Mitigation Project Name	Agony Acres	County	Guilford	USACE Action ID	2012-01909
DMS IMS ID	95716	Date Project Instituted	12/4/2012	NCDWR Permit No	2013-1305
River Basin	Cape Fear	Date Prepared	5/22/2018		
Cataloging Unit	03030002				

Credit Release Milestone	Stream Credits						Wetland Credits							
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)		6,479.130												
Potential Credits (As-Built Survey)		6,596.133												
Potential Credits (IRT Approved)		6,479.133												
1 (Site Establishment)	N/A				N/A	N/A	N/A				N/A		N/A	N/A
2 (Year 0 / As-Built)	30%	1,978.840			2015	3/6/2015	30%				30%		N/A	N/A
3 (Year 1 Monitoring)	10%	659.613			2016	4/25/2016	10%				10%		N/A	N/A
4 (Year 2 Monitoring)	10%	647.913			2017	8/8/2017	10%				15%		N/A	N/A
IRT Adjustment*		-46.800				8/8/2017								
5 (Year 3 Monitoring)	10%	647.913			2018	4/25/2018	15%				20%		N/A	N/A
6 (Year 4 Monitoring)	5%				2019		5%				10%		N/A	N/A
7 (Year 5 Monitoring)	10%				2020		15%				15%		N/A	N/A
8 (Year 6 Monitoring)	5%				2021		5%				N/A		N/A	N/A
9 (Year 7 Monitoring)	10%				2022		10%				N/A		N/A	N/A
Stream Bankfull Standard	10%	647.913			2017	8/8/2017	N/A				N/A			
Total Credits Released to Date		4,535.393												

*NOTE: Adjustment required due to IRT concerns on how the as-built credits were calculated

DEBITS (released credits only)

		Ratios	1	1.5	2.5	5	1	3	2	5	1	3	2	5	1	3	2	5
			Stream Restoration	Stream Enhancement I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
IRT Adjusted As-Built Amounts (feet and acres)			5,192.000	353.000	1,726.000	1,807.000												
IRT Adjusted As-Built Amounts (mitigation credits)			5,192.000	235.333	690.400	361.400												
Percentage Released			70%	70%	70%	70%												
Released Amounts (feet / acres)			3,634.400	247.100	1,208.200	1,264.900												
Released Amounts (credits)			3,634.400	164.733	483.280	252.980												
NCDWR Permit	USACE Action ID	Project Name																
2007-1470	2007-02903	NCDOT TIP R-2635 - Western Wake Expressway				421.730												
2013-0223	2001-21125	NCDOT TIP U-2524C / D - Greensboro - Western Loop	1,592.700	105.900	517.800													
2013-0223	2001-21125	NCDOT TIP U-2524C / D - Greensboro - Western Loop	20.000															
2013-0517	2013-00557	NCDOT TIP R-2413A/B - NC 68 Connector, Guilford County	510.900															
2013-0517	2013-00557	NCDOT TIP R-2413A/B - NC 68 Connector, Guilford County		35.300														
2013-0517	2013-00557	NCDOT TIP R-2413A/B - NC 68 Connector, Guilford County			172.600													
2013-0912	2013-01990	NCDOT TIP R-2612B				301.000												
2013-0918	2005-21386	NCDOT TIP U-2525B/C - Greensboro Eastern Loop, Guilford County	991.600	70.600	345.200													
2013-0918	2005-21386	NCDOT TIP U-2525B/C - Greensboro Eastern Loop, Guilford County	519.200	35.300	172.600													
2017-0239	2002-20667	NCDOT TIP U-3109B - Mebane Bypass, Alamance County				542.170												
Remaining Amounts (feet / acres)			0.000	0.000	0.000	0.000												
Remaining Amounts (credits)			0.000	0.000	0.000	0.000												

Contingencies (if any): None

Agony Acres

Signature of Wilmington District Official Approving Credit Release

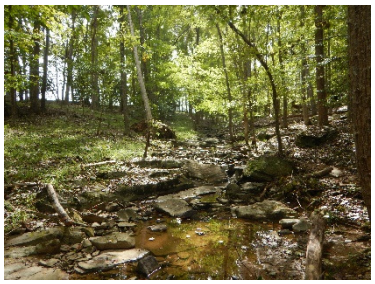
9/6/18
Date

1 - For DMS, no credits are released during the first milestone

2 - For DMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCEEP Portal, provided the following criteria have been met:

1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met



MONITORING YEAR 4 ANNUAL REPORT

Final

AGONY ACRES MITIGATION SITE

Guilford County, NC
NCDEQ Contract 004949
DMS Project Number 95716

Data Collection Period: March 2018 – October 2018
Draft Submission Date: November 8, 2018
Final Submission Date: December 19, 2018

PREPARED FOR:

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

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EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) completed a full delivery project at the Agony Acres Mitigation Site (Site) for the North Carolina Division of Mitigation Services (DMS) to restore, enhance, and preserve a total of 9,052 linear feet (LF) of perennial and intermittent stream and restore 3.0 acres of riparian buffer in Guilford County, NC. The Site provides 6,468.6 Stream Mitigation Units (SMUs) and 3.0 Buffer Mitigation Units (BMUs). The Site is located in the Reedy Fork Watershed within Cape Fear River Basin Hydrologic Unit Code (HUC) 03030002 (Cape Fear 02) near Ossipee, NC (Figure 1). The streams are all unnamed tributaries (UT) to Reedy Fork and are referred to herein as UT1, UT1A, UT1B, and UT2. The buffer restoration component is adjacent to Reedy Fork and lower UT1.

The Site is located within the Jordan Lake Water Supply Watershed which has been designated as a Nutrient Sensitive Water. The Site's watershed is within Cape Fear local watershed HUC 03030002020070, which was not identified as a Cape Fear 02 Targeted Local Watershed (TLW) in DMS's 2009 Cape Fear River Basin Restoration Priority (RBRP) plan; however, this local watershed was later designated as a Targeted Resource Area (TRA) in the 2011 Request for Proposals (RFP) in the Cape Fear 02. The Agony Acres Mitigation Site fully supports the Cataloging Unit (CU)-wide functional objectives stated in the 2011 RFP to reduce and control nutrient inputs, reduce and control sediment inputs, and protect and augment Significant Natural Heritage Areas in the Cape Fear 02 River Basin. The Site will contribute to meeting the CU-wide Functional Improvement Objectives by establishing the following project goals:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorous inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor;
- Protect existing high quality streams and forested buffers; and
- Improve and protect hydrologic inputs to the adjacent Reedy Fork Aquatic Habitat Significant Natural Heritage Area.

The project is helping meet the goals for the watershed outlined in the RBRP and provides numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Agony Acres project area, others, such as pollutant removal, reduced sediment loading, and improved aquatic and terrestrial habitat, have farther-reaching effects.

Stream restoration and enhancement construction efforts were completed in September 2014. Baseline as-built monitoring activities (MY0) were completed between October and December 2014. A conservation easement is in place on 30.74 acres of stream and riparian corridors to protect them in perpetuity. During MY4 a DOT culvert replacement project was approved and is expected to encroach on the upper extent of UT1 Reach 1. Approximately 26 linear feet of stream and 0.036 acres will be removed from the conservation easement. All stream length, easement area, and credit values in this report reflect the expected condition of full delivery assets following the DOT culvert replacement project.

Monitoring Year 4 (MY4) site visits and assessments were completed between the months of March and October 2018 to visually assess the conditions of the project and collect stream hydrology data. Per IRT guidelines, detailed monitoring and analysis of vegetation, substrate, and channel cross-sectional dimensions were omitted during MY4. Visual observations, hydrology data, and management practices are included in this report. To preserve the clarity and continuity of reporting structure, this report

maintains section and appendix numbering from previous monitoring reports. Omitted sections are denoted in the table of contents.

Overall, Site performance for vegetation, stream geomorphology, and hydrology meet success criteria for MY4. Vegetation appears to be performing adequately to attain the interim success criteria of 260 stems per acre at the end of monitoring year five. Visual observation indicated that stream channels have remained geomorphically stable during MY4. Persistent flow and multiple bankfull events were recorded on all streams during MY4. Identified invasive vegetation has been treated or is scheduled to be treated.

AGONY ACRES MITIGATION SITE
Monitoring Year 4 Annual Report

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*Content omitted from Monitoring Year 4 Report

Section 1: PROJECT OVERVIEW

The Agony Acres Mitigation Site (Site) is located in northeastern Guilford County, north of Gibsonville (Figure 1). From Gibsonville take NC 61 north 5.5 miles. Turn right on Sockwell Road and travel 1.4 miles. The project site is located north of Sockwell Road and is bound on the north by Reedy Fork. The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province. The project watershed is classified as approximately 65% managed herbaceous cover, 30% mixed upland hardwoods, 3% cultivated, 2% southern yellow pine, and the remaining 1% is low intensity development. The drainage area for the Agony Acres Mitigation Site is 358 acres.

