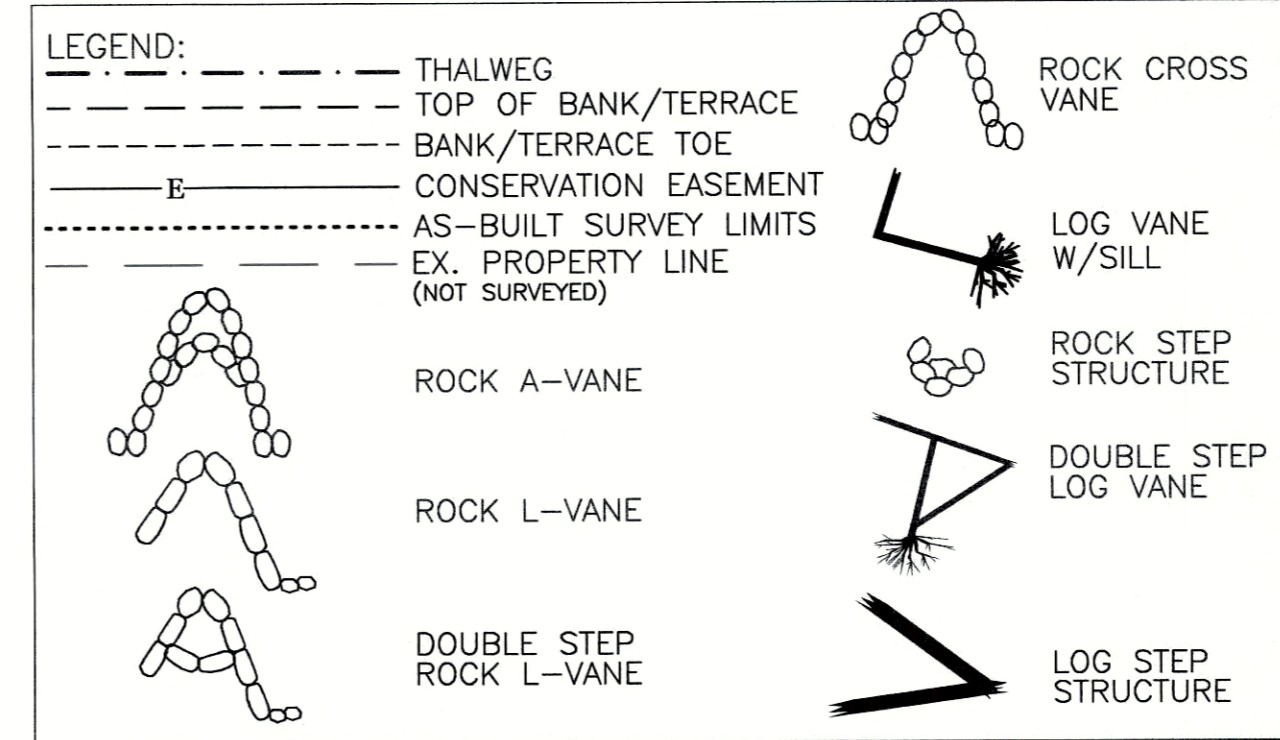
MATCHLINE SHEET 4



I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440
 SEAL
 L-4440
 LAND SURVEYOR
 NORTH CAROLINA
 PROFESSIONAL

GENERAL NOTES:
 1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
 2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
 3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
 4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
 5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
 6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
 7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.



AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

NEIGHBORS BRANCH (DOWNSTREAM)

NEIGHBORS BRANCH & WALTON CRAWLEY STREAM RESTORATION PROJECT
NCEP PROJECT#92872

NORTH CAROLINA

McDOWELL COUNTY

NEBO

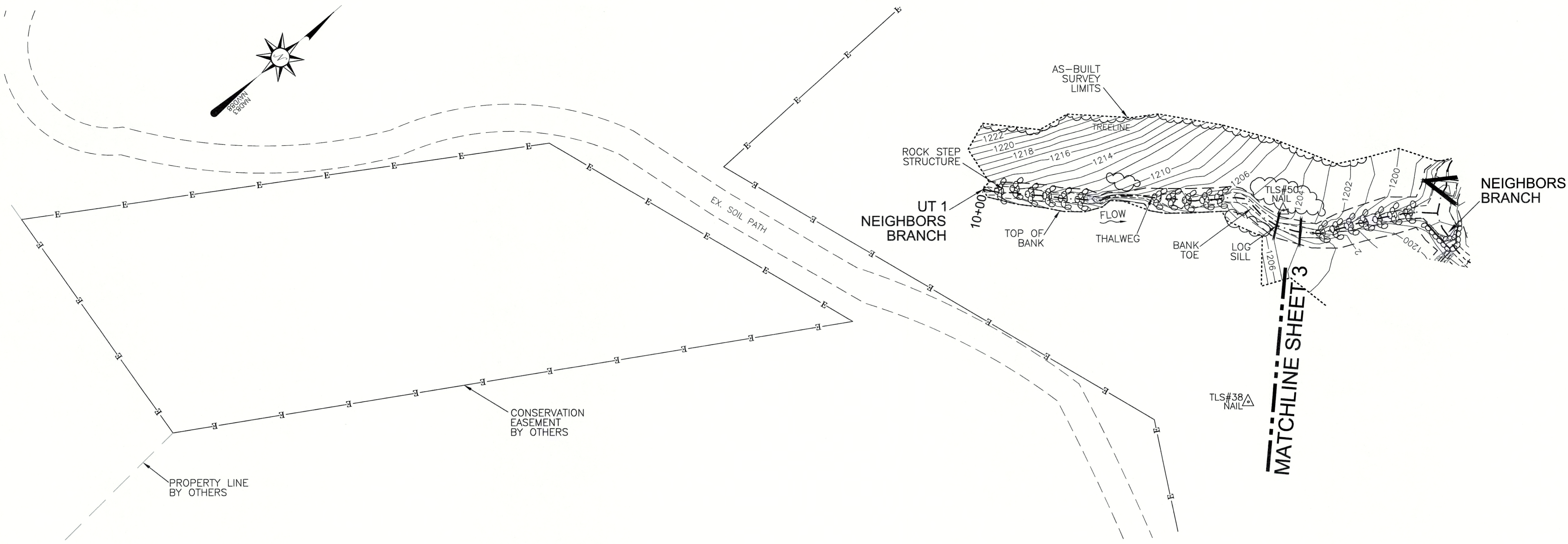
REVISIONS, DATE AND INITIAL:



