

Michael Baker

I N T E R N A T I O N A L

October 23, 2017

**Subject: MY6 Supplemental Monitoring
Candiff Creek Restoration
Yadkin 01 River Basin
NCDEQ – DMS Project Number 92767
Contract Number 002211**

Dear Mr. Wiesner,

This memo is intended to provide information about Monitoring Year 6 for the Candiff Creek Restoration Site. An additional year of monitoring was requested as a permit condition in 2015 (SAW-2010-01810). The supplemental monitoring occurred for Reaches M1 and UT1 near the upstream end of the project. Erosion and mass wasting along approximately 335 linear feet of UT1 and 528 linear feet of Reach M1 was addressed by excavating bankfull benches, sloping stream banks, installing instream structures and replanting the area. These reaches were proposed as Enhancement Level II reaches at a 2.5:1 credit ratio. The construction work conducted is typically more applicable to a higher level of intervention and corresponding higher credit ratio. As stated in previous monitoring reports and in the abovementioned permit application, additional credits are not being sought. After repair work was completed along M1 and UT1 in September of 2015, bank pins were installed in two outer bends along M1 and monitored for Monitoring Years 5 and 6. Representative site photographs were also taken along both reaches. In addition, several areas of kudzu were treated along the right bank of UT1 and M1. The site was visited and visually inspected several times throughout 2017.

Monitoring of the installed bank pins indicated that banks along Reach M1 are stable and not exhibiting active erosion. Representative photographs of both reaches support this, and show that vegetation on the site is well established and helping to stabilize the stream banks. Photographs of both bank pin arrays are provided in the attached photo log. A small section of terrace slope is exhibiting some minor erosion but is not systemic and will not be a detriment to the project.

Dispersed kudzu in the conservation easement surrounding M1 and UT1 was treated twice during 2017. The first treatment of the invasive plant occurred in June. The second treatment occurred in September, and removed any new growth that hadn't been treated in June. Kudzu growth within the conservation easement is currently under control. The landowner is actively grazing cattle outside of the conservation easement to assist in kudzu control and encroachment from outside of the conservation easement. Additionally, during these site visits to primarily treat kudzu at the upper end of the project site, any other invasive species discovered were treated throughout the conservation easement. This included sporadic multiflora rose and Chinese privet.

Visual inspection of planted vegetation including bare root trees and shrubs, livetakes, and herbaceous vegetation shows that vegetation is thriving throughout the conservation easement.

Overall, the MY6 supplemental monitoring indicated that the streambank enhancement activities along Reaches M1 and UT1 were successful. The upper end of the Candiff Creek Restoration Site has stabilized

and is functioning well. There are no obvious instances of erosion or mass wasting along the outer bends where bank pins were installed, and all structures are functioning as intended.

Through visual inspection, it was determined that the remainder of the mitigation site is also functioning as intended and as described in the Monitoring Year 5 report. The only areas of concern were the two small (<10 feet) bank erosion areas noted in the Monitoring Year 5 report and shown in the CCPV below. These areas have not degraded anymore and are anticipated to stabilize with time. The site was fully inspected on October 20, 2017 and no beaver sign was noted.

Michael Baker has completed the limited MY6 monitoring efforts as required by the 2015 repair permit condition. The remainder of the site continues to trend toward a successful mitigation project. Michael Baker and DMS plan to present the site to the IRT in 2018 for full project closure.

Please let me know if you have any comments, questions, or concerns regarding this project.

Sincerely,

A handwritten signature in black ink, appearing to read "Jake Byers", with a long horizontal flourish extending to the right.