The Site is located in the Reedy Fork Watershed within the Jordan Lake Water Supply Watershed which has been designated a Nutrient Sensitive Water. The project streams flow directly into Reedy Fork which flows into the Haw River and eventually into the Jordan Lake Reservoir. The Site's watershed is within Hydrologic Unit Code (HUC) 03030002020070 which was not identified as a Cape Fear 02 Targeted Local Watershed (TLW) in DMS's 2009 Cape Fear River Basin Restoration Priority (RBRP) plan; however, this HUC was later designated as a Targeted Resource Area (TRA) in the 2011 Request for Proposals (RFP) in the Cape Fear 02. The Site connects to Reedy Fork and three separate but connected Significant Natural Heritage areas. Reedy Fork Aquatic Habitat, Reedy Fork Slopes at NC 61, and Altamahaw Alluvial Forest are all listed on the NC Natural Heritage GIS database and are immediately adjacent to the Site. There are also records for several state threatened, special concern, and significantly rare mussel species in Reedy Fork.

North Carolina Division of Mitigation Services (DMS) completed a Local Watershed Plan (LWP) in 2008 on the HUC immediately downstream which begins at the confluence of Reedy Fork and the Haw River and includes Travis and Tickle Creeks. The Site is located less than one mile outside of the LWP area and has a very similar land use pattern. The 2008 Little Alamance, Travis, and Tickle Creeks LWP identified nutrient inputs from agriculture and stream bank erosion in altered reaches as major stressors within this TLW. The Site was identified as a stream and buffer restoration and cattle exclusion opportunity to improve water quality and buffers within the TRA.

The Site consists of four tributaries to Reedy Fork which are located within the North Carolina Division of Water Resources (NCDWR) subbasin 03-06-02 of the Cape Fear River Basin. The project stream reaches include UT1, UT1A, UT1B, and UT2.

Mitigation work within the Site included restoration, enhancement, and preservation of 9,052 linear feet (LF) of perennial and intermittent stream channel and 3.0 acres (ac) of riparian buffer restoration. The Site provides 6,468.6 Stream Mitigation Units (SMUs) and 3.0 Buffer Mitigation Units (BMUs). The stream areas were also planted with native vegetation to improve habitat and protect water quality.

The final mitigation plan was submitted and accepted by the DMS in March 2014. Construction activities were completed by Land Mechanic Designs, Inc. in September 2014. The planting was completed by Bruton Natural Systems, Inc. in December 2014. The baseline as-built survey was completed by Kee Mapping and Surveying, in October 2014. Annual monitoring will be conducted for seven years with the close-out anticipated to occur in 2022 given the success criteria are met. During MY4 the NCIRT approved a NCDOT culvert replacement project which is expected to encroach upon resources within the Agony Acres conservation easement at the upstream extent of UT1. Approximately 26 linear feet of stream and 0.036 acres of the easement are expected to be placed within a NCDOT permanent drainage easement. This will result in a loss of 10.4 SMUs from the impacted Enhancement II level treatment of UT1 reach 1. Wildlands is excused from provision of these credits and NCDOT is responsible for providing mitigation. All values in this report and appendices have been updated to reflect the expected

asset allocation following completion of the culvert replacement project based on plans provided by NCDOT. Appendix 1 provides detailed project activity, history, contact information, directions, watershed/site background information, and correspondence regarding the culvert replacement project and impacts to the Site.

1.1 Project Goals and Objectives

Prior to construction activities, the stream channels exhibited varying degrees of degradation across the Site. The Site was used as agricultural and pasture land and most of the buffers had been reduced to narrow corridors. Cattle had free access to the streams, which resulted in sporadic degraded stream banks and poor bed forms.

The restored stream channels on the Site were previously incised and overwidened in many locations, likely as a result of historic channelization. The alterations of the Site to promote cattle grazing and farming resulted in elimination of many of the ecological functions of this small stream complex. Specifically, functional losses at the Site included degraded aquatic habitat, altered hydrology (related to loss of floodplain connection and lowered water table), and a reduction of the quality and quantity of riparian wetland habitats and related water quality benefits. Ongoing bank erosion was also occurring at some locations due to high, overly steep banks, and lack of bank vegetation. Table 4 in Appendix 1 and Tables 10a-d in Appendix 4 present the pre-restoration conditions in detail.

The mitigation project is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Agony Acres Mitigation Site project area; others, such as pollutant removal and improved aquatic and terrestrial habitat, have more far-reaching effects. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. These project goals were established and completed with careful consideration of goals and objectives that were described in the RBRP and to meet DMS's mitigation needs while maximizing the ecological and water quality uplift within the watershed.

The following project specific goals established in the Agony Acres Mitigation Plan (Wildlands, 2014) include:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions important to sensitive species within and adjacent to the project site;
- Reduce fecal coliform, nitrogen, and phosphorous inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor;
- Protect existing high quality streams and forested buffers that provide habitat important to sensitive species within and adjacent to the project site;
- Improve and protect hydrologic inputs to the adjacent Reedy Fork Aquatic Habitat Significant Natural Heritage Area; and
- Improve and protect hydrologic inputs to Reedy Fork, which is listed as impaired on the 2012 NC 303(d) list for impaired aquatic life and for elevated fecal coliform levels.

The project goals will be addressed through the following project objectives:

- On-site nutrient inputs were decreased by removing cattle from streams, re-establishing floodplain connectivity, and filtering on-site runoff through buffer zones. Off-site nutrient input will be absorbed on-site by filtering flood flows through restored floodplain areas, where flood flow will spread through native vegetation. Vegetation is expected to uptake excess nutrients.

- Stream bank erosion which contributes sediment load to the creeks was greatly reduced, if not eliminated, in the project area. Eroding stream banks were stabilized using bioengineering, natural channel design techniques, and grading to reduce bank angles and bank height. Storm flow containing grit and fine sediment is filtered through restored floodplain areas, where flow will spread through native vegetation. Spreading flood flows also reduces velocity and allows sediment to settle out. Sediment transport capacity of restored reaches was improved so that capacity balances more closely to load. Sediment load reduction will be monitored through assessing bank stability with cross section surveys and visual assessment through photo documentation which serves as an accepted surrogate for direct turbidity measurements.
- Restored riffle/pool sequences promote aeration of water and create deep water zones, helping to lower water temperature. Establishment and maintenance of riparian buffers creates long-term shading of the channel flow to minimize thermal heating. Lower water temperatures will help maintain dissolved oxygen concentrations.
- In-stream structures were constructed to improve habitat diversity and trap detritus. Wood habitat structures were included in the stream as part of the restoration design. Such structures include log drops and rock structures that incorporate woody debris and native onsite rock.
- Adjacent buffer and riparian habitats were restored with native vegetation as part of the project. Native vegetation provides cover and food for terrestrial creatures. Native plant species were planted and invasive species treated. Eroding and unstable areas were stabilized with vegetation as part of this project.
- The restored land is protected in perpetuity through a conservation easement.

The design streams were restored to the appropriate form based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. Specifically, the site design was developed to restore a small stream complex directly adjacent to Reedy Fork. Other key factors addressed in the design were to create stable habitats, improve riparian buffers, and restore the natural migration patterns for fish spawning. Figure 2 and Table 1 in Appendix 1 present the stream mitigation components for the Agony Acres Mitigation Site.

1.2 Monitoring Year 4 Data Assessment

Annual monitoring and quarterly site visits were conducted during MY4 to assess the condition of the project. The stream and buffer success criteria for the Site follow the approved success criteria presented in the Agony Acres Mitigation Plan (Wildlands, 2014).

1.2.1 Vegetative Assessment

Detailed vegetation inventory and analysis is not required during MY4. Visual assessment during MY4 indicated that vegetation is performing adequately to attain interim success criteria of 260 planted stems per acre and the end of MY5 and terminal success criteria of 210 planted stems per acre averaging ten feet in height.

Riparian buffer area monitoring is on the same schedule as the stream mitigation bank. Visual monitoring during MY4 indicated that the riparian buffer area is on track to attain final success criteria of 320 stems per acre.

1.2.2 Vegetation Areas of Concern

The tree of heaven (*Ailanthus altissima*) and Japanese hops (*Humulus japonica*) described in the MY3 report were both chemically treated during MY4. The tree of heaven was confined to the area near the confluence of UT1 and UT1B (Figure 3.1). Each stem of tree of heaven was treated using the hack and squirt or cut stump methods of herbicide application using triclopyr. The Japanese hops population

located in the buffer restoration area along Reedy Fork was treated in MY4 with a foliar application of metsulfuron methyl (Figure 3.3). Literature indicates this is the most effective herbicide for Japanese hops treatment and also has a lower risk of causing collateral damage to surrounding vegetation including the planted trees. Wildlands will continue to monitor this area for persisting Japanese hops and treat as necessary during subsequent monitoring years. The site also contains Chinese privet (*Ligustrum sinense*) along the lower extent of UT1 reach 4 which will be treated.

1.2.3 Stream Assessment

Detailed dimensional survey and analysis is not required during MY4. Visual monitoring indicated that the stream channel is performing as desired. No deposition or erosion exceeding approximate natural levels was observed. See Appendix 2 for stream photographs and visual assessment data.

All values in this report and appendices have been updated to reflect the expected asset allocation following completion of the culvert replacement project based on plans provided by NCDOT.