3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE

SHEET

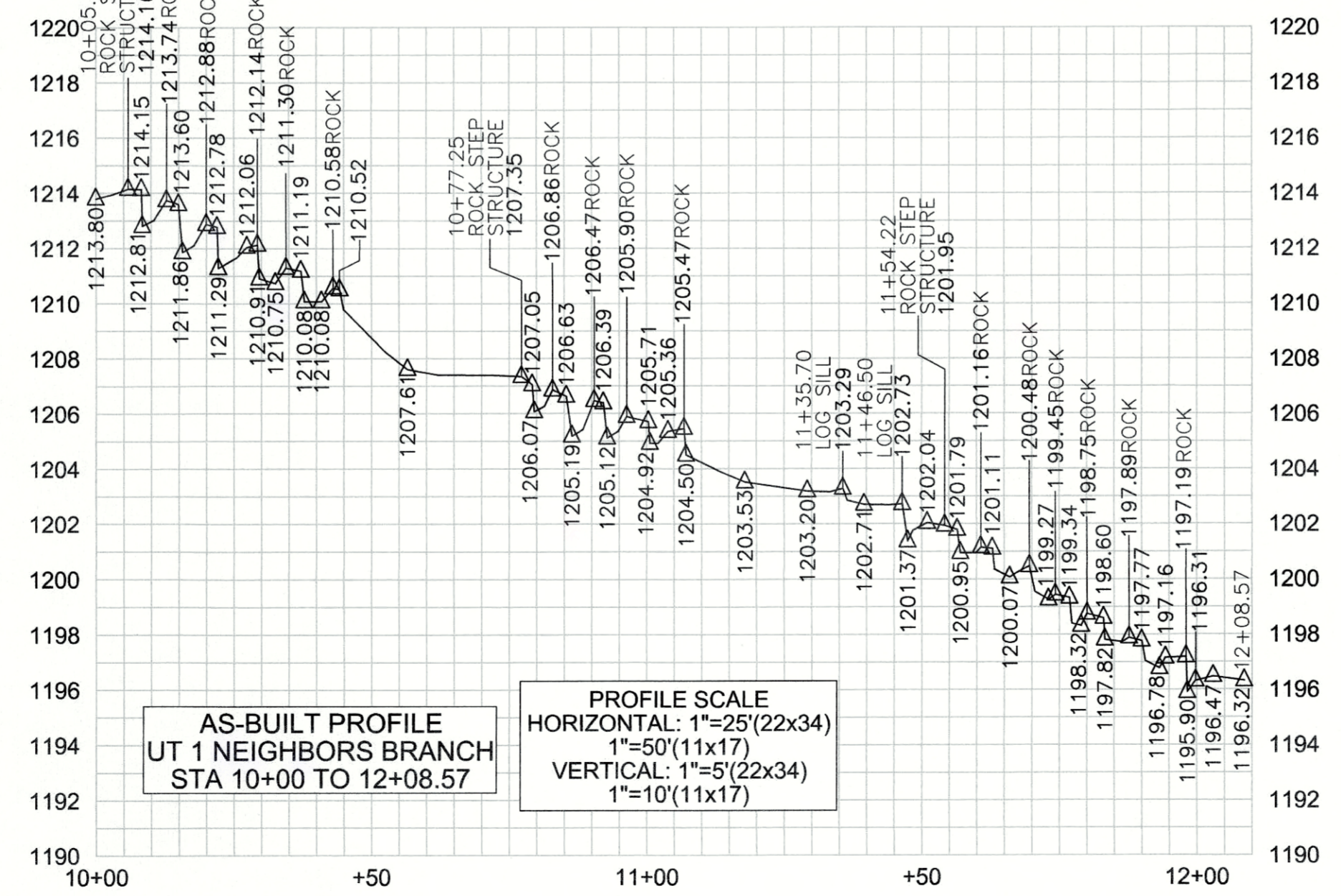
3 of 12



I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THIS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440
 NORTH CAROLINA PROFESSIONAL LAND SURVEYOR
 SEAL L-4440
 ELISABETH G. TURNER

- GENERAL NOTES:**
1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
 2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
 3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
 4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
 5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
 6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
 7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.



LEGEND:

--- (dashed line)	THALWEG
--- (dashed line)	TOP OF BANK/TERRACE
--- (dashed line)	BANK/TERRACE TOE
--- (dashed line)	CONSERVATION EASEMENT
--- (dashed line)	AS-BUILT SURVEY LIMITS
--- (dashed line)	EX. PROPERTY LINE (NOT SURVEYED)
--- (dashed line)	LOG SILL
--- (dashed line)	ROCK STEP STRUCTURE

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

REVISIONS, DATE AND INITIAL:

3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE

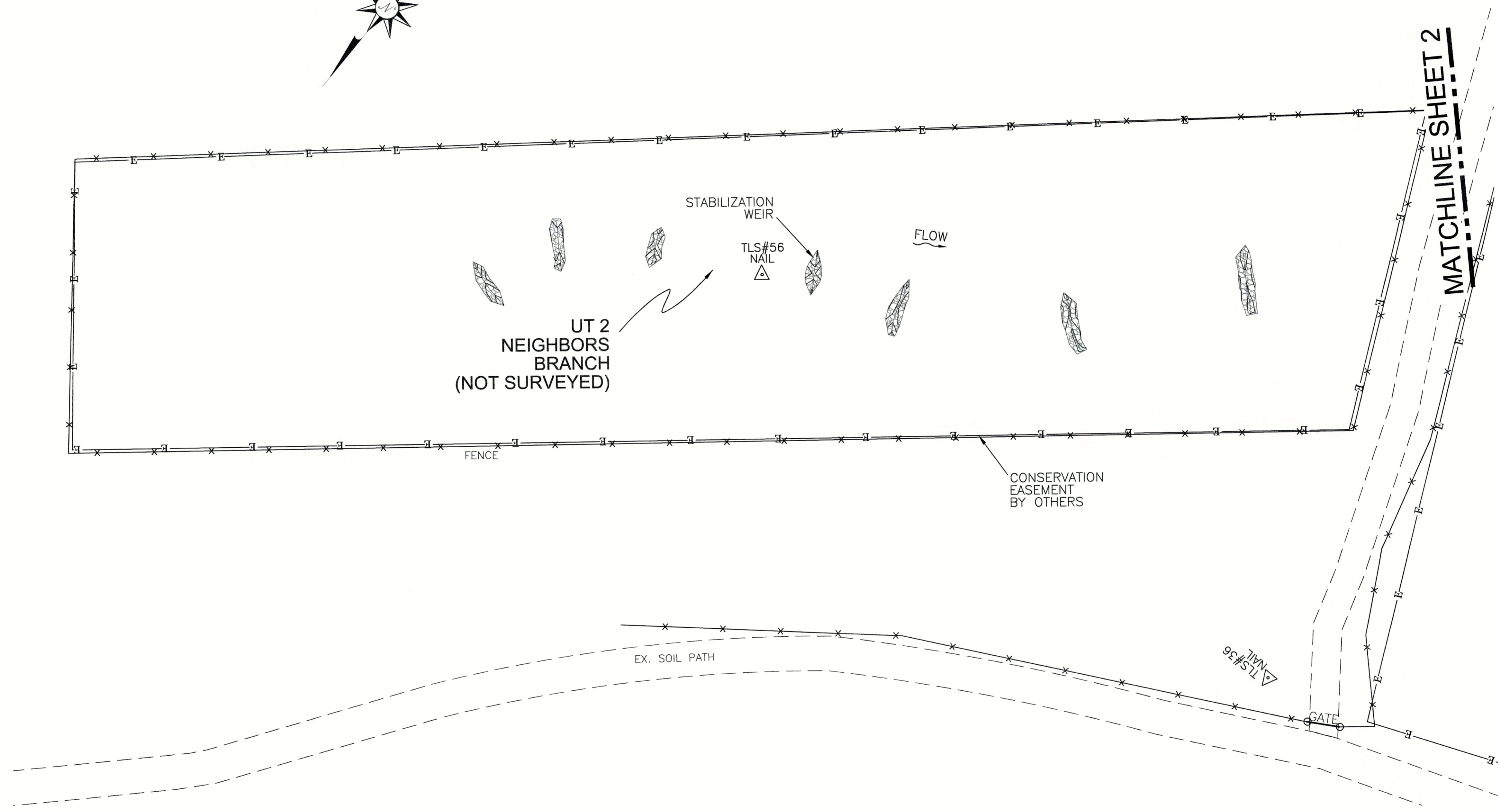
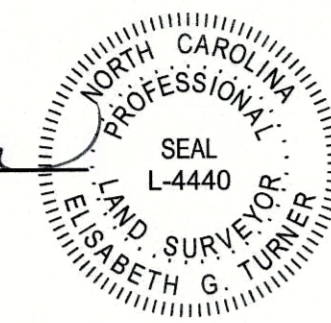


UT 1 NEIGHBORS BRANCH
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT#92872
 MCDOWELL COUNTY
 NORTH CAROLINA
 NEBO

DATE:	08/10/2015
SURVEYED BY:	DST/JAP/DTH
DRAWN BY:	ROB/DST
REVIEWED BY:	DST/EGT
PROJECT:	TLS-15-001
FILE:	NEIGHBOR_CRAWLEY_92872_AB_TLS_F
SCALE:	AS SHOWN

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



LEGEND:	
	THALWEG
	TOP OF BANK/TERRACE
	BANK/TERRACE TOE
	CONSERVATION EASEMENT
	NEW FENCE
	AS-BUILT SURVEY LIMITS
	EX. PROPERTY LINE (NOT SURVEYED)
	STABILIZATION WEIR

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

- GENERAL NOTES:**
- ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
 - HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
 - CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
 - THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
 - THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
 - INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
 - NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.

