MONITORING YEAR 0 ANNUAL REPORT

Final

May 2022

BANNER FARM MITIGATION SITE

Henderson County, NC
French Broad River Basin
HUC 06010105

DMS Project No. 100062
DEQ Contract No. 7530
DMS RFP No. 16-007334
Date of Issue: September 8, 2017
USACE Action ID No. SAW-2018-01153
DWR Project No. 20181032
Data Collection Dates: December 2021 – March 2022

PREPARED FOR:

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

PREPARED BY:

Wildlands Engineering, Inc.
167-B Haywood Road
Asheville, NC 28806

Phone: 704.332.7754
Fax: 704.332.3306

May 27, 2022

Mr. Matthew Reid
Western Project Manager
Division of Mitigation Services
5 Ravenscroft Dr., Suite 102
Asheville, NC 28801

RE: **Banner Farm Draft MY0 Report Review**
French Broad River Basin – CU# 06010105
Henderson County
DMS Project ID No. 100062
Contract # 7530

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft As-built Monitoring report for the Banner Farm Mitigation Site provided in bold type below and offers the following responses in italics.

Please add "Date of Issue: September 8, 2017" following RFP number on title page.

Wildlands Response: The date of issue has been added to the title page.

Table 1: Can you explain the changes in reach lengths for Banner Creek R1 and R2 and Banner Creek R4a and R4b. The total lengths are the same as the Mitigation Plan lengths but the individual reach lengths have changed (+/- 30' R1 and R2 and +/- 14' R4a and R4b). Did the reach breaks change?

Wildlands Response: The changes in reach lengths were due to a discrepancy in the reach break station callouts between the project overview sheet (sheet 0.2) and the stream plan and profile sheets (sheets 2.1.1 to 2.3.4) in the In the Preliminary Design Plans from the Mitigation Plan. The Mitigation Plan lengths were calculated referencing the project overview stationing. It was determined that the correct stationing was found in the stream plan and profile sheets and was thus updated in the as-built footage in Table 1. As noted above, the total lengths remain the same.

2.1 Asbuilt/Record Drawings: Thank you for the detailed list of all red line changes to the project. Approximately 13 rock sills, 17 brush toes, 4 cover logs and 6 log sills installed that were not part of the original design. Please add a short discussion to this section regarding the reasoning and need that lead to the field change for the additional structures.

Wildlands Response: Text was added to Section 2.1 discussing structures added between mitigation plan design and as built.

2.1.8 Encroachments: Please add a brief discussion regarding the need to amend the plat due to the farm entrance location. DMS met onsite with WEI in March to observe the issue. There were several

reasons that required the location of the farm entrance to be changed during construction. Proximity to DOT bridge, utility pole, existing trees and unsuitable slope all contributed to the need to move the entrance.

Wildlands Response: Text was added to Section 2.1.8 outlining field conditions which led to the relocation of the farm entrance and the associated minor easement encroachment to be resolved via plat amendment.

Table 4 and 5: Please add the date that the assessment work took place to the top of the tables. The IRT has requested this information be provided.

Wildlands Response: The date of the assessment work has been added to the top of tables 4 and 5.

Section 2 and Table 10: Section 2 indicates construction was completed in October and Table 2 shows November. Update as necessary.

Wildlands Response: Section 2 has been updated to be consistent with Table 10.

Table 10: The IRT approval letter for the mitigation plan is dated June 12, 2020. Please update the Mitigation Plan Approved line.

Wildlands Response: Table 10 has been updated.

Digital Deliverable Comments:

The As-built alignment is not segmented or attributed to enable verification of reach lengths, please resubmit this feature class with reach breaks and names and no credit sections identified.

Wildlands Response: The centerline alignment feature class named "Banner_AB_CL_Alignment" has been segmented and attributed to enable verification of reach lengths. This has been included in the geodatabase provided in the electronic support files.

Enclosed please find one hard copy of the Final As-built Monitoring Report and an electronic copy of the report and support files. Please contact me at (865) 207-8835 if you have any questions.

Sincerely,

Eric Neuhaus, PE
Project Manager
eneuhaus@wildlandseng.com

BANNER FARM MITIGATION SITE

Monitoring Year 0 Annual Report

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APPENDICES

Section 1: PROJECT OVERVIEW

The Banner Farm Mitigation Site (Site) is located in Henderson County, approximately five miles west of Hendersonville near Horse Shoe. The Site is positioned in the Blue Ridge Physiographic Province and project streams include Banner Creek and two associated tributaries which drain to the French Broad River. At the confluence with Banner Creek, the French Broad River is defined in the 2016 North Carolina Integrated Report as Class WS-IV waters. This classification of waters is protected for drinking, culinary, food processing, aquatic life, secondary recreation, and freshwater purposes.

1.1 Project Quantities and Credits

The site is located on 7 parcels under 4 different landowners and a conservation easement was recorded on 46.6 acres. Mitigation work within the Site included restoration of perennial stream channels and creation, re-establishment, and rehabilitation of wetland areas. Table 1 below shows stream and wetland credits and the total amount of credits expected at closeout.

Table 1: Project Quantities and Credits

Project Components							
Project Segment	**Original Mitigation Plan Ft/Ac**	**As-Built Ft/Ac**	**Mitigation Category**	**Original Restoration Level**	**Original Mitigation Ratio (X:1)**	**Credits**	**Comments**
Stream							
Banner Creek Reach 1	797	827	Cool	R	1.000	797.000	Restoring dimension, pattern, and profile, reconnecting channels with floodplains and wetlands, replanting buffers, protecting with conservation easement
Banner Creek Reach 2	866	836	Cool	R	1.000	866.000	
Banner Creek Reach 3	467	467	Cool	R	1.000	467.000	
Banner Creek Reach 4a	794	780	Cool	R	1.000	794.000	
Banner Creek Reach 4b	420	434	Cool	R	1.000	420.000	
UT1	1,071	1,071	Cool	R	1.000	1,071.000	
UT2	1,879	1,879	Cool	R	1.000	1,879.000	
					Total:	**6,294.000**	
Wetland							
Wetland Re-Establishment	31.820	31.671	RR	REE	1.000	31.820	Re-establish hydrology via the plugging/filling of drainage features, stream grading, wetland planting, invasive species treatment, permanent conservation easement

Project Components							
Project Segment	**Original Mitigation Plan Ft/Ac**	**As-Built Ft/Ac**	**Mitigation Category**	**Original Restoration Level**	**Original Mitigation Ratio (X:1)**	**Credits**	**Comments**
Wetland Rehabilitation	2.760	2.746	RR	RH	2.000	1.380	Improve hydrology via the plugging/filling of drainage features, wetland planting, stream grading, invasive species treatment, permanent conservation easement
Wetland Creation	1.140	1.094	RR	C	3.000	0.380	Priority 2 stream grading, plugging/filling of drainage features, wetland planting, invasive species treatment, permanent conservation easement
					Total:	**33.580**	

Project Credits							
Restoration Level	**Stream**			**Riparian Wetland**		**Non-Riparian Wetland**	**Coastal Marsh**
	Warm	**Cool**	**Cold**	**Riverine**	**Non-Riv**		
Restoration		6,294.000					
Re-establishment				31.820			
Rehabilitation				1.380			
Enhancement							
Enhancement I							
Enhancement II							
Creation				0.380			
Preservation							
Totals		**6,294.000**		**33.580**			

1.2 Project Goals and Objectives

The project is intended to provide numerous ecological benefits. Table 2 below describes expected outcomes to water quality and ecological processes and provides project goals and objectives.

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Stabilize eroding stream banks.	Reconstruct stream channels slated for restoration with stable dimensions. Add bank revetments and in-stream structures to reaches to protect restored streams.	Reduce erosion and sediment inputs.	Cross-sections should be stable and show little change in bankfull area and width-to-depth ratio.	Cross-section monitoring and visual inspections.	Cross-section dimensions are within the design parameters.
Improve the stability of stream channels.	Construct stream channels that will maintain a stable pattern and profile considering the hydrologic and sediment inputs to the system, landscape setting, and watershed conditions.	Reduce erosion and sediment inputs; maintain appropriate bedforms and sediment size distribution.	Entrenchment ratio (ER) stays over 2.2 and bank height ratio (BHR) below 1.2 with visual assessments showing progress toward stability.	Cross-section monitoring and visual inspections.	Cross-sections show streams are stable and functioning as designed. ERs are over 2.2 and BHRs are below 1.2.
Improve instream habitat.	Install habitat features including constructed riffles, cover logs, and brush toes into restored streams. Add woody materials to channel beds. Construct pools of varying depth.	Support biological communities and processes. Provide aquatic habitat for diverse populations of aquatic organisms.	There is no required performance standard for this metric.	N/A	N/A

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Reconnect channels with floodplains and riparian wetlands.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain.	Reduce shear stress on channel, hydrate adjacent wetland areas, filter pollutants out of overbank flows, provide surface storage of water on floodplain, increase groundwater recharge while reducing outflow of stormwater, support water quality, and habitat goals.	Four bankfull events in separate years within the 7-year monitoring period.	Crest gages with transducers recording stage elevations.	Hydrology data will be reported in MY1.
Restore wetland hydrology, soils, and plant communities.	Restore and enhance riparian wetlands by raising stream beds, plug in existing ditches, removing berm material over relic hydric soils, and planting native wetland species.	Increase water storage, increase groundwater recharge, water quality treatment through retention, and increase habitat for aquatic and terrestrial species.	Free groundwater surface within 12 inches of the ground surface for 12% of the growing season.	Groundwater gages have been installed wetland re-establishment, creation, and rehabilitation areas and monitored annually.	Hydrology data will be reported in MY1.
Restore and enhance native floodplain vegetation.	Plant native tree species in riparian zone where they are currently insufficient.	Provide a canopy to shade streams and reduce thermal loading. Stabilize stream banks and floodplain. Support water quality habitat goals.	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5, and 210 stems per acre at MY7. Average height of 6 feet in each plot at MY5 and 8 feet in each plot at MY7 for planted stems.	Vegetation plots measuring 100 square meters are established on 2% of the planted area are monitored annually.	All permanent and mobile vegetation plots have a planted stem density greater than 320 stems per acre.
Permanently protect the project Site from harmful uses	Establish conservation easements on the Site	Protect and enhance aquatic habitat, reduce sediments inputs, and protect any rare natural communities.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	Minor encroachments along farm road to be resolved and discussed in MY1 report.

1.3 Project Attributes

The Site and adjoining properties have sustained predominantly rural characteristics for approximately 60 years. Portions of Site parcels were extensively ditched to drain and maintain adjacent agricultural fields for row crop production from 1964 to the commencement of project construction. Large segments of the ditches were determined to be modified streams including Banner Creek, UT1, and UT2. Throughout the watershed, agricultural land use declined slightly from 1964 to 1994 as residential areas were established and fields were abandoned and allowed to reforest. The watershed has since remained relatively stable with only minor changes in land use. Table 3 below presents additional information on pre-restoration conditions.

Table 3: Project Attributes

Project Information					
Project Name	Banner Farm Mitigation Site				
County	Henderson				
Project Area (acres)	46.6				
Project Coordinates (latitude and longitude decimal)	35° 21' 7"N, 82° 33' 13" W				
Project Watershed Summary Information					
Physiographic Province	Blue Ridge				
River Basin	French Broad				
USGS Hydrologic Unit 8-digit	06010105				
DWR Sub-basin	04-03-02				
Project Drainage Area (acres)	722				
Project Drainage Area Percentage of Impervious Area	1.5%				
Land Use Classification	44% cultivated crops and hay, 27% forest, 2.5% shrub/grassland/herbaceous, 0.5% wetlands, 26% residential				
Reach Summary Information					
Parameters	**Banner Creek**				
	R1	**R2**	**R3**	**R4a**	**R4b**
Pre-project length (feet)	705	945	357	607	802
Post-project length (feet)	827	836	467	780	434
Valley confinement (Confined, moderately confined, unconfined)	Unconfined				
Drainage area (acres)	390	422	429	634	722
Perennial, Intermittent, Ephemeral	P				
NCDWR Water Quality Classification	WS-IV (WSW)				
Dominant Stream Classification (existing)	C4	C4	C4	C5/4	C5/4
Dominant Stream Classification (proposed)	C4	C4	C4	C5/4	C5/4
Dominant Evolutionary Classification (Simon) if applicable	V	IV	III	IV	IV
Parameters	**UT1**			**UT2**	
Pre-project length (feet)	620			2042	
Post-project length (feet)	1,071			1,879	
Valley confinement (Confined, moderately confined, unconfined)	Unconfined				
Drainage area (acres)	83			192	
Perennial, Intermittent, Ephemeral	P				
NCDWR Water Quality Classification	WS-IV (WSW)				
Dominant Stream Classification (existing)	E/C5			E/C5	
Dominant Stream Classification (proposed)	E5			C4	
Dominant Evolutionary Classification (Simon) if applicable	IV				

Regulatory Considerations			
Regulation	**Applicable ?**	**Resolved?**	**Supporting Docs?**
USACE Public Notice - Section 404	Yes	Yes	SAW-2018-01153[1]
Water of the United States - Section 404	Yes	No	PCN[2]
Water of the United States - Section 401	Yes	No	PCN[2]
Endangered Species Act	Yes	Yes	Final Mitigation Plan
Historic Preservation Act	Yes	Yes	Final Mitigation Plan
Coastal Zone Management Act	Yes	No	N/A
FEMA Floodplain Compliance	Yes	No	No Rise Certification
Essential Fisheries Habitat	Yes	N/A	N/A

[1] Public Notice was issued on August 28, 2018.
[2]PCN was submitted to DMS with Final Mitigation Plan for IRT submittal.

Wetland Summary Information						
Parameters	**Wetland Rehabilitation Areas**					
	A	**D**	**E**	**F**	**H**	**I**
Post-project area (acres)	0.46	0.12	<0.01	0.03	0.06	<0.01
Wetland Type (non-riparian, riparian)	Riparian					
Classification	Bottomland Hardwood Forest					
Mapped Soil Series	Toxaway/ Rosman	Toxaway/ Codorus	Toxaway	Toxaway	Codorus/ Delanco	Codorus
Soil Hydric Status	Yes/No		Yes		No	
Restoration or enhancement method	Rehabilitation (Vegetative, hydrology)					
Parameters	**Wetland Rehabilitation Areas**					
	J	**K**	**L**	**R**	**S**	**W**
Post-project area (acres)	0.05	0.11	<0.01	1.65		0.28
Wetland Type (non-riparian, riparian)	Riparian					
Classification	Bottomland Hardwood Forest					
Mapped Soil Series	Codorus/ Delanco	Codorus/ Bradson	Codorus	Codorus/ Delanco	Codorus/ Bradson	Toxaway
Soil Hydric Status	No					
Restoration or enhancement method	Rehabilitation (Vegetative, hydrology)					
Parameters	**Wetland Re-establishment Areas**					
Post-project area (acres)	31.67					
Wetland Type (non-riparian, riparian)	Riparian					
Mapped Soil Series	Codorus/Delanco/Bradson/Toxaway/Rosman					
Soil Hydric Status	No					
Restoration or enhancement method	Re-establishment (Vegetative, hydrology)					
Parameters	**Wetland Creation Areas**					
Post-project area (acres)	1.094					
Wetland Type (non-riparian, riparian)	Riparian					
Mapped Soil Series	Rosman					
Soil Hydric Status	No					
Restoration or enhancement method	Creation (Vegetative, hydrology)					

Section 2: As-Built Condition (Baseline)

The Site construction was completed in November 2021. The as-built survey, which included developing an as-built topographic surface; as well as, surveying the as-built channel centerlines, top of banks, structures, and cross-sections, was collected between 10/26/2021 – 01/25/2022 and completed in March 2022. The Site's construction planting was completed on 02/15/22. Monitoring device installation and vegetative and substrate data collection were completed by 02/17/2022. River cane planting was completed on 03/02/2022.

2.1 As-Built/Record Drawings

A sealed half-size set of the as-built survey and record drawing which includes the post-construction survey, alignments, structures, and monitoring features are in Appendix E. Field adjustments made during construction that differ from the preliminary design plans are shown as red lines on the record drawing. These adjustments were made during construction or final design, where needed, based on field evaluations, and are listed below. Overall, use of instream structure at the site was increased during final design and construction based on site conditions and material availability. An additional 13 rock sills, 17 brush toes, 4 cover logs and 6 log sills were installed at the site. The quantity of rock and log sills was increased along Banner Creek Reach 1 to raise bed elevations in the channel while preserving mature trees where possible. Additional brush toe installed along Banner Creek Reach 1 was intended to increase bank stability downstream of grade drops and through steeper sections of stream. Brush toes and cover logs installed in channels through proposed wetland areas were increased site wide to provide additional habitat and bedform diversity within long, low sloped pools. Encroachments are detailed in Section 2.1.9.

2.1.1 Banner Creek Reach 1

- STA 0+21 – Brush toe extended to provide additional bank protection.
- STA 0+75 – Brush toe installed to provide bank protection.
- STA 1+60 – Rock sill installed for stability.
- STA 1+77 – Brush toe installed to provide bank protection and habitat.
- STA 1+94 – 3+77 Profile adjustment to save existing trees.
- STA 2+24 – Length of riffle reduced to protect tree root mass.
- STA 2+63 – Riffles combined and location changed to protect trees.
- STA 2+79 – Rock sill installed for stability.
- STA 2+87 – Brush toe installed to provide bank protection.
- STA 3+09 – Riffle length reduced to protect trees.
- STA 3+17 – Rock sill installed for stability.
- STA 3+34 – Riffle added for profile adjustment to save trees.
- STA 3+39 – Rock sill installed for stability.
- STA 3+51 – Brush toe installed to provide bank protection.
- STA 3+71 – Riffle shortened to protect trees.
- STA 5+37 – Brush toe replaced by cover log based on site materials and channel conditions.
- STA 5+79 – Rock sill replaced by log still based on site materials and channel conditions.
- STA 5+85 – Cover log installed to provide habitat.
- STA 6+40 – Added stabilization at outlet.
- STA 6+56 – Rock sill replaced by log sill based on site materials and channel conditions.
- STA 7+23 – Boulder toe installed to provide bank protection downstream of existing crossing.
- STA 7+52 – Rock sill installed for stability.

- STA 7+61 – Brush toe installed to provide habitat.
- STA 9+24 – Added stabilization at drainage outlet with natural stone.

2.1.2 Banner Creek Reach 2

- STA 9+66 – Brush toe installed to provide bank protection and habitat.
- STA 10+44 – Added stabilization at outlet with natural stone.
- STA 11+78 – Added stabilization at outlet with natural stone.
- STA 13+48 – Cover log installed to provide bank protection.
- STA 14+90 – Rock sill installed for stability.
- STA 15+16 – Brush toe installed to provide bank stability and habitat.
- STA 16+42 – Log sill installed for stability.
- STA 16+71 – Brush toe installed to provide bank stability and habitat.
- STA 17+16 – Log sill installed for stability.
- STA 17+45 – Rock sill replaced by J-hook to protect bank.
- STA 17+47 – STA 18+34 – Profile adjusted to reduce slope at tie-out to existing stream bed.
- STA 17+66 – Riffle added due to change in profile.
- STA 17+71 – Log sill installed for stability due to change in profile.
- STA 17+81 – Riffle location changed due to change in profile.
- STA 17+89 – Log sill installed for stability due to change in profile.

2.1.3 Banner Creek Reach 3

- STA 18+20 – Riffle installed due to change in profile to tie to existing stream bed.
- STA 18+28 – Rock sill installed due to change in profile for stability.
- STA 20+40 – Rock sill not installed to refrain from encroaching on DOT right-of-way.
- STA 23+46 – Brush toe installed to provide bank protection and habitat.

2.1.4 Banner Creek Reach 4A

- STA 29+40 – Log sill installed for stability.
- STA 29+85 – Brush toe installed to provide bank protection and habitat.
- STA 31+81 – Cover log installed to provide bank protection and habitat.
- STA 32+00 – Brush toe installed to provide bank protection and habitat.

2.1.5 Banner Creek Reach 4B

- STA 33+79 – Rock sill installed for stability.
- STA 37+40 – Brush toe installed to provide bank protection.

2.1.6 UT1

- STA 100+37 – Rip rap headwall added during final design.
- STA 100+62 – Rip rap headwall added during final design.
- STA 100+69 – Rock sill installed for stability and aquatic organism passage.
- STA 101+77 – Rock sill installed for stability.
- STA 102+00 – Brush toe installed for bank protection and habitat.
- STA 103+63 – Brush toe installed to provide bank protection and habitat.
- STA 107+88 – Rip rap headwall added during final design.
- STA 108+09 – Rip rap headwall added during final design.
- STA 108+81 – Brush toe installed to provide bank protection and habitat.
- STA 109+39 – STA 112+82 – Stream profile adjustment to tie to Banner Creek stream bed.

- STA 109+39 – Rock sill installed for stability.
- STA 109+63 – Cover log installed to provide habitat.
- STA 110+79 – Rock sill installed for stability.
- STA 112+15 – Brush toe installed to provide bank protection and habitat.

2.1.7 UT2

- STA 200+52 – Rock sill replaced by log sill due to availability of logs.
- STA 201+95 – Brush toe installed to provide bank protection and habitat.
- STA 203+32 – Brush toe installed to provide bank protection and habitat.
- STA 207+69 – Cover log installed to provide habitat.
- STA 209+83 – Brush toe installed to provide bank protection and habitat.
- STA 210+57 – Brush toe installed to provide bank protection and habitat.
- STA 213+06 – Brush toe installed to provide bank protection and habitat.
- STA 214+64 – Cover log installed to provide bank protection and habitat.
- STA 218+38 – Cover log installed to provide bank protection and habitat.

2.1.8 Encroachments

Easement encroachments to be resolved:

Though the following encroachments will be corrected during MY1 maintenance activities, the areas were documented on the record drawings as red lines. They are as follows:

- Wetland grading sheet 2.2 – The constructed farm entrance is encroaching on the conservation easement but not on mitigation assets. During construction, the location of the farm entrance had to be modified. The entrance was proposed (and built) between two existing DOT bridges. An existing overhead electric guy wire pole and newly installed narrow bridge notification sign conflicted with the original proposed location of the farm entrance. Based on the field conditions including existing utilities, DOT signage, FEMA considerations, and landowner workability it was determined that the best course of action was to shift the entrance west, which resulted in the minor encroachment on the conservation easement. Wildlands is currently working to modify the recorded conservation easement to release the area and rectify the encroachment. The conservation easement modification will be completed in MY1.
- Wetland grading sheet 2.3 – 292 SQFT of constructed soil road is encroaching on conservation easement. In MY1, the area will be raked, seeded, and strawed. Horse tape will be added between marker boundaries in this are to keep vehicles and farm equipment from entering conservation easement. This work will be completed in MY1.
- Wetland grading sheet 2.4 – 2 SQFT of constructed soil road is encroaching on conservation easement. The area will be raked, seeded, and strawed. This work will be completed in MY1.

2.1.9 Planting

Changes within the planted riparian buffer were minimal and consisted of three species changes and planting density adjustments within the Wetland and Streambank Planting Zones. Species replacements and planting density adjustments were made due to availability of the species at the time of planting. All species replacements were approved species or alternate species within the Final Mitigation Plan's planting list (Wildlands, 2020), so no approval for the inclusion of the species is needed.

Open Area Planting Zone

- Sweet birch (*Betula lenta*) was replaced by silver maple (*Acer saccharinum*).

Wetland Planting Zone

- Persimmon (*Diospyros virginiana*) was replaced by American elm (*Ulnus americana*).

- Mountain doghobble (*Leucothoe fontanesiana*) was replaced by elderberry (*Sambucus canadensis*).
- Stem densities were updated from 15% to 15.5% for river birch (*Betula nigra*) and boxelder (*Acer negundo*). Tulip poplar (*Liriodendron tulipifera*) was reduced from 15% to 5%. Tag alder (*Alnus serrulate*) was increased from 2% to 3.5%. Spicebush (*Lindera benzoin*) and American holly (*Ilex opaca*) were increased from 2% to 2.5% and 1% to 2%, respectively.
- An additional density of 5% of American elm and 1% of elderberry were added to offset planting densities adjustments.

Streambank Planting Zone

- Planting densities for black willow (*Salix nigra*) was increased from 10% to 11%, while buttonbush (*Cephalthus occidentalis*) was reduced from 15% to 14.5% and elderberry was increased from 15% to 15.5%.

Planting Plan

- Sheet 3.3 – No bare roots were planted due to the depth of standing water.
- Sheet 3.3 – No bare roots were planted due to farm road encroachment.
- Sheet 3.4 – River cane planting areas replaced with wetland area plantings. Due to the availability of plant material.
- Sheet 3.4 – River cane planting areas replaced with open area buffer plantings. Due to the availability of plant material.
- Sheet 3.4 – River cane plantings concentrated towards the lower bench of the project. Due to the availability of plant material.
- Sheet 3.4 – Area not disturbed during construction. Existing vegetation is already established. No river cane or bare roots needed.

2.1.10 Monitoring Device Locations

Installed monitoring devices and plot locations closely mimic the locations of those proposed in the Site's Mitigation Plan. Minor deviations from these locations were made when professional judgement deemed them necessary to better represent as-built field conditions or when installation of the device in the proposed location was not physically feasible.

Section 3: Monitoring Year 0 Data Assessment

The as-built and MY0 data collection was conducted between December 2021 and March 2022 to assess the baseline condition of the project. The vegetation, stream, and wetland success criteria for the Site follow the approved Mitigation Plan (Wildlands, 2020).

Performance criteria for vegetation, stream, and hydrologic assessments are located in Section 1.2 Table 3: Goals, Performance Criteria, and Functional Improvements. The first annual monitoring assessment (MY1) will be completed in the fall of 2022, at least 6 months after the MY0 assessment. The Site will be monitored for a total of seven years, with the final monitoring activities scheduled for 2028.

3.1 Vegetative Assessment

The MY0 vegetative survey was completed in February 2022. Vegetation monitoring resulted in a stem density range of 405 to 850 planted stems per acre across vegetation plots which is above the interim requirement of 320 stems per acre required at MY3. The average stem density across vegetation plots is 565 planted stems per acre. All 24 permanent and 12 mobile vegetation plots exceeded the interim success criteria individually and are on track to meet the final success criteria required for MY7.

Herbaceous vegetation is establishing itself across the site. Refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table and Appendix B for Vegetation Plot Data.

3.2 Vegetation Areas of Concern

There are currently no vegetation areas of concern. Invasive species are not currently pervasive on the Site. Treatments of reed canary grass (*Phalaris arundinacea*) and golden bamboo (*Phyllostachys aurea*) occurred before construction to prevent the spread of invasive species that could compete with planted native species. Invasive species will continue to be monitored and managed as necessary throughout the monitoring period.

3.3 Stream Assessment

Morphological surveys for MY0 were completed in February 2022. All streams on Site are stable and functioning as designed. Cross-sections show dimensions within an acceptable range of the design parameters. Entrenchment ratios are greater than 2.2, and bank height ratios are less than 1.2. Reachwide and riffle 100-count substrate sampling was conducted during baseline condition assessment to classify the reach and characterize the riffle pavement.

Sediment analysis results show riffles along most reaches have a median particle size classification of coarse gravel to small cobble. As expected, and noted in the Mitigation Plan (Wildlands, 2020), the Banner Creek Reach 4b riffle count is showing a finer median particle size of fine sand due to backwater and high sand loads from the French Broad River. Based on a DMS Technical Workgroup memo from 10/19/21 and concurrence received on 10/27/2021 from the DMS project manager for the Site, pebble counts will not be conducted during the remaining monitoring years unless requested by the IRT or deemed necessary by best professional judgement. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table and Stream Photographs. Refer to Appendix C for Stream Geomorphology Data. Refer to Appendix D for the DMS Technical Workgroup memo and the email confirmation from the DMS project manager (Reid, 2021).

3.4 Stream Areas of Concern

No stream areas of concern were identified at this time.

3.5 Hydrology Assessment

In total, 3 automated crest gages (CG) were installed along Banner Creek Reach 2, UT1, and UT2 to monitor bankfull events. Hydrologic data will be collected and reported during MY1.

3.6 Wetland Assessment

In total, 18 groundwater gages and one soil temperature probe were installed across re-establishment, rehabilitation, creation wetland areas. Groundwater gage data will be collected and reported during MY1. Refer to Appendix A for Groundwater Gage and Soil Profile Photographs. Refer to Appendix F for Groundwater Gage Installation Sheets that contain soil profile descriptions and ground elevations.

3.7 Adaptive Management Plan

Site maintenance and adaptive measurement implementation will follow those outlined in the project's Final Mitigation Plan (Wildlands, 2020). No adaptive management plans are needed at this time.