Jake Byers, PE

NC Ecosystem Services Manager

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Candiff Creek Restoration – M1 and UT1, MY6 Photographs



**Bottom Bank Pin – Reach M1, right bank
Between Station 11+00 and 12+00
August 14, 2017**



**Top Bank Pin – Reach M1, right bank
Between Station 11+00 and 12+00
August 14, 2017**



**Bottom Bank Pin – Reach M1, left bank
Between Station 13+00 and 14+00
August 14, 2017**



**Top Bank Pin – Reach M1, left bank
Between Station 13+00 and 14+00
August 14, 2017**



**Bottom of Reach M1
August 14, 2017**



**Bottom of Reach M1
August 14, 2017**

Candiff Creek Restoration – M1 and UT1, MY6 Photographs



**Reach M1
August 14, 2017**



**Reach M1
August 14, 2017**



**Reach M1
August 14, 2017**



**Reach M1
August 14, 2017**



**Top of Reach M1
August 14, 2017**



**Top of Reach M1
August 14, 2017**

Candiff Creek Restoration – M1 and UT1, MY6 Photographs



**Top of Reach M1
August 14, 2017**



**Top of Reach M1
August 14, 2017**



**Bottom of Reach UT1
August 14, 2017**



**Bottom of Reach UT1
August 14, 2017**



**Reach UT1
August 14, 2017**



**Reach UT1
August 14, 2017**

Candiff Creek Restoration – M1 and UT1, MY6 Photographs



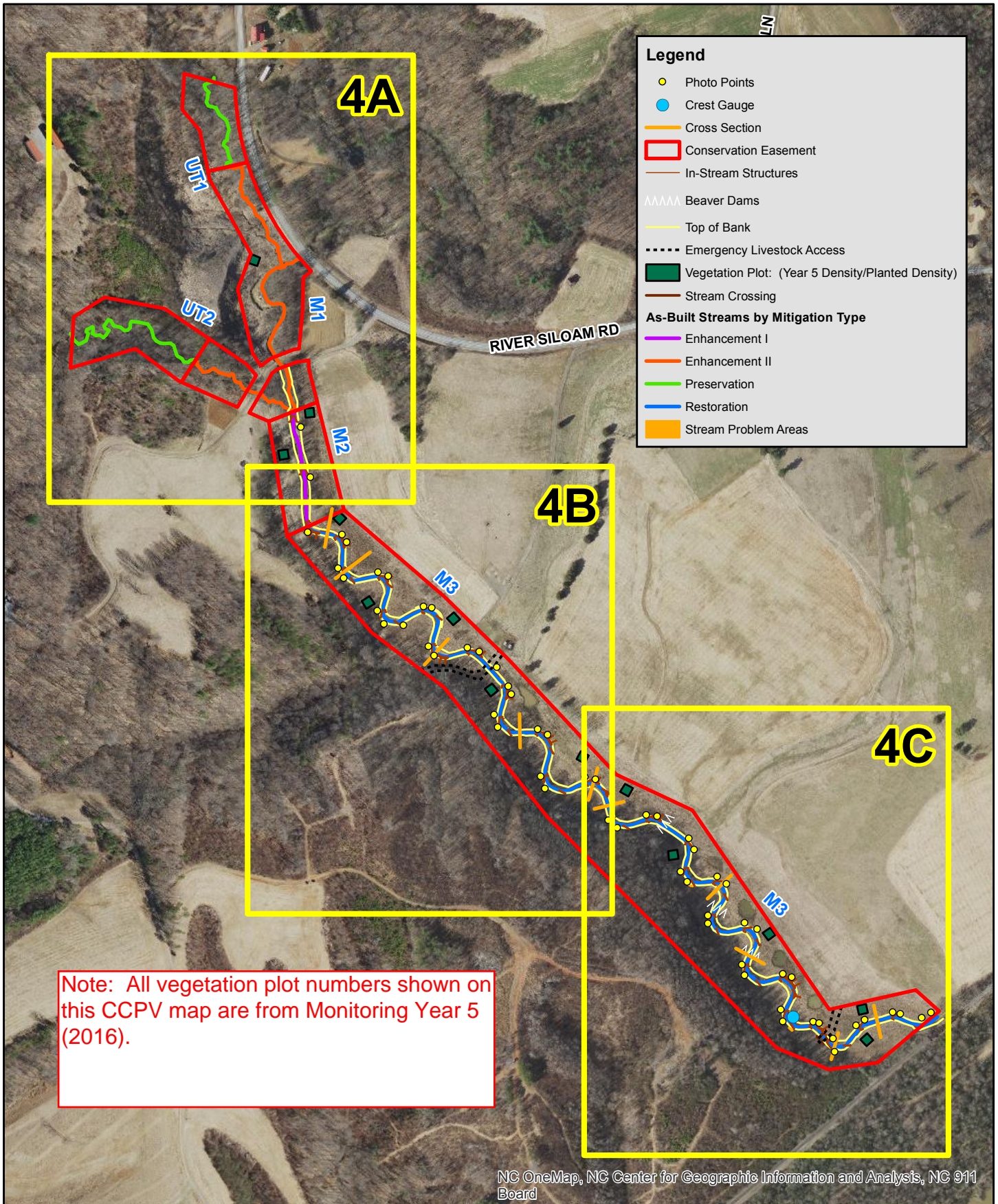
**Top of Reach UT1
August 14, 2017**

Table 1. Design Approach for the Candiff Creek Restoration Project

Candiff Creek Restoration Project: DMS Project No. 92767								