REVISIONS, DATE AND INITIAL:

3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE



UT2 NEIGHBORS BRANCH (UPSTREAM)
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT #92872
 McDowell County
 NORTH CAROLINA

DATE:	08/10/2015
SURVEYED BY:	DST/JAP/DTH
DRAWN BY:	ROB/DST
REVIEWED BY:	DST/EGT
PROJECT:	TLS-15-001
FILE:	NEIGHBOR_CRAWLEY_92872_AB_TLS_F
SCALE:	AS SHOWN

SHEET
5 of 12

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



LEGEND:	
	THALWEG
	TOP OF BANK/TERRACE
	BANK/TERRACE TOE
	CONSERVATION EASEMENT
	NEW FENCE
	AS-BUILT SURVEY LIMITS
	EX. PROPERTY LINE (NOT SURVEYED)
	STABILIZATION WEIR

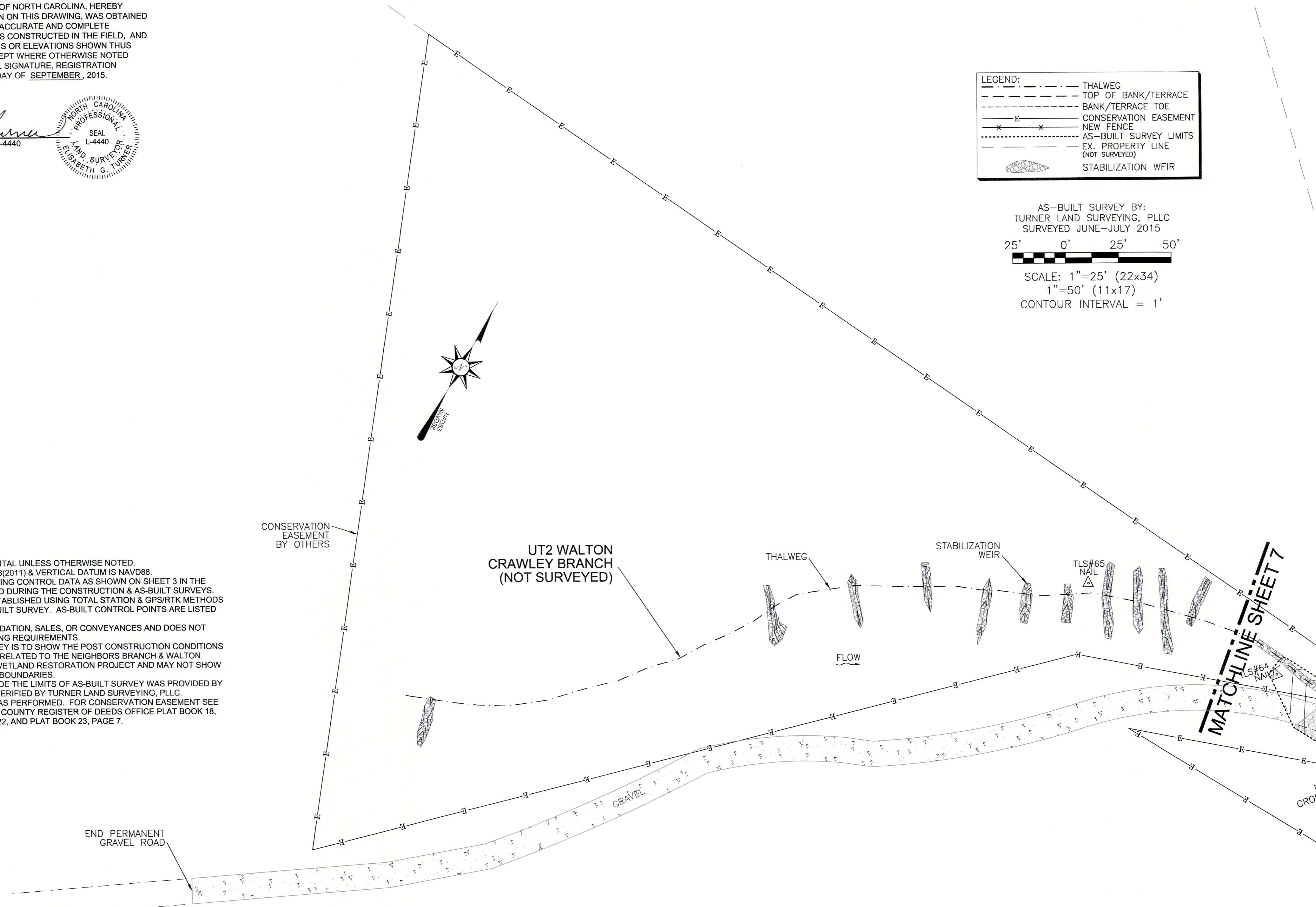
AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

GENERAL NOTES:

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN MCDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.



REVISIONS, DATE AND INITIAL:

3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE



UT2 WALTON CRAWLEY BRANCH
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT#92872

NORTH CAROLINA
 MCDOWELL COUNTY

DATE:	08/10/2015
SURVEYED BY:	DST/JAP/DTH
DRAWN BY:	ROB/DST
REVIEWED BY:	DST/EGT
PROJECT:	TLS-15-001
FILE:	NEIGHBOR_CRAWLEY_92872_AB_TLS_F
SCALE:	AS SHOWN