3.8 Monitoring Year 0 Summary

Overall, the Site is performing as intended, and is on course to meet success criteria. Vegetation plot data shows an average density of 565 planted stems per acre across vegetation plots. All plots are on track to exceed the MY3 interim requirement of 320 planted stems per acre. All project streams are stable, functioning as intended, and meeting project goals. Herbaceous vegetation is

establishing itself across the site and the floodplain is stable. Stream and wetland hydrology data will be included in the MY1 annual report. Invasive species are not currently a concern, but they will be assessed and treated as necessary in future monitoring years.

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

Section 4: METHODOLOGY

Annual monitoring will consist of collecting morphologic, vegetative, and hydrologic data to assess project success based on the goals outlined in the Site's Mitigation Plan (Wildlands, 2020). Monitoring requirements will follow guidelines outlined in the NC IRT Stream and Wetland Mitigation Guidance Update (2016). Installed monitoring devices and plot locations closely mimic the locations of those proposed in the Site's Mitigation Plan. Deviations from these locations were made when professional judgement deemed them necessary to better represent as-built field conditions or when installation of the device in the proposed location was not physically feasible.

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 Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was collected by either a professional licensed surveyor or an Arrow 100® Submeter GNSS Receiver and processed using ArcPro. Crest gages, using automated pressure transducers, were installed in riffle cross-sections to monitor stream hydrology throughout the year. Groundwater gages were installed using guidance from the USACE's *Technical Standard for Water-Table Monitoring of Potential Wetland Sites* (2005). Stream hydrology and vegetation monitoring protocols followed the Wilmington District Stream and Wetland Compensatory Mitigation Update (NCIRT, 2016). Vegetation installation data collection follow the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008); however, vegetation data processing follows the NC DMS Vegetation Data Entry Tool and Vegetation Plot Data Table (NCDMS, 2020).

Section 5: REFERENCES

Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E. 2003. Stream Restoration A Natural Channel Design Handbook.

Harrelson, C.C., Rawlins, C.L., Potyondy, J.P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Retrieved: http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-5.pdf.

North Carolina Division of Mitigation Services. 2009 (NC DMS). French Broad River Basin Restoration Priorities (RBRP). Raleigh, NC.

NC DMS. 2020. Vegetation Data Entry Tool and Vegetation Plot Data Table. Raleigh, NC. https://ncdms.shinyapps.io/Veg_Table_Tool/

NC DMS and Interagency Review Team (IRT) Technical Workgroup. 2018. Standard Measurement of the BHR Monitoring Parameter. Raleigh, NC.

NC DMS and IRT Technical Workgroup. 2021. Pebble Count Data Requirements. Raleigh, NC. October 19, 2021.

North Carolina Division of Water Quality. 2016. Surface Water Classifications. http://portal.ncdenr.org/web/wq/ps/csu/classifications

North Carolina Geological Survey (NCGS), 1985, Geologic Map of North Carolina: Raleigh, North Carolina Department of Natural Resources and Community Development, Geological Survey Section, scale 1:500,00, in color.

North Carolina Interagency Review Team (NCIRT). 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update. Accessed at: https://saw-reg.usace.army.mil/PN/2016/Wilmington-District-Mitigation-Update.pdf

Reid, M. 2021. Email Correspondence, Pebble Count Data Requirements. October 28, 2021.

Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.

Rosgen, D.L. 1996. Applied River Morphology. Pagosa Springs, CO: Wildland Hydrology Books.

Simon, A. 1989. A model of channel response in disturbed alluvial channels. Earth Surface Processes and Landforms 14(1):11-26.

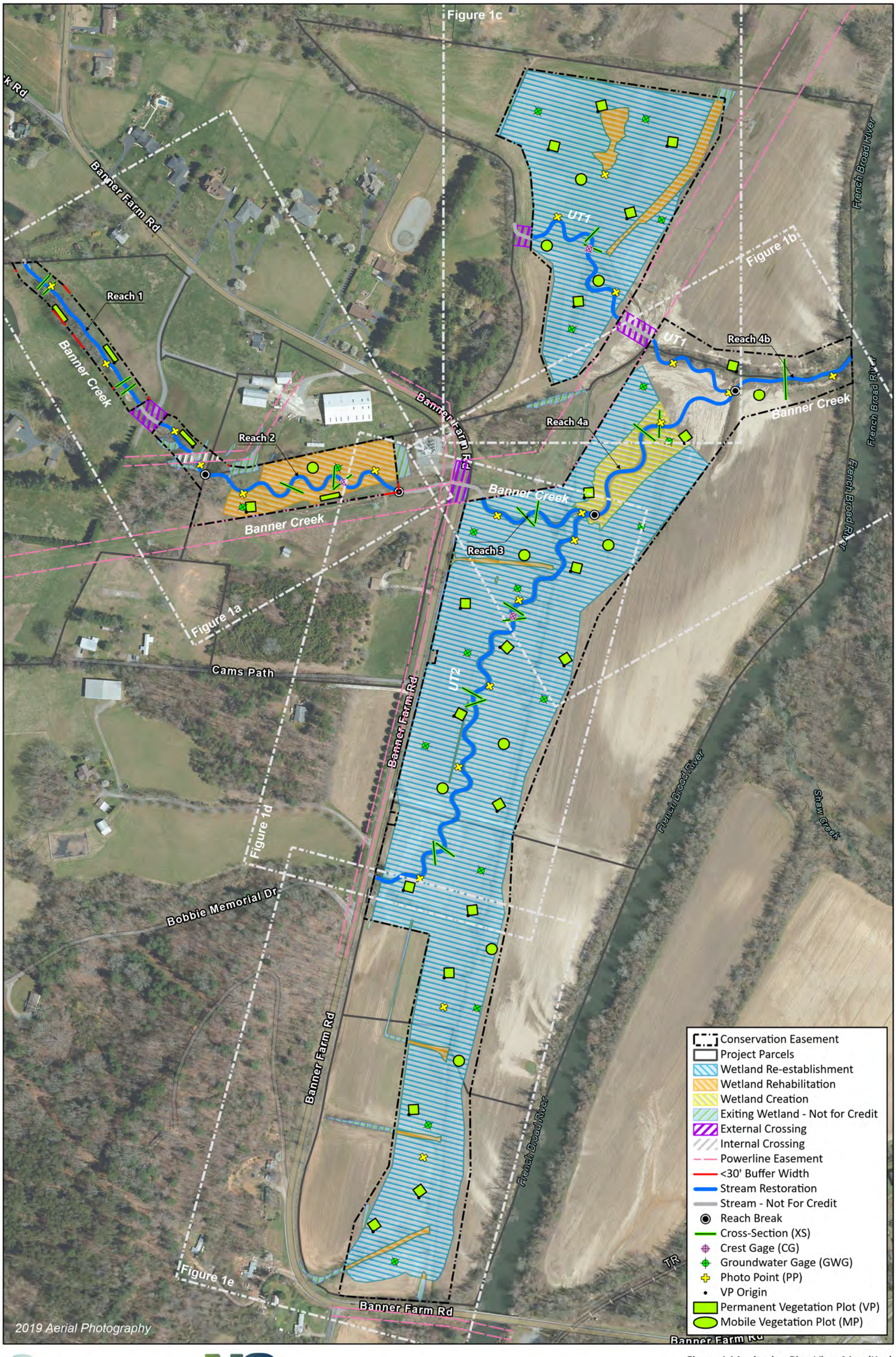
US Army Corps of Engineers (USACE). 2005. *Technical Standard for Water-Table Monitoring of Potential Wetland Sites*. ERDC TN-WRAP-05-2.

United States Geological Survey (USGS). 1998. North Carolina Geology.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2019. http://websoilsurvey.sc.egov.usda.gov/. Accessed August 2019.

Wildlands Engineering, Inc. (2020). Banner Farm Mitigation Site Final Mitigation Plan. DMS, Raleigh, NC.

Figures



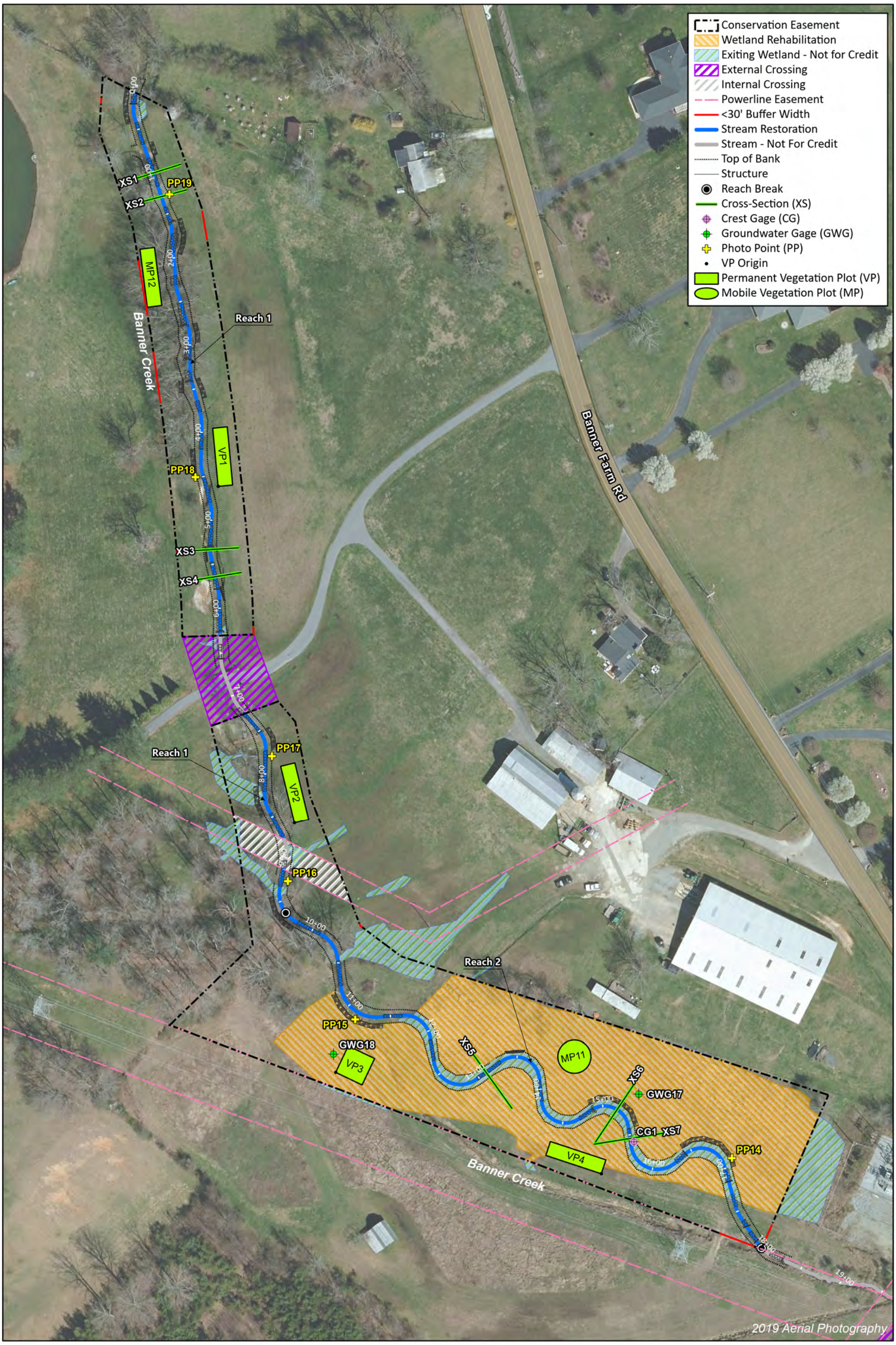
WILDLANDS ENGINEERING

Environmental Quality

0 600 Feet

Figure 1 Monitoring Plan View Map (Key)
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Henderson County, NC



WILDLANDS ENGINEERING

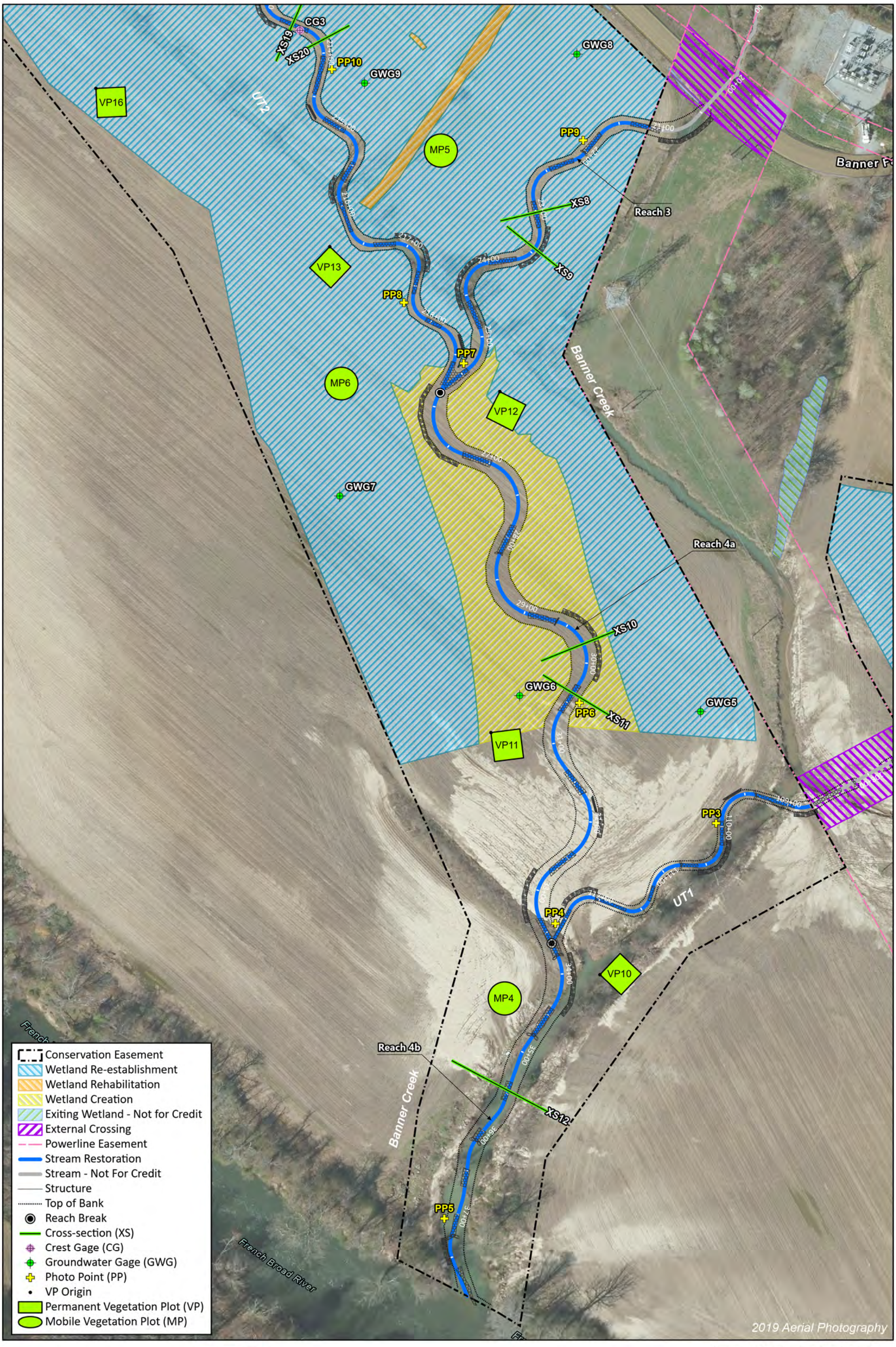
Environmental Quality

0 200 Feet

N

Figure 1a Monitoring Plan View Map
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Henderson County, NC



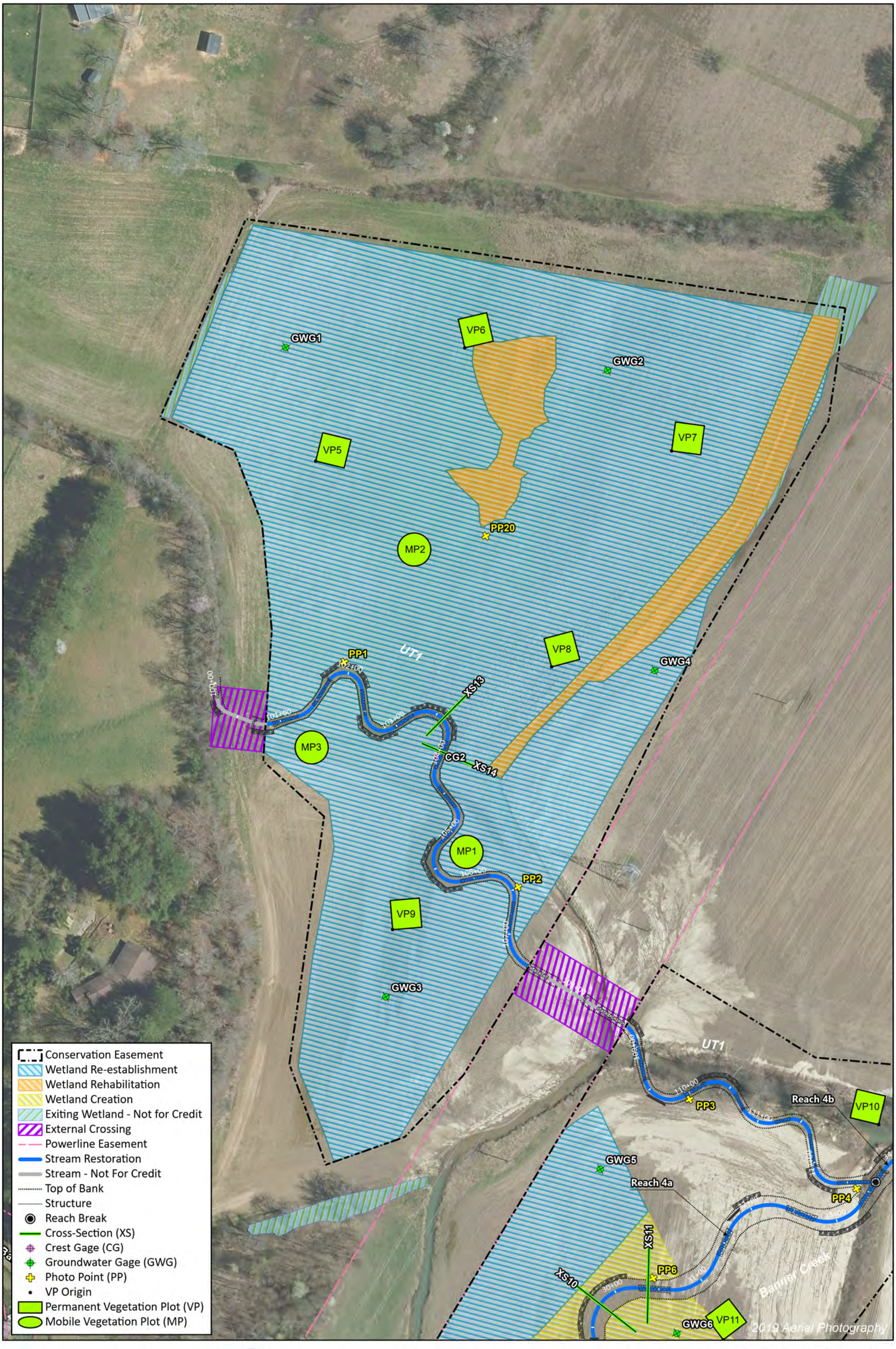
WILDLANDS ENGINEERING

Environmental Quality

0 200 Feet

Figure 1b Monitoring Plan View Map
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Henderson County, NC



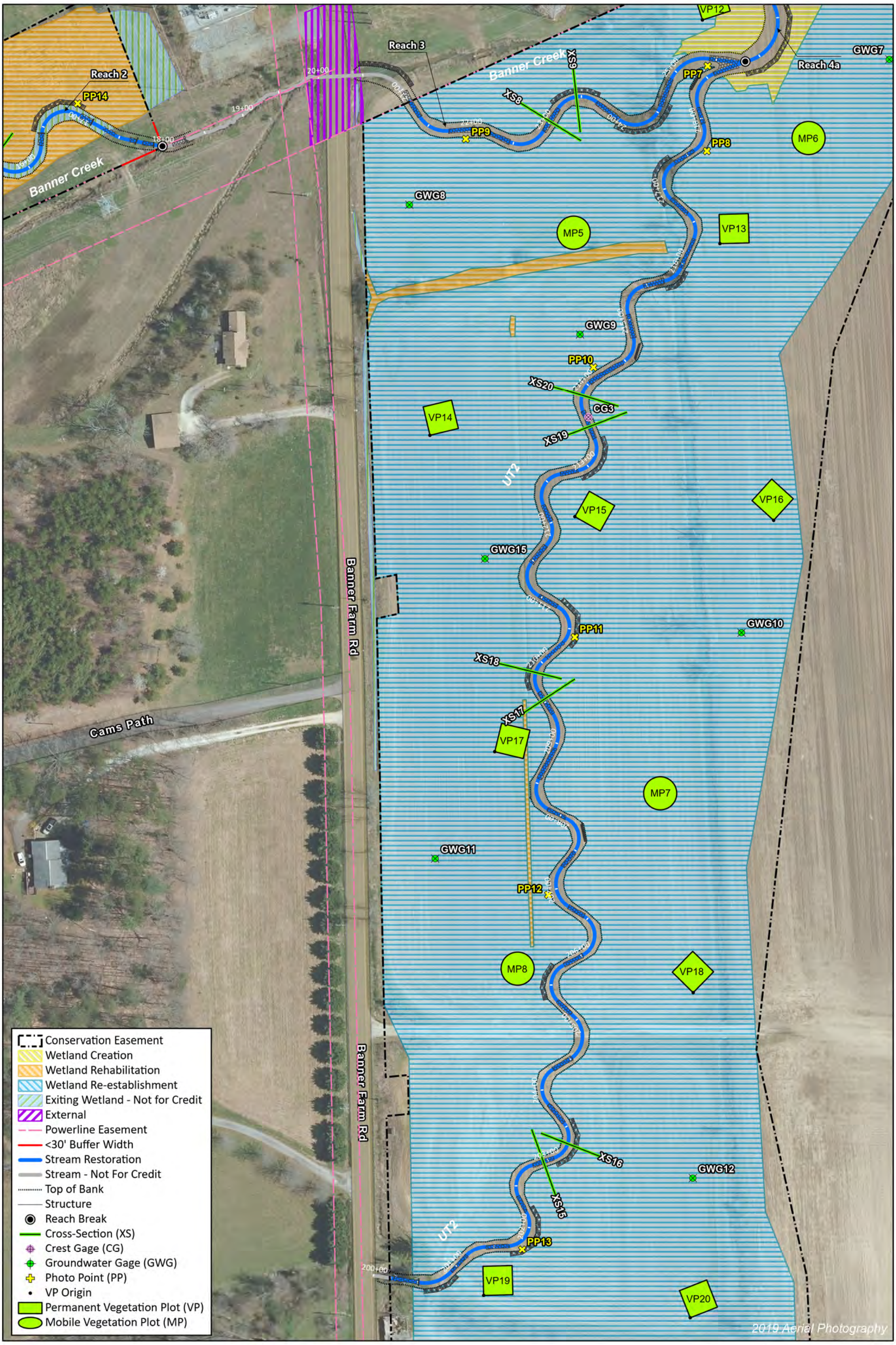
WILDLANDS ENGINEERING

Environmental Quality

0 200 Feet

Figure 1c Monitoring Plan View Map
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Henderson County, NC



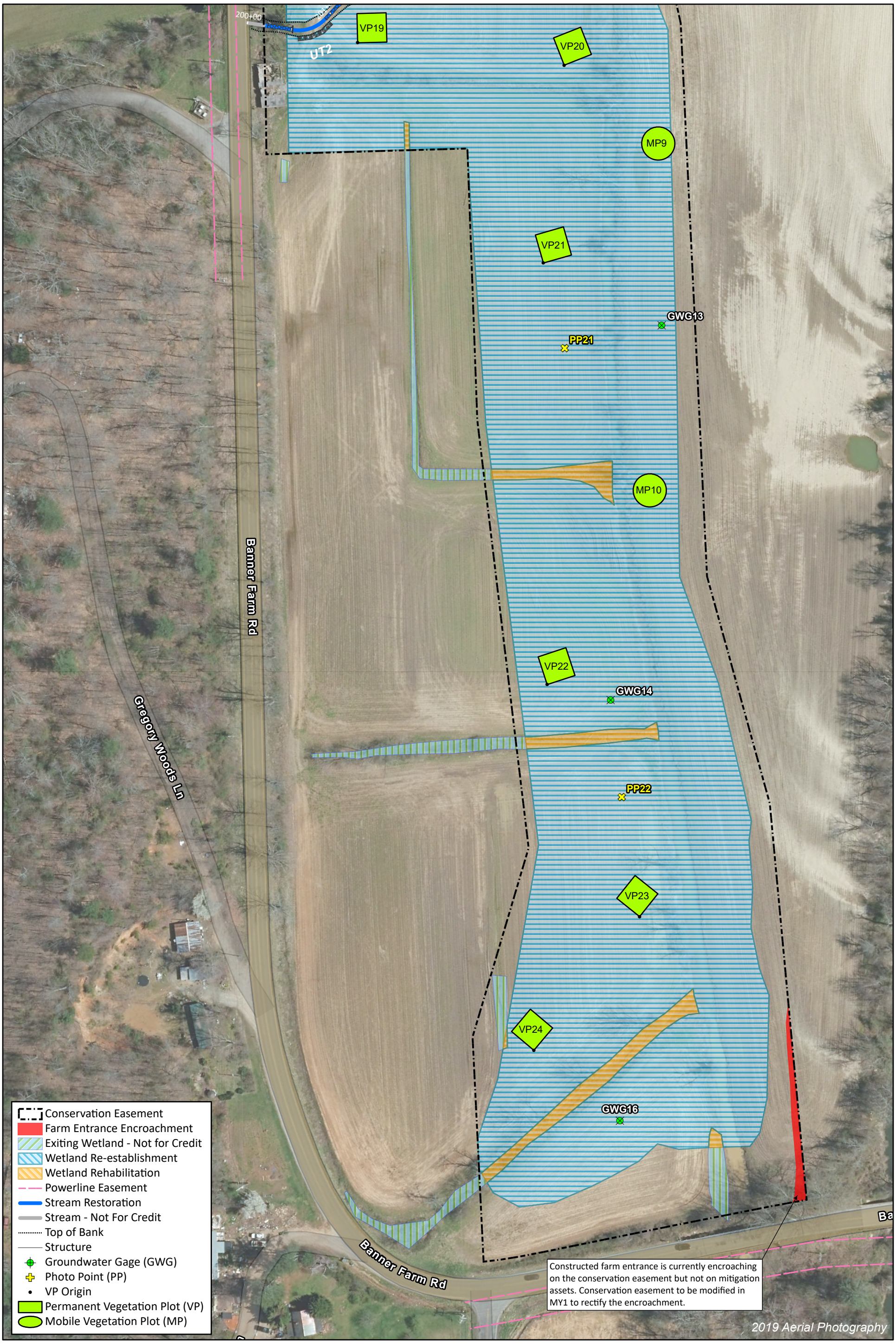
WILDLANDS ENGINEERING

Environmental Quality

0 200 Feet

Figure 1d Monitoring Plan View Map
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Henderson County, NC



WILDLANDS ENGINEERING

Environmental Quality

0 200 Feet

Figure 1e Monitoring Plan View Map
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Henderson County, NC

APPENDIX A. Visual Assessment Data

Table 4a-b. Visual Stream Morphology Stability Assessment Table

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Table 4a: Banner Creek Reach 1 Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	827
					Assessed Bank Length	1,654
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	9	9		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	12	12		100%

Table 4b: Banner Creek Reach 2 Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	836
					Assessed Bank Length	1,672
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	5	5		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	4	4		100%

Table 4c-d. Visual Stream Morphology Stability Assessment Table

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Table 4c: Banner Creek Reach 3 Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
				Assessed Stream Length		467
				Assessed Bank Length		934
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	1	1		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2		100%

Table 4d: Banner Creek Reach 4a Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
				Assessed Stream Length		780
				Assessed Bank Length		1,560
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	2	2		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5		100%

Table 4e-f. Visual Stream Morphology Stability Assessment Table

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Table 4e: Banner Creek Reach 4b Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	434
					Assessed Bank Length	868
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2		100%

Table 4f: UT1 Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	1,071
					Assessed Bank Length	2,142
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	4	4		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	8	8		100%

Table 4g. Visual Stream Morphology Stability Assessment Table

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Table 4g: UT2 Date Last Assessed: 3/02/2022

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
				Assessed Stream Length		1,879
				Assessed Bank Length		3,758
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	1	1		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	12	12		100%

Table 5. Vegetation Condition Assessment Table

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Planted Acreage **45.00** Date Last Assessed: 3/02/2022

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10	0	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10	0	0%
		Total	**0**	**0%**
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10	0	0%
		Cumulative Total	**0.0**	**0%**