Project Segment or Reach ID	Existing Feet/Acres	Mitigation Type *	Approach**	Linear Footage	Mitigation Ratio	Mitigation Units	Stationing	Comment
M1	690	E	EII	690	2.5:1	276	10+00 - 17+35	Invasive species vegetation removal and buffer planting; 45 LF of stream length removed for one stream crossing. In-stream structures installation and bankfull bench excavation conducted in 2015 along with replanting of buffer.
M2	265	E	EI	265	1.5:1	177	17+35 - 20+00	Installed in-stream structures to control grade and reduce bank erosion
M3	3,828	R	P1, P2	4,081	1:1	4,081	20+00 - 61+23	Invasive species removal and buffer planting; 42 linear feet of stream length removed for two stream crossings
UT1 (Lower Reach)	885	E	EII	485	2.5:1	194	14+00 - 18+85	Invasive species vegetation removal, buffer planting, and livestock exclusion fencing.
UT1 (Upper Reach)		P	N/A	400	5:1	80	10+00 - 14+00	Preservation area - no construction activities in this area
UT2 (Lower Reach)	1,117	E	EII	317	2.5:1	127	18+00 - 21+62	Invasive species vegetation removal, buffer planting, and livestock exclusion fencing. 45 LF of stream length removed for one stream crossing.
UT2 (Upper Reach)		P	N/A	800	5:1	160	10+00 - 18+00	Preservation area - no construction activities in this area
Mitigation Unit Summations								
Stream (SMU)	Riparian Wetland (Ac)	Non-riparian Wetland (Ac)		Total Wetland (Ac)		Planted Riparian Buffer (Ac)	Permanent Conservation Easement (Ac)	
5,095	0	0		0		17.31	27.54	