1.2.4 Stream Areas of Concern

Beaver activity was observed within UT1 Reach 5 during March of MY4. Beaver dams were removed and there are no signs that beaver have returned. This isolated beaver activity is thought to be related to high flows of Reedy Fork during the early spring. No other stream areas of concern were observed.

1.2.5 Hydrology Assessment

Two bankfull flow events occurring in separate years must be documented on the restoration and enhancement reaches within the seven-year monitoring period. In addition, the presence of baseflow must be recorded along portions of UT1B constructed with a Priority I restoration approach. Baseflow must be present for at least some portion of the year (most likely in the winter/early spring) during years with normal rainfall conditions.

Multiple bankfull events were recorded during MY4 on all streams at the Site (Table 13). Bankfull events on all streams have been recorded during previous monitoring years; therefore, the Site has met the bankfull stream hydrology criteria.

Baseflow was documented in UT1B for all of MY4 with the exception of short periods during the July. UT1B has met baseflow criteria for MY1 through MY4. Refer to Appendix 5 for hydrologic data and graphs.

1.2.6 Maintenance Plan

The areas containing privet as described in section 1.2.2 above will be monitored and treated throughout the monitoring period. The entire Site will continue to be monitored and treated for additional invasive vegetation.

1.3 Monitoring Year 4 Summary

Visual assessment indicated that all project streams are geomorphically stable and functioning as designed. Survival and growth of planted trees appear to meet interim success criteria. Invasive vegetation identified to date has been treated with the exception the of privet at the lower extent of UT1 reach 4. Hydrology criteria have been attained for the duration of the project and multiple bankfull events and persistent flow were recorded again during MY4.

Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Mitigation Plan documents available on

DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 2: METHODOLOGY

Geomorphic data was collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Plan View Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcView. Crest gages were installed in surveyed riffle cross sections and monitored quarterly. Hydrology attainment installation and monitoring methods are in accordance with the USACE (USACE, 2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-DMS Level 2 Protocol (Lee et al., 2006). Reporting follows the DMS Monitoring Report Template and Guidance Version 1.3 (DMS, 2010).

Section 3: REFERENCES

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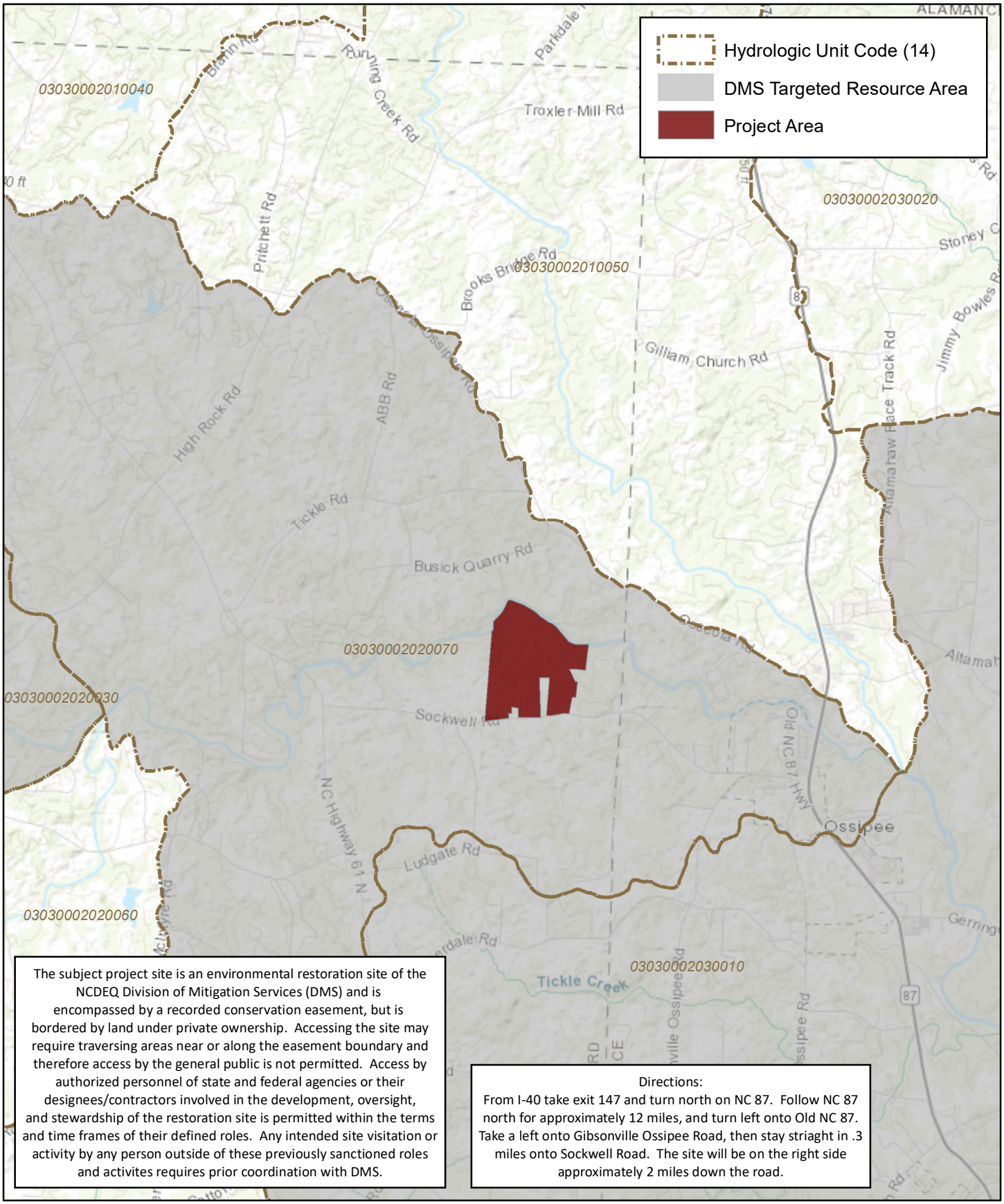
APPENDIX 1. General Tables and Figures



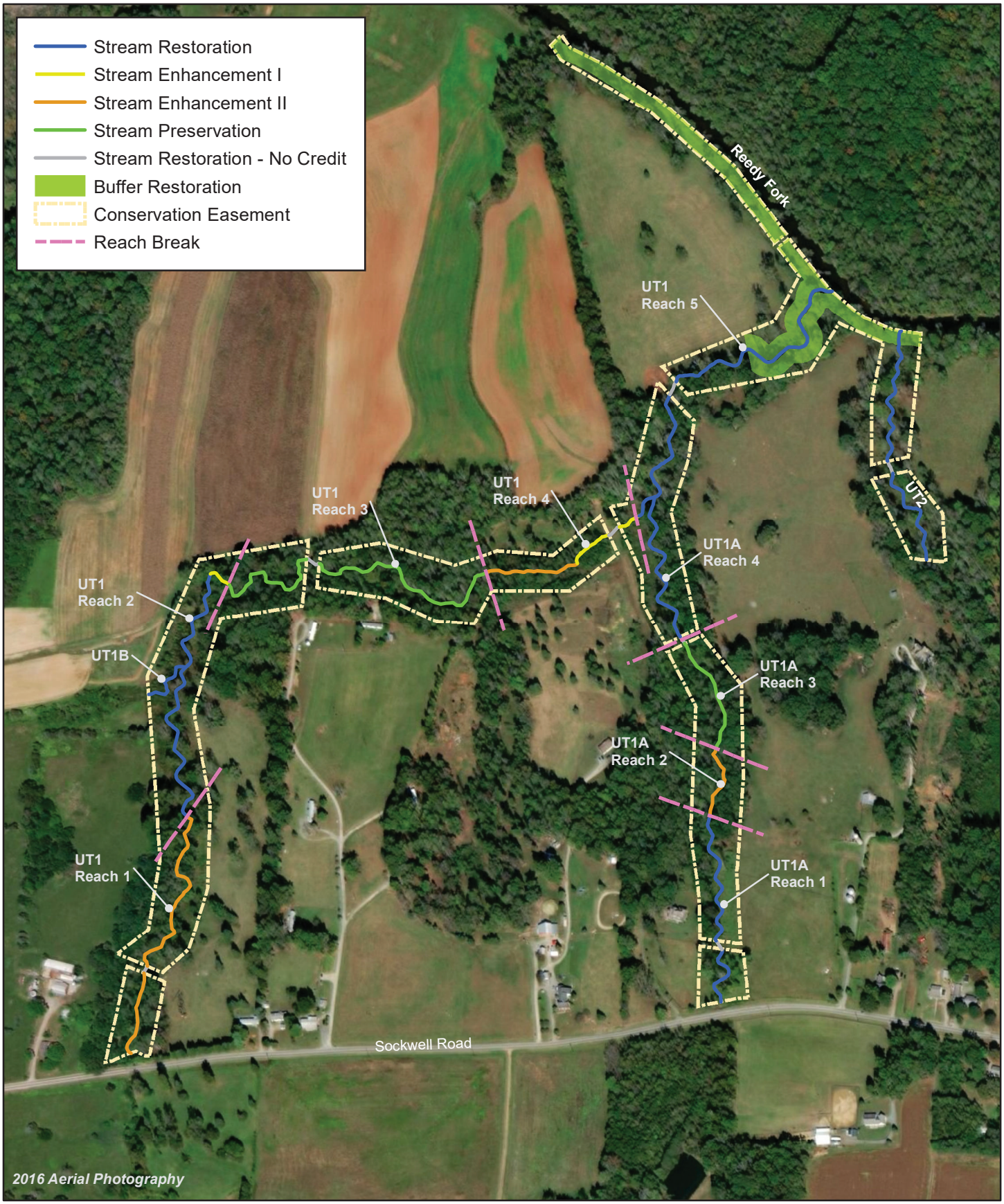
WILDLANDS ENGINEERING

0 0.5 1 Miles

N

Figure 1 Project Vicinity Map
Agony Acres Mitigation Site
DMS Project No. 95716
Monitoring Year 4 - 2018