Easement Acreage **46.60** Date Last Assessed: 3/02/2022

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Invasive species included in summation above should be identified in report summary.	0.10	0	0%
Easement Encroachment Areas	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	0 Encroachments Noted / 0 ac	

Stream Photographs
MY0

	
Photo Point 1 – UT1, view upstream *(02/16/2022)*	**Photo Point 1** – UT1, view downstream *(02/16/2022)*
	
Photo Point 2 – UT1, view upstream *(02/16/2022)*	**Photo Point 2** – UT1, view downstream *(02/16/2022)*
	
Photo Point 3 – UT1, view upstream *(02/16/2022)*	**Photo Point 3** – UT1, view downstream *(02/16/2022)*

Photo Point 4 – UT1, view upstream *(02/16/2022)*

Photo Point 4 – Banner Creek R4a, view upstream *(02/16/2022)*

Photo Point 4 – Banner Creek R4b, view downstream *(02/16/2022)*

Photo Point 5 – Banner Creek R4b, view upstream *(02/16/2022)*

Photo Point 5 – Banner Creek R4b, view downstream *(02/16/2022)*

Photo Point 6 – Banner Creek R4a, view upstream *(02/16/2022)*

Photo Point 6 – Banner Creek R4a, view downstream *(02/16/2022)*

Photo Point 7 – UT2, view upstream *(02/16/2022)*

Photo Point 7 – Banner Creek R3, view upstream *(02/16/2022)*

Photo Point 7 – Banner Creek R4a, view downstream *(02/16/2022)*

	
Photo Point 8 – UT2, view upstream *(02/16/2022)*	**Photo Point 8** – UT2, view downstream *(02/16/2022)*
	
Photo Point 9 – Banner Creek R3, view upstream *(02/16/2022)*	**Photo Point 9** – Banner Creek R3, view downstream *(02/16/2022)*
	
Photo Point 10 – UT2, view upstream *(02/16/2022)*	**Photo Point 10** – UT2, view downstream *(02/16/2022)*

	
Photo Point 11 – UT2, view upstream *(02/16/2022)*	**Photo Point 11** – UT2, view downstream *(02/16/2022)*
	
Photo Point 12 – UT2, view upstream *(02/16/2022)*	**Photo Point 12** – UT2, view downstream *(02/16/2022)*
	
Photo Point 13 – UT2, view upstream *(02/16/2022)*	**Photo Point 13** – UT2, view downstream *(02/16/2022)*

Photo Point 14 – Banner Creek R2, view upstream *(02/16/2022)*

Photo Point 14 – Banner Creek R2, view downstream *(02/16/2022)*

Photo Point 15 – Banner Creek R2, view upstream *(02/16/2022)*

Photo Point 15 – Banner Creek R2, view downstream *(02/16/2022)*

Photo Point 16 – Banner Creek R1, view upstream *(02/16/2022)*

Photo Point 16 – Banner Creek R1, view downstream *(02/16/2022)*

	
Photo Point 17 – Banner Creek R1, view upstream *(02/16/2022)*	**Photo Point 17** – Banner Creek R1, view downstream *(02/16/2022)*
	
Photo Point 18 – Banner Creek R1, view upstream *(02/16/2022)*	**Photo Point 18** – Banner Creek R1, view downstream *(02/16/2022)*
	
Photo Point 19 – Banner Creek R1, view upstream *(02/16/2022)*	**Photo Point 19** – Banner Creek R1, view downstream *(02/16/2022)*

Wetland Photographs
MY0

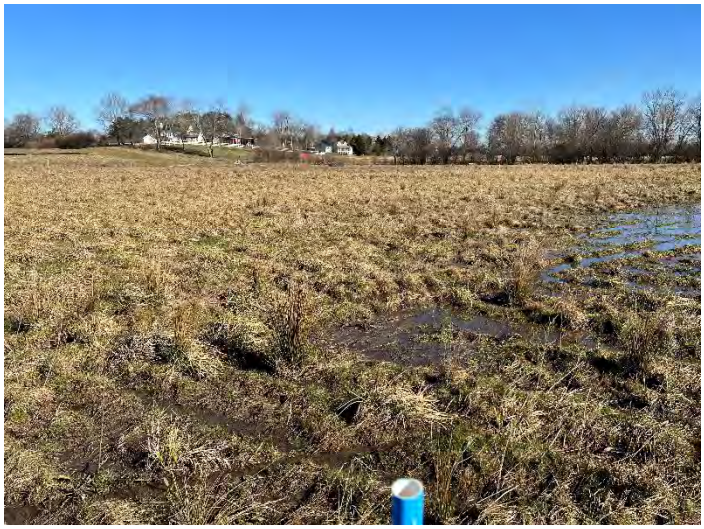


Photo Point 20 – wetland rehabilitation/re-establishment area, view north *(03/02/2022)*	**Photo Point 20** – wetland rehabilitation/re-establishment area, view east *(03/02/2022)*
	
Photo Point 20 – wetland re-establishment area, view south *(03/02/2022)*	**Photo Point 20** – wetland re-establishment area, view west *(03/02/2022)*

Photo Point 21 –
wetland re-establishment area, view north *(03/02/2022)*

Photo Point 21 –
wetland re-establishment area, view east *(03/02/2022)*

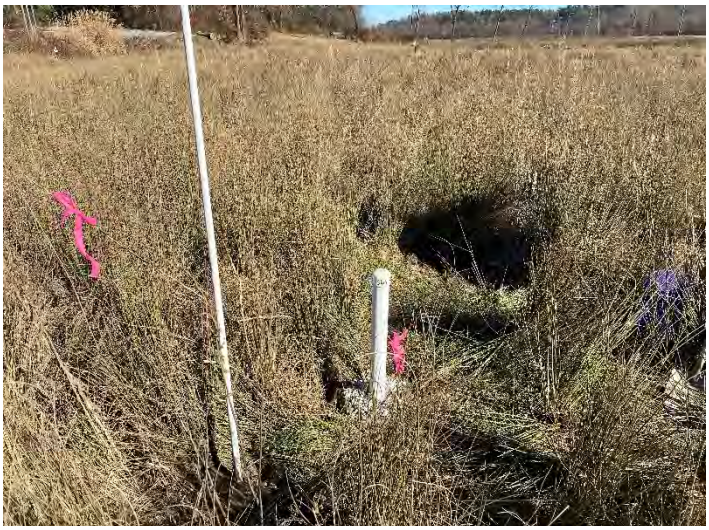
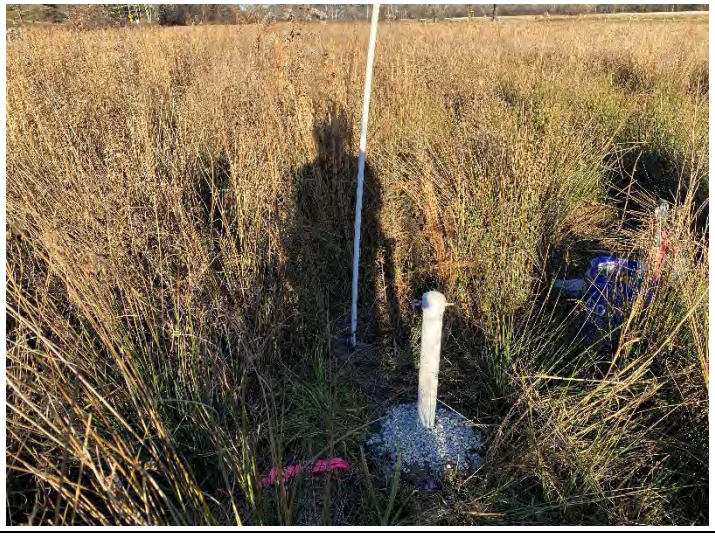
Photo Point 21 –
wetland re-establishment area, view south *(03/02/2022)*

Photo Point 21 –
wetland re-establishment area, view west *(03/02/2022)*

	
Photo Point 22 – wetland re-establishment area, view north *(03/02/2022)*	**Photo Point 22** – wetland re-establishment area, view east *(03/02/2022)*
	
Photo Point 22 – wetland re-establishment area, view south *(03/02/2022)*	**Photo Point 22** – wetland re-establishment area, view west *(03/02/2022)*

Groundwater Gage Photographs
MY0

	
GWG 1 – *(02/16/2022)*	**GWG 2** – *(02/16/2022)*
	
GWG 3 – *(02/16/2022)*	**GWG 4** – *(02/16/2022)*
	
GWG 5 – *(02/16/2022)*	**GWG 6** – *(02/16/2022)*

	
GWG 7 – *(02/16/2022)*	**GWG 8** – *(02/16/2022)*
	
GWG 9 – *(02/16/2022)*	**GWG 10** – *(06/29/2021)*
	
GWG 11 – *(02/16/2022)*	**GWG 12** – *(02/16/2022)*

	
GWG 13 – *(02/16/2022)*	**GWG 14** – *(02/16/2022)*
	
GWG 15 – *(02/16/2022)*	**GWG 16** – *(02/16/2022)*
	
GWG 17 – *(02/16/2022)*	**GWG 18** – *(02/16/2022)*

Groundwater Gage Soil Profile Photographs
MY0

GWG 1 Soil Profile – *(12/02/2021)*

GWG 2 Soil Profile – *(12/02/2021)*

GWG 3 Soil Profile – *(12/02/2021)*

GWG 4 Soil Profile – *(12/02/2021)*

GWG 5 Soil Profile – *(12/02/2021)*

GWG 6 Soil Profile – *(12/02/2021)*

GWG 7 Soil Profile – *(12/03/2021)*

GWG 8 Soil Profile – *(12/03/2021)*

GWG 9 Soil Profile – *(12/03/2021)*

GWG 10 Soil Profile – *(12/03/2021)*

GWG 11 Soil Profile – *(12/03/2021)*

GWG 12 Soil Profile – *(12/06/2021)*

GWG 13 Soil Profile – *(12/06/2021)*

GWG 14 Soil Profile – *(12/06/2021)*

GWG 15 Soil Profile – *(12/06/2021)*

GWG 16 Soil Profile – *(12/06/2021)*

GWG 17 Soil Profile – *(12/06/2021)*

GWG 18 Soil Profile – *(12/06/2021)*

Culvert Crossing Photographs
MY0

	
Culvert Crossing – Upper UT1, view upstream *(02/16/2022)*	**Culvert Crossing** – Upper UT1, view downstream *(02/16/2022)*
	
Culvert Crossing – Lower UT1, view upstream *(02/16/2022)*	**Culvert Crossing** – Lower UT1, view downstream *(02/16/2022)*
	
Culvert Crossing – Banner Creek R1, view upstream *(02/16/2022)*	**Culvert Crossing** – Banner Creek R1, view downstream *(02/16/2022)*

Vegetation Photographs

MY0

Permanent Vegetation Plot 1 *(02/16/2022)*

Permanent Vegetation Plot 2 *(02/16/2022)*

Permanent Vegetation Plot 3 *(02/16/2022)*

Permanent Vegetation Plot 4 *(02/16/2022)*

Permanent Vegetation Plot 5 *(02/15/2022)*

Permanent Vegetation Plot 6 *(02/15/2022)*

Permanent Vegetation Plot 7 *(02/15/2022)*

Permanent Vegetation Plot 8 *(02/15/2022)*

Permanent Vegetation Plot 9 *(02/15/2022)*

Permanent Vegetation Plot 10 *(02/15/2022)*

Permanent Vegetation Plot 11 *(02/15/2022)*

Permanent Vegetation Plot 12 *(02/15/2022)*

Permanent Vegetation Plot 13 *(02/15/2022)*

Permanent Vegetation Plot 14 *(02/15/2022)*

Permanent Vegetation Plot 15 *(02/15/2022)*

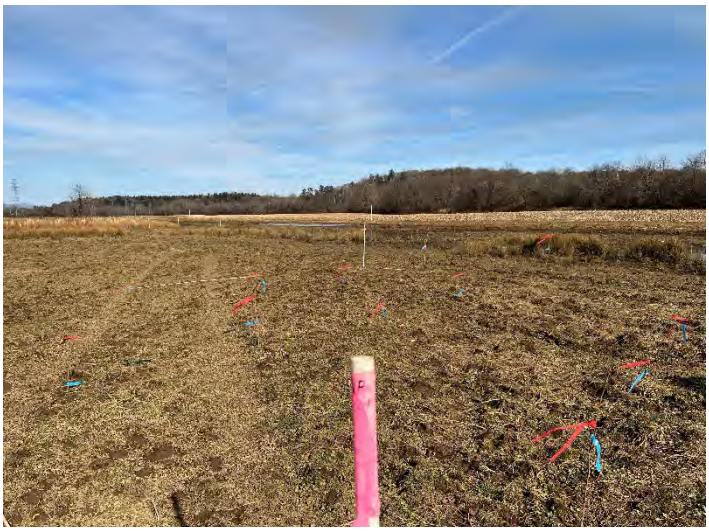
Permanent Vegetation Plot 16 *(02/15/2022)*

Permanent Vegetation Plot 17 *(02/15/2022)*

Permanent Vegetation Plot 18 *(02/15/2022)*

Permanent Vegetation Plot 19 *(02/15/2022)*

Permanent Vegetation Plot 20 *(02/15/2022)*



Permanent Vegetation Plot 21 *(02/15/2022)*

Permanent Vegetation Plot 22 *(02/15/2022)*

Permanent Vegetation Plot 23 *(02/15/2022)*

Permanent Vegetation Plot 24 *(02/15/2022)*

Mobile Vegetation Plot 1 *(02/15/2022)*

Mobile Vegetation Plot 2 *(02/15/2022)*

Mobile Vegetation Plot 3 *(03/03/2022)*

Mobile Vegetation Plot 4 *(02/15/2022)*

Mobile Vegetation Plot 5 *(02/15/2022)*

Mobile Vegetation Plot 6 *(02/15/2022)*

Mobile Vegetation Plot 7 *(02/15/2022)*

Mobile Vegetation Plot 8 *(02/15/2022)*

Mobile Vegetation Plot 9 *(02/15/2022)*

Mobile Vegetation Plot 10 *(02/15/2022)*

Mobile Vegetation Plot 11 *(03/03/2022)*

Mobile Vegetation Plot 12 *(02/15/2022)*

APPENDIX B. Vegetation Plot Data

Table 6a. Vegetation Plot Data
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Planted Acreage	45
Date of Initial Plant	2022-02-13
Date of Current Survey	2022-02-15
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC							2	2	2	2	3	3
	Acer saccharinum	silver maple	Tree	FACW			1	1	1	1						
	Alnus serrulata	hazel alder	Tree	OBL												
	Amelanchier arborea	common serviceberry	Tree	FAC	1	1			1	1						
	Asimina triloba	pawpaw	Tree	FAC											1	1
	Betula nigra	river birch	Tree	FACW	2	2	3	3	2	2	3	3	2	2	1	1
	Carpinus caroliniana	American hornbeam	Tree	FAC												
	Cornus florida	flowering dogwood	Tree	FACU	1	1										
	Diospyros virginiana	common persimmon	Tree	FAC	1	1	1	1	1	1						
	Fagus grandifolia	American beech	Tree	FACU			1	1	1	1						
	Fraxinus pennsylvanica	green ash	Tree	FACW	2	2	2	2								
	Hamamelis virginiana	American witchhazel	Tree	FACU					1	1						
	Ilex opaca	American holly	Tree	FACU											1	1
	Lindera benzoin	northern spicebush	Tree	FAC					1	1			1	1	1	1
	Liriodendron tulipifera	tuliptree	Tree	FACU			1	1			1	1	2	2		
	Nyssa sylvatica	blackgum	Tree	FAC	1	1	2	2	1	1	2	2	1	1	2	2
	Platanus occidentalis	American sycamore	Tree	FACW	1	1	2	2	3	3	1	1	1	1	2	2
	Prunus serotina	black cherry	Tree	FACU	3	3										
	Quercus falcata	southern red oak	Tree	FACU	2	2	2	2	2	2						
	Quercus rubra	northern red oak	Tree	FACU	2	2										
	Salix nigra	black willow	Tree	OBL							3	3	4	4	3	3
	Sambucus canadensis	American black elderberry	Tree								1	1				
	Ulmus americana	American elm	Tree	FACW							1	1	1	1	1	1
Sum	Performance Standard				16	16	15	15	14	14	14	14	14	14	15	15
Mitigation Plan Performance Standard	Current Year Stem Count					16		15		14		14		14		15
	Stems/Acre					648		607		567		567		567		607
	Species Count					10		9		10		8		8		9
	Dominant Species Composition (%)					19		20		21		21		29		20
	Average Plot Height (ft.)					2		2		2		3		3		3
	% Invasives					0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					16		15		14		14		14		15
	Stems/Acre					648		607		567		567		567		607
	Species Count					10		9		10		8		8		9
	Dominant Species Composition (%)					19		20		21		21		29		20
	Average Plot Height (ft.)					2		2		2		3		3		3
	% Invasives					0		0		0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6b. Vegetation Plot Data
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Planted Acreage	45
Date of Initial Plant	2022-02-13
Date of Current Survey	2022-02-15
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC	2	2	3	3	1	1			2	2	1	1
	Acer saccharinum	silver maple	Tree	FACW												
	Alnus serrulata	hazel alder	Tree	OBL							1	1	2	2	1	1
	Amelanchier arborea	common serviceberry	Tree	FAC												
	Asimina triloba	pawpaw	Tree	FAC			1	1								
	Betula nigra	river birch	Tree	FACW	2	2	3	3	2	2	1	1	2	2	1	1
	Carpinus caroliniana	American hornbeam	Tree	FAC	1	1	1	1					1	1	1	1
	Cornus florida	flowering dogwood	Tree	FACU							1	1				
	Diospyros virginiana	common persimmon	Tree	FAC							1	1				
	Fagus grandifolia	American beech	Tree	FACU												
	Fraxinus pennsylvanica	green ash	Tree	FACW												
	Hamamelis virginiana	American witchhazel	Tree	FACU							2	2				
	Ilex opaca	American holly	Tree	FACU									1	1	1	1
	Lindera benzoin	northern spicebush	Tree	FAC							1	1				
	Liriodendron tulipifera	tuliptree	Tree	FACU					2	2						
	Nyssa sylvatica	blackgum	Tree	FAC	3	3	1	1	2	2			1	1		
	Platanus occidentalis	American sycamore	Tree	FACW	3	3	2	2	3	3	2	2	2	2	4	4
	Prunus serotina	black cherry	Tree	FACU							1	1				
	Quercus falcata	southern red oak	Tree	FACU							2	2				
	Quercus rubra	northern red oak	Tree	FACU							3	3				
	Salix nigra	black willow	Tree	OBL	2	2	2	2	1	1			3	3	3	3
	Sambucus canadensis	American black elderberry	Tree		1	1	1	1							1	1
	Ulmus americana	American elm	Tree	FACW	2	2	1	1	3	3			1	1	2	2
Sum	Performance Standard				16	16	15	15	14	14	15	15	15	15	15	15
Mitigation Plan Performance Standard	Current Year Stem Count					16		15		14		15		15		15
	Stems/Acre					648		607		567		607		607		607
	Species Count					8		9		7		10		9		9
	Dominant Species Composition (%)					19		20		21		20		20		27
	Average Plot Height (ft.)					3		3		2		2		2		3
	% Invasives					0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					16		15		14		15		15		15
	Stems/Acre					648		607		567		607		607		607
	Species Count					8		9		7		10		9		9
	Dominant Species Composition (%)					19		20		21		20		20		27
	Average Plot Height (ft.)					3		3		2		2		2		3
	% Invasives					0		0		0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6c. Vegetation Plot Data

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

Planted Acreage	45
Date of Initial Plant	2022-02-13
Date of Current Survey	2022-02-15
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 13 F		Veg Plot 14 F		Veg Plot 15 F		Veg Plot 16 F		Veg Plot 17 F		Veg Plot 18 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC	5	5	2	2	3	3	3	3	3	3	2	2
	Acer saccharinum	silver maple	Tree	FACW												
	Alnus serrulata	hazel alder	Tree	OBL			1	1								
	Amelanchier arborea	common serviceberry	Tree	FAC												
	Asimina triloba	pawpaw	Tree	FAC												
	Betula nigra	river birch	Tree	FACW	1	1	2	2	4	4	3	3	2	2	3	3
	Carpinus caroliniana	American hornbeam	Tree	FAC												
	Cornus florida	flowering dogwood	Tree	FACU												
	Diospyros virginiana	common persimmon	Tree	FAC												
	Fagus grandifolia	American beech	Tree	FACU												
	Fraxinus pennsylvanica	green ash	Tree	FACW												
	Hamamelis virginiana	American witchhazel	Tree	FACU												
	Ilex opaca	American holly	Tree	FACU			1	1								
	Lindera benzoin	northern spicebush	Tree	FAC												
	Liriodendron tulipifera	tuliptree	Tree	FACU			1	1	1	1	1	1	2	2		
	Nyssa sylvatica	blackgum	Tree	FAC	1	1	1	1			1	1	2	2	1	1
	Platanus occidentalis	American sycamore	Tree	FACW	3	3	1	1	4	4	5	5	2	2	3	3
	Prunus serotina	black cherry	Tree	FACU												
	Quercus falcata	southern red oak	Tree	FACU												
	Quercus rubra	northern red oak	Tree	FACU												
	Salix nigra	black willow	Tree	OBL	1	1	4	4	1	1	1	1	2	2	5	5
	Sambucus canadensis	American black elderberry	Tree													
	Ulmus americana	American elm	Tree	FACW	3	3	1	1	2	2	2	2	1	1	2	2
Sum	Performance Standard				14	14	14	14	15	15	16	16	14	14	16	16
Mitigation Plan Performance Standard	Current Year Stem Count					14		14		15		16		14		16
	Stems/Acre					567		567		607		648		567		648
	Species Count					6		9		6		7		7		6
	Dominant Species Composition (%)					36		29		27		31		21		31
	Average Plot Height (ft.)					2		3		2		2		3		3
	% Invasives					0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					14		14		15		16		14		16
	Stems/Acre					567		567		607		648		567		648
	Species Count					6		9		6		7		7		6
	Dominant Species Composition (%)					36		29		27		31		21		31
	Average Plot Height (ft.)					2		3		2		2		3		3
	% Invasives					0		0		0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6d. Vegetation Plot Data
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Planted Acreage	45
Date of Initial Plant	2022-02-13
Date of Current Survey	2022-02-15
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 19 F		Veg Plot 20 F		Veg Plot 21 F		Veg Plot 22 F		Veg Plot 23 F		Veg Plot 24 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC	1	1	3	3	2	2	2	2	4	4	1	1
	Acer saccharinum	silver maple	Tree	FACW												
	Alnus serrulata	hazel alder	Tree	OBL	1	1							1	1	1	1
	Amelanchier arborea	common serviceberry	Tree	FAC												
	Asimina triloba	pawpaw	Tree	FAC												
	Betula nigra	river birch	Tree	FACW	2	2	2	2	2	2	3	3	5	5	3	3
	Carpinus caroliniana	American hornbeam	Tree	FAC	1	1							1	1		
	Cornus florida	flowering dogwood	Tree	FACU												
	Diospyros virginiana	common persimmon	Tree	FAC												
	Fagus grandifolia	American beech	Tree	FACU												
	Fraxinus pennsylvanica	green ash	Tree	FACW												
	Hamamelis virginiana	American witchhazel	Tree	FACU												
	Ilex opaca	American holly	Tree	FACU												
	Lindera benzoin	northern spicebush	Tree	FAC												
	Liriodendron tulipifera	tuliptree	Tree	FACU					1	1			1	1	1	1
	Nyssa sylvatica	blackgum	Tree	FAC	2	2	2	2	4	4	3	3	2	2	2	2
	Platanus occidentalis	American sycamore	Tree	FACW	1	1	3	3	4	4			2	2	3	3
	Prunus serotina	black cherry	Tree	FACU												
	Quercus falcata	southern red oak	Tree	FACU												
	Quercus rubra	northern red oak	Tree	FACU												
	Salix nigra	black willow	Tree	OBL	4	4	3	3	2	2	5	5			2	2
	Sambucus canadensis	American black elderberry	Tree													
	Ulmus americana	American elm	Tree	FACW			3	3	1	1	2	2			1	1
Sum	Performance Standard				12	12	16	16	16	16	15	15	16	16	14	14
Mitigation Plan Performance Standard	Current Year Stem Count					12		16		16		15		16		14
	Stems/Acre					486		648		648		607		648		567
	Species Count					7		6		7		5		7		8
	Dominant Species Composition (%)					33		19		25		33		31		21
	Average Plot Height (ft.)					3		2		3		3		2		2
	% Invasives					0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					12		16		16		15		16		14
	Stems/Acre					486		648		648		607		648		567
	Species Count					7		6		7		5		7		8
	Dominant Species Composition (%)					33		19		25		33		31		21
	Average Plot Height (ft.)					3		2		3		3		2		2
	% Invasives					0		0		0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6e. Vegetation Plot Data

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

Planted Acreage	45
Date of Initial Plant	2022-02-13
Date of Current Survey	2022-02-15
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 1 R	Veg Plot 2 R	Veg Plot 3 R	Veg Plot 4 R	Veg Plot 5 R	Veg Plot 6 R	Veg Plot 7 R	Veg Plot 8 R	Veg Plot 9 R	Veg Plot 10 R	Veg Plot 11 R	Veg Plot 12 R
					Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Acer negundo	boxelder	Tree	FAC	2		1	1	5	3	3	1	1	1	3	
	Acer saccharinum	silver maple	Tree	FACW												
	Alnus serrulata	hazel alder	Tree	OBL							1					1
	Amelanchier arborea	common serviceberry	Tree	FAC												
	Asimina triloba	pawpaw	Tree	FAC		1				1						
	Betula nigra	river birch	Tree	FACW			1	2	2	5	4	3	5	1		2
	Carpinus caroliniana	American hornbeam	Tree	FAC		2	1				1	1		1		1
	Cornus florida	flowering dogwood	Tree	FACU	1			3								1
	Diospyros virginiana	common persimmon	Tree	FAC				1	1	1	1				2	3
	Fagus grandifolia	American beech	Tree	FACU												
	Fraxinus pennsylvanica	green ash	Tree	FACW												2
	Hamamelis virginiana	American witchhazel	Tree	FACU												
	Ilex opaca	American holly	Tree	FACU		1								2		
	Lindera benzoin	northern spicebush	Tree	FAC												2
	Liriodendron tulipifera	tuliptree	Tree	FACU		2	1	1				1		1	2	1
	Nyssa sylvatica	blackgum	Tree	FAC	2			1				1	1	2	2	1
	Platanus occidentalis	American sycamore	Tree	FACW		1		1	1	2	1	1		1	2	3
	Prunus serotina	black cherry	Tree	FACU												2
	Quercus falcata	southern red oak	Tree	FACU				2								2
	Quercus rubra	northern red oak	Tree	FACU	1										1	
	Salix nigra	black willow	Tree	OBL	3	4	6					2	2	2		
	Sambucus canadensis	American black elderberry	Tree							1					1	
	Ulmus americana	American elm	Tree	FACW	1	1	1		2				1	1		
Sum	Performance Standard				10	12	11	12	11	13	11	10	10	12	13	21
Mitigation Plan Performance Standard	Current Year Stem Count				10	12	11	12	11	13	11	10	10	12	13	21
	Stems/Acre				405	486	445	486	445	526	445	405	405	486	526	850
	Species Count				6	7	6	8	5	6	6	7	5	9	7	12
	Dominant Species Composition (%)				30	33	55	25	45	38	36	30	50	17	23	14
	Average Plot Height (ft.)				3	2	3	2	2	2	2	2	2	2	2	2
	% Invasives				0	0	0	0	0	0	0	0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count				10	12	11	12	11	13	11	10	10	12	13	21
	Stems/Acre				405	486	445	486	445	526	445	405	405	486	526	850
	Species Count				6	7	6	8	5	6	6	7	5	9	7	12
	Dominant Species Composition (%)				30	33	55	25	45	38	36	30	50	17	23	14
	Average Plot Height (ft.)				3	2	3	2	2	2	2	2	2	2	2	2
	% Invasives				0	0	0	0	0	0	0	0	0	0	0	0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 7a. Vegetation Performance Standards Summary Table

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	2	10	0	607	2	9	0	567	2	10	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	567	3	8	0	567	3	8	0	607	3	9	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	3	8	0	607	3	9	0	567	2	7	0
	Veg Plot 10 F				Veg Plot 11 F				Veg Plot 12 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607	2	10	0	607	2	9	0	607	3	9	0

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

Table 7b. Vegetation Performance Standards Summary Table

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	Veg Plot 13 F				Veg Plot 14 F				Veg Plot 15 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	567	2	6	0	567	3	9	0	607	2	6	0
	Veg Plot 16 F				Veg Plot 17 F				Veg Plot 18 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	2	7	0	567	3	7	0	648	3	6	0
	Veg Plot 19 F				Veg Plot 20 F				Veg Plot 21 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	486	3	7	0	648	2	6	0	648	3	7	0
	Veg Plot 22 F				Veg Plot 23 F				Veg Plot 24 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607	3	5	0	648	2	7	0	567	2	8	0