SHEET
6 of 12

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



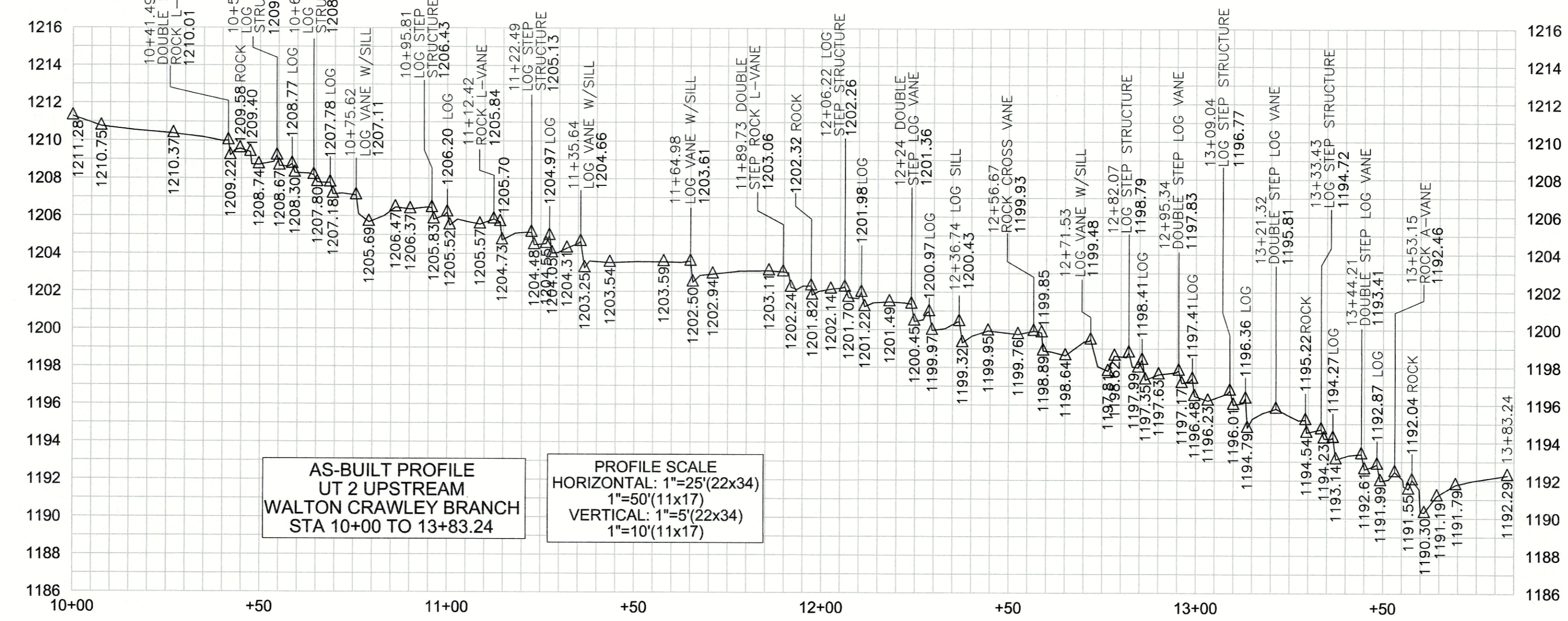
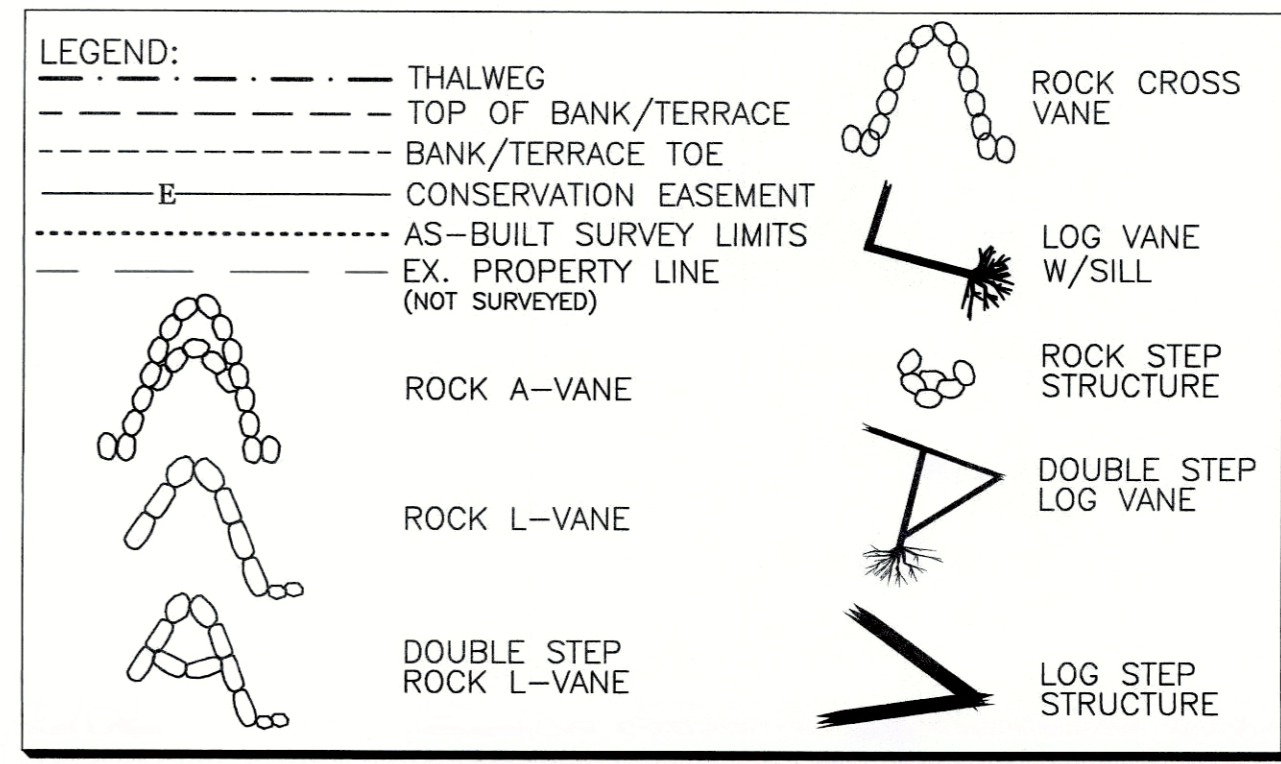
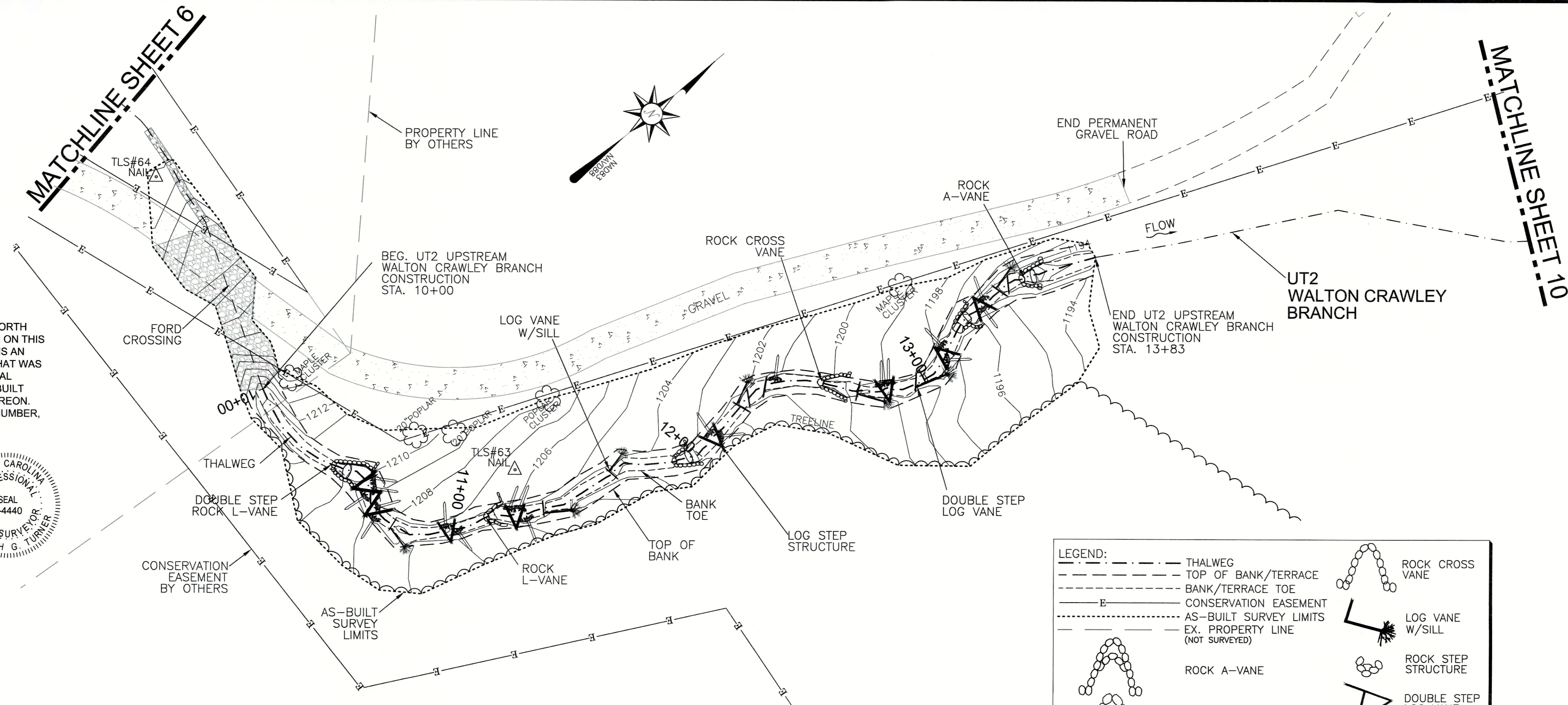
AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

GENERAL NOTES:

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.