Guilford County, NC



WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 2 Project Component/Asset Map
Agony Acres Mitigation Site
DMS Project No. 95716
Monitoring Year 4 - 2018

Guilford County, NC

Table 1. Project Components and Mitigation Credits
Agony Acres Mitigation Site (DMS Project No.95716)
Monitoring Year 4 - 2018

MITIGATION CREDITS

	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	6,107.3**	361	N/A	N/A	N/A	N/A	130,680	N/A	N/A

PROJECT COMPONENTS

Reach ID	As-Built Stationing/ Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage/ Acreage	Mitigation Ratio	Credits (SMU/ WMU/BMU)
STREAMS							
UT1-Reach 1 (DOT ROW)	100+00 to 100+14	40**	EII	Enhancement (No Credit)	40**	---	---
UT1-Reach 1	100+14 to 103+62; 103+93 to 111+24	1,053**	EII	Enhancement	1,053**	2.5	421.2**
UT1-Reach 1 (Easement Break)	103+62 to 103+93	31	EII	Enhancement (No Credit)	31	---	---
UT1-Reach 2	111+24 to 122+38	1,039	P1	Restoration	1,114	1	1,114
UT1-Reach 2	122+38 to 123+31	93	EI	Enhancement	93	1.5	62
UT1-Reach 3	123+31 to 128+50; 129+06 to 137+37	1,350		Preservation	1,350	5	270
UT1-Reach 3 (Easement Break)	128+50 to 129+06	56		Preservation (No Credit)	56	---	---
UT1-Reach 4	137+37 to 140+92	355	EII	Enhancement	355	2.5	142
UT1-Reach 4	140+92 to 142+66; 143+20 to 144+06	260	EI	Enhancement	260	1.5	173
UT1-Reach 4 (Easement Break)	142+66 to 143+20	54	EI	Enhancement (No Credit)	54	---	---
UT1-Reach 5	144+06 to 149+65; 150+20 to 158+94	1,355	P1/2	Restoration	1,433	1	1,433
UT1-Reach 5 (Easement Break)	149+65 to 150+20	65	P1	Restoration (No Credit)	55	---	---
UT1A-Reach 1 (DOT ROW)	200+00 to 200+05	5	P1	Restoration (No Credit)	5	---	---
UT1A-Reach 1	200+05 to 202+64; 203+04 to 208+49	738	P1	Restoration	804	1	804
UT1A-Reach 1 (Easement Break)	202+64 to 203+04	32	P1	Restoration (No Credit)	40	---	---
UT1A-Reach 2	208+49 to 211+41	292	EII	Enhancement	292	2.5	117
UT1A-Reach 3	211+41 to 215+98	457		Preservation	457	5	91
UT1A-Reach 3 (Easement Break)	215+98 to 216+28	30	EII	Enhancement (No Credit)	30	---	---
UT1A-Reach 4	216+28 to 222+78	461	P1	Restoration	650	1	650
UT1B	300+00 to 302+19	243	P1	Restoration	219	1	219
UT2	400+00 to 404+16; 404+67 to 410+23	975	P1	Restoration	972	1	972
UT2 (Easement Break)	404+16 to 404+67	53	P1/2	Restoration (No Credit)	51	---	---
Riparian Buffer Area	---	---	---	Restoration	3.0 (130,680 ft^2)	1	130,680

COMPONENT SUMMATION

Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (acres)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	5,192	-	-	-	3.0	-
Enhancement		-	-	-	-	-
Enhancement I	353					
Enhancement II	1,700**					
Creation		-	-	-		
Preservation	1,807	-	-	-		-
High Quality Preservation	-	-	-	-		-

N/A: not applicable
* Credit calculations were originally calculated along the as-built thalweg and updated to be calculated along stream centerlines as stated in the approved Mitigation Plan for Monitoring Year 3 after discusions with NC IRT.
**Values updated for MY4 report to account for DOT culvert replacement project.

Table 2. Project Activity and Reporting History
Agony Acres Mitigation Site (DMS Project No.95716)
Monitoring Year 4 - 2018

Activity or Report		Date Collection Complete	Completion or Scheduled Delivery
Mitigation Plan		October 2013-March 2014	March 2014
Final Design - Construction Plans		April 2014-June 2014	June 2014
Construction		June 2014-September 2014	September 2014
Temporary S&E mix applied to entire project area [1]		September 2014	September 2014
Permanent seed mix applied to reach/segments		September 2014	September 2014
Bare root and live stake plantings for reach/segments		December 2014	December 2014
Baseline Monitoring Document (Year 0)	Stream Survey	October 2014	February 2015
	Vegetation Survey	December 2014	
Year 1 Monitoring	Stream Survey	May 2015	December 2015
	Vegetation Survey	September 2015	
Year 2 Monitoring	Stream Survey	March 2016	December 2016
	Vegetation Survey	June 2016	
Supplemental Planting			December 2016
Year 3 Monitoring	Stream Survey	April 2017	December 2017
	Vegetation Survey	August 2017	
Invasive Vegetation Treatment			September-October 2018
Year 4 Monitoring	Stream Survey	N/A	December 2018
	Vegetation Survey	N/A	
Year 5 Monitoring	Stream Survey	2019	December 2019
	Vegetation Survey	2019	
Year 6 Monitoring	Stream Survey	2020	December 2020
	Vegetation Survey	2020	
Year 7 Monitoring	Stream Survey	2021	December 2021
	Vegetation Survey	2021	

[1]Seed and mulch is added as each section of construction is completed.

Table 3. Project Contact Table
Agony Acres Mitigation Site (DMS Project No.95716)
Monitoring Year 4 - 2018

Designer Nicole Macaluso, PE, CFM	**Wildlands Engineering, Inc.** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
Construction Contractor	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Seed Mix Sources	**Green Resource, LLC**
Nursery Stock Suppliers **Bare Roots**	 **Dykes and Son Nursery**
Live Stakes	**Bruton Natural Systems, Inc**
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986, ext. 107

Table 4. Project Information and Attributes
Agony Acres Mitigation Site (DMS Project No.95716)
Monitoring Year 4 - 2018

PROJECT INFORMATION	
Project Name	Agony Acres Mitigation Site
County	Guilford County
Project Area (acres)	30.74 acres
Project Coordinates (latitude and longitude)	36° 10' 40" N, 79° 33' 02" W
PROJECT WATERSHED SUMMARY INFORMATION	
Physiographic Province	Piedmont
River Basin	Cape Fear River
USGS Hydrologic Unit 8-digit	03030002
USGS Hydrologic Unit 14-digit	03030002020070
DWR Sub-basin	03-06-02
Project Drainiage Area (acres)	358 acres
Project Drainage Area Percentage of Impervious Area	<1%
CGIA Land Use Classification	65% Managed Herbaceous Cover, 30% Mixed Upland Hardwoods, 3% Cultivated, 2% Southern Yellow Pine, <1% Low Intensity Development

REACH SUMMARY INFORMATION

Parameters	UT1 - Reaches 1 -3	UT1 - Reaches 4 & 5	UT1A	UT1B	UT2	
Length of reach (linear feet) - Post-Restoration	3,711	2,157	2,278	219	1,023	
Drainage area (acres)	228	358	103	61	61	
NCDWR stream identification score	42.5	46.5	41	29.25	32.25	
NCDWR Water Quality Classification	WS-V					
Morphological Desription (stream type)	P	P	P/I	P	P	
Evolutionary trend (Simon's Model) - Pre- Restoration	I, III	III, IV	I, II/III	II/III	II/III	
Underlying mapped soils	Cecil sandy loam, Congaree loam, Coronaca clay loam, Enon fine sandy loam, Enon clay loam, Madison clay loam, Mecklenburg sandy clay loam, Wehadkee loam					
Drainage class	---	---	---	---	---	---
Soil Hydric status	---	---	---	---	---	---
Slope	---	---	---	---	---	---
FEMA classification	N/A					
Native vegetation community	Piedmont bottomland forest					
Percent composition exotic invasive vegetation -Post-Restoration	0%					

REGULATORY CONSIDERATIONS

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.
Waters of the United States - Section 401	Yes	Yes	
Division of Land Quality (Dam Safety)	No	N/A	N/A
Endangered Species Act	Yes	Yes	Agony Acres Mitigation Plan; Wildlands determined "no effect" on Guilford County listed endangered species.
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 1/15/13).
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	N/A	N/A	The project streams do not have an associated regulatory floodplain; however portions of UT1, UT1A, and UT2 are located within the floodway and flood fringe of Reedy Fork (FEMA Zone AE, FIRM panels 8838 and 8848).
Essential Fisheries Habitat	No	N/A	N/A

Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

February 19, 2018

Interagency Review Team
US Army Corps of Engineers

RE: Sockwell Road Culvert Replacement Impacts to the Agony Acres Mitigation Site.