* R = Restoration
E = Enhancement
P = Preservation

** P1 = Priority I
P2 = Priority II
EII = Enhancement II



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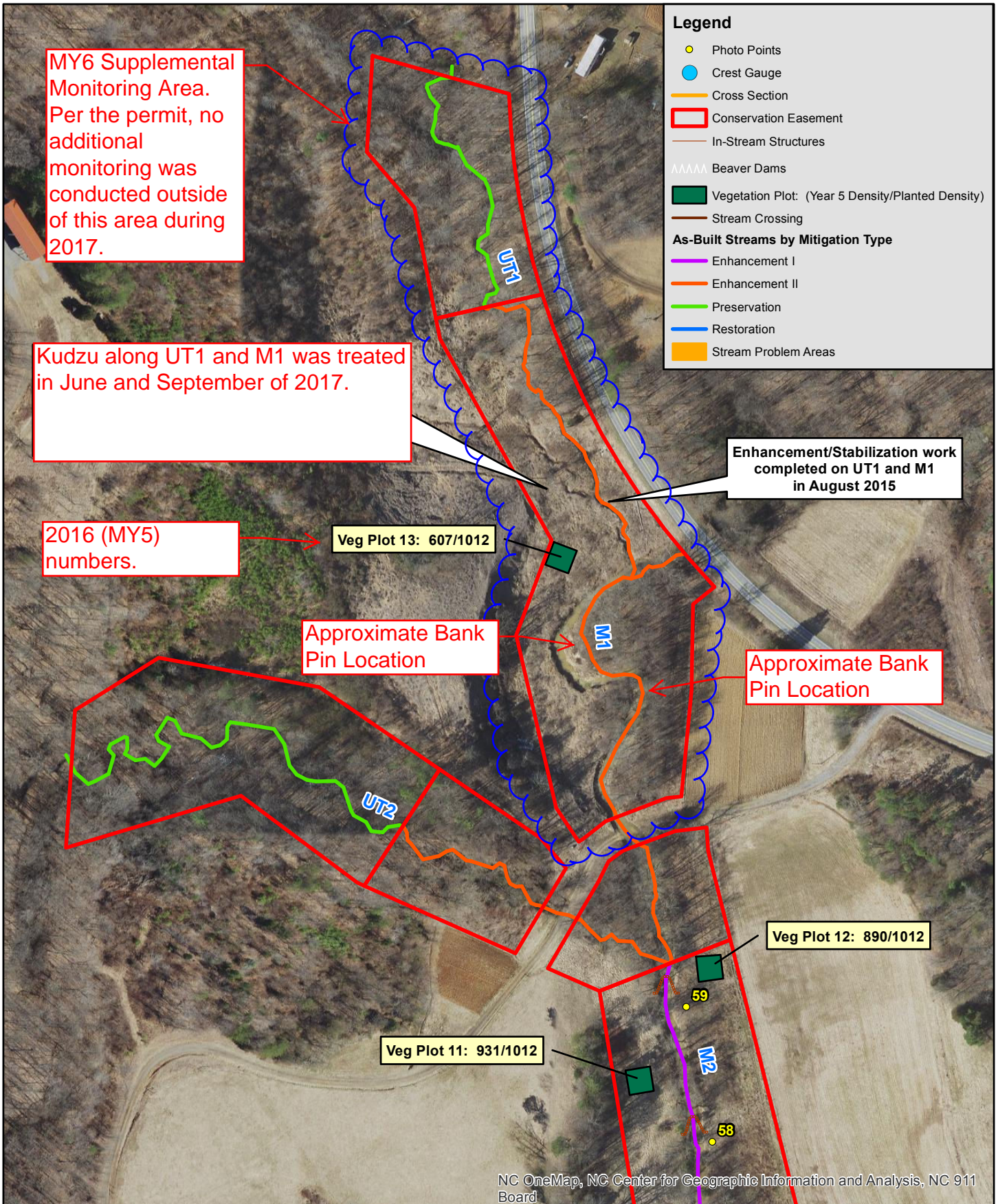
Surry Soil and Water
Conservation District

DEQ -
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DMS Project
92767



**Current Condition
Plan View Figure Index
Candiff Creek - Surry County, NC**

0 250 500 1,000
Feet



MY6 Supplemental Monitoring Area.
Per the permit, no additional monitoring was conducted outside of this area during 2017.

Kudzu along UT1 and M1 was treated
in June and September of 2017.

2016 (MY5) numbers.

Veg Plot 13: 607/1012

Approximate Bank Pin Location

Enhancement/Stabilization work completed on UT1 and M1 in August 2015

Approximate Bank Pin Location

Veg Plot 12: 890/1012

Veg Plot 11: 931/1012

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Legend

- Photo Points
- Crest Gauge
- Cross Section
- Conservation Easement
- In-Stream Structures
- AAAAA Beaver Dams
- Vegetation Plot: (Year 5 Density/Planted Density)
- Stream Crossing
- As-Built Streams by Mitigation Type**
- Enhancement I
- Enhancement II
- Preservation
- Restoration
- Stream Problem Areas