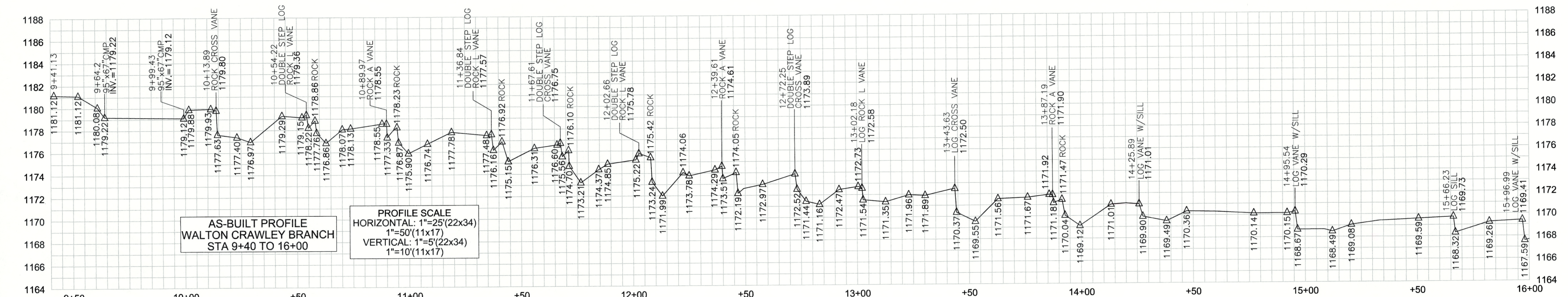
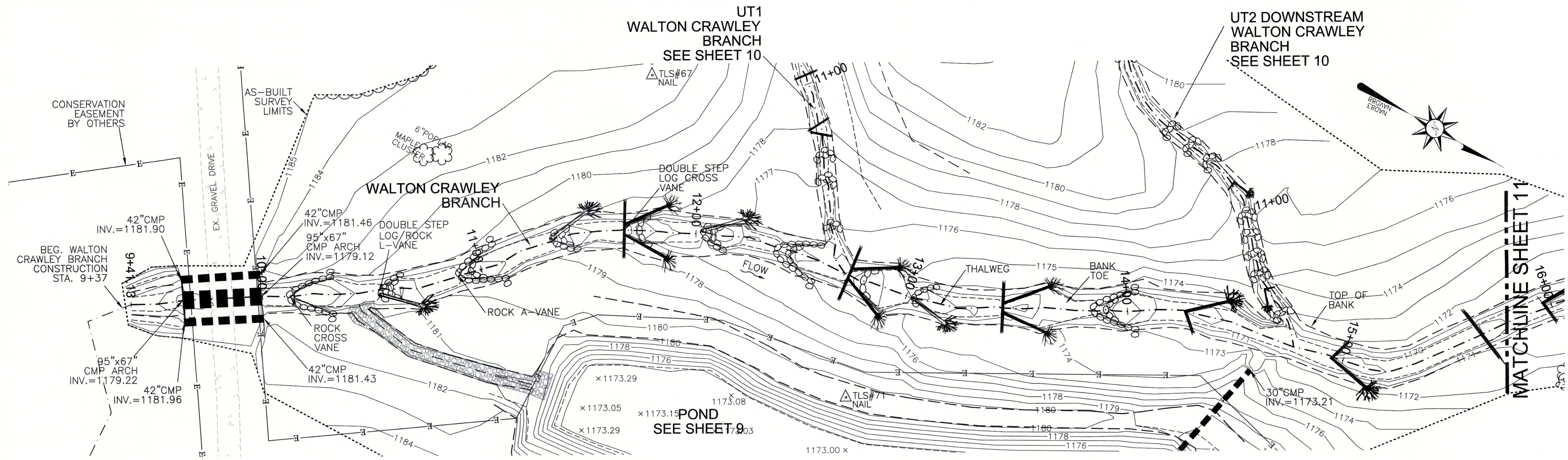
REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING
 3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE

UT2 UPSTREAM WALTON CRAWLEY
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT #92872
 McDowell County
 NORTH CAROLINA

DATE: 08/10/2015
 SURVEYED BY: DST/JAP/DTH
 DRAWN BY: ROB/DST
 REVIEWED BY: DST/EGT
 PROJECT: TLS-15-001
 FILE: NEIGHBOR_CRAWLEY_92872_AB_TLS_F
 SCALE: AS SHOWN

SHEET 7 of 12



I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THIS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440
 NORTH CAROLINA PROFESSIONAL LAND SURVEYOR
 SEAL L-4440

- GENERAL NOTES:**
1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
 2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
 3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
 4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
 5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
 6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
 7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

LEGEND:

- THALWEG
- TOP OF BANK/TERRACE
- BANK/TERRACE TOE
- CONSERVATION EASEMENT
- AS-BUILT SURVEY LIMITS
- EX. PROPERTY LINE (NOT SURVEYED)
- LOG SILL
- ROCK A-VANE
- ROCK L-VANE
- LOG VANE W/SILL
- LOG/ROCK L-VANE
- DOUBLE STEP LOG/ROCK L-VANE
- ROCK CROSS VANE
- ROCK STEP STRUCTURE
- DOUBLE STEP LOG CROSS VANE
- LOG CROSS VANE
- LOG STEP STRUCTURE

REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING
 3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE

WALTON CRAWLEY BRANCH
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT #92872

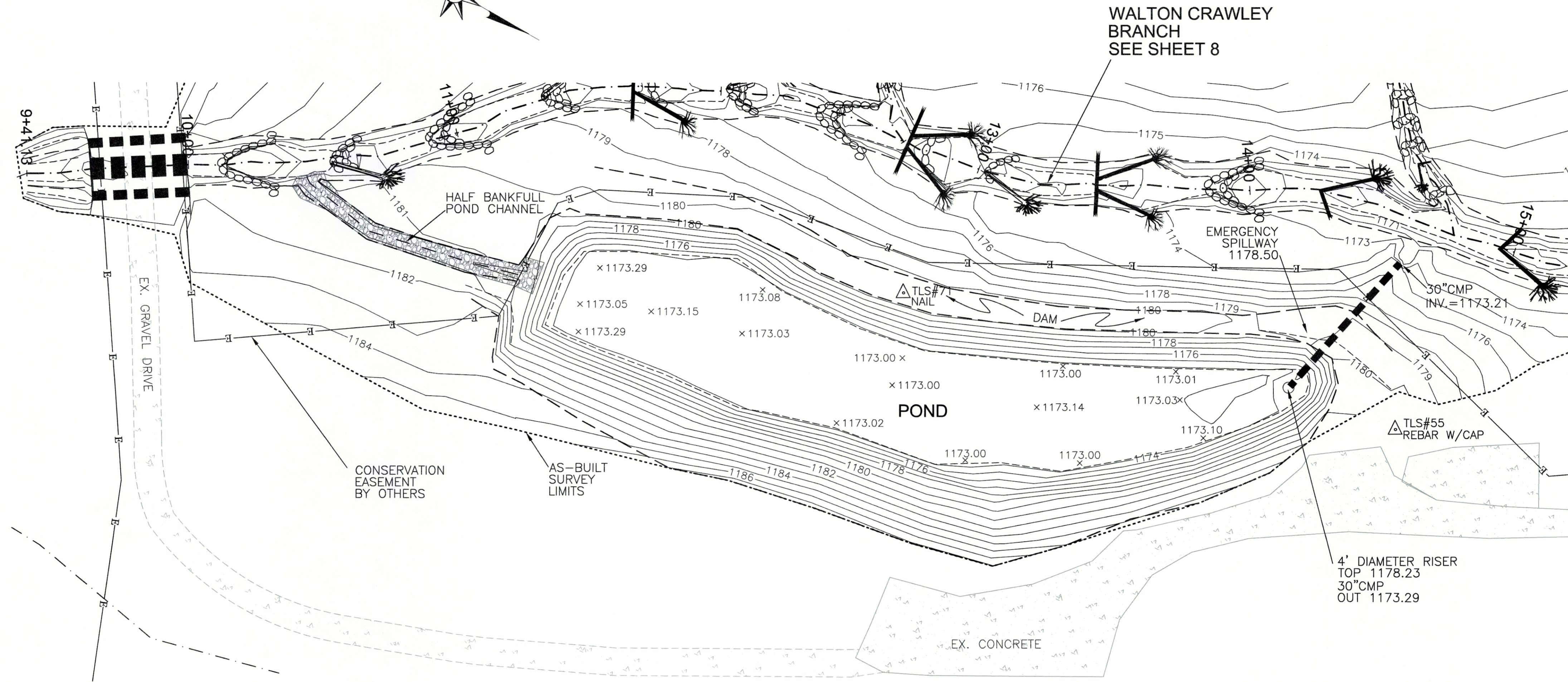
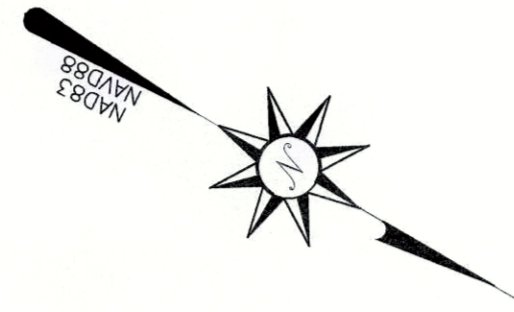
MCDOWELL COUNTY
 NORTH CAROLINA
 NEBO