The North Carolina Department of Transportation, Division 7 Office (NCDOT) has identified a culvert replacement along Sockwell Road, near Gibbsonville, in Guilford County. The culvert replacement will impact the Division of Mitigation Services (DMS) Full Delivery Agony Acres Mitigation Site. NCDOT Division 7 provided DMS with background information concerning the proposed culvert replacement including easement avoidance and minimization considerations, culvert design plans and files, and hydraulic analysis.

DMS and Wildlands Engineering (the Agony Acres mitigation provider) have reviewed the documentation provided by NCDOT as well as performed an onsite inspection of proposed impacted project area. Based upon our review, we do not have reason to believe the proposed culvert replacement will affect the mitigation project beyond the actual foot print of construction.

The culvert in question was built in the earliest decades of the 20th century using terra-cotta blocks. NCDOT has major concerns with the existing structure due to the scour under the foundation. NCDOT evaluated options such curb and gutter, shifting roadway, steepening side slopes, and realigning of the pipe. Each option was met with additional challenges that either impacted the stream project more or provided little change to the overall impact. Due to the age of the existing culvert, part of the impacts to the mitigation site are a result of needing meet current roadway safety standards.

NCDOT has indicated that 26 feet of stream will be impacted by the culvert replacement. The IRT has consistently applied a 2:1 replacement ratio for mitigation sites impacted by encroachment. NCDOT has agreed to this replacement given IRT final approval.

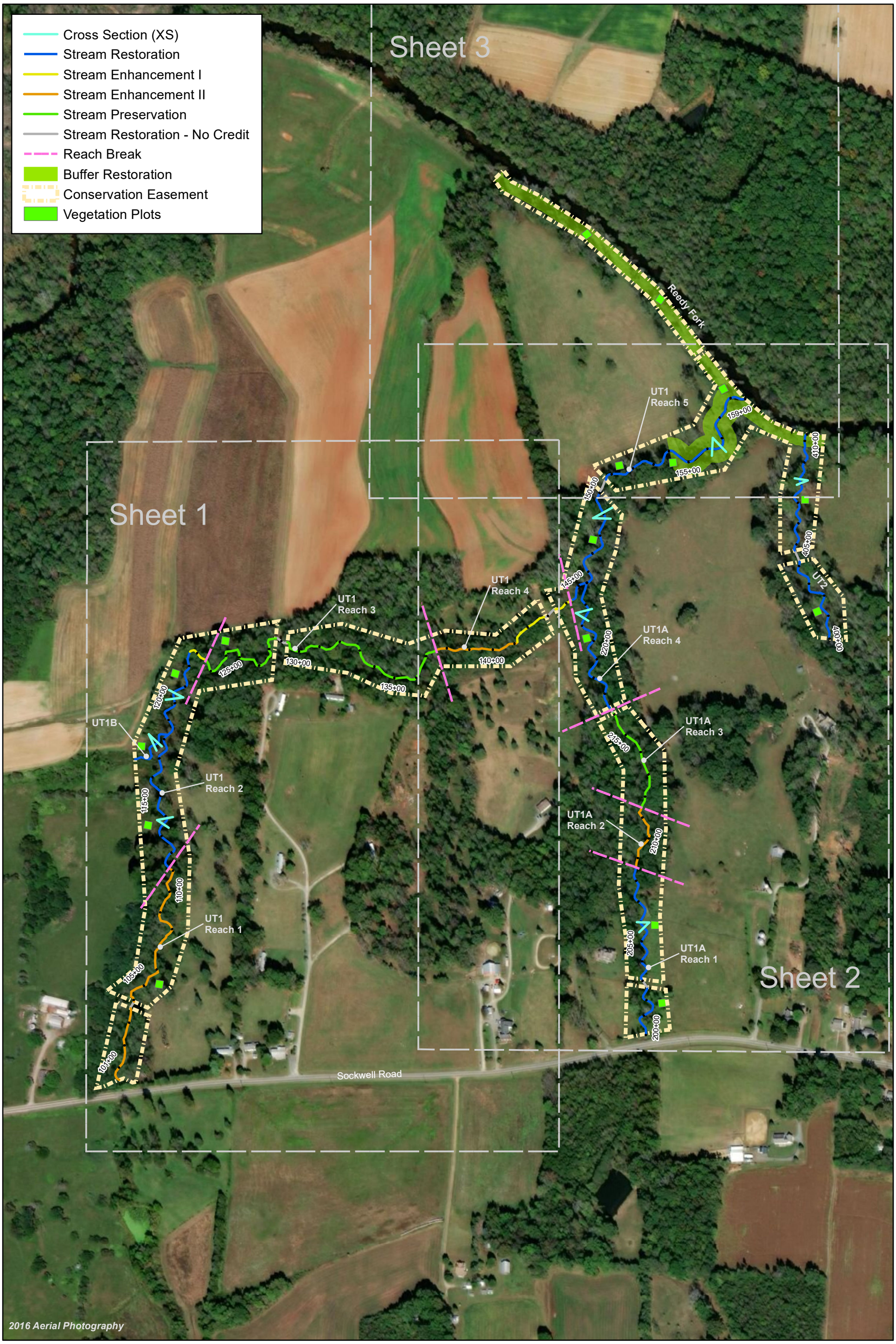
NCDOT and DMS have followed procedures set forth in the July 2013 IRT Encroachment into Mitigation Sites policy. DMS is requesting the IRT consider the information provided with this submittal and approve the 2:1 ratio for replacement of mitigation credits. Once IRT approval is completed, NCDOT would be compensating for 52 Stream Mitigation Units. DMS will release right of entry as soon as payment is received.

We look forward to your response.

Sincerely,

Tim Baumgartner
Director
Division of Mitigation Services

APPENDIX 2. Visual Assessment Data



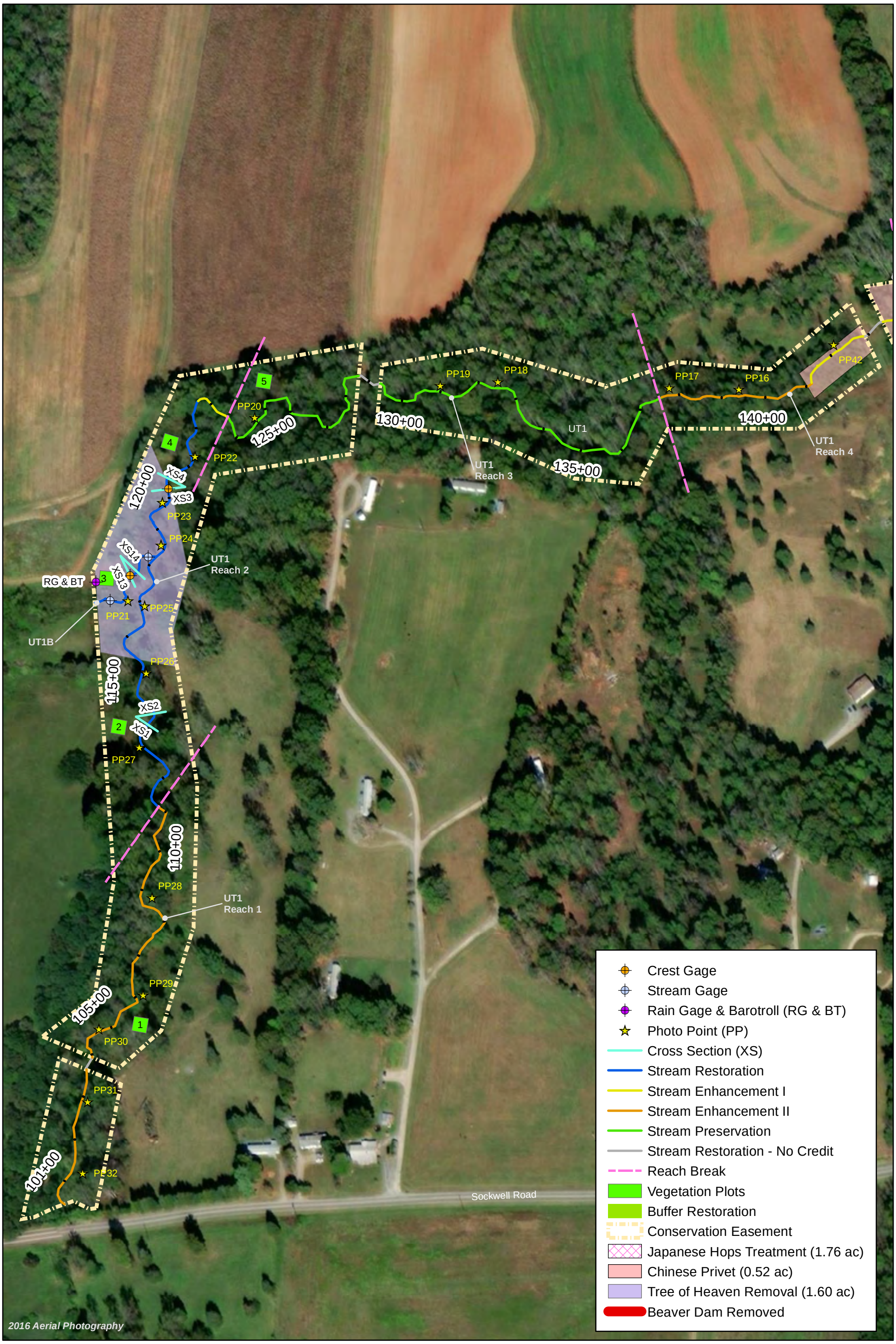
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.0 Integrated Current Condition Plan View (Key)
Agony Acres Mitigation Site
DMS Project No. 95716
Monitoring Year 4 - 2018