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

Table 7c. Vegetation Performance Standards Summary Table

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	Veg Plot Group 1 R				Veg Plot Group 2 R				Veg Plot Group 3 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	405	3	6	0	486	2	7	0	445	3	6	0
	Veg Plot Group 4 R				Veg Plot Group 5 R				Veg Plot Group 6 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	486	2	8	0	445	2	5	0	526	2	6	0
	Veg Plot Group 7 R				Veg Plot Group 8 R				Veg Plot Group 9 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	445	2	6	0	405	2	7	0	405	2	5	0
	Veg Plot Group 10 R				Veg Plot Group 11 R				Veg Plot Group 12 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	486	2	9	0	526	2	7	0	850	2	12	0

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

APPENDIX C. Stream Geomorphology Data

Table 8a. Baseline Stream Data Summary

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**Banner Creek R1**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	9.8		1	13.5		12.8	14.0	2
Floodprone Width (ft)	25		1	30	68	61	62	2
Bankfull Mean Depth	1.2		1	1.0		1.1	1.2	2
Bankfull Max Depth	1.7		1	1.7		1.8	2.0	2
Bankfull Cross Sectional Area (ft^2)	12.0		1	14.0		15.9	15.9	2
Width/Depth Ratio	8.2		1	13.0		10.2	12.3	2
Entrenchment Ratio	2.5		1	2.2	5.0	4.4	4.7	2
Bank Height Ratio	2.2		1	1.0	1.1	1.0	1.0	2
Max part size (mm) mobilized at bankfull	-			33		-		
Rosgen Classification	C4			C4		C4		
Bankfull Discharge (cfs)	40.5		1	40.0	43.0	52.3	55.2	2
Sinuosity	1.08			1.20		1.20		
Water Surface/Channel Slope $(ft/ft)^2$	0.006			0.002		0.005		
Other	-			-		-		
Parameter	**Banner Creek R2**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	10.4		1	13.5		10.2	13.3	2
Floodprone Width (ft)	58		1	30	68	81	86	2
Bankfull Mean Depth	1.1		1	1.0		0.9	1.1	2
Bankfull Max Depth	2.3		1	1.2	1.7	1.4	1.9	2
Bankfull Cross Sectional Area (ft^2)	11.6		1	14.0		9.6	14.6	2
Width/Depth Ratio	9.3		1	13.0		10.9	12.0	2
Entrenchment Ratio	14.4		1	2.2	5.0	6.5	7.9	2
Bank Height Ratio	1.4		1	1.0	1.1	1.0	1.0	2
Max part size (mm) mobilized at bankfull	-			33		-		
Rosgen Classification	C5/4			C4		C4		
Bankfull Discharge (cfs)	45.7		1	40.0	43.0	18.7	32.1	2
Sinuosity	1.01			1.20		1.20		
Water Surface/Channel Slope $(ft/ft)^2$	0.007			0.002		0.003		
Other	-			-		-		

Table 8b. Baseline Stream Data Summary

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**Banner Creek R3**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	7.4		1	14.8		14.9		1
Floodprone Width (ft)	31		1	33	74	88		1
Bankfull Mean Depth	1.6		1	1.0		1.4		1
Bankfull Max Depth	2.1		1	1.7		2.2		1
Bankfull Cross Sectional Area (ft^2)	11.9		1	17.3		20.6		1
Width/Depth Ratio	4.6		1	13.0		10.7		1
Entrenchment Ratio	4.2		1	2.2	5.0	5.9		1
Bank Height Ratio	1.7		1	1.0	1.1	1.0		1
Max part size (mm) mobilized at bankfull	-			33		-		
Rosgen Classification	C4			C4		C4		
Bankfull Discharge (cfs)	42.5		1	44.0		44.2		1
Sinuosity	1.00			1.30		1.30		
Water Surface/Channel Slope $(ft/ft)^2$	0.009			0.002		0.002		
Other	-			-		-		
Parameter	**Banner Creek R4a**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	19.4		1	19.8		20.0		1
Floodprone Width (ft)	23		1	44	99	94		1
Bankfull Mean Depth	1.7		1	1.5		1.4		1
Bankfull Max Depth	2.6		1	2.5		2.5		1
Bankfull Cross Sectional Area (ft^2)	32.4		1	30.3		28.2		1
Width/Depth Ratio	11.4		1	13.0		14.2		1
Entrenchment Ratio	1.2		1	2.2	5.0	4.7		1
Bank Height Ratio	2.1		1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	-			44		-		
Rosgen Classification	C4			C5/4		C5/4		
Bankfull Discharge (cfs)	57.5		1	60.0		60.1		1
Sinuosity	1.02			1.20		1.20		
Water Surface/Channel Slope $(ft/ft)^2$	0.001			0.001		0.002		
Other	-			-		-		

Table 8c. Baseline Stream Data Summary

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**Banner Creek Reach 4b**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	19.4		1	20.8		22.4		1
Floodprone Width (ft)	23		1	46	104	114		1
Bankfull Mean Depth	1.7		1	1.6		1.6		1
Bankfull Max Depth	2.6		1	1.9	2.7	2.7		1
Bankfull Cross Sectional Area (ft^2)	32.4		1	32.7		35.5		1
Width/Depth Ratio	11.4		1	13.0		14.2		1
Entrenchment Ratio	1.2		1	2.2	5.0	5.1		1
Bank Height Ratio	2.1		1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	-			45		-		
Rosgen Classification	C4			C5/4		C5/4		
Bankfull Discharge (cfs)	57.5		1	70.0		145.3		1
Sinuosity	1.02			1.20		1.20		
Water Surface/Channel Slope $(ft/ft)^2$	0.001			0.002		0.005		
Other	-			-		-		
Parameter	**UT1**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	5.2	10.0	1	9.0		9.2		1
Floodprone Width (ft)	15	24	1	20	72	66		1
Bankfull Mean Depth	0.7	0.8	1	0.9		1.0		1
Bankfull Max Depth	1.4	1.7	1	1.5		1.6		1
Bankfull Cross Sectional Area (ft^2)	3.6	7.8	1	8.4		9.6		1
Width/Depth Ratio	7.5	12.9	1	10.0		8.9		1
Entrenchment Ratio	2.4	2.9	1	2.2	8.0	7.2		1
Bank Height Ratio	2.0	2.1	1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	-			30		-		
Rosgen Classification	E/C5			E5		E5		
Bankfull Discharge (cfs)	5.0	8.0	1	14.0		23.5		1
Sinuosity	1.10			1.30		1.30		
Water Surface/Channel Slope $(ft/ft)^2$	0.003			0.002		0.004		
Other	-			-		-		

Table 8d. Baseline Stream Data Summary

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**UT2**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	4.6		1	12.0		11.0	12.0	3
Floodprone Width (ft)	16		1	26	60	75	82	3
Bankfull Mean Depth	0.9		1	1.1		1.1	1.4	3
Bankfull Max Depth	1.2		1	1.7		1.6	2.0	3
Bankfull Cross Sectional Area (ft^2)	4.1		1	12.8		11.9	15.4	3
Width/Depth Ratio	5.1		1	11.0		7.8	10.5	3
Entrenchment Ratio	3.5		1	2.2	5.0	6.2	7.5	3
Bank Height Ratio	1.4		1	1.0		1.0	1.0	3
Max part size (mm) mobilized at bankfull	-			33		-		
Rosgen Classification	E/C5			C4		C4		
Bankfull Discharge (cfs)	10.0	13.0	1	25.0		14.8	22.5	3
Sinuosity	1.28			1.30		1.30		
Water Surface/Channel Slope $(ft/ft)^2$	0.005			0.002		0.001		
Other	-			-		-		

Table 9a. Cross-Section Morphology Monitoring Summary

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	Banner Creek Reach 1																							
	Cross-Section 1 (Riffle)						Cross-Section 2 (Pool)						Cross-Section 3 (Pool)						Cross-Section 4 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	2063.92						2063.62						2062.56						2062.07					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.0						-						-						1.0					
Thalweg Elevation	2062.09						2060.14						2059.01						2060.08					
LTOB[2] Elevation	2063.92						2063.62						2062.56						2062.07					
LTOB[2] Max Depth (ft)	1.8						3.5						3.5						2.0					
LTOB[2] Cross Sectional Area (ft^2)	15.9						31.0						26.6						15.9					
	Banner Creek Reach 2																		Banner Creek Reach 3					
	Cross-Section 5 (Riffle)						Cross-Section 6 (Pool)						Cross-Section 7 (Riffle)						Cross-Section 8 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	2058.64						2057.76						2057.92						2055.76					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.0						-						1.0						1.0					
Thalweg Elevation	2056.76						2054.66						2056.49						2053.52					
LTOB[2] Elevation	2058.64						2057.76						2057.92						2055.76					
LTOB[2] Max Depth (ft)	1.9						3.1						1.4						2.2					
LTOB[2] Cross Sectional Area (ft^2)	14.6						26.5						9.6						20.6					
	Banner Creek Reach 3						Banner Creek Reach 4a												Banner Creek Reach 4b					
	Cross-Section 9 (Pool)						Cross-Section 10 (Pool)						Cross-Section 11 (Riffle)						Cross-Section 12 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	2055.55						2054.68						2054.69						2053.69					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.0						-						1.0						1.0					
Thalweg Elevation	2052.03						2050.36						2052.14						2050.95					
LTOB[2] Elevation	2055.55						2054.68						2054.69						2053.69					
LTOB[2] Max Depth (ft)	3.5						4.3						2.5						2.7					
LTOB[2] Cross Sectional Area (ft^2)	26.2						68.4						28.2						35.5					

[1] Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation.

[2] LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Table 9b. Cross-Section Morphology Monitoring Summary

Banner Farm Mitigation Site

DMS Project No. 100062

Monitoring Year 0 - 2022

	UT1												UT2											
	Cross-Section 13 (Pool)						Cross-Section 14 (Riffle)						Cross-Section 15 (Riffle)						Cross-Section 16 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	2056.51						2056.54						2057.14						2056.67					
Bank Height Ratio - Based on AB Bankfull[1] Area	-						1.0						1.0						-					
Thalweg Elevation	2053.81						2054.96						2055.16						2053.10					
LTOB[2] Elevation	2056.51						2056.54						2057.14						2056.67					
LTOB[2] Max Depth (ft)	2.7						1.6						2.0						3.6					
LTOB[2] Cross Sectional Area (ft^2)	16.8						9.6						15.4						28.4					
	UT2																							
	Cross-Section 17 (Riffle)						Cross-Section 18 (Pool)						Cross-Section 19 (Riffle)						Cross-Section 20 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	2056.27						2055.93						2055.87						2055.80					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.0						-						1.0						-					
Thalweg Elevation	2054.31						2052.20						2054.24						2052.10					
LTOB[2] Elevation	2056.27						2055.93						2055.87						2055.80					
LTOB[2] Max Depth (ft)	2.0						3.7						1.6						3.7					
LTOB[2] Cross Sectional Area (ft^2)	14.1						24.5						11.9						33.3					

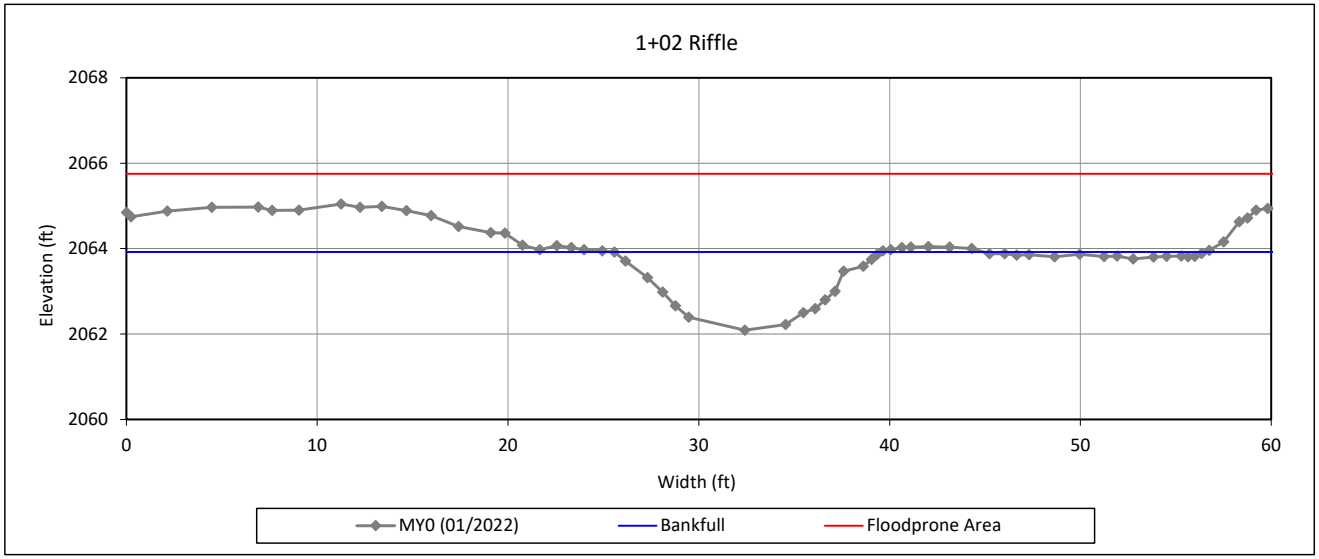
[1]Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation.

[2]LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 1-Banner Creek Reach 1



Bankfull Dimensions

15.9	x-section area (ft.sq.)
14.0	width (ft)
1.1	mean depth (ft)
1.8	max depth (ft)
14.7	wetted perimeter (ft)
1.1	hydraulic radius (ft)
12.3	width-depth ratio
61.7	W flood prone area (ft)
4.4	entrenchment ratio
1.0	low bank height ratio

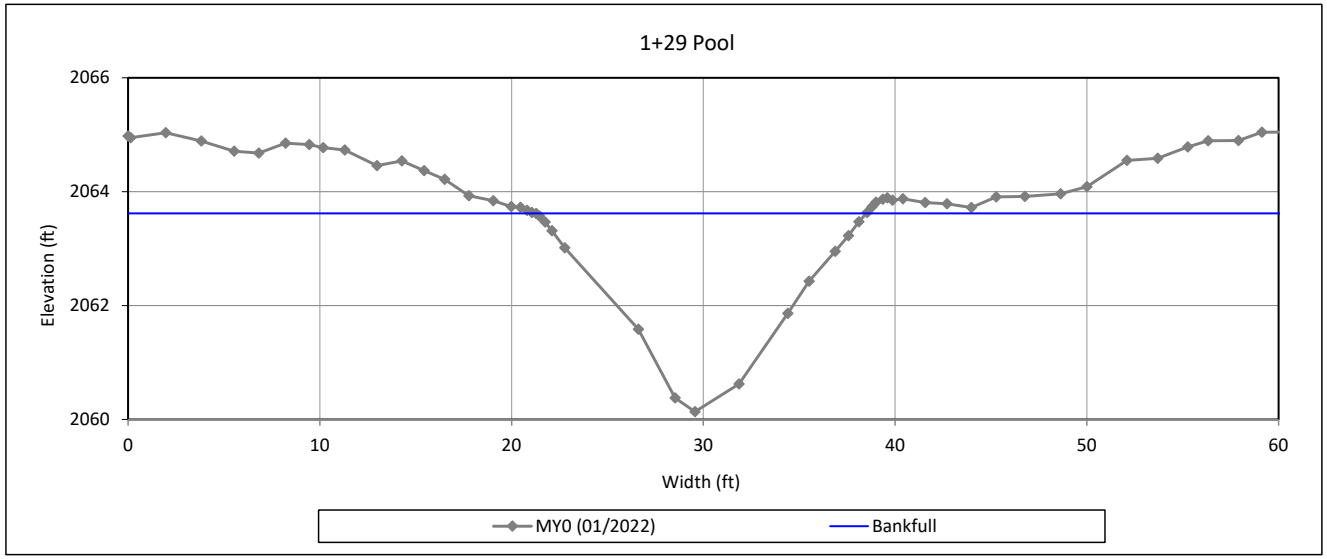
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 2-Banner Creek Reach 1



Bankfull Dimensions	
31.0	x-section area (ft.sq.)
17.2	width (ft)
1.8	mean depth (ft)
3.5	max depth (ft)
18.7	wetted perimeter (ft)
1.7	hydraulic radius (ft)
9.6	width-depth ratio

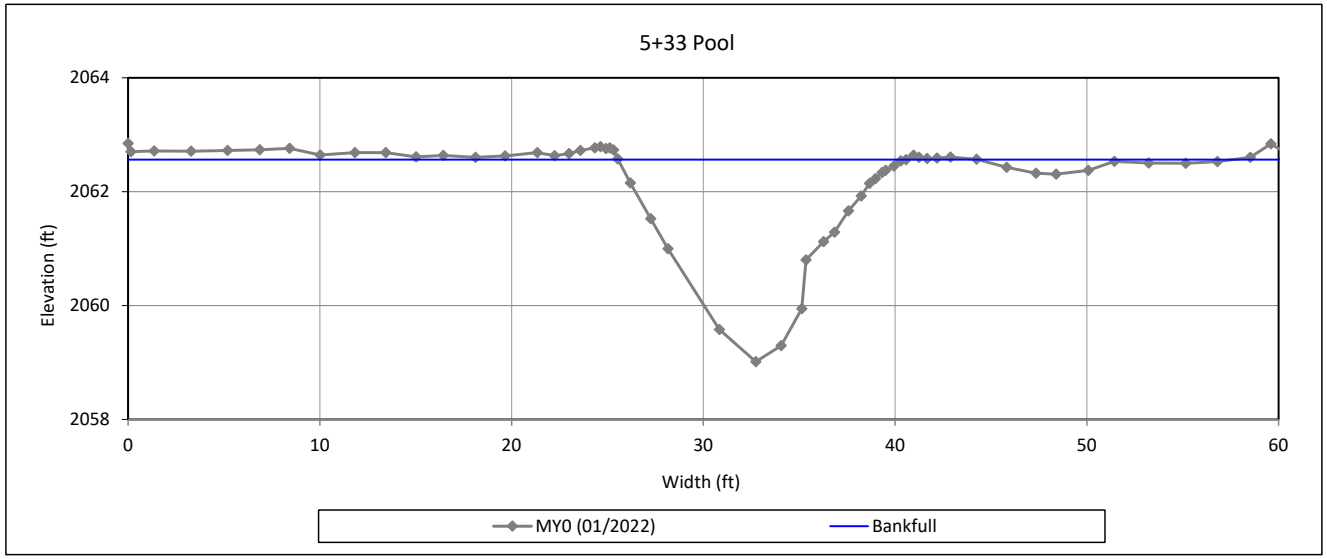
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 3-Banner Creek Reach 1



Bankfull Dimensions	
26.6	x-section area (ft.sq.)
15.0	width (ft)
1.8	mean depth (ft)
3.5	max depth (ft)
17.1	wetted perimeter (ft)
1.6	hydraulic radius (ft)
8.5	width-depth ratio

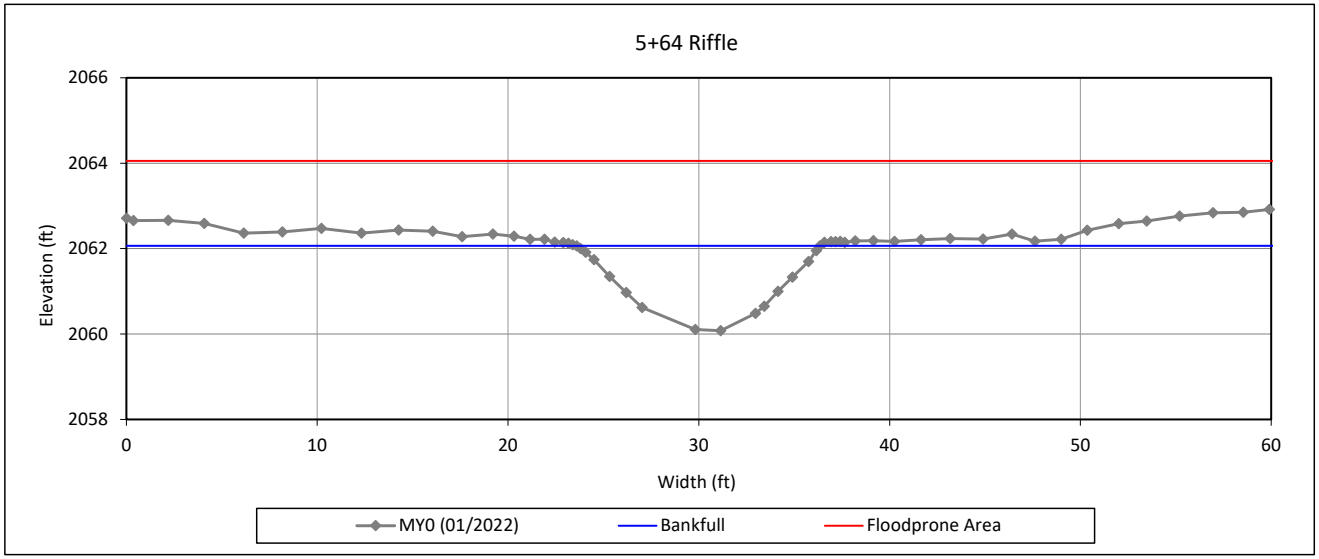
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 4-Banner Creek Reach 1



Bankfull Dimensions

15.9	x-section area (ft.sq.)
12.8	width (ft)
1.2	mean depth (ft)
2.0	max depth (ft)
13.5	wetted perimeter (ft)
1.2	hydraulic radius (ft)
10.2	width-depth ratio
60.5	W flood prone area (ft)
4.7	entrenchment ratio
1.0	low bank height ratio

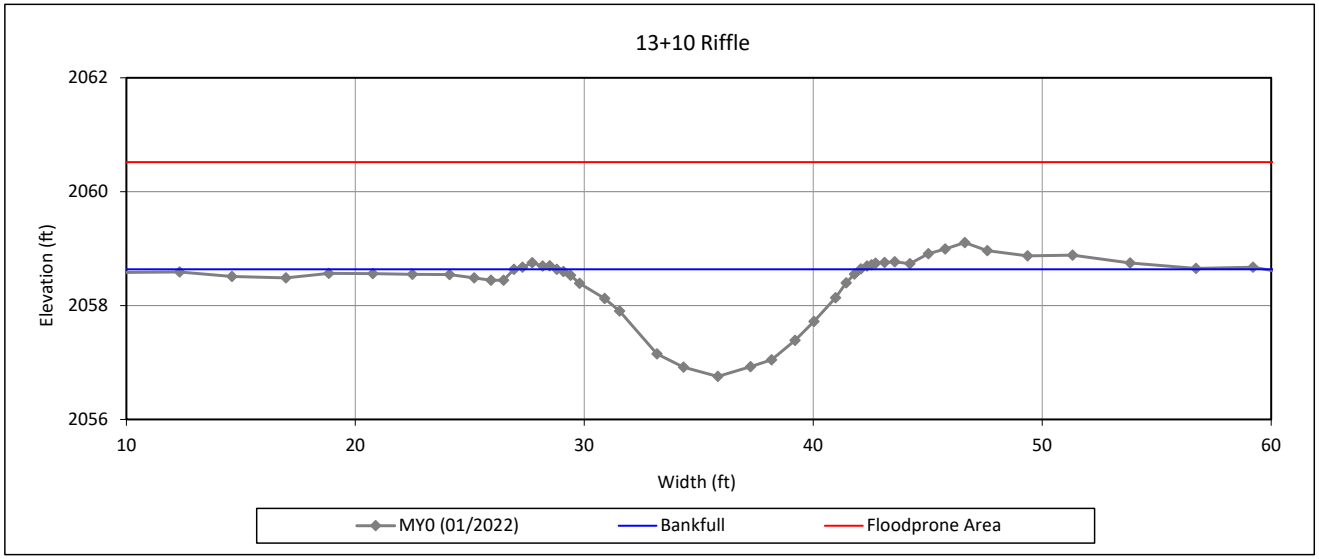
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 5-Banner Creek Reach 2



Bankfull Dimensions

14.6	x-section area (ft.sq.)
13.3	width (ft)
1.1	mean depth (ft)
1.9	max depth (ft)
13.9	wetted perimeter (ft)
1.1	hydraulic radius (ft)
12.0	width-depth ratio
85.8	W flood prone area (ft)
6.5	entrenchment ratio
1.0	low bank height ratio

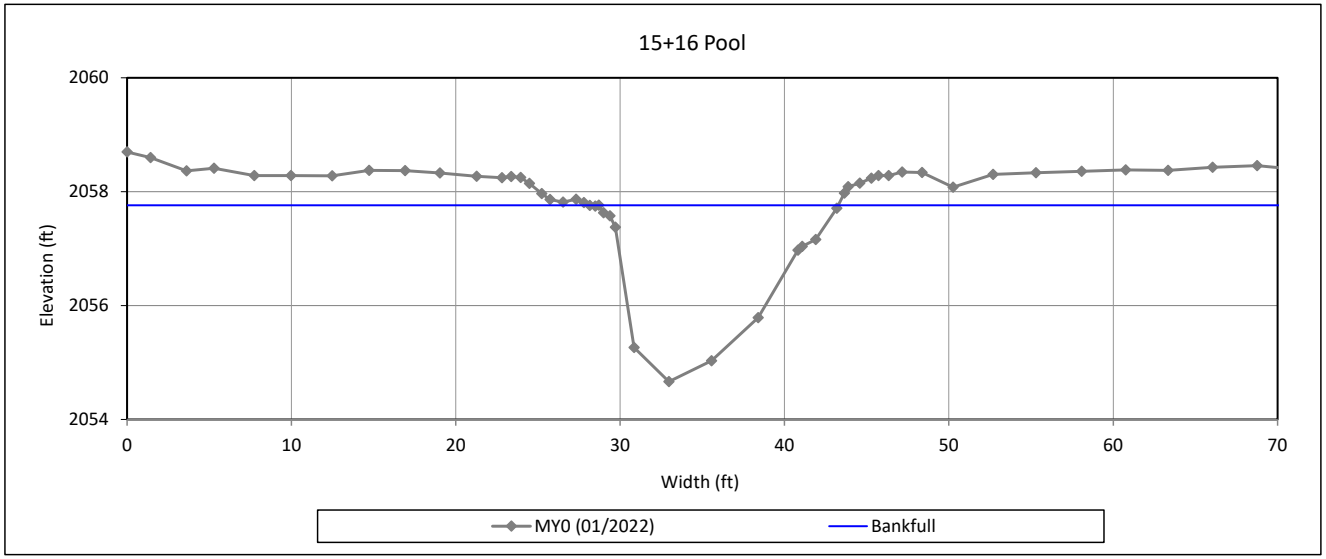
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 6-Banner Creek Reach 2



Bankfull Dimensions	
26.5	x-section area (ft.sq.)
14.6	width (ft)
1.8	mean depth (ft)
3.1	max depth (ft)
16.5	wetted perimeter (ft)
1.6	hydraulic radius (ft)
8.0	width-depth ratio

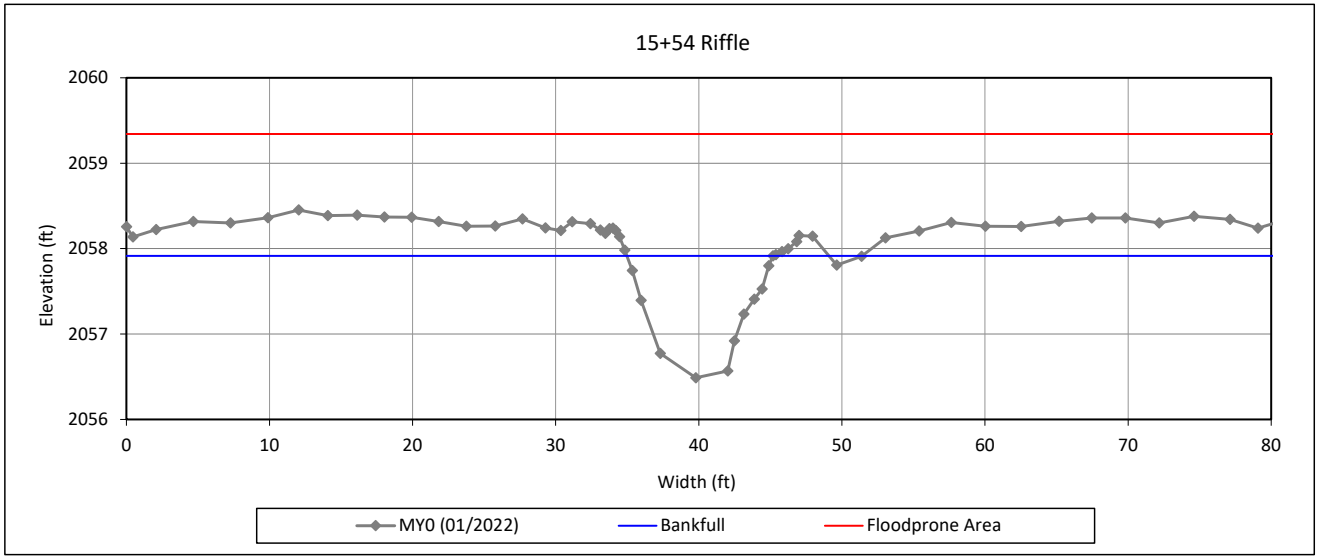
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 7-Banner Creek Reach 2