DATE: 08/10/2015
 SURVEYED BY: DST/JAP/DTH
 DRAWN BY: ROB/DST
 REVIEWED BY: DST/EGT
 PROJECT: TLS-15-001
 FILE: NEIGHBOR CRAWLEY_92872_AB_TLS_F
 SCALE: AS SHOWN

SHEET 8 of 12

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



GENERAL NOTES:

1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.

LEGEND:	
	THALWEG
	TOP OF BANK/TERRACE
	BANK/TERRACE TOE
	CONSERVATION EASEMENT
	AS-BUILT SURVEY LIMITS
	EX. PROPERTY LINE (NOT SURVEYED)

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

REVISIONS, DATE AND INITIAL:

3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE



WALTON CRAWLEY BRANCH POND
NEIGHBORS BRANCH & WALTON CRAWLEY
STREAM RESTORATION PROJECT
 NCEP PROJECT #92872

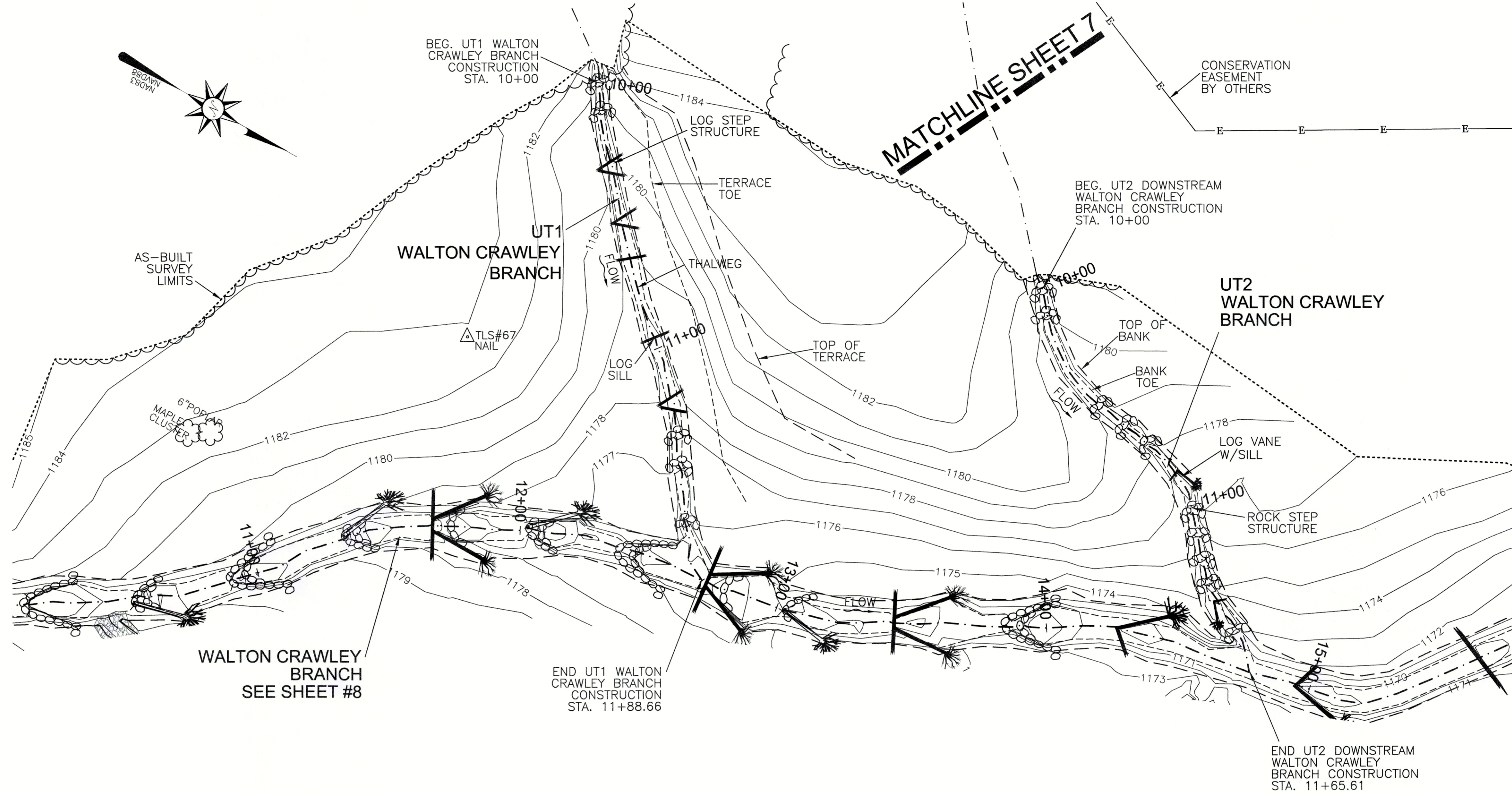
MCDOWELL COUNTY
 NORTH CAROLINA
 NEBO

DATE:	08/10/2015
SURVEYED BY:	DST/JAP/DTH
DRAWN BY:	ROB/DST
REVIEWED BY:	DST/EGT
PROJECT:	TLS-15-001
FILE:	NEIGHBOR_CRAWLEY_92872_AB_TLS_F
SCALE:	AS SHOWN

SHEET
9 of 12

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

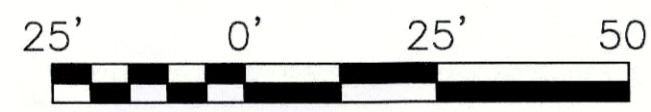
Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



LEGEND:

---	THALWEG
---	TOP OF BANK/TERRACE
---	BANK/TERRACE TOE
E---	CONSERVATION EASEMENT
---	AS-BUILT SURVEY LIMITS
-.-.-	EX. PROPERTY LINE (NOT SURVEYED)
—	LOG SILL
—	LOG STEP STRUCTURE
—	ROCK STEP STRUCTURE
—	LOG VANE W/SILL