Guilford County, NC



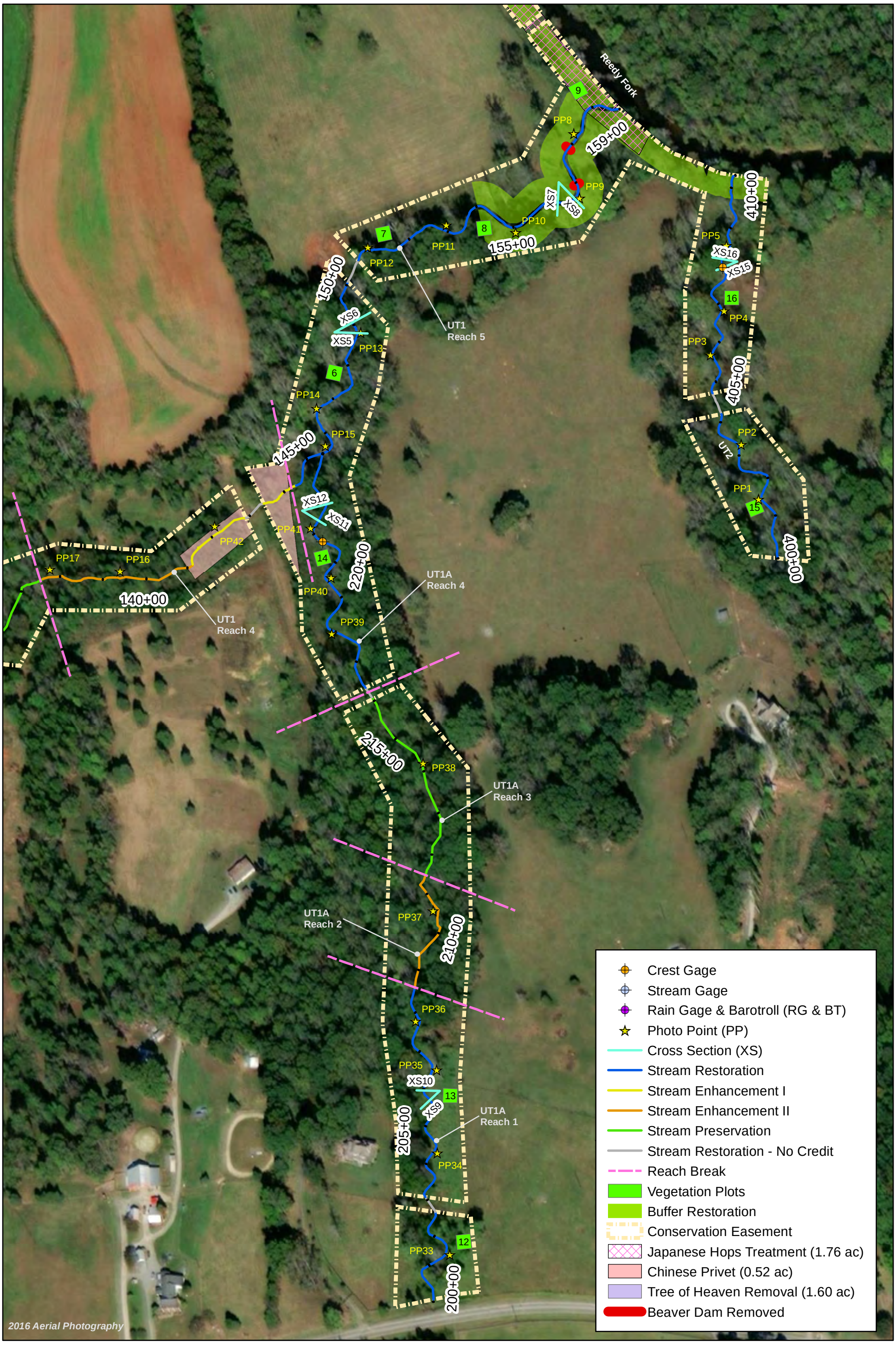
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.1 Integrated Current Condition Plan View
(Sheet 1 of 3)
Agony Acres Mitigation Site
DMS Project No. 95716
Monitoring Year 4 - 2018

Guilford County, NC



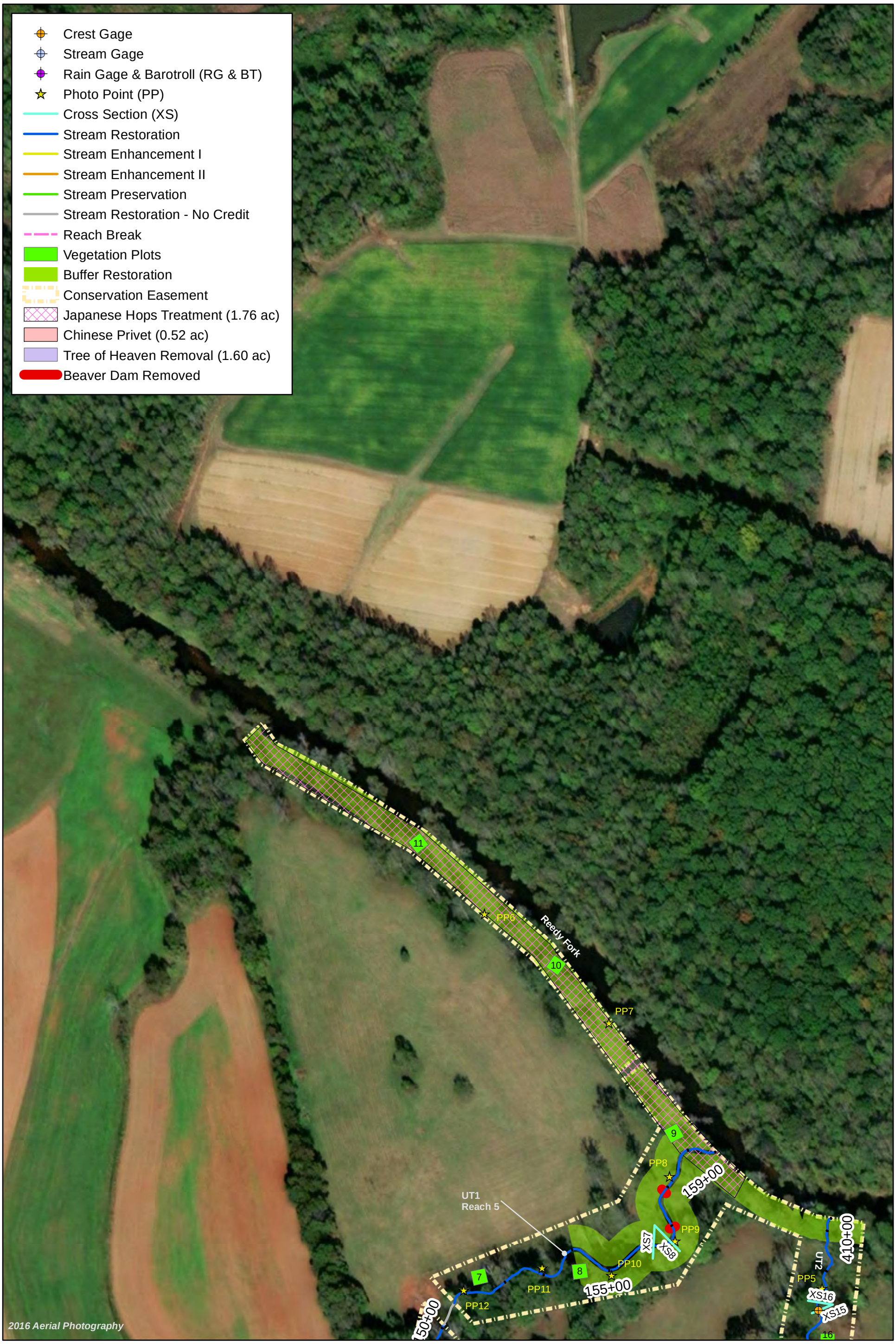
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.2 Integrated Current Condition Plan View
(Sheet 2 of 3)
Agony Acres Mitigation Site
DMS Project No. 95716
Monitoring Year 4 - 2018