Bankfull Dimensions

9.6	x-section area (ft.sq.)
10.2	width (ft)
0.9	mean depth (ft)
1.4	max depth (ft)
10.8	wetted perimeter (ft)
0.9	hydraulic radius (ft)
10.9	width-depth ratio
80.8	W flood prone area (ft)
7.9	entrenchment ratio
1.0	low bank height ratio

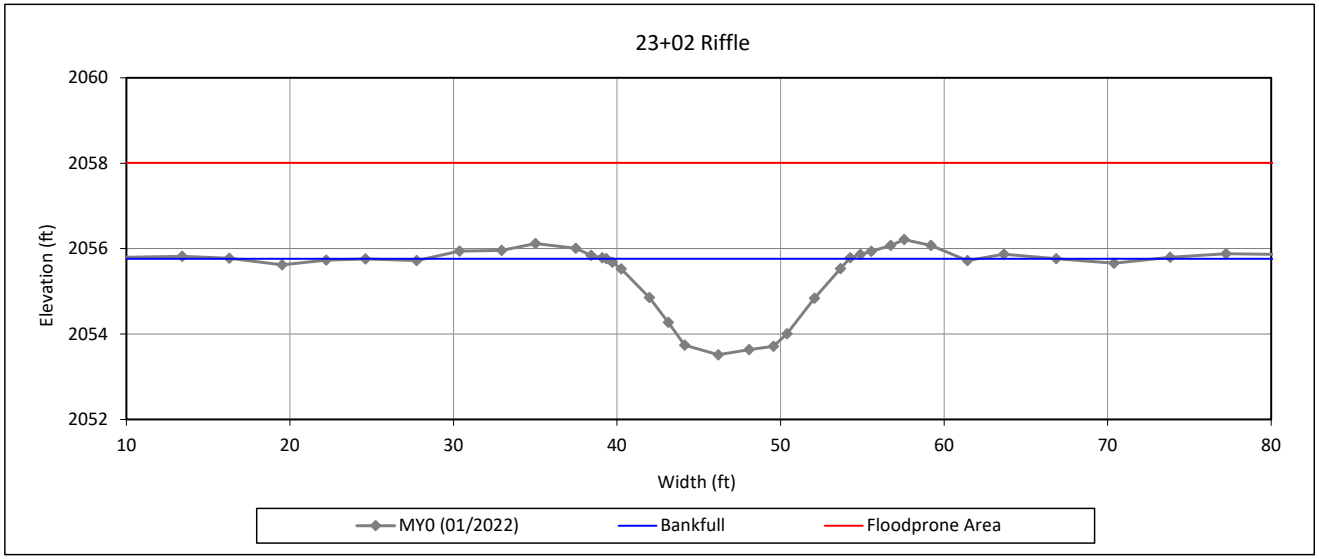
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 8-Banner Creek Reach 3



Bankfull Dimensions

20.6	x-section area (ft.sq.)
14.9	width (ft)
1.4	mean depth (ft)
2.2	max depth (ft)
15.7	wetted perimeter (ft)
1.3	hydraulic radius (ft)
10.7	width-depth ratio
87.5	W flood prone area (ft)
5.9	entrenchment ratio
1.0	low bank height ratio

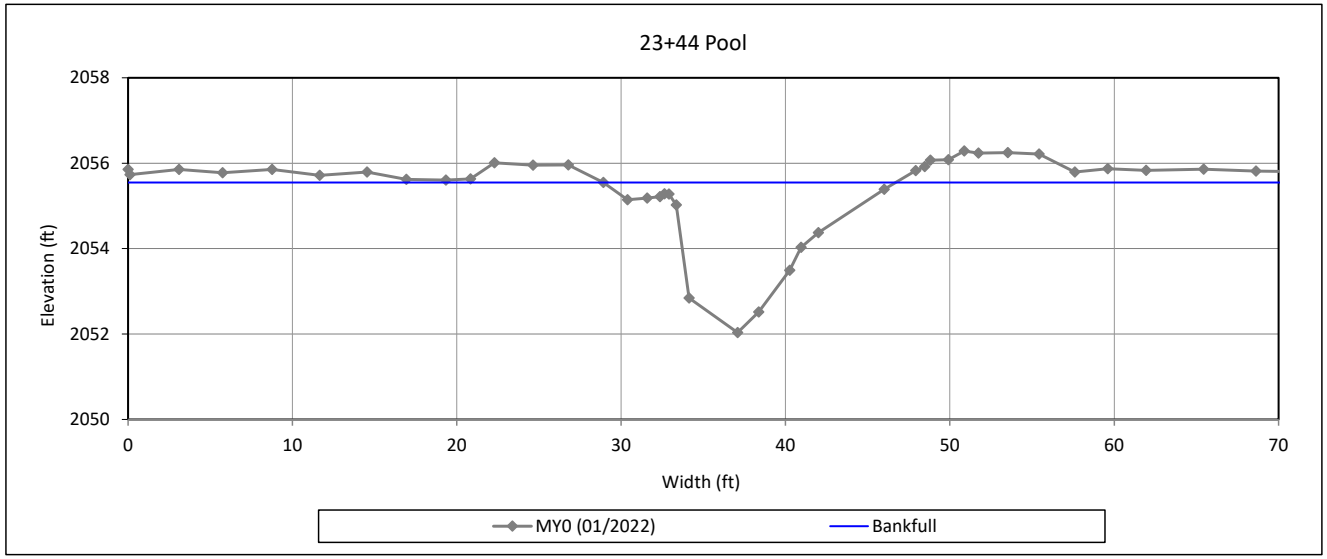
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 9-Banner Creek Reach 3



Bankfull Dimensions	
26.2	x-section area (ft.sq.)
17.8	width (ft)
1.5	mean depth (ft)
3.5	max depth (ft)
20.3	wetted perimeter (ft)
1.3	hydraulic radius (ft)
12.1	width-depth ratio

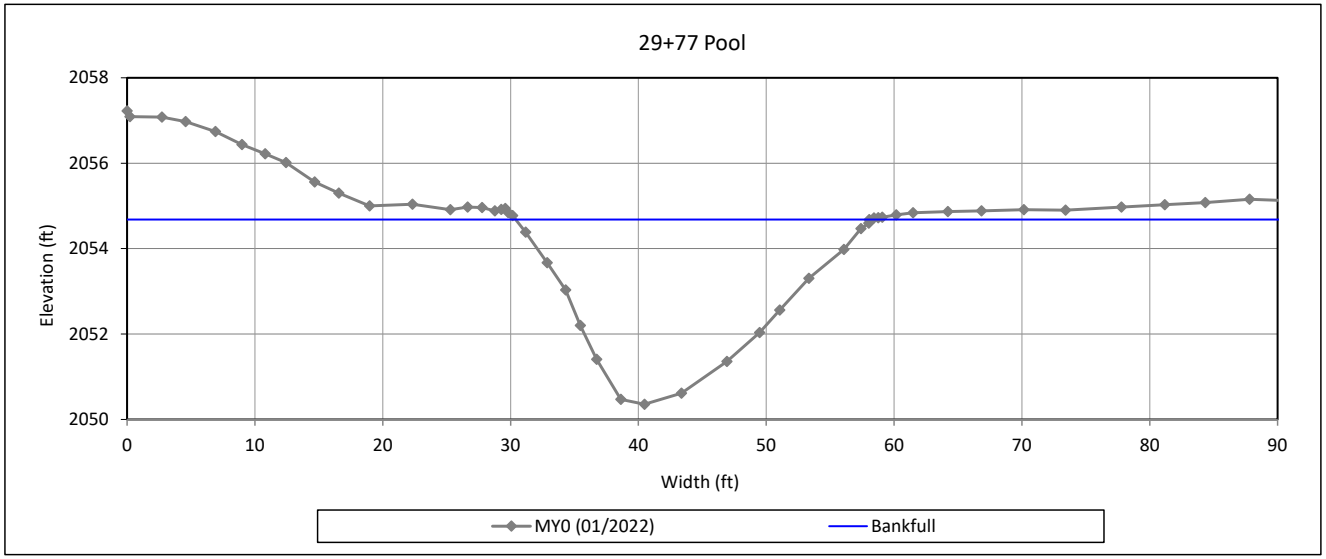
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 10-Banner Creek Reach 4a



Bankfull Dimensions	
68.4	x-section area (ft.sq.)
27.7	width (ft)
2.5	mean depth (ft)
4.3	max depth (ft)
29.3	wetted perimeter (ft)
2.3	hydraulic radius (ft)
11.2	width-depth ratio

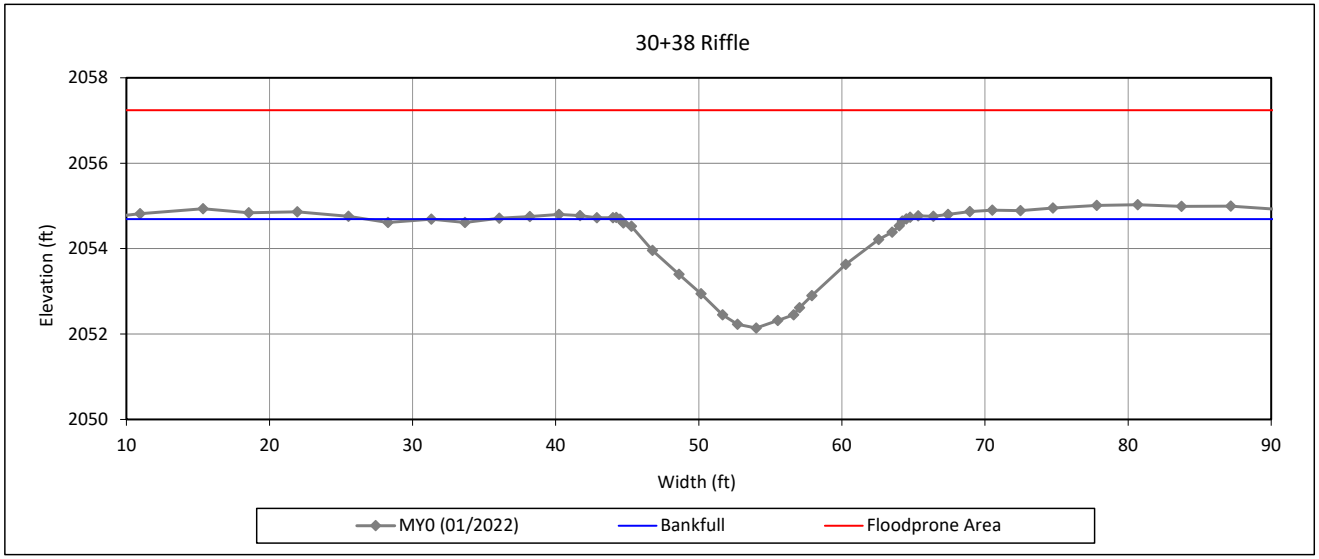
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 11-Banner Creek Reach 4a



Bankfull Dimensions

28.2	x-section area (ft.sq.)
20.0	width (ft)
1.4	mean depth (ft)
2.5	max depth (ft)
20.7	wetted perimeter (ft)
1.4	hydraulic radius (ft)
14.2	width-depth ratio
93.5	W flood prone area (ft)
4.7	entrenchment ratio
1.0	low bank height ratio

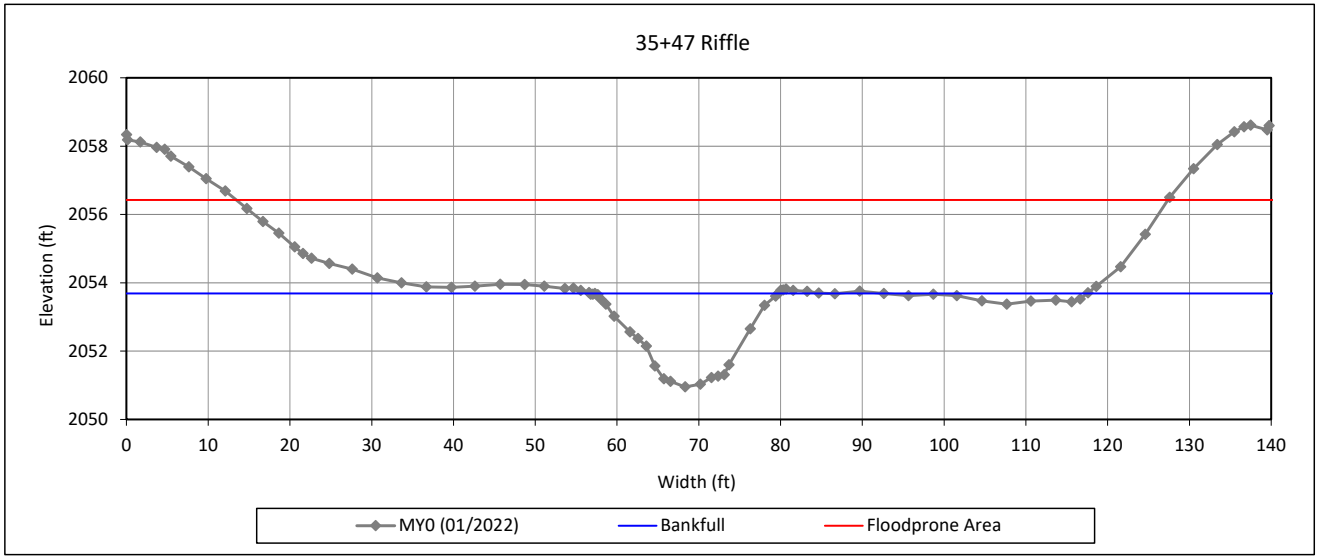
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 12-Banner Creek Reach 4b



Bankfull Dimensions

35.5	x-section area (ft.sq.)
22.4	width (ft)
1.6	mean depth (ft)
2.7	max depth (ft)
23.3	wetted perimeter (ft)
1.5	hydraulic radius (ft)
14.2	width-depth ratio
114.0	W flood prone area (ft)
5.1	entrenchment ratio
1.0	low bank height ratio

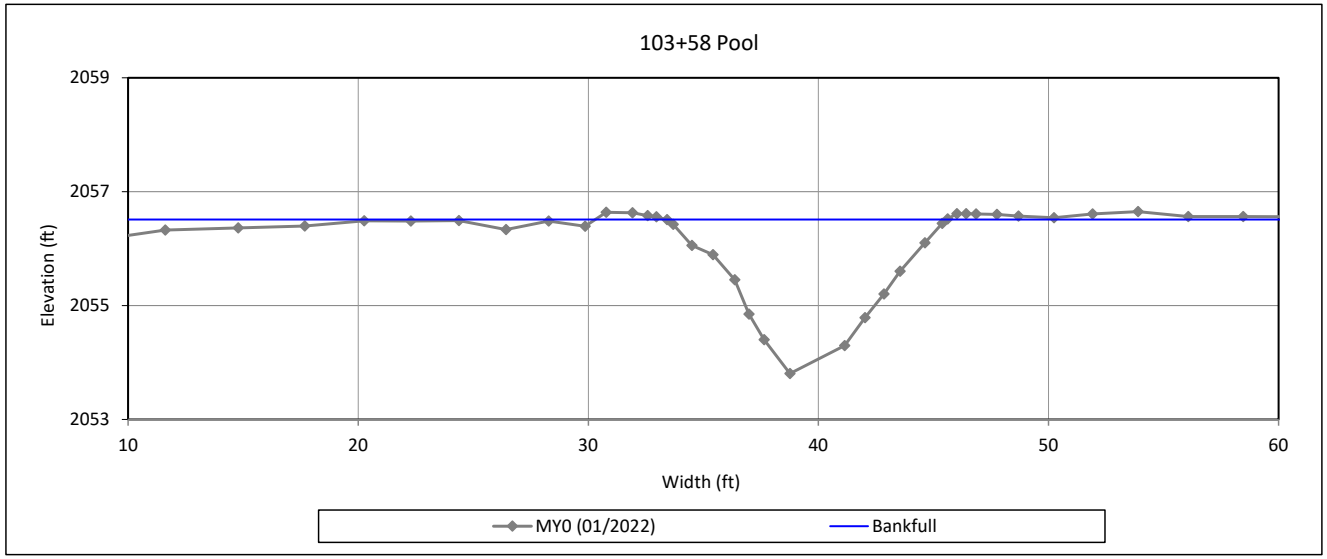
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 13-UT1



Bankfull Dimensions	
16.8	x-section area (ft.sq.)
12.2	width (ft)
1.4	mean depth (ft)
2.7	max depth (ft)
13.5	wetted perimeter (ft)
1.2	hydraulic radius (ft)
8.8	width-depth ratio

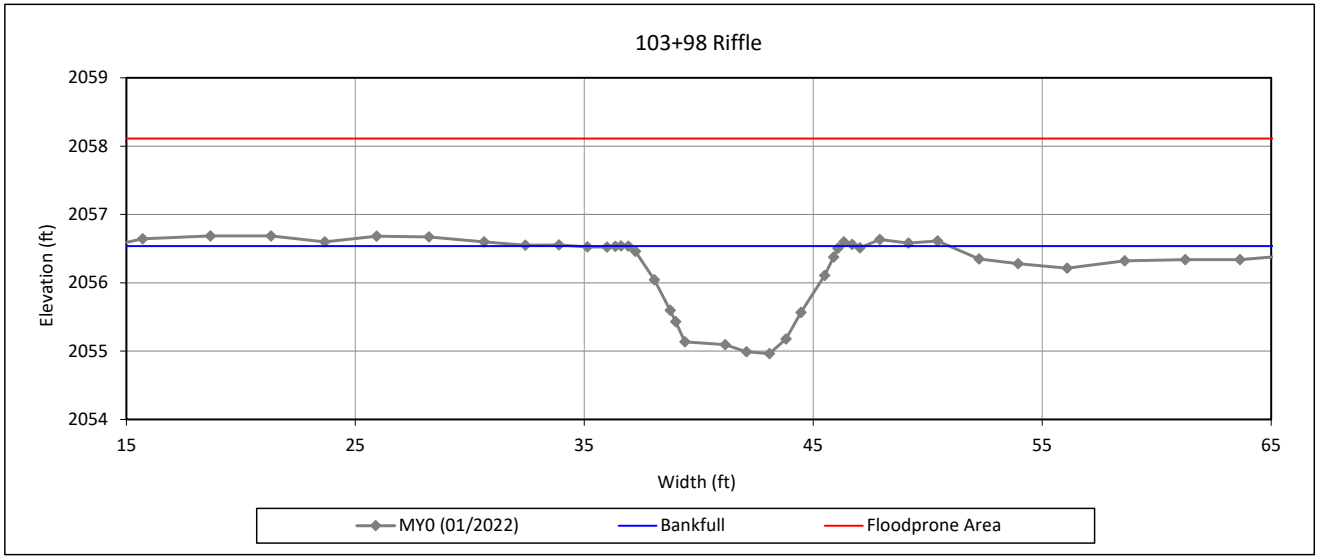
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 14-UT1



Bankfull Dimensions

9.6	x-section area (ft.sq.)
9.2	width (ft)
1.0	mean depth (ft)
1.6	max depth (ft)
10.0	wetted perimeter (ft)
1.0	hydraulic radius (ft)
8.9	width-depth ratio
66.4	W flood prone area (ft)
7.2	entrenchment ratio
1.0	low bank height ratio

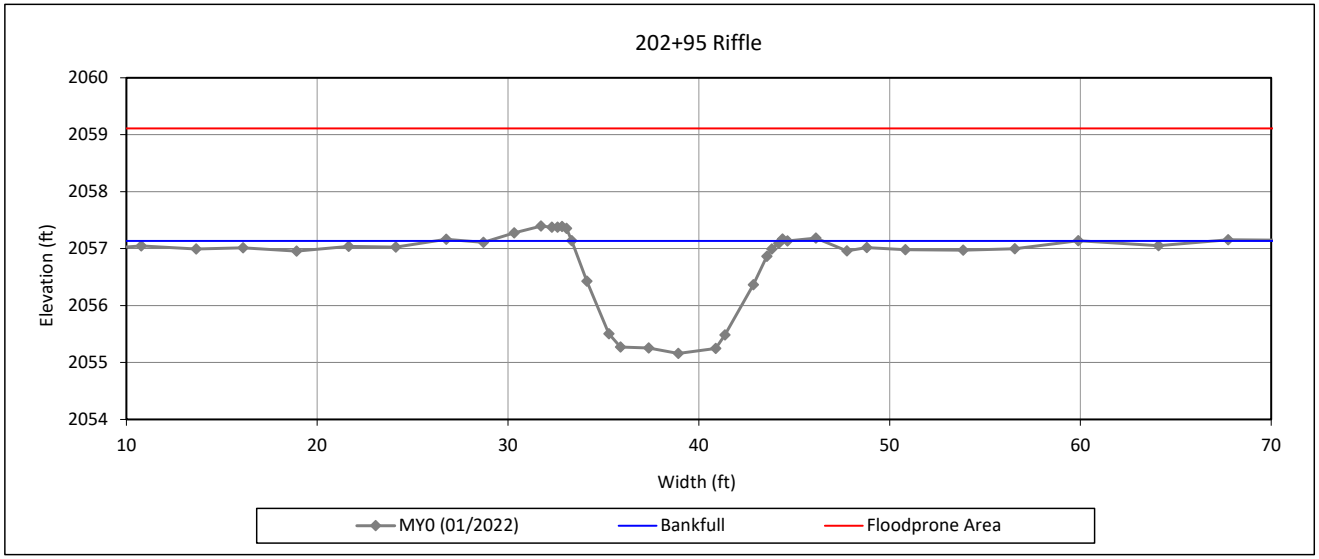
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 15-UT2



Bankfull Dimensions

15.4	x-section area (ft.sq.)
11.0	width (ft)
1.4	mean depth (ft)
2.0	max depth (ft)
12.1	wetted perimeter (ft)
1.3	hydraulic radius (ft)
7.8	width-depth ratio
81.9	W flood prone area (ft)
7.5	entrenchment ratio
1.0	low bank height ratio

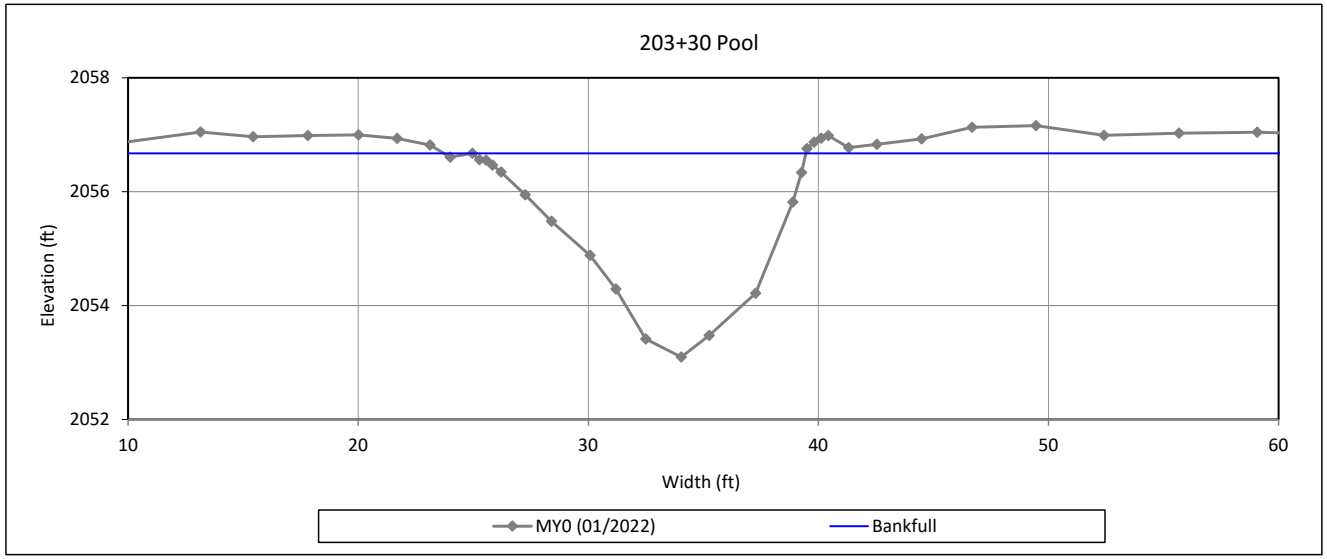
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 16-UT2



Bankfull Dimensions	
28.4	x-section area (ft.sq.)
14.5	width (ft)
2.0	mean depth (ft)
3.6	max depth (ft)
16.6	wetted perimeter (ft)
1.7	hydraulic radius (ft)
7.4	width-depth ratio

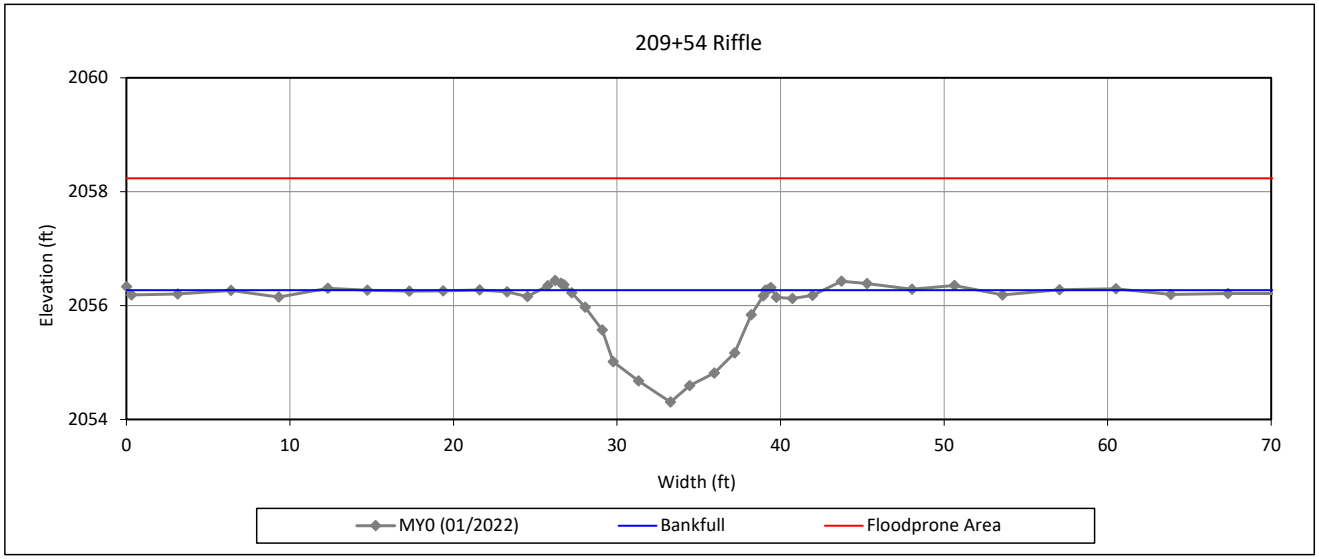
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 17-UT2



Bankfull Dimensions

14.1	x-section area (ft.sq.)
12.0	width (ft)
1.2	mean depth (ft)
2.0	max depth (ft)
12.8	wetted perimeter (ft)
1.1	hydraulic radius (ft)
10.2	width-depth ratio
74.8	W flood prone area (ft)
6.2	entrenchment ratio
1.0	low bank height ratio