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

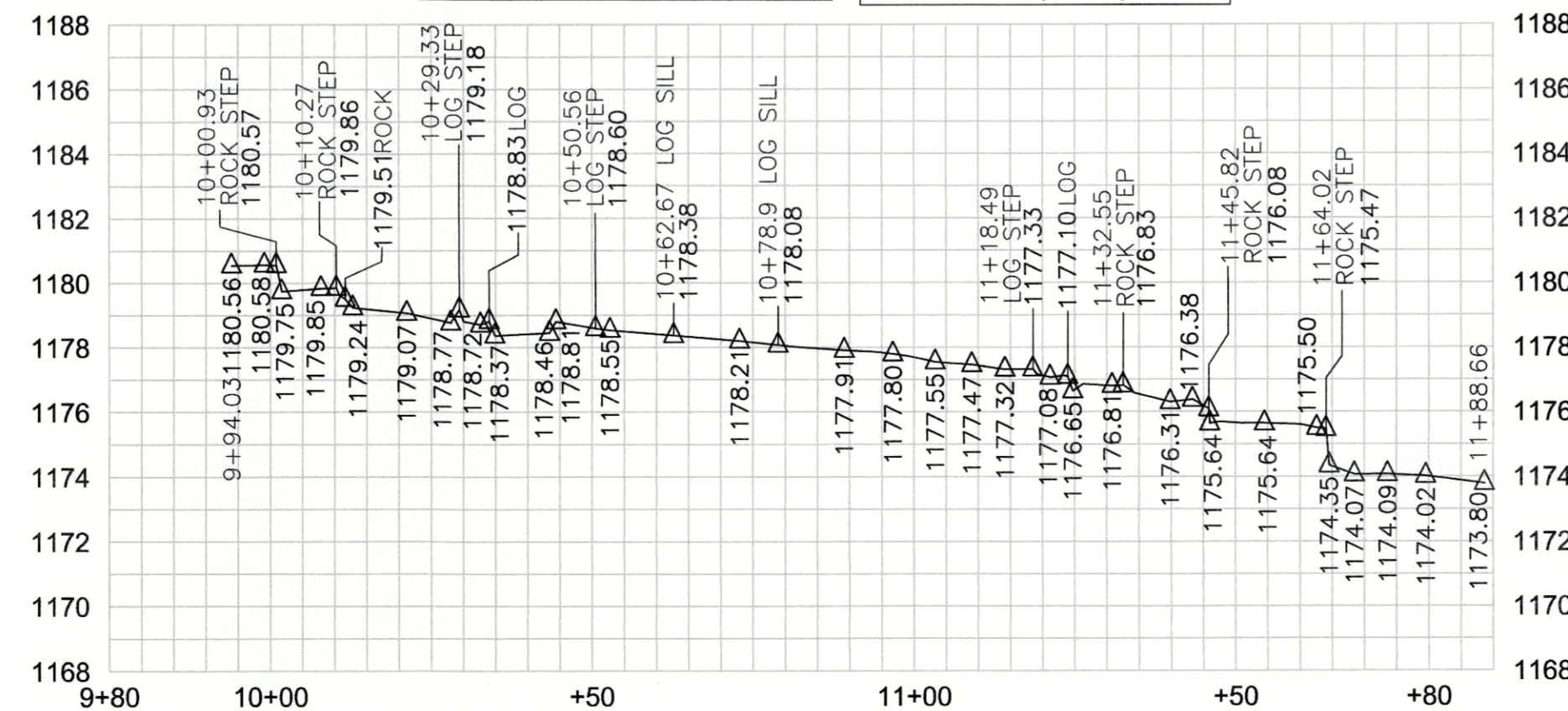


SCALE: 1"=25' (22x34)
 1"=50' (11x17)

CONTOUR INTERVAL = 1'

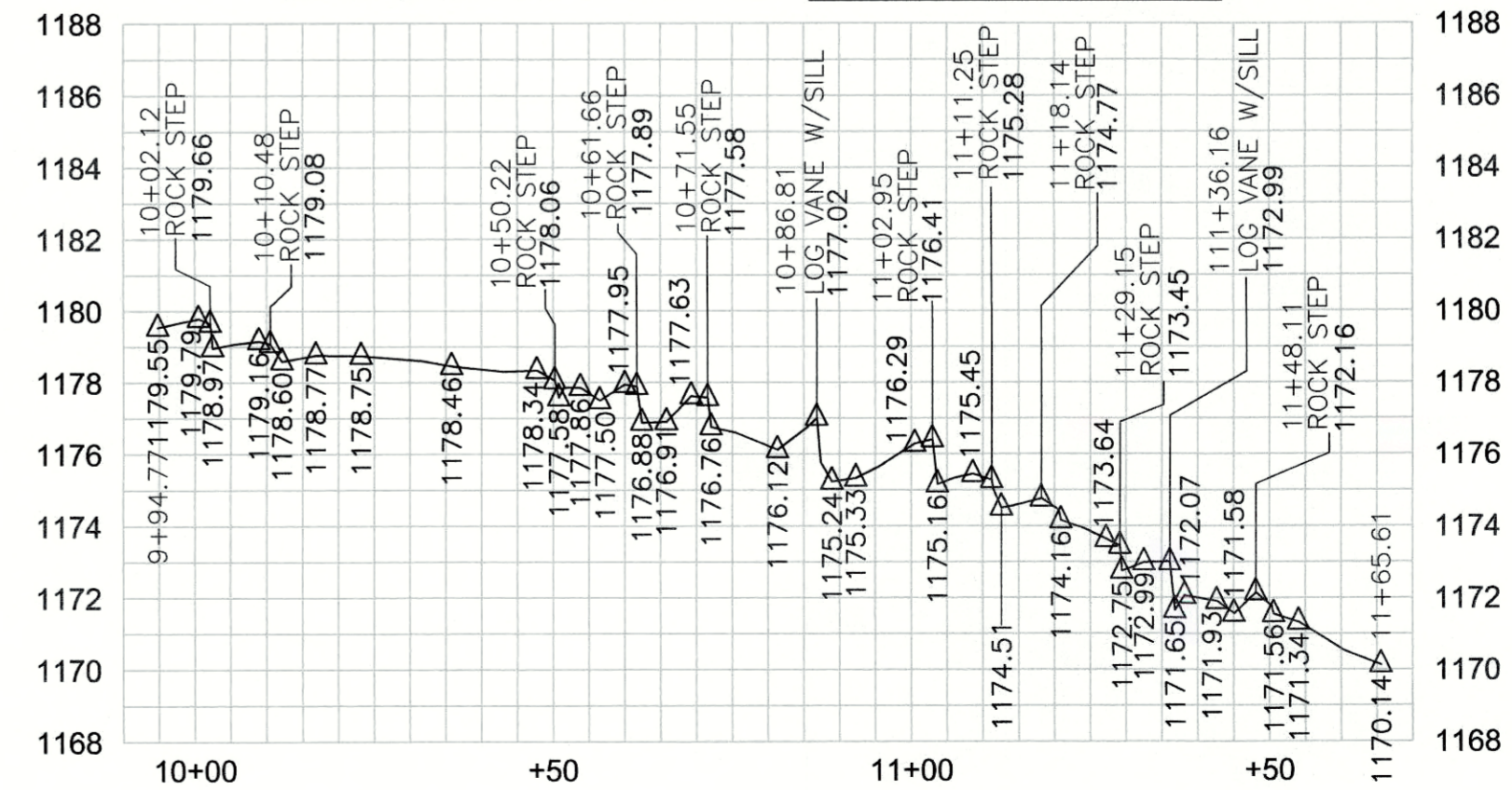
**AS-BUILT PROFILE
 UT1 WALTON
 CRAWLEY BRANCH
 STA 9+94.03 TO 11+88.66**

**PROFILE SCALE
 HORIZONTAL: 1"=25'(22x34)
 1"=50'(11x17)
 VERTICAL: 1"=5'(22x34)
 1"=10'(11x17)**



**AS-BUILT PROFILE
 UT2 DOWNSTREAM
 WALTON CRAWLEY BRANCH
 STA 9+94.77 TO 11+65.61**

**PROFILE SCALE
 HORIZONTAL: 1"=25'(22x34)
 1"=50'(11x17)
 VERTICAL: 1"=5'(22x34)
 1"=10'(11x17)**



- GENERAL NOTES:**
1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
 2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
 3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
 4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
 5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
 6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
 7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.