Guilford County, NC



WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.3 Integrated Current Condition Plan View
(Sheet 3 of 3)
Agony Acres Mitigation Site
DMS Project No. 95716
Monitoring Year 4 - 2018

Guilford County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018

UT1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	42	42			100%			
	3. Meander Pool Condition	Depth Sufficient	39	39			100%			
		Length Appropriate	39	39			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	39	39			100%			
		Thalweg centering at downstream of meander bend (Glide)	39	39			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	16	16			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	16	16			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	16	16			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	16	16			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	16	16			100%			

Table 5b. Visual Stream Morphology Stability Assessment Table

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018

UT1A

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	26	26			100%			
	3. Meander Pool Condition	Depth Sufficient	26	26			100%			
		Length Appropriate	26	26			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	26	26			100%			
		Thalweg centering at downstream of meander bend (Glide)	26	26			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	3	3			100%			

Table 5c. Visual Stream Morphology Stability Assessment Table

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018

UT1B

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	6	6			100%			
	3. Meander Pool Condition	Depth Sufficient	5	5			100%			
		Length Appropriate	5	5			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	5	5			100%			
		Thalweg centering at downstream of meander bend (Glide)	5	5			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	1	1			100%			

Table 5d. Visual Stream Morphology Stability Assessment Table

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018

UT2

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	20	20			100%			
	3. Meander Pool Condition	Depth Sufficient	21	21			100%			
		Length Appropriate	21	21			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	21	21			100%			
		Thalweg centering at downstream of meander bend (Glide)	21	21			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				TOTALS	0	0	100%	n/a	n/a	n/a
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	5	5			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms	5	5			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	5	5			100%			

Table 6. Vegetation Condition Assessment Table
Agony Acres Mitigation Site (DMS Project No. 95716)
Monitoring Year 4 - 2018

Planted Acreage **18**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0.0	0.0%
		Total	**0**	**0.0**	**0.0%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 Ac	0	0	0%
		Cumulative Total	**0**	**0.0**	**0%**

Easement Acreage **31**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1,000	2	0.52	0%*
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0	0%

*The untreated privet area of concern was not planted.

STREAM PHOTOGRAPHS
UT2
Monitoring Year 4

PHOTO POINT 1 – looking upstream *(03/28/2018)*	**PHOTO POINT 1** – looking downstream *(03/28/2018)*
PHOTO POINT 2 – looking upstream *(03/28/2018)*	**PHOTO POINT 2** – looking downstream *(03/28/2018)*

PHOTO POINT 3 – looking upstream *(03/28/2018)*

PHOTO POINT 3 – looking downstream *(03/28/2018)*

PHOTO POINT 4 – looking upstream *(03/28/2018)*

PHOTO POINT 4 – looking downstream *(03/28/2018)*

PHOTO POINT 5 – looking upstream *(03/28/2018)*

PHOTO POINT 5 – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
Reedy Fork (Buffer)
Monitoring Year 4

PHOTO POINT 6 – looking upstream *(03/27/2018)*	**PHOTO POINT 6** – looking downstream *(03/27/2018)*
PHOTO POINT 7 – looking upstream *(03/27/2018)*	**PHOTO POINT 7** – looking downstream *(03/27/2018)*

STREAM PHOTOGRAPHS
UT1 Reach 5
Monitoring Year 4

PHOTO POINT 8 – looking upstream *(03/28/2018)*	**PHOTO POINT 8** – looking downstream *(03/28/2018)*
PHOTO POINT 9 – looking upstream *(03/28/2018)*	**PHOTO POINT 9** – looking downstream *(03/28/2018)*

PHOTO POINT 10 – looking upstream *(06/18/2018)*

PHOTO POINT 10 – looking downstream *(06/18/2018)*

PHOTO POINT 11 – looking upstream *(03/28/2018)*

PHOTO POINT 11 – looking downstream *(03/28/2018)*

PHOTO POINT 12 – looking upstream *(03/28/2018)*

PHOTO POINT 12 – looking downstream *(03/28/2018)*

PHOTO POINT 13 – looking upstream *(03/28/2018)*

PHOTO POINT 13 – looking downstream *(03/28/2018)*

PHOTO POINT 14 – looking upstream *(03/28/2018)*

PHOTO POINT 14 – looking downstream *(03/28/2018)*

PHOTO POINT 15 – looking upstream *(03/28/2018)*

PHOTO POINT 15 – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1 Reach 4
Monitoring Year 4

PHOTO POINT 16 – looking upstream *(03/28/2018)*	**PHOTO POINT 16** – looking downstream *(03/28/2018)*
PHOTO POINT 17 – looking upstream *(03/28/2018)*	**PHOTO POINT 17** – looking downstream *(03/28/2018)*

PHOTO POINT 42 – looking upstream *(03/28/2018)*	**PHOTO POINT 42** – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1 Reach 3
Monitoring Year 4

PHOTO POINT 18 – looking upstream *(03/28/2018)*	**PHOTO POINT 18** – looking downstream *(03/28/2018)*
PHOTO POINT 19 – looking upstream *(03/28/2018)*	**PHOTO POINT 19** – looking downstream *(03/28/2018)*

PHOTO POINT 20 – looking upstream *(03/28/2018)*	**PHOTO POINT 20** – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1B
Monitoring Year 4

PHOTO POINT 21 – looking upstream *(03/28/2018)*	**PHOTO POINT 21** – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1 Reach 2
Monitoring Year 4

PHOTO POINT 22 – looking upstream *(03/27/2018)*	**PHOTO POINT 22** – looking downstream *(03/27/2018)*
PHOTO POINT 23 – looking upstream *(03/27/2018)*	**PHOTO POINT 23** – looking downstream *(03/27/2018)*

PHOTO POINT 24 – looking upstream *(03/27/2018)*

PHOTO POINT 24 – looking downstream *(03/27/2018)*

PHOTO POINT 25 – looking upstream *(03/27/2018)*

PHOTO POINT 25 – looking downstream *(03/27/2018)*

PHOTO POINT 26 – looking upstream *(03/27/2018)*

PHOTO POINT 26 – looking downstream *(03/27/2018)*

PHOTO POINT 27 – looking upstream *(03/27/2018)*	**PHOTO POINT 27** – looking downstream *(03/27/2018)*

STREAM PHOTOGRAPHS
UT1 Reach 1
Monitoring Year 4

PHOTO POINT 28 – looking upstream *(03/28/2018)*	**PHOTO POINT 28** – looking downstream *(03/28/2018)*
PHOTO POINT 29 – looking upstream *(03/28/2018)*	**PHOTO POINT 29** – looking downstream *(03/28/2018)*

PHOTO POINT 30 – looking upstream *(03/28/2018)*

PHOTO POINT 30 – looking downstream *(03/28/2018)*

PHOTO POINT 31 – looking upstream *(03/28/2018)*

PHOTO POINT 31 – looking downstream *(03/28/2018)*

PHOTO POINT 32 – looking upstream *(03/28/2018)*

PHOTO POINT 32 – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1A Reach 1
Monitoring Year 4

PHOTO POINT 33 – looking upstream *(03/28/2018)*	**PHOTO POINT 33** – looking downstream *(03/28/2018)*
PHOTO POINT 34 – looking upstream *(03/28/2018)*	**PHOTO POINT 34** – looking downstream *(03/28/2018)*

PHOTO POINT 35 – looking upstream *(03/28/2018)*	**PHOTO POINT 35** – looking downstream *(03/28/2018)*
PHOTO POINT 36 – looking upstream *(03/28/2018)*	**PHOTO POINT 36** – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1A Reach 2
Monitoring Year 4

PHOTO POINT 37 – looking upstream *(03/28/2018)*	**PHOTO POINT 37** – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1A Reach 3
Monitoring Year 4

PHOTO POINT 38 – looking upstream *(03/28/2018)*	**PHOTO POINT 38** – looking downstream *(03/28/2018)*

STREAM PHOTOGRAPHS
UT1A Reach 4
Monitoring Year 4

PHOTO POINT 39 – looking upstream *(03/28/2018)*	**PHOTO POINT 39** – looking downstream *(03/28/2018)*
PHOTO POINT 40 – looking upstream *(03/28/2018)*	**PHOTO POINT 40** – looking downstream *(03/28/2018)*

PHOTO POINT 41 – looking upstream *(03/28/2018)*	**PHOTO POINT 41** – looking downstream *(03/28/2018)*