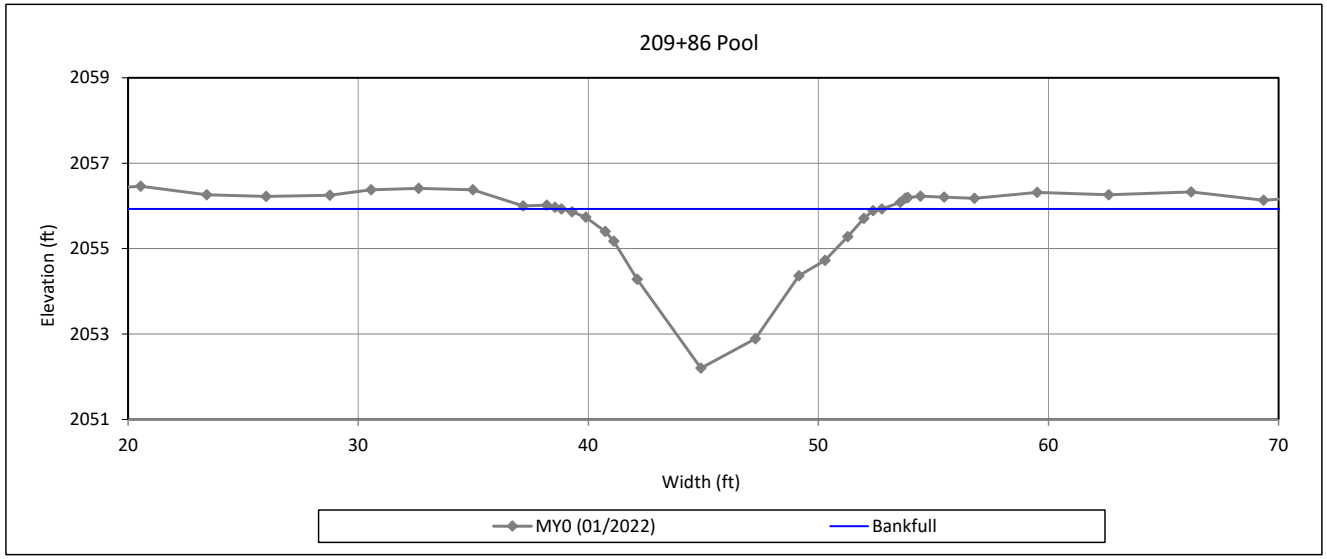
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 18-UT2



Bankfull Dimensions	
24.5	x-section area (ft.sq.)
13.9	width (ft)
1.8	mean depth (ft)
3.7	max depth (ft)
16.1	wetted perimeter (ft)
1.5	hydraulic radius (ft)
7.9	width-depth ratio

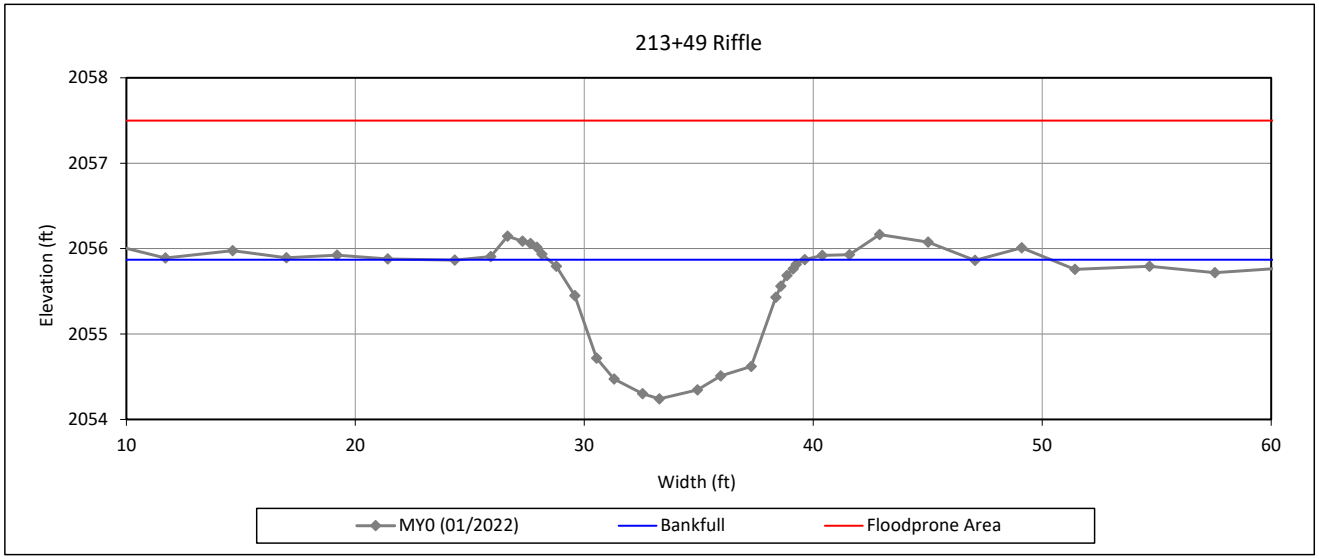
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 19-UT2



Bankfull Dimensions

11.9	x-section area (ft.sq.)
11.2	width (ft)
1.1	mean depth (ft)
1.6	max depth (ft)
12.0	wetted perimeter (ft)
1.0	hydraulic radius (ft)
10.5	width-depth ratio
79.0	W flood prone area (ft)
7.1	entrenchment ratio
1.0	low bank height ratio

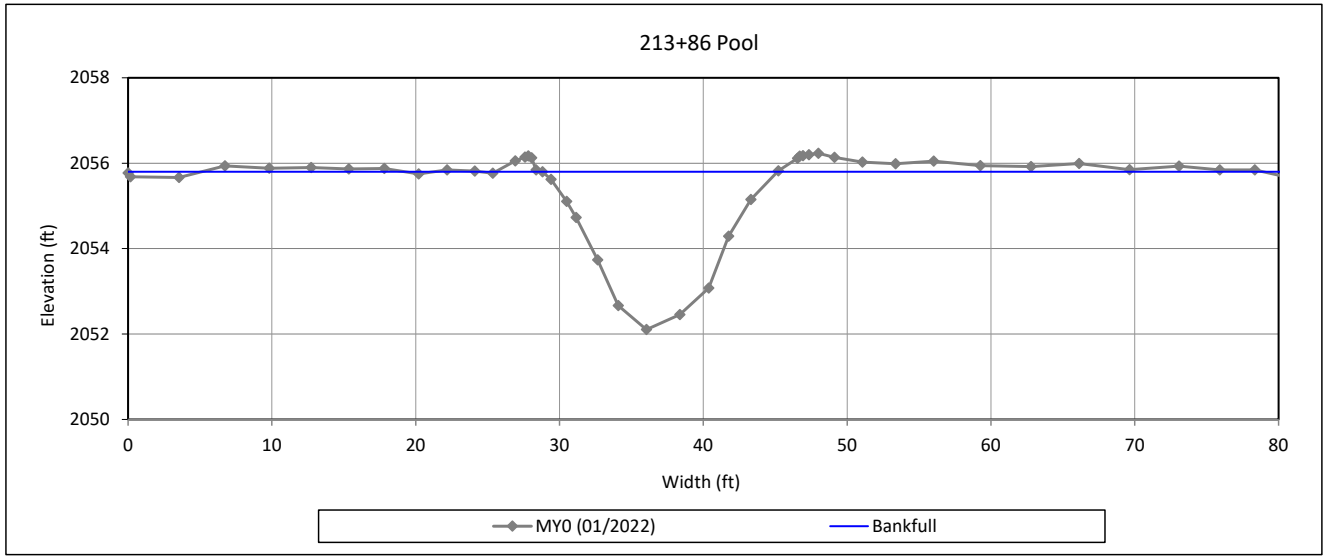
Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Cross-Section 20-UT2



Bankfull Dimensions	
33.3	x-section area (ft.sq.)
16.3	width (ft)
2.0	mean depth (ft)
3.7	max depth (ft)
18.2	wetted perimeter (ft)
1.8	hydraulic radius (ft)
8.0	width-depth ratio

Survey Date: 01/2022
Field Crew: Kee Mapping & Surveying

View Downstream

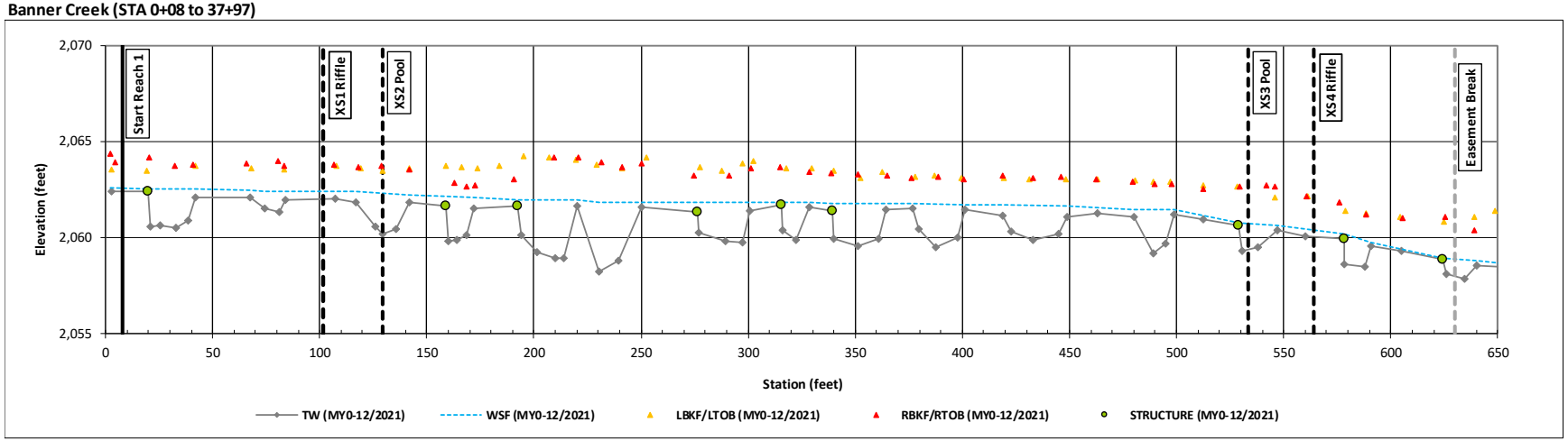
Longitudinal Profile Plots

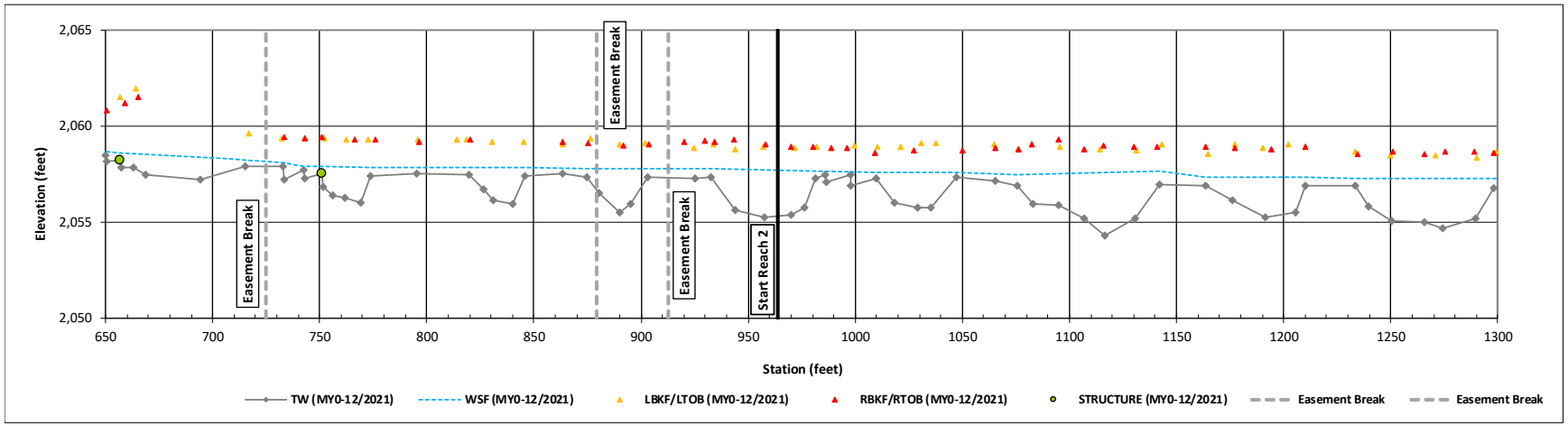
Banner Creek Mitigation Site

DMS ID No. 100062

Monitoring Year 0 - 2022

Banner Creek (STA 0+08 to 37+97)





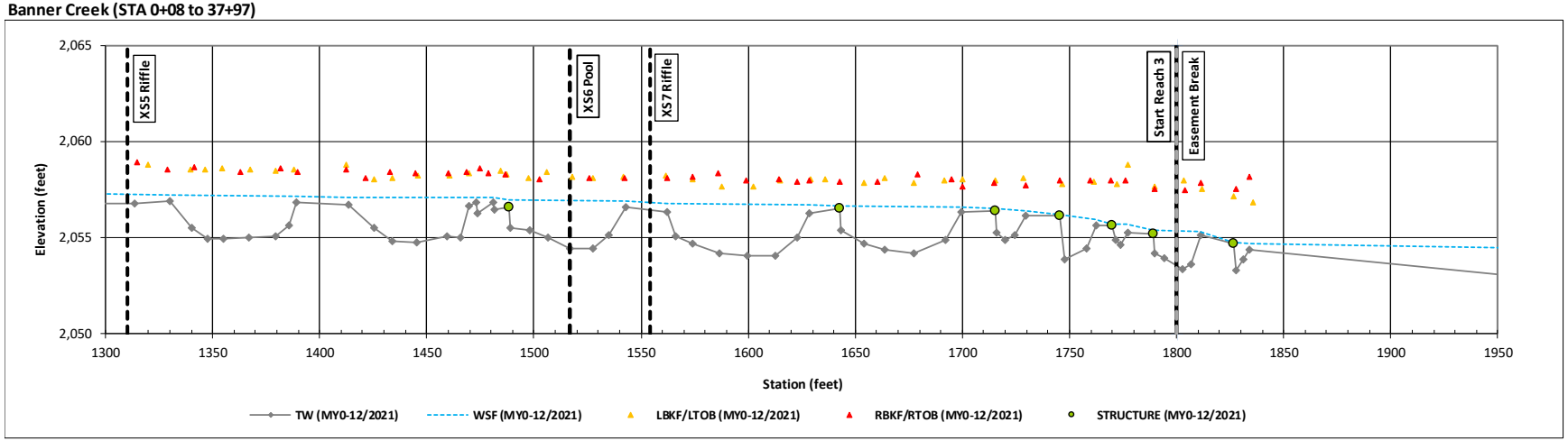
Longitudinal Profile Plots

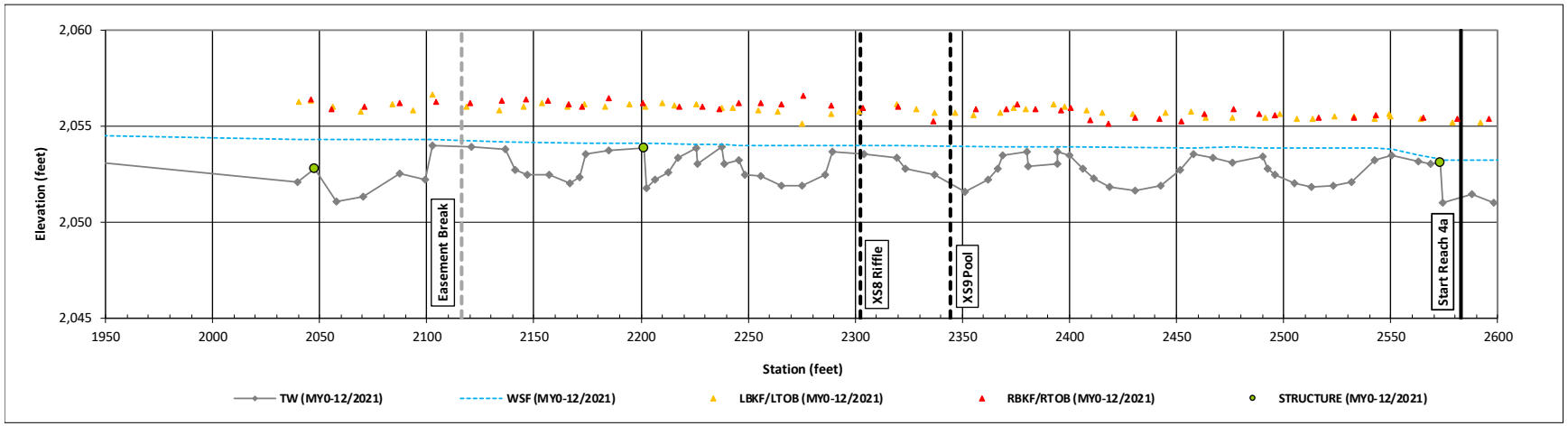
Banner Creek Mitigation Site

DMS ID No. 100062

Monitoring Year 0 - 2022

Banner Creek (STA 0+08 to 37+97)

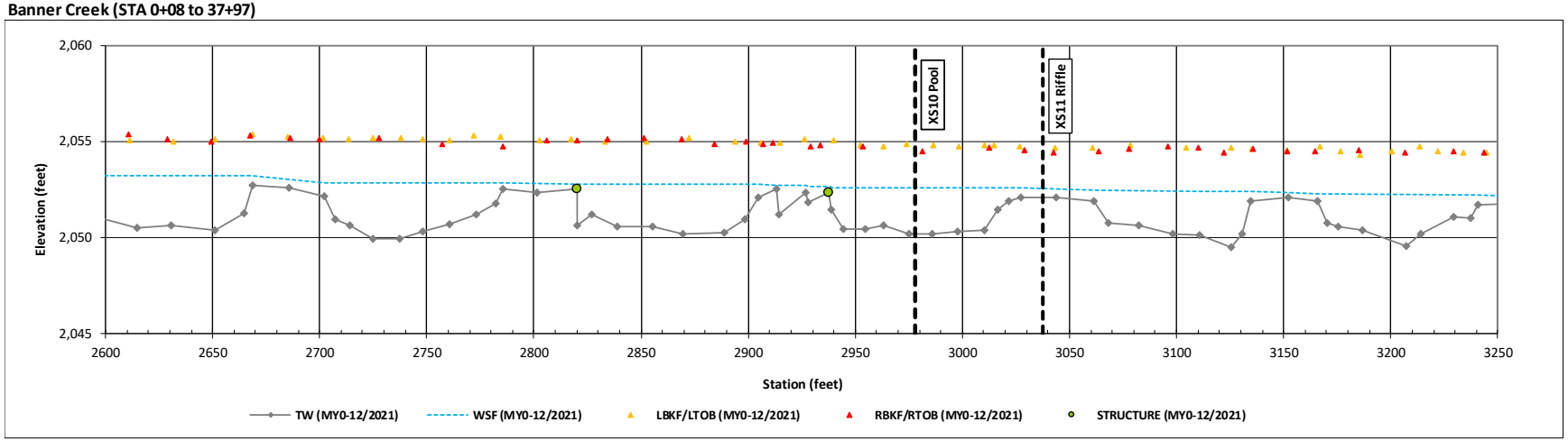


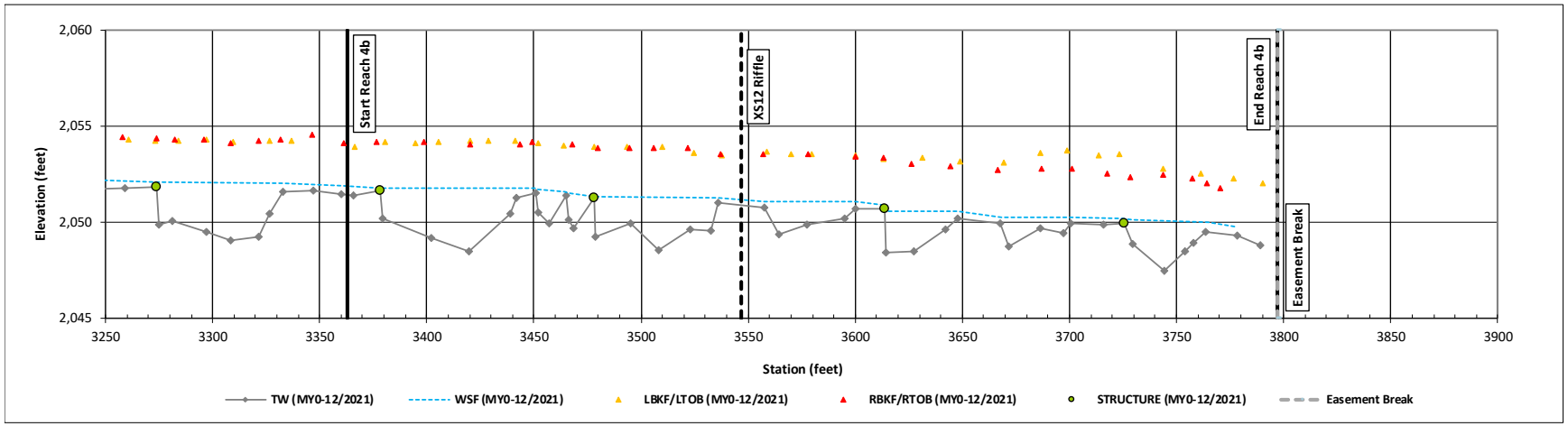


Longitudinal Profile Plots

Banner Creek Mitigation Site
DMS ID No. 100062
Monitoring Year 0 - 2022

Banner Creek (STA 0+08 to 37+97)

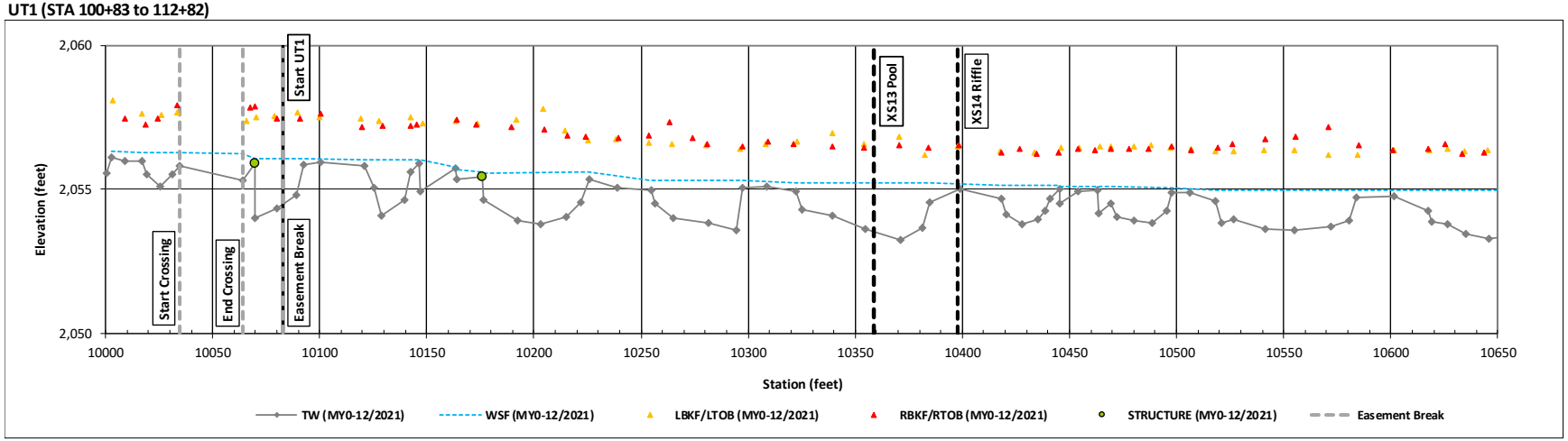


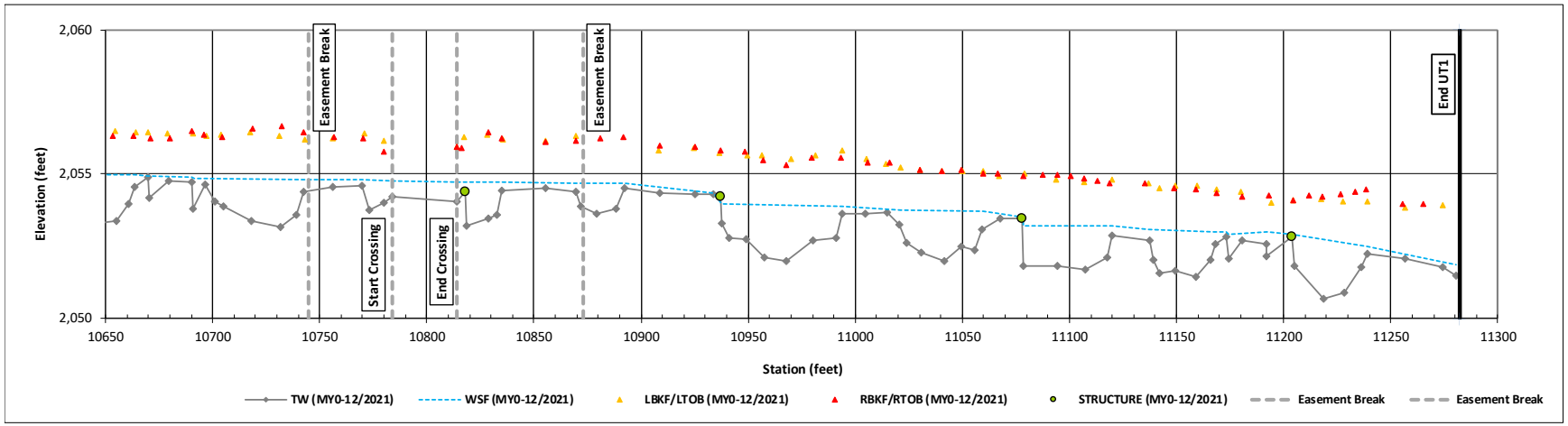


Longitudinal Profile Plots

Banner Creek Mitigation Site
DMS ID No. 100062
Monitoring Year 0 - 2022

UT1 (STA 100+83 to 112+82)

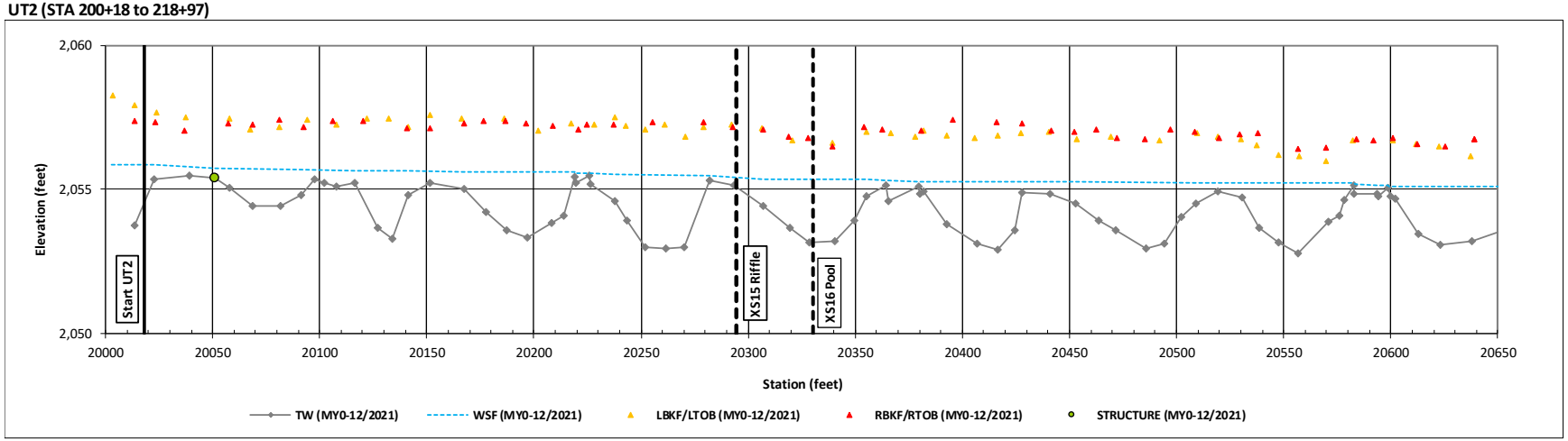


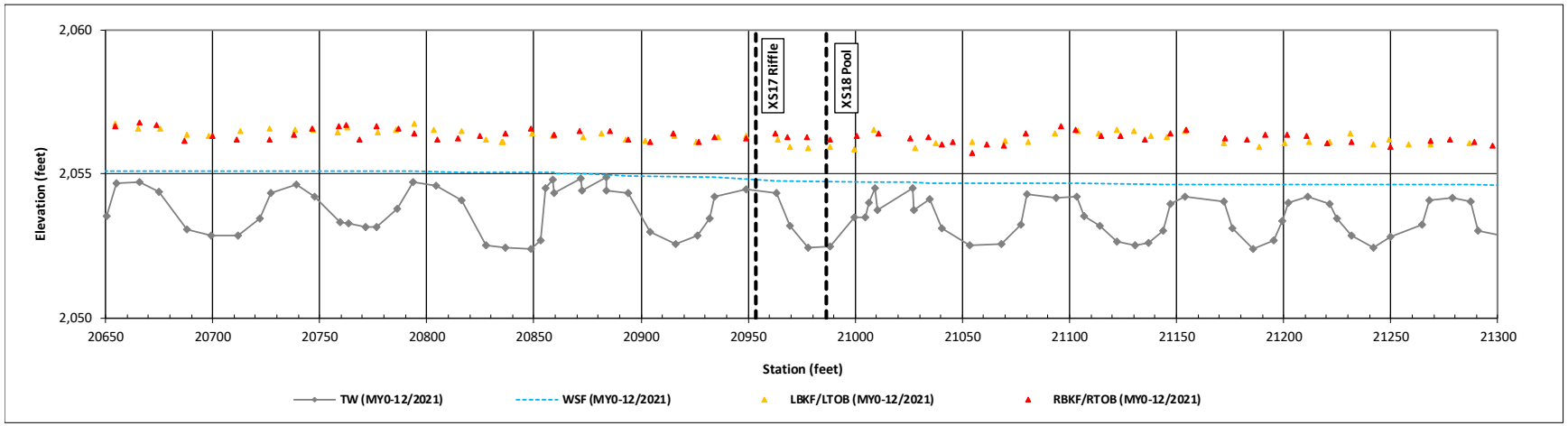


Longitudinal Profile Plots

Banner Creek Mitigation Site
DMS ID No. 100062
Monitoring Year 0 - 2022

UT2 (STA 200+18 to 218+97)