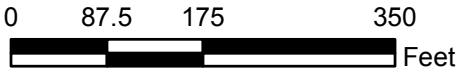
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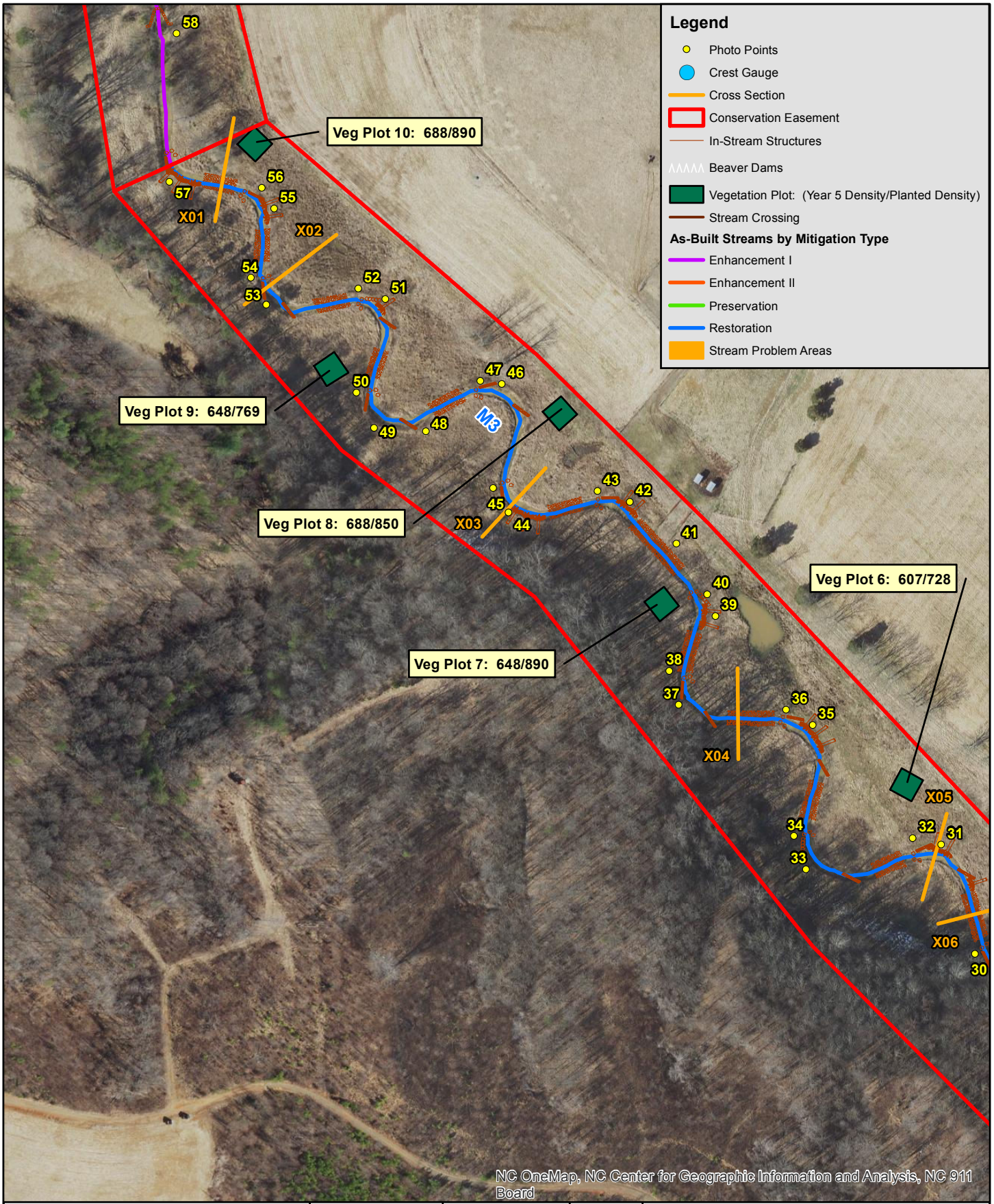


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Current Condition
Plan View Figure 4A
Candiff Creek - Surry County, NC





Legend

- Photo Points
- Crest Gauge
- Cross Section
- ▭ Conservation Easement
- In-Stream Structures
- AAAAA Beaver Dams
- ▭ Vegetation Plot: (Year 5 Density/Planted Density)
- Stream Crossing

As-Built Streams by Mitigation Type

- Enhancement I
- Enhancement II
- Preservation
- Restoration
- ▭ Stream Problem Areas