APPENDIX 3. Vegetation Plot Data

Vegetation inventory and analysis not required during MY4

APPENDIX 4. Morphological Summary Data and Plots

Morphological survey and analysis not required during MY4

APPENDIX 5. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018

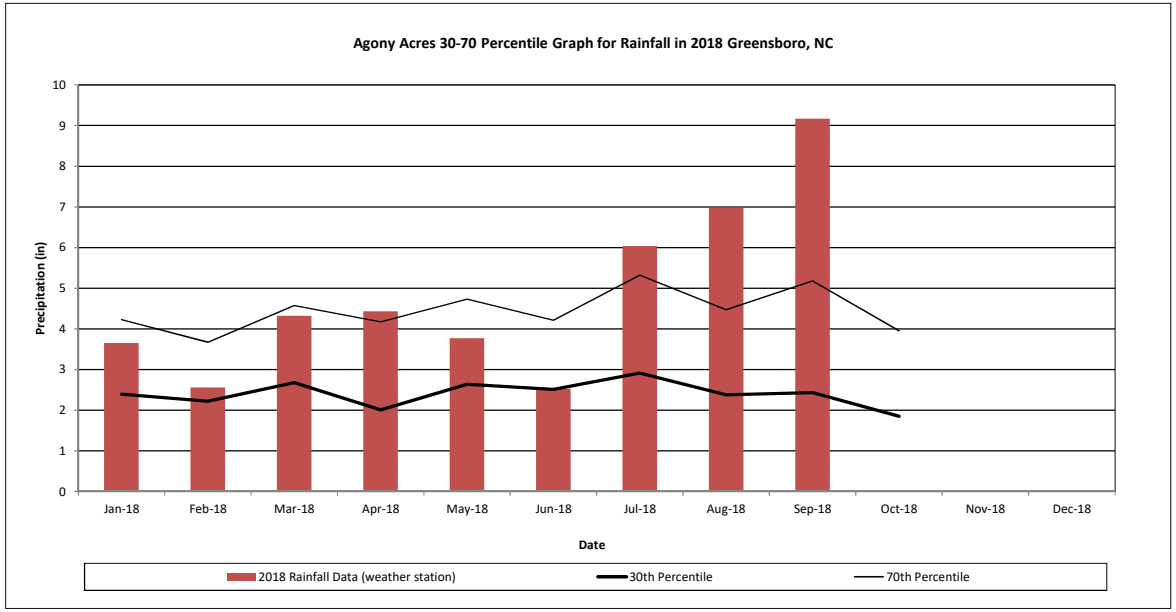
Reach	Date of Data Collection	Date of Occurrence	Method
UT1	2/26/2018	2/6/2018	Crest Gage/ Pressure Transducer
	10/9/2018	4/27/2018	
	10/9/2018	8/3/2018	
	10/9/2018	8/20/2018	
	10/9/2018	9/17/2018*	
UT1A	2/26/2018	2/4/2018	
	10/9/2018	8/20/2018	
	10/9/2018	9/17/2018*	
UT1B	10/9/2018	8/3/2018	
	10/9/2018	8/20/2018	
	10/9/2018	9/1/2018	
	10/9/2018	9/17/2018*	
UT2	2/26/2018	1/7/2018	
	10/9/2018	4/24/2018	
	10/9/2018	8/3/2018	
	10/9/2018	9/17/2018*	

*event attributed to Hurricane Florence

Monthly Rainfall Data

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018



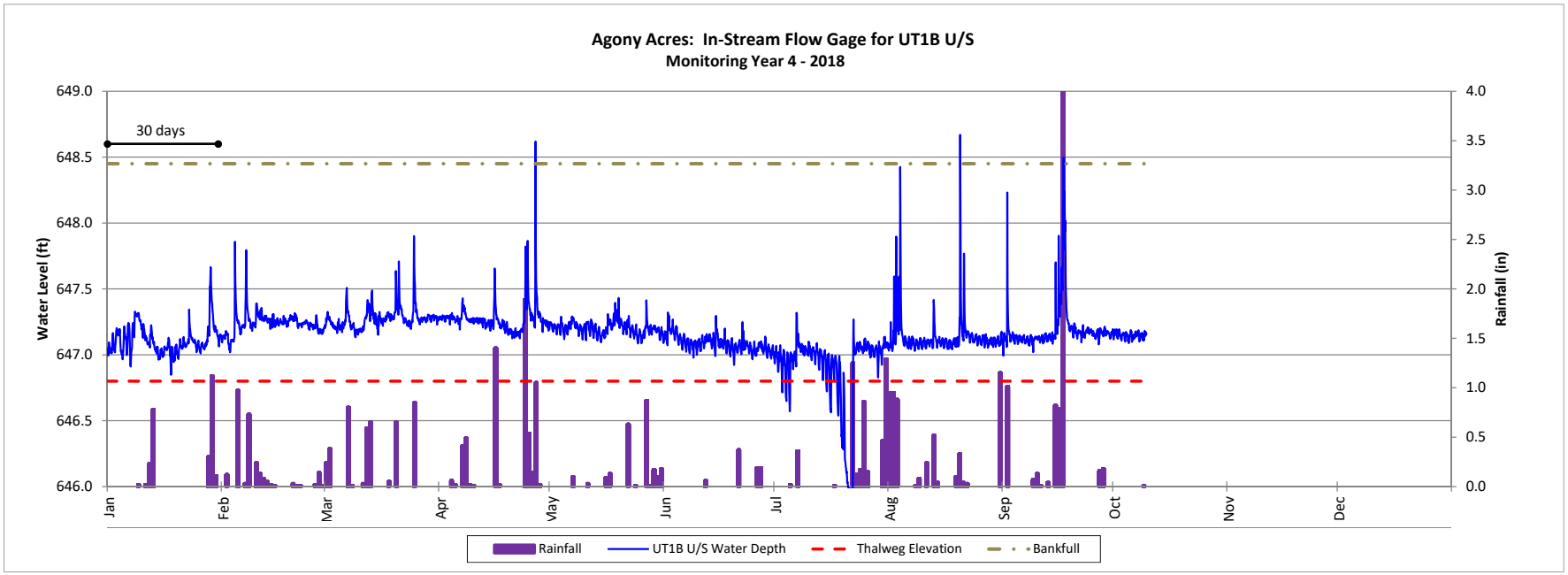
[1] 2018 monthly rainfall collected from weather station NC723, at Pedimont Tiad Intl AP, NC (USDA, 2002).

[2] 30th and 70th percentile rainfall data collected from weather station NC723, at Pedimont Tiad Intl AP, NC (USDA, 2002).

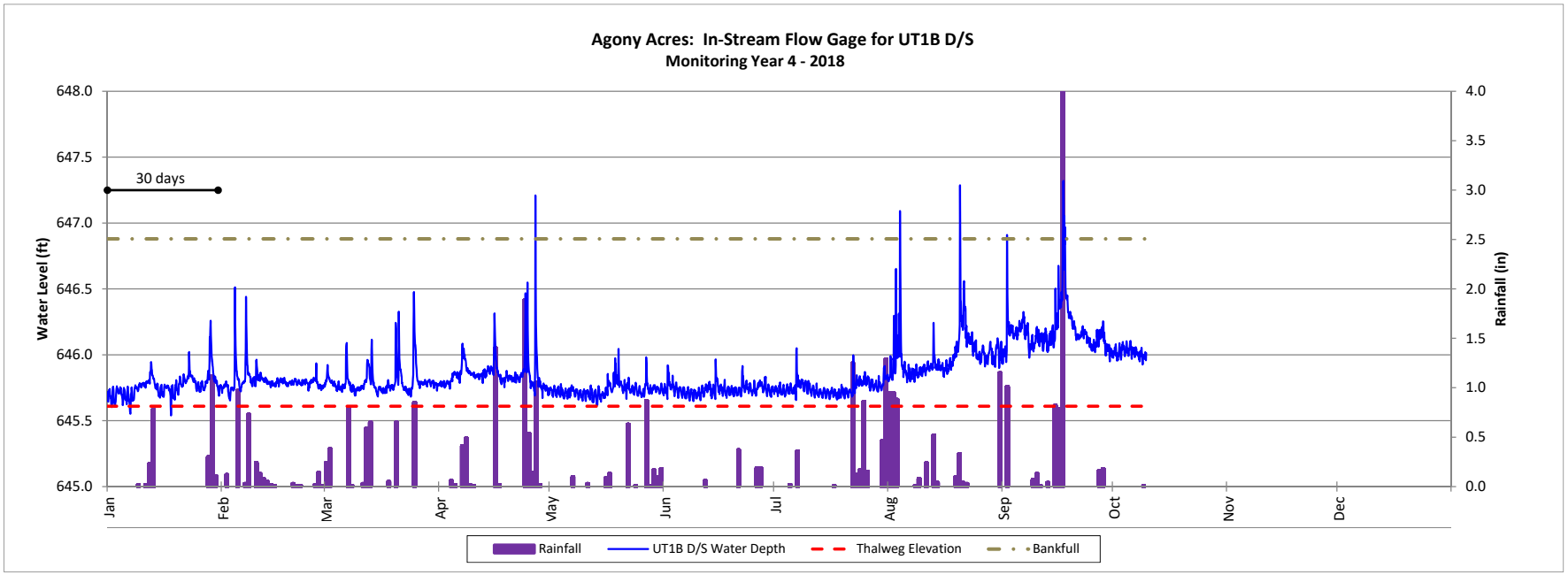
In-Stream Flow Gages

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018



In-Stream Flow Gages

Agony Acres Mitigation Site (DMS Project No. 95716)

Monitoring Year 4 - 2018