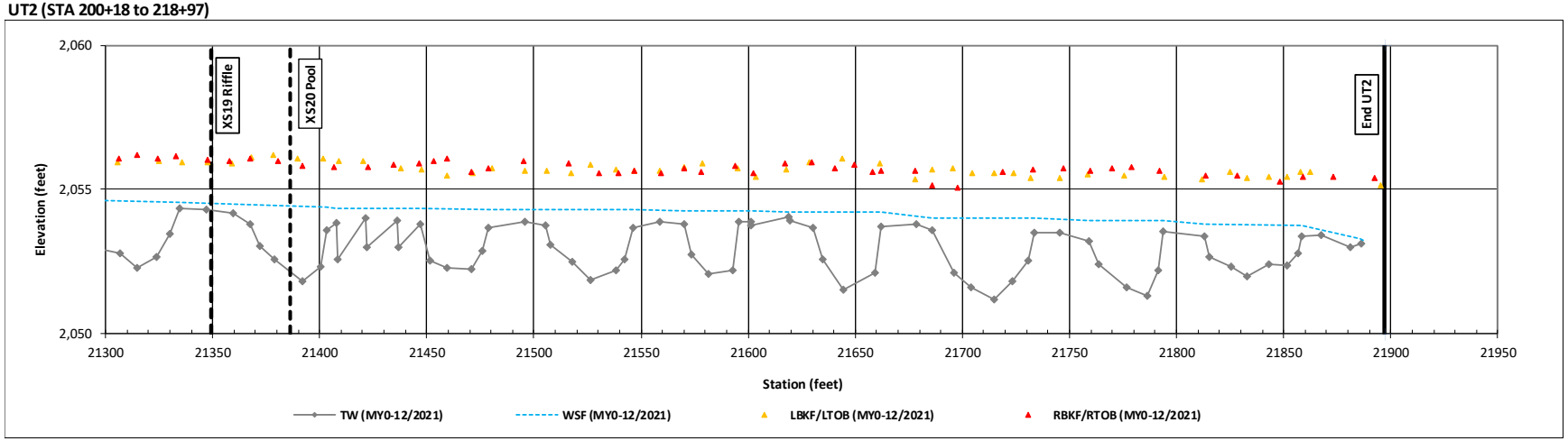
Longitudinal Profile Plots

Banner Creek Mitigation Site

DMS ID No. 100062

Monitoring Year 0 - 2022

UT2 (STA 200+18 to 218+97)

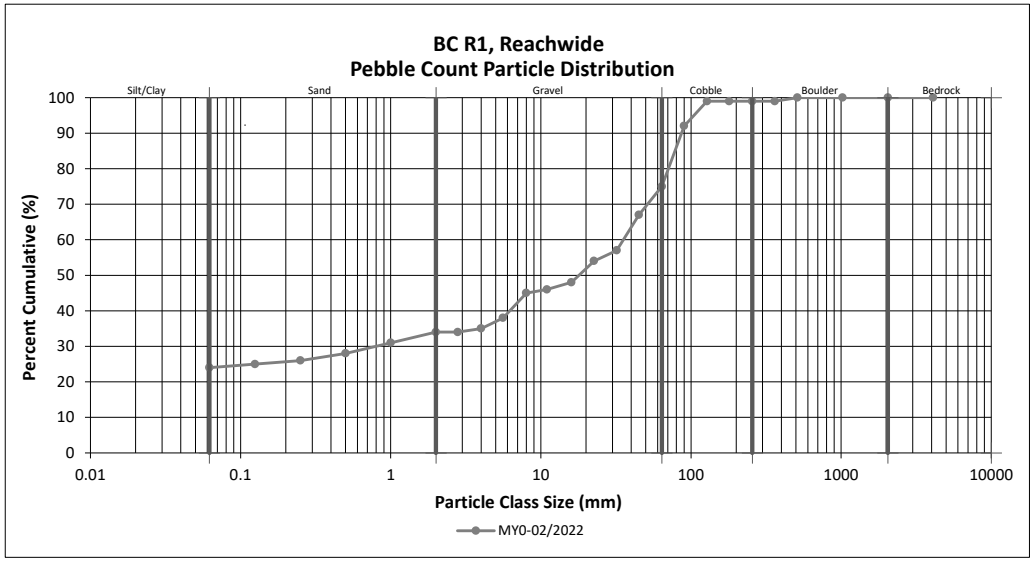


Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		24	24	24	24
SAND	Very fine	0.062	0.125		1	1	1	25
	Fine	0.125	0.250		1	1	1	26
	Medium	0.25	0.50		2	2	2	28
	Coarse	0.5	1.0		3	3	3	31
	Very Coarse	1.0	2.0		3	3	3	34
GRAVEL	Very Fine	2.0	2.8					34
	Very Fine	2.8	4.0		1	1	1	35
	Fine	4.0	5.6		3	3	3	38
	Fine	5.6	8.0		7	7	7	45
	Medium	8.0	11.0		1	1	1	46
	Medium	11.0	16.0	1	1	2	2	48
	Coarse	16.0	22.6	3	3	6	6	54
	Coarse	22.6	32	3		3	3	57
	Very Coarse	32	45	10		10	10	67
	Very Coarse	45	64	8		8	8	75
COBBLE	Small	64	90	17		17	17	92
	Small	90	128	7		7	7	99
	Large	128	180					99
	Large	180	256					99
BOULDER	Small	256	362					99
	Small	362	512	1		1	1	100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**



Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	4.0
D_{50} =	18.0
D_{84} =	76.7
D_{95} =	104.7
D_{100} =	512.0

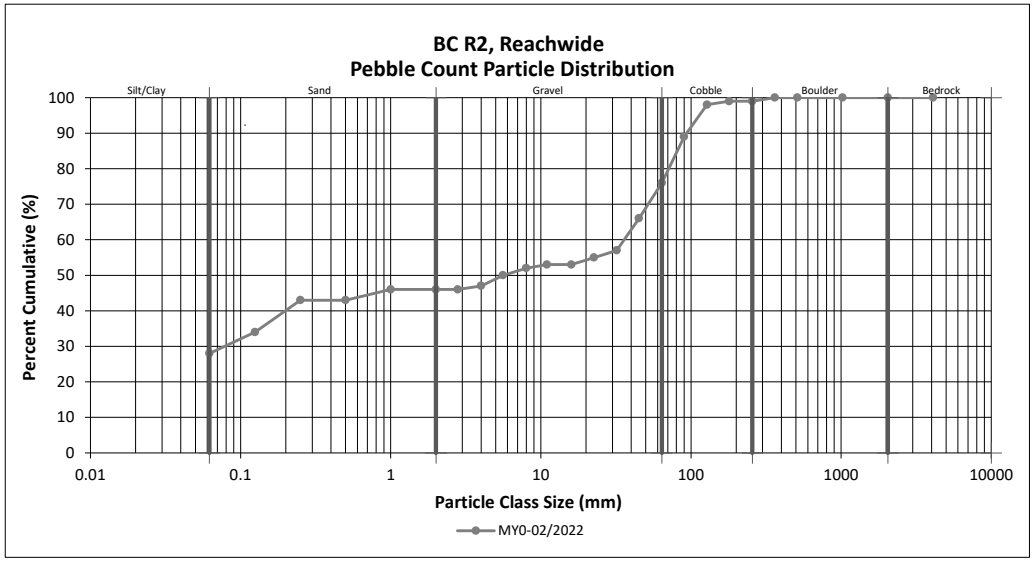
Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	26	28	28	28
SAND	Very fine	0.062	0.125		6	6	6	34
	Fine	0.125	0.250	1	8	9	9	43
	Medium	0.25	0.50					43
	Coarse	0.5	1.0	2	1	3	3	46
	Very Coarse	1.0	2.0					46
GRAVEL	Very Fine	2.0	2.8					46
	Very Fine	2.8	4.0		1	1	1	47
	Fine	4.0	5.6		3	3	3	50
	Fine	5.6	8.0		2	2	2	52
	Medium	8.0	11.0	1		1	1	53
	Medium	11.0	16.0					53
	Coarse	16.0	22.6		2	2	2	55
	Coarse	22.6	32	2		2	2	57
	Very Coarse	32	45	8	1	9	9	66
	Very Coarse	45	64	10		10	10	76
COBBLE	Small	64	90	13		13	13	89
	Small	90	128	9		9	9	98
	Large	128	180	1		1	1	99
	Large	180	256					99
BOULDER	Small	256	362	1		1	1	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.1
D_{50} =	5.6
D_{84} =	78.9
D_{95} =	113.8
D_{100} =	362.0



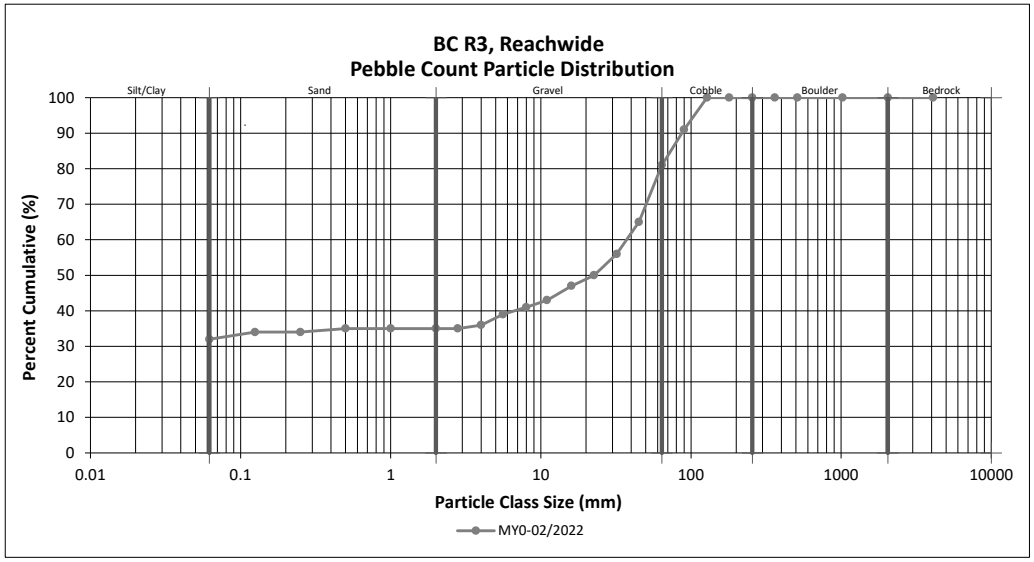
Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R3, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	30	32	32	32
SAND	Very fine	0.062	0.125		2	2	2	34
	Fine	0.125	0.250					34
	Medium	0.25	0.50		1	1	1	35
	Coarse	0.5	1.0					35
	Very Coarse	1.0	2.0					35
GRAVEL	Very Fine	2.0	2.8					35
	Very Fine	2.8	4.0		1	1	1	36
	Fine	4.0	5.6		3	3	3	39
	Fine	5.6	8.0		2	2	2	41
	Medium	8.0	11.0		2	2	2	43
	Medium	11.0	16.0		4	4	4	47
	Coarse	16.0	22.6	1	2	3	3	50
	Coarse	22.6	32	6		6	6	56
	Very Coarse	32	45	7	2	9	9	65
	Very Coarse	45	64	16		16	16	81
COBBLE	Small	64	90	9	1	10	10	91
	Small	90	128	9		9	9	100
	Large	128	180					100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.5
D_{50} =	22.6
D_{84} =	70.9
D_{95} =	105.3
D_{100} =	128.0

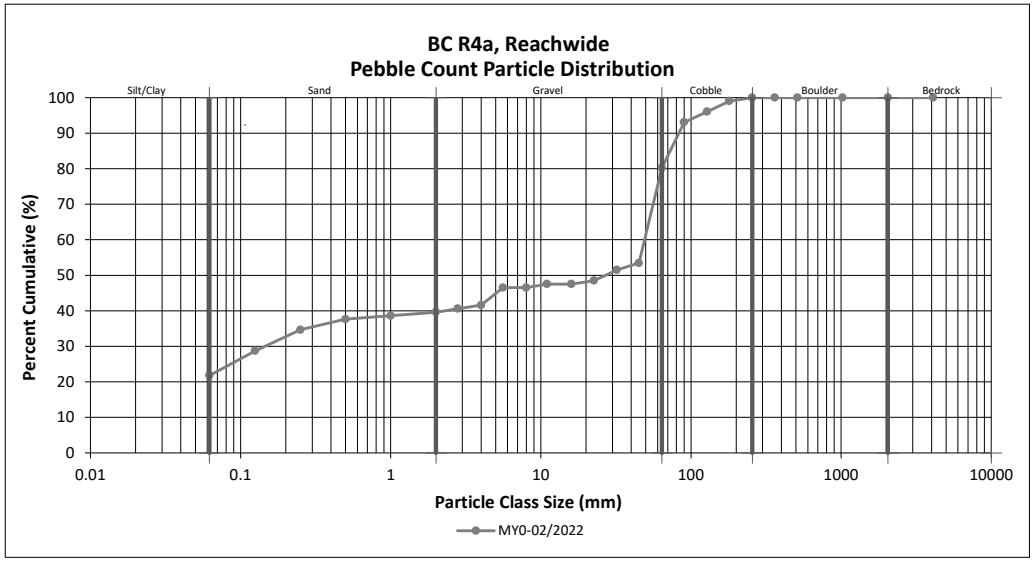


Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R4a, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		22	22	22	22
SAND	Very fine	0.062	0.125		7	7	7	29
	Fine	0.125	0.250		6	6	6	35
	Medium	0.25	0.50		3	3	3	38
	Coarse	0.5	1.0		1	1	1	39
	Very Coarse	1.0	2.0		1	1	1	40
GRAVEL	Very Fine	2.0	2.8		1	1	1	41
	Very Fine	2.8	4.0		1	1	1	42
	Fine	4.0	5.6		5	5	5	47
	Fine	5.6	8.0					47
	Medium	8.0	11.0		1	1	1	48
	Medium	11.0	16.0					48
	Coarse	16.0	22.6		1	1	1	49
	Coarse	22.6	32	2	1	3	3	51
	Very Coarse	32	45	2		2	2	53
	Very Coarse	45	64	27		27	27	80
COBBLE	Small	64	90	13		13	13	93
	Small	90	128	3		3	3	96
	Large	128	180	3		3	3	99
	Large	180	256	1		1	1	100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**51**	**50**	**101**	**100**	**100**



Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.3
D_{50} =	26.9
D_{84} =	70.8
D_{95} =	113.2
D_{100} =	256.0

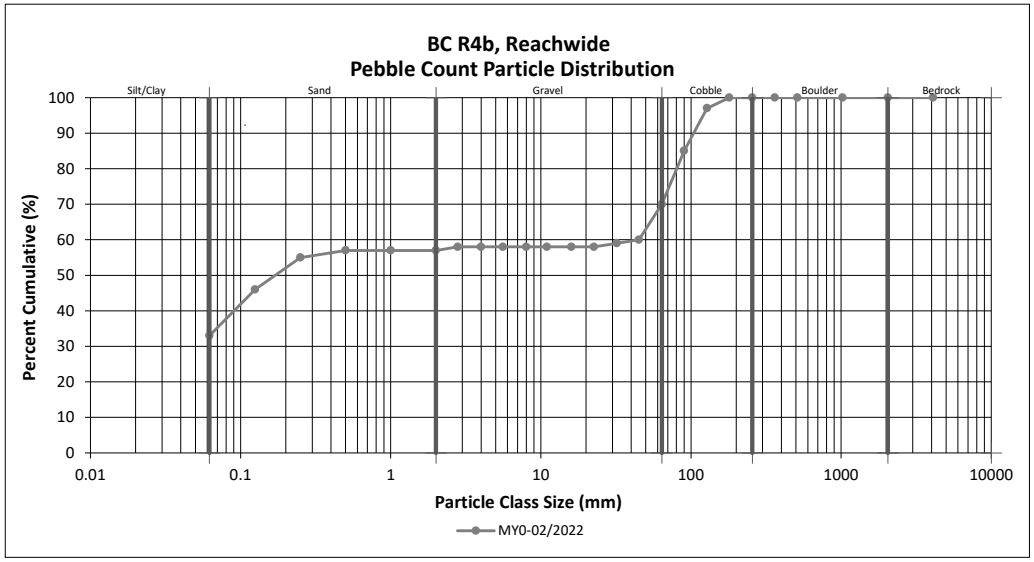
Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R4b, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	7	26	33	33	33
SAND	Very fine	0.062	0.125		13	13	13	46
	Fine	0.125	0.250	2	7	9	9	55
	Medium	0.25	0.50		2	2	2	57
	Coarse	0.5	1.0					57
	Very Coarse	1.0	2.0					57
GRAVEL	Very Fine	2.0	2.8		1	1	1	58
	Very Fine	2.8	4.0					58
	Fine	4.0	5.6					58
	Fine	5.6	8.0					58
	Medium	8.0	11.0					58
	Medium	11.0	16.0					58
	Coarse	16.0	22.6					58
	Coarse	22.6	32	1		1	1	59
	Very Coarse	32	45	1		1	1	60
	Very Coarse	45	64	10		10	10	70
COBBLE	Small	64	90	14	1	15	15	85
	Small	90	128	12		12	12	97
	Large	128	180	3		3	3	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.1
D_{50} =	0.2
D_{84} =	88.0
D_{95} =	120.7
D_{100} =	180.0



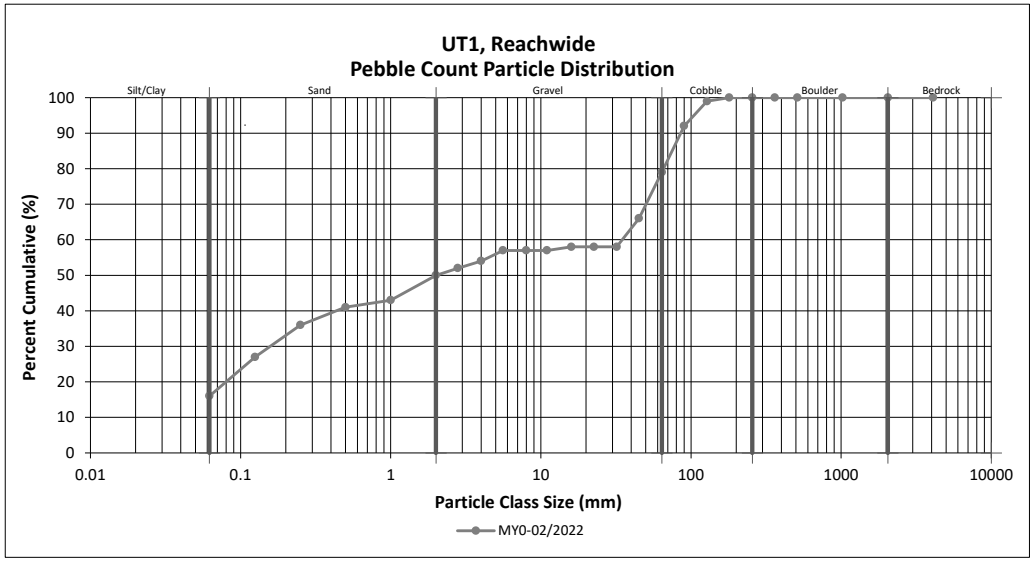
Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

UT1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		16	16	16	16
SAND	Very fine	0.062	0.125		11	11	11	27
	Fine	0.125	0.250		9	9	9	36
	Medium	0.25	0.50		5	5	5	41
	Coarse	0.5	1.0		2	2	2	43
	Very Coarse	1.0	2.0	4	3	7	7	50
GRAVEL	Very Fine	2.0	2.8	1	1	2	2	52
	Very Fine	2.8	4.0		2	2	2	54
	Fine	4.0	5.6	2	1	3	3	57
	Fine	5.6	8.0					57
	Medium	8.0	11.0					57
	Medium	11.0	16.0	1		1	1	58
	Coarse	16.0	22.6					58
	Coarse	22.6	32					58
	Very Coarse	32	45	8		8	8	66
	Very Coarse	45	64	13		13	13	79
COBBLE	Small	64	90	13		13	13	92
	Small	90	128	7		7	7	99
	Large	128	180	1		1	1	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.2
D_{50} =	2.0
D_{84} =	73.0
D_{95} =	104.7
D_{100} =	180.0

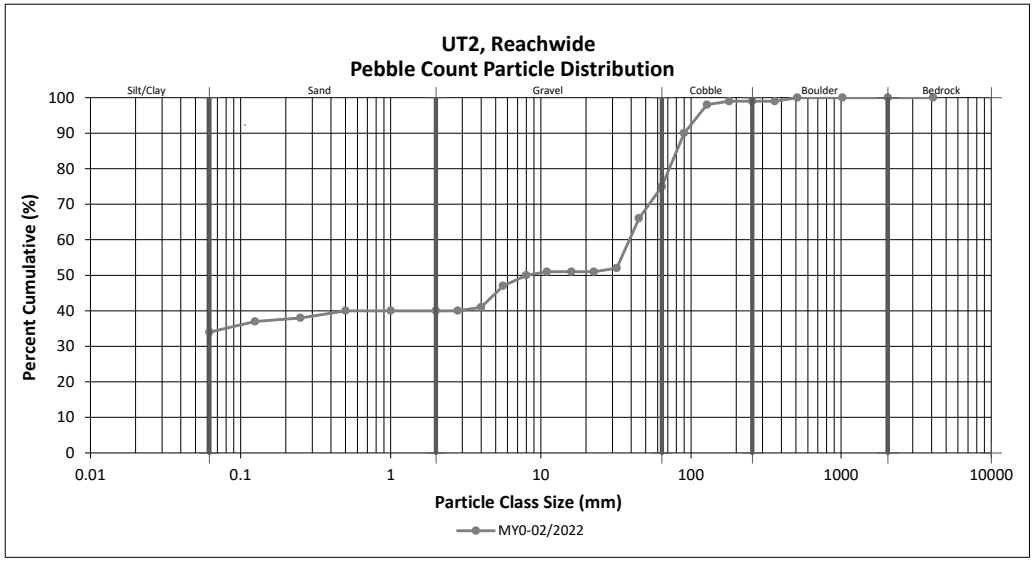


Reachwide Pebble Count Plots

Banner Creek Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

UT2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		34	34	34	34
SAND	Very fine	0.062	0.125		3	3	3	37
	Fine	0.125	0.250		1	1	1	38
	Medium	0.25	0.50		2	2	2	40
	Coarse	0.5	1.0					40
	Very Coarse	1.0	2.0					40
GRAVEL	Very Fine	2.0	2.8					40
	Very Fine	2.8	4.0		1	1	1	41
	Fine	4.0	5.6	1	5	6	6	47
	Fine	5.6	8.0		3	3	3	50
	Medium	8.0	11.0		1	1	1	51
	Medium	11.0	16.0					51
	Coarse	16.0	22.6					51
	Coarse	22.6	32	1		1	1	52
	Very Coarse	32	45	14		14	14	66
	Very Coarse	45	64	9		9	9	75
COBBLE	Small	64	90	15		15	15	90
	Small	90	128	8		8	8	98
	Large	128	180	1		1	1	99
	Large	180	256					99
BOULDER	Small	256	362					99
	Small	362	512	1		1	1	100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**



Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.1
D_{50} =	8.0
D_{84} =	78.5
D_{95} =	112.2
D_{100} =	512.0

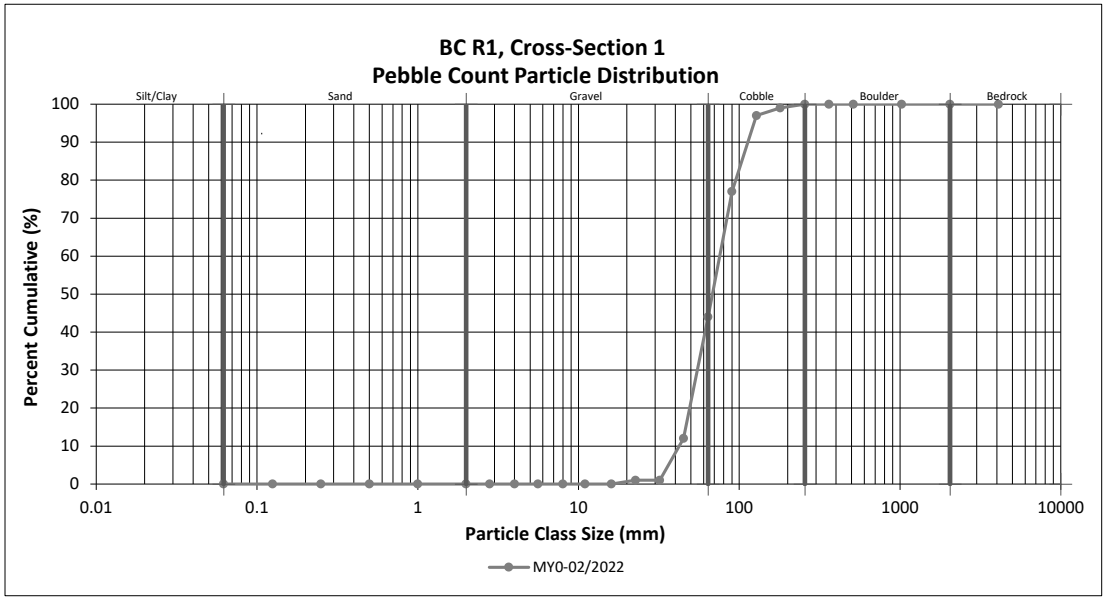
Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R1, Cross-Section 1

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6	1	1	1
	Coarse	22.6	32			1
	Very Coarse	32	45	11	11	12
	Very Coarse	45	64	32	32	44
COBBLE	Small	64	90	33	33	77
	Small	90	128	20	20	97
	Large	128	180	2	2	99
	Large	180	256	1	1	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 1	
Channel materials (mm)	
D_{16} =	47.0
D_{35} =	58.0
D_{50} =	68.1
D_{84} =	101.8
D_{95} =	123.6
D_{100} =	256.0

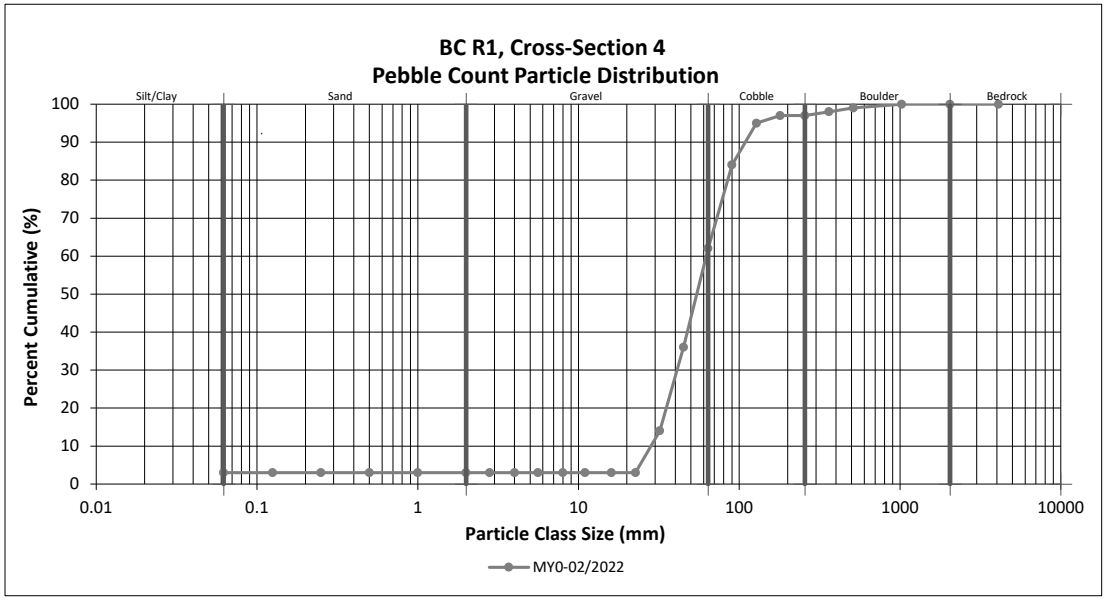


Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R1, Cross-Section 4

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	3	3	3
SAND	Very fine	0.062	0.125			3
	Fine	0.125	0.250			3
	Medium	0.25	0.50			3
	Coarse	0.5	1.0			3
	Very Coarse	1.0	2.0			3
GRAVEL	Very Fine	2.0	2.8			3
	Very Fine	2.8	4.0			3
	Fine	4.0	5.6			3
	Fine	5.6	8.0			3
	Medium	8.0	11.0			3
	Medium	11.0	16.0			3
	Coarse	16.0	22.6			3
	Coarse	22.6	32	11	11	14
	Very Coarse	32	45	22	22	36
	Very Coarse	45	64	26	26	62
COBBLE	Small	64	90	22	22	84
	Small	90	128	11	11	95
	Large	128	180	2	2	97
	Large	180	256			97
BOULDER	Small	256	362	1	1	98
	Small	362	512	1	1	99
	Medium	512	1024	1	1	100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