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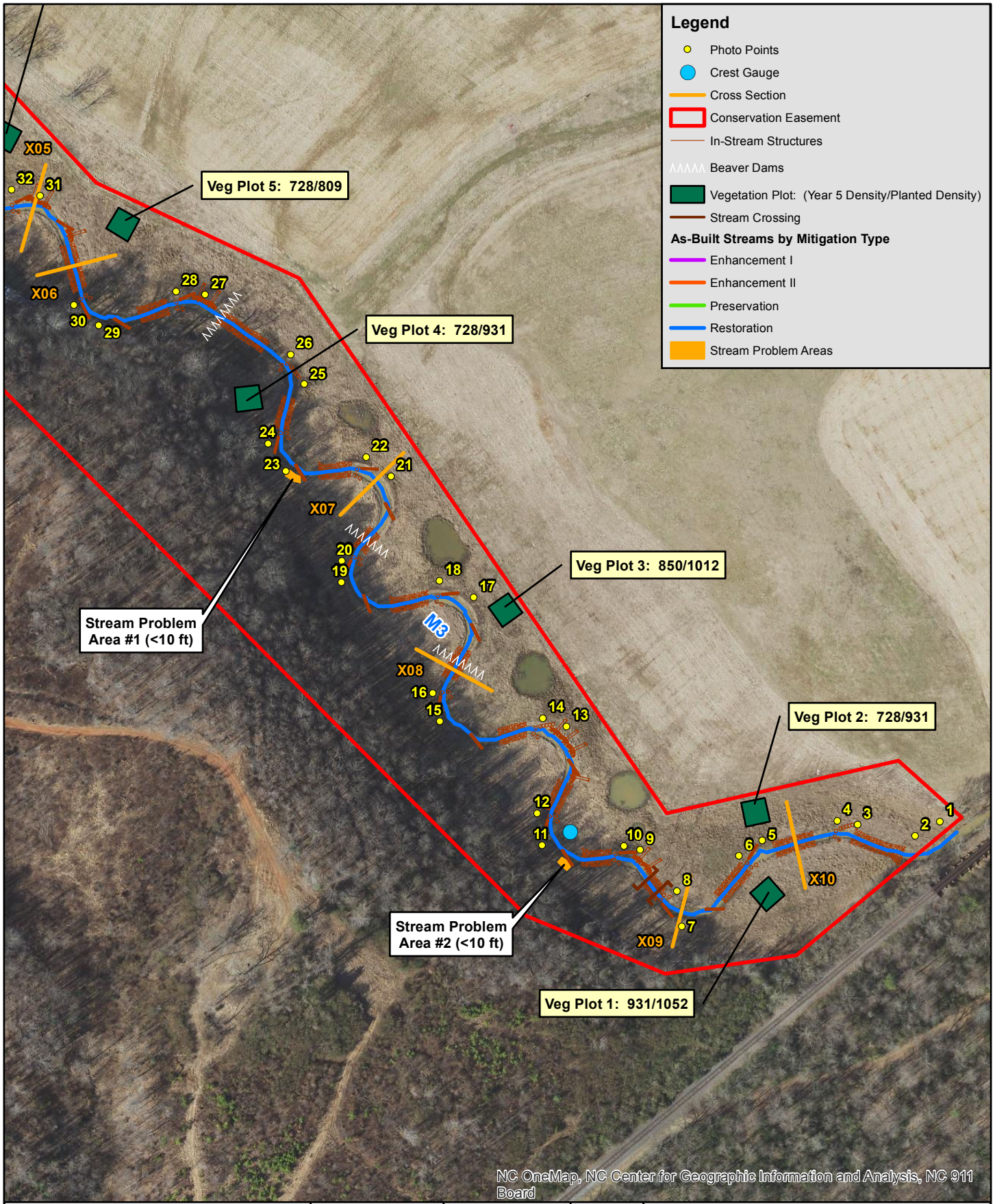


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**Current Condition
Plan View Figure 4B
Candiff Creek - Surry County, NC**

0 87.5 175 350
Feet



Legend

- Photo Points
- Crest Gauge
- Cross Section
- ▭ Conservation Easement
- In-Stream Structures
- MMMM Beaver Dams
- ▭ Vegetation Plot: (Year 5 Density/Planted Density)
- Stream Crossing

As-Built Streams by Mitigation Type

- Enhancement I
- Enhancement II
- Preservation
- Restoration
- ▭ Stream Problem Areas

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**Current Condition
Plan View Figure 4C
Candiff Creek - Surry County, NC**

0 87.5 175 350
Feet