REVISIONS, DATE AND INITIAL:



3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE

UT 1 WALTON CRAWLEY BRANCH &
 UT 2 DOWNSTREAM WALTON CRAWLEY BRANCH
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT#92872
 McDowell County
 North Carolina

DATE: 08/10/2015

SURVEYED BY: DST/JAP/DTH

DRAWN BY: ROB/DST

REVIEWED BY: DST/EGT

PROJECT: TLS-15-001

FILE: NEIGHBOR_CRAWLEY_92872_AB_TLS_F

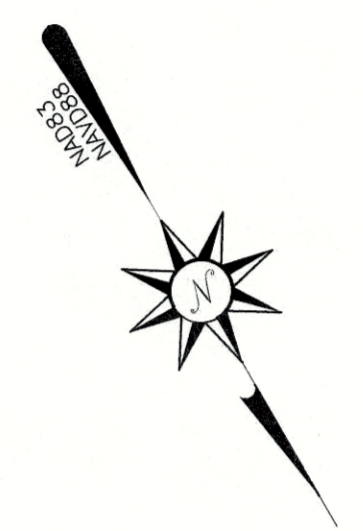
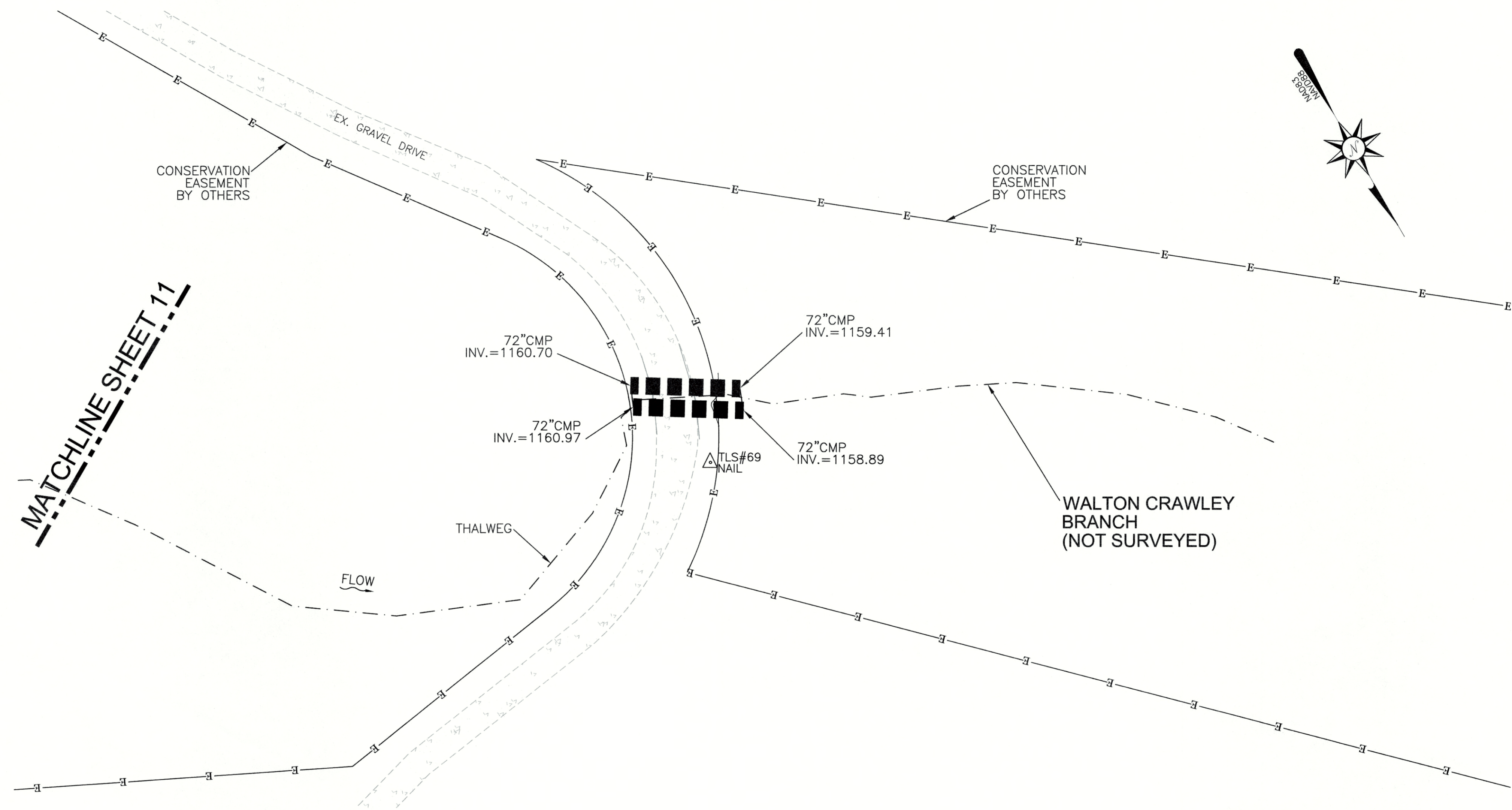
SCALE: AS SHOWN

SHEET

10 of 12

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF SEPTEMBER, 2015.

Elisabeth G. Turner
 ELISABETH G. TURNER, P.L.S. #L-4440



LEGEND:

--- (dashed line)	THALWEG
- - - - (long dashed line)	TOP OF BANK/TERRACE
- - - - (short dashed line)	BANK/TERRACE TOE
-E- (line with 'E' markers)	CONSERVATION EASEMENT
- - - - (dotted line)	AS-BUILT SURVEY LIMITS
- - - - (dash-dot line)	EX. PROPERTY LINE (NOT SURVEYED)

AS-BUILT SURVEY BY:
 TURNER LAND SURVEYING, PLLC
 SURVEYED JUNE-JULY 2015

25' 0' 25' 50'

SCALE: 1"=25' (22x34)
 1"=50' (11x17)
 CONTOUR INTERVAL = 1'

- GENERAL NOTES:
1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
 2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
 3. CONTROL IS BASED ON EXISTING CONTROL DATA AS SHOWN ON SHEET 3 IN THE DESIGN PLANS AND RECOVERED DURING THE CONSTRUCTION & AS-BUILT SURVEYS. ADDITIONAL CONTROL WAS ESTABLISHED USING TOTAL STATION & GPS/RTK METHODS AND CONFIRMED DURING AS-BUILT SURVEY. AS-BUILT CONTROL POINTS ARE LISTED ON SHEET 1.
 4. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
 5. THE PURPOSE OF THIS SURVEY IS TO SHOW THE POST CONSTRUCTION CONDITIONS OF THE STREAM AND GRADING RELATED TO THE NEIGHBORS BRANCH & WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION PROJECT AND MAY NOT SHOW ALL UTILITIES, STRUCTURES, & BOUNDARIES.
 6. INFORMATION SHOWN OUTSIDE THE LIMITS OF AS-BUILT SURVEY WAS PROVIDED BY THE DESIGNER AND WAS NOT VERIFIED BY TURNER LAND SURVEYING, PLLC.
 7. NO PROPERTY RESEARCH WAS PERFORMED. FOR CONSERVATION EASEMENT SEE PLAT RECORDED IN McDOWELL COUNTY REGISTER OF DEEDS OFFICE PLAT BOOK 18, PAGE 90, PLAT BOOK 19, PAGE 22, AND PLAT BOOK 23, PAGE 7.

REVISIONS, DATE AND INITIAL:

3719 BENSON DRIVE
 RALEIGH, NC 27609
 P-0702 (919) 827-0745
 www.turnerlandsurveying.com
 Certified DBE/WBE



WALTON CRAWLEY BRANCH
 NEIGHBORS BRANCH & WALTON CRAWLEY
 STREAM RESTORATION PROJECT
 NCEEP PROJECT #92872
 MCDOWELL COUNTY
 NORTH CAROLINA

DATE:	08/10/2015
SURVEYED BY:	DST/JAP/DTH
DRAWN BY:	ROB/DST
REVIEWED BY:	DST/EGT
PROJECT:	TL-15-001
FILE:	NEIGHBOR_CRAWLEY_92872_AB_TLS_F
SCALE:	AS SHOWN

SHEET
 12 of 12