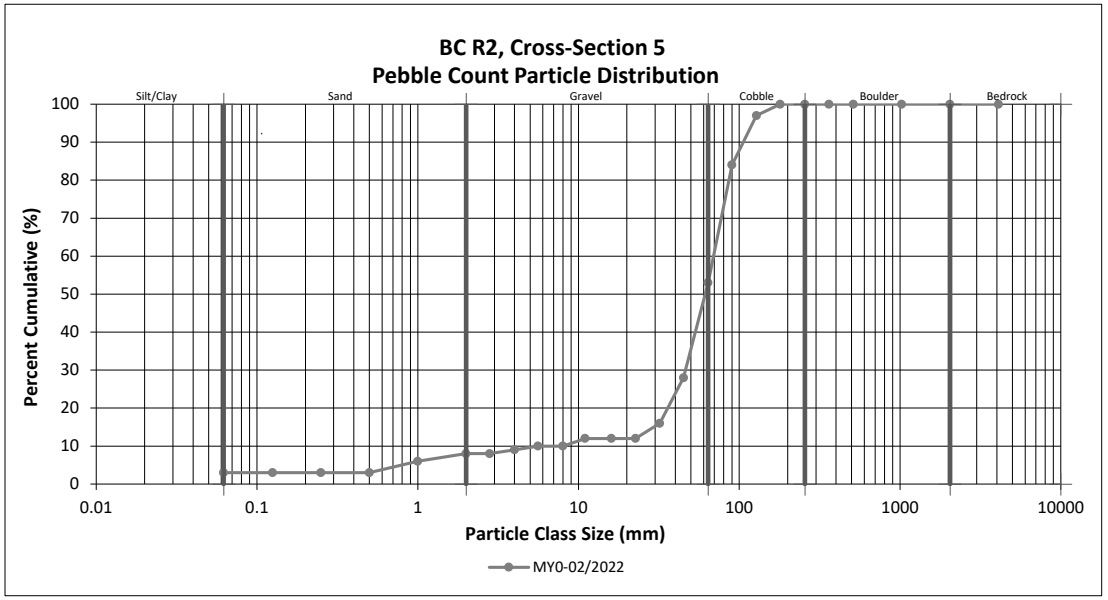
Cross-Section 4	
Channel materials (mm)	
D_{16} =	33.0
D_{35} =	44.3
D_{50} =	54.4
D_{84} =	90.0
D_{95} =	128.0
D_{100} =	1024.0

Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R2, Cross-Section 5

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	3	3	3
SAND	Very fine	0.062	0.125			3
	Fine	0.125	0.250			3
	Medium	0.25	0.50			3
	Coarse	0.5	1.0	3	3	6
	Very Coarse	1.0	2.0	2	2	8
GRAVEL	Very Fine	2.0	2.8			8
	Very Fine	2.8	4.0	1	1	9
	Fine	4.0	5.6	1	1	10
	Fine	5.6	8.0			10
	Medium	8.0	11.0	2	2	12
	Medium	11.0	16.0			12
	Coarse	16.0	22.6			12
	Coarse	22.6	32	4	4	16
	Very Coarse	32	45	12	12	28
	Very Coarse	45	64	25	25	53
COBBLE	Small	64	90	31	31	84
	Small	90	128	13	13	97
	Large	128	180	3	3	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



Cross-Section 5	
Channel materials (mm)	
D_{16} =	32.0
D_{35} =	49.7
D_{50} =	61.4
D_{84} =	90.0
D_{95} =	121.2
D_{100} =	180.0

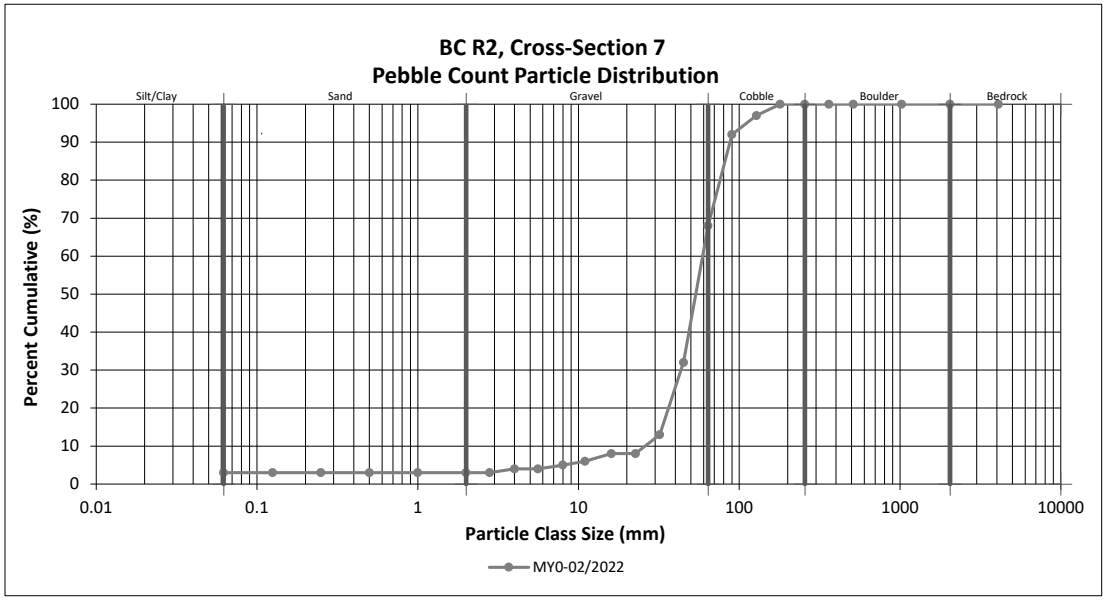
Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R2, Cross-Section 7

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	3	3	3
SAND	Very fine	0.062	0.125			3
	Fine	0.125	0.250			3
	Medium	0.25	0.50			3
	Coarse	0.5	1.0			3
	Very Coarse	1.0	2.0			3
GRAVEL	Very Fine	2.0	2.8			3
	Very Fine	2.8	4.0	1	1	4
	Fine	4.0	5.6			4
	Fine	5.6	8.0	1	1	5
	Medium	8.0	11.0	1	1	6
	Medium	11.0	16.0	2	2	8
	Coarse	16.0	22.6			8
	Coarse	22.6	32	5	5	13
	Very Coarse	32	45	19	19	32
	Very Coarse	45	64	36	36	68
COBBLE	Small	64	90	24	24	92
	Small	90	128	5	5	97
	Large	128	180	3	3	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 7	
Channel materials (mm)	
D_{16} =	33.8
D_{35} =	46.3
D_{50} =	53.7
D_{84} =	80.3
D_{95} =	111.2
D_{100} =	180.0

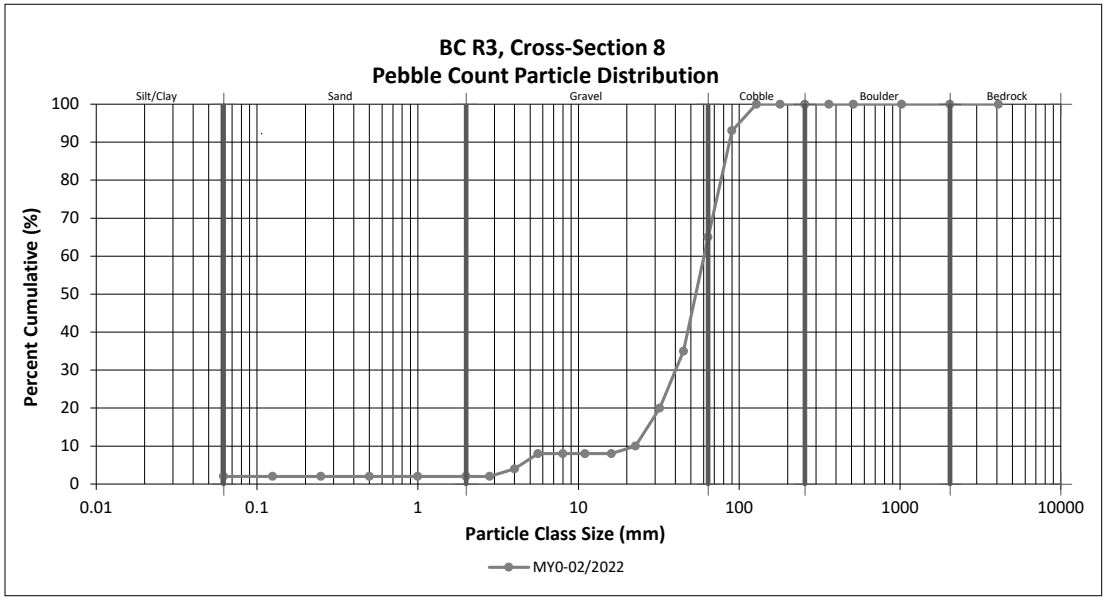


Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R3, Cross-Section 8

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0			2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0	2	2	4
	Fine	4.0	5.6	4	4	8
	Fine	5.6	8.0			8
	Medium	8.0	11.0			8
	Medium	11.0	16.0			8
	Coarse	16.0	22.6	2	2	10
	Coarse	22.6	32	10	10	20
	Very Coarse	32	45	15	15	35
	Very Coarse	45	64	30	30	65
COBBLE	Small	64	90	28	28	93
	Small	90	128	7	7	100
	Large	128	180			100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



Cross-Section 8	
Channel materials (mm)	
D_{16} =	27.8
D_{35} =	45.0
D_{50} =	53.7
D_{84} =	80.7
D_{95} =	99.5
D_{100} =	128.0

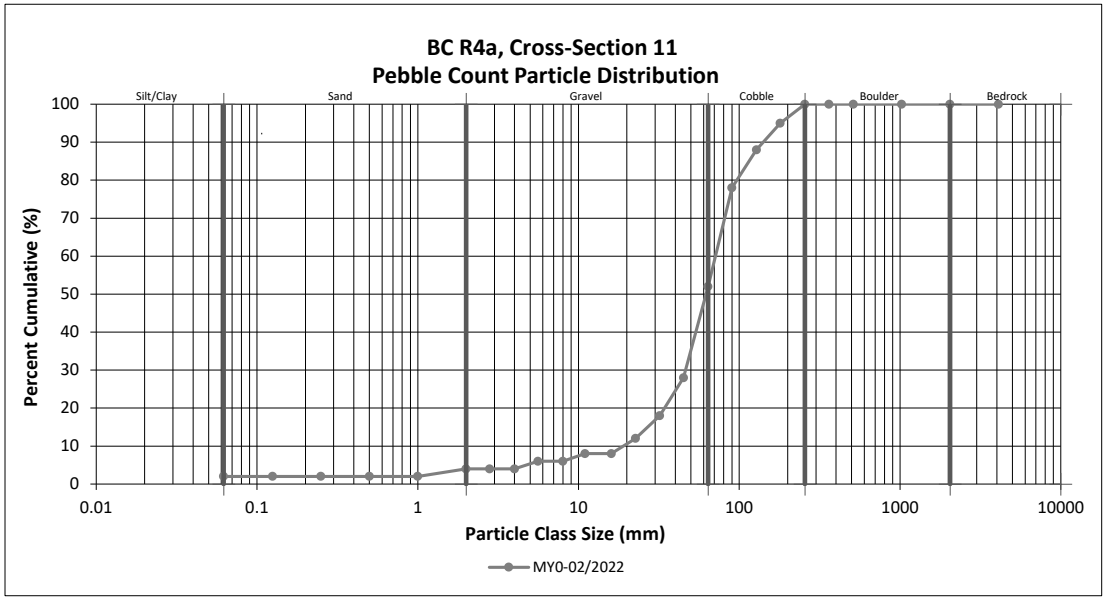
Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R4a, Cross-Section 11

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0			2
	Very Coarse	1.0	2.0	2	2	4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.6	2	2	6
	Fine	5.6	8.0			6
	Medium	8.0	11.0	2	2	8
	Medium	11.0	16.0			8
	Coarse	16.0	22.6	4	4	12
	Coarse	22.6	32	6	6	18
	Very Coarse	32	45	10	10	28
	Very Coarse	45	64	24	24	52
COBBLE	Small	64	90	26	26	78
	Small	90	128	10	10	88
	Large	128	180	7	7	95
	Large	180	256	5	5	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 11	
Channel materials (mm)	
D_{16} =	28.5
D_{35} =	49.9
D_{50} =	62.1
D_{84} =	111.2
D_{95} =	180.0
D_{100} =	256.0

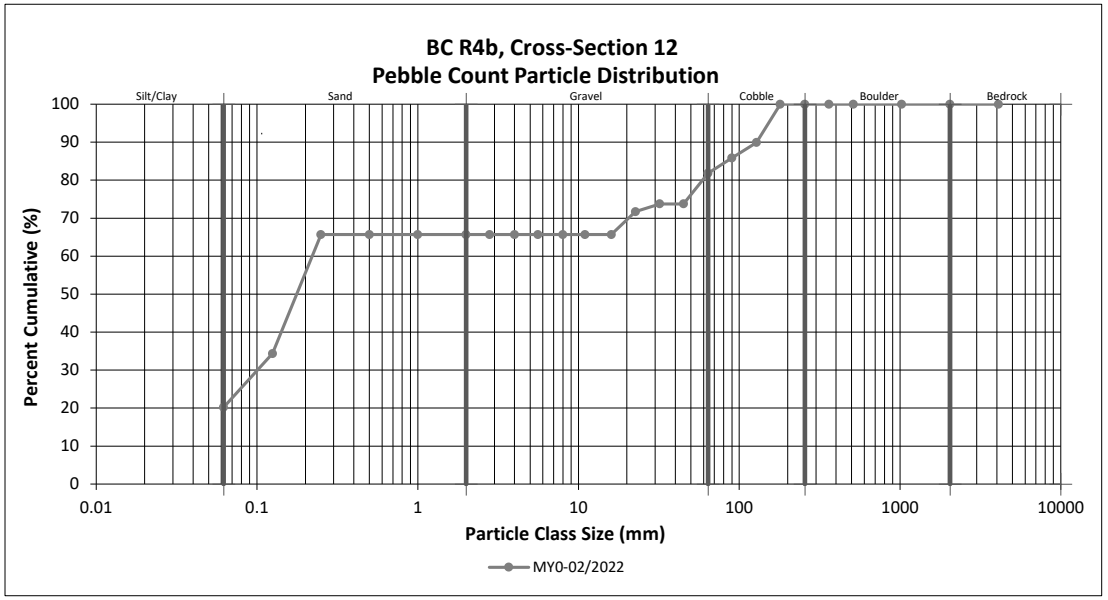


Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

BC R4b, Cross-Section 12

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	20	20	20
SAND	Very fine	0.062	0.125	14	14	34
	Fine	0.125	0.250	31	31	66
	Medium	0.25	0.50			66
	Coarse	0.5	1.0			66
	Very Coarse	1.0	2.0			66
GRAVEL	Very Fine	2.0	2.8			66
	Very Fine	2.8	4.0			66
	Fine	4.0	5.6			66
	Fine	5.6	8.0			66
	Medium	8.0	11.0			66
	Medium	11.0	16.0			66
	Coarse	16.0	22.6	6	6	72
	Coarse	22.6	32	2	2	74
	Very Coarse	32	45			74
	Very Coarse	45	64	8	8	82
COBBLE	Small	64	90	4	4	86
	Small	90	128	4	4	90
	Large	128	180	10	10	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**99**	**100**	**100**



Cross-Section 12	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	0.1
D_{50} =	0.2
D_{84} =	76.9
D_{95} =	152.0
D_{100} =	180.0

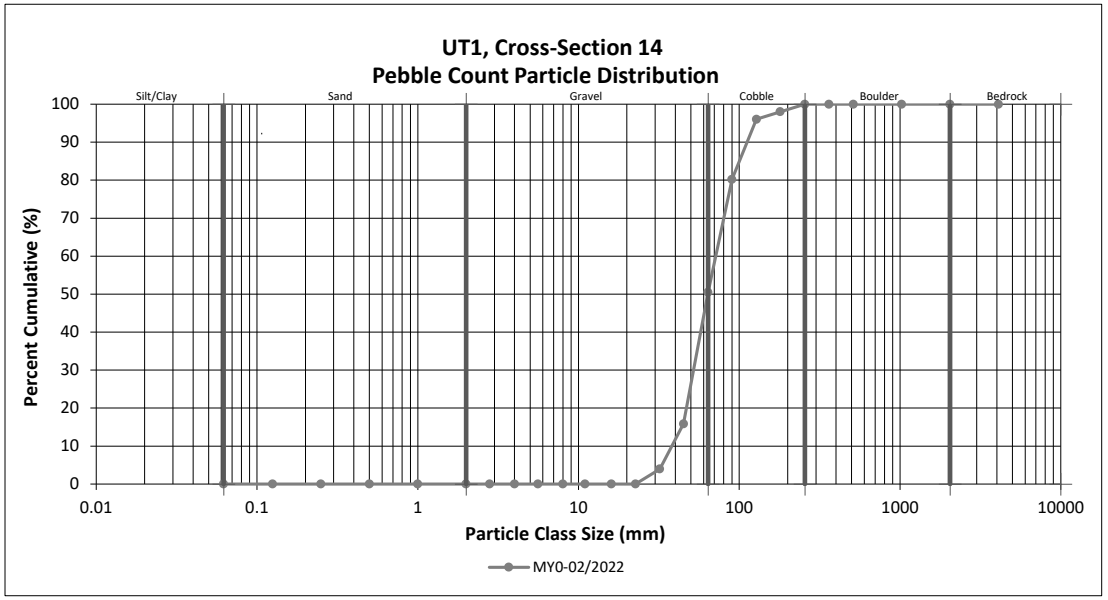
Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

UT1, Cross-Section 14

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6			0
	Coarse	22.6	32	4	4	4
	Very Coarse	32	45	12	12	16
	Very Coarse	45	64	35	35	50
COBBLE	Small	64	90	30	30	80
	Small	90	128	16	16	96
	Large	128	180	2	2	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**101**	**100**	**100**

Cross-Section 14	
Channel materials (mm)	
D_{16} =	45.1
D_{35} =	54.7
D_{50} =	63.7
D_{84} =	97.9
D_{95} =	125.1
D_{100} =	256.0



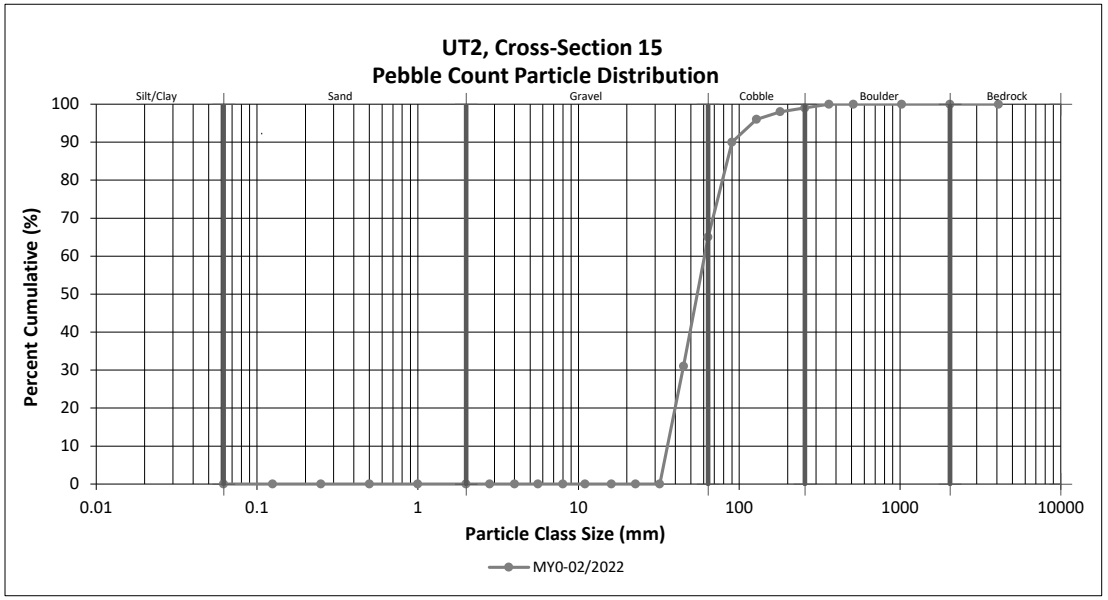
Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

UT2, Cross-Section 15

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6			0
	Coarse	22.6	32			0
	Very Coarse	32	45	31	31	31
	Very Coarse	45	64	34	34	65
COBBLE	Small	64	90	25	25	90
	Small	90	128	6	6	96
	Large	128	180	2	2	98
	Large	180	256	1	1	99
BOULDER	Small	256	362	1	1	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 15	
Channel materials (mm)	
D_{16} =	38.2
D_{35} =	46.9
D_{50} =	54.8
D_{84} =	82.9
D_{95} =	120.7
D_{100} =	362.0

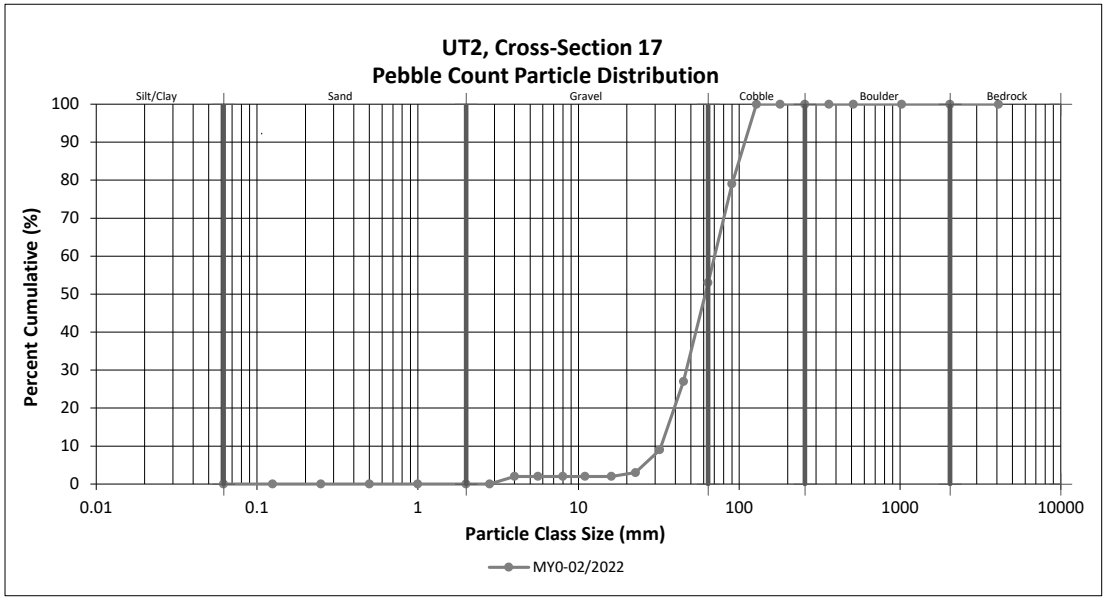


Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

UT2, Cross-Section 17

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0	2	2	2
	Fine	4.0	5.6			2
	Fine	5.6	8.0			2
	Medium	8.0	11.0			2
	Medium	11.0	16.0			2
	Coarse	16.0	22.6	1	1	3
	Coarse	22.6	32	6	6	9
	Very Coarse	32	45	18	18	27
	Very Coarse	45	64	26	26	53
COBBLE	Small	64	90	26	26	79
	Small	90	128	21	21	100
	Large	128	180			100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



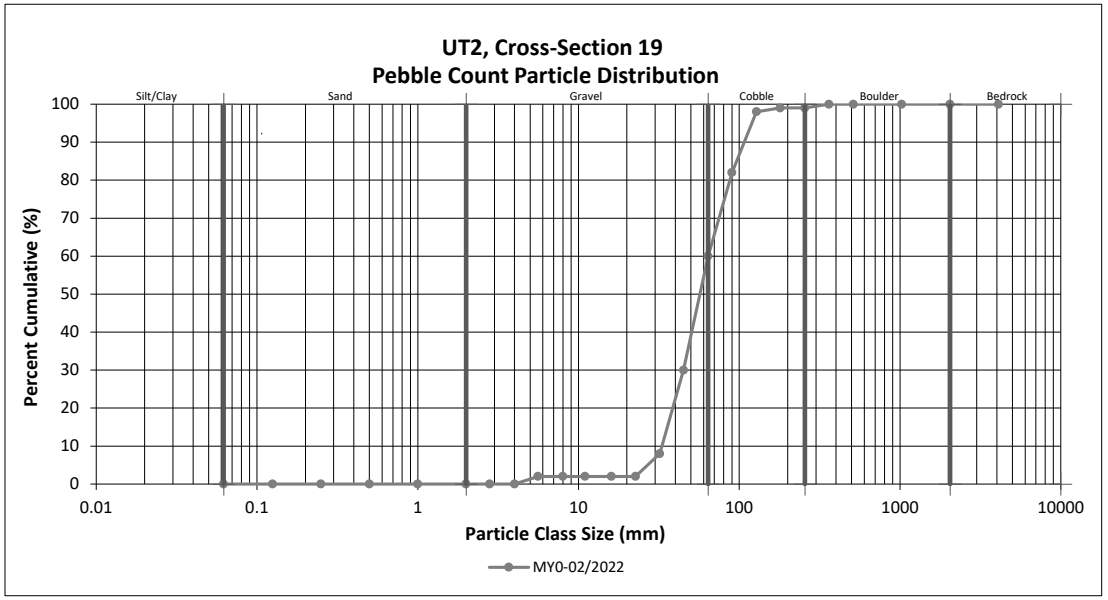
Cross-Section 17	
Channel materials (mm)	
D_{16} =	36.5
D_{35} =	50.2
D_{50} =	61.5
D_{84} =	97.9
D_{95} =	117.7
D_{100} =	128.0

Riffle Pebble Count Plots

Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

UT2, Cross-Section 19

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6	2	2	2
	Fine	5.6	8.0			2
	Medium	8.0	11.0			2
	Medium	11.0	16.0			2
	Coarse	16.0	22.6			2
	Coarse	22.6	32	6	6	8
	Very Coarse	32	45	22	22	30
	Very Coarse	45	64	30	30	60
COBBLE	Small	64	90	22	22	82
	Small	90	128	16	16	98
	Large	128	180	1	1	99
	Large	180	256			99
BOULDER	Small	256	362	1	1	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



Cross-Section 19	
Channel materials (mm)	
D_{16} =	36.2
D_{35} =	47.7
D_{50} =	56.9
D_{84} =	94.1
D_{95} =	119.8
D_{100} =	362.0

APPENDIX D. Project Timeline and Contact Information

Table 10. Project Activity and Reporting History
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Activity or Deliverable		Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted		N/A	April 2018
Mitigation Plan Approved		June 2020	June 2020
Construction (Grading) Completed		N/A	November 2021
Planting Completed		N/A	February 2022
As-Built Survey Completed		February 2022	February 2022
Baseline Monitoring Document (Year 0)	Stream Survey	February - March 2022	April 2022
	Vegetation Survey	February 2022	
Year 1 Monitoring	Stream Survey		
	Vegetation Survey		
Year 2 Monitoring	Stream Survey		
	Vegetation Survey		
Year 3 Monitoring	Stream Survey		
	Vegetation Survey		
Year 4 Monitoring			
Year 5 Monitoring	Stream Survey		
	Vegetation Survey		
Year 6 Monitoring			
Year 7 Monitoring	Stream Survey		
	Vegetation Survey		

Table 11. Project Contact Table
Banner Farm Mitigation Site
DMS Project No. 100062
Monitoring Year 0 - 2022

Designer Eric Neuhaus, PE	**Wildlands Engineering, Inc.** 167-B Haywood Rd. Asheville, NC 28806 828-774-5547
Construction Contractor	**Main Stream Earthwork, Inc.** 631 Camp Dan Valley Rd Reidsville, NC 27320
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Kristi Suggs 704-332-7754 x 110

To: DMS Technical Workgroup, DMS operations staff

From: Periann Russell, Division of Mitigation Services (DMS)

RE: Pebble count data requirements

Date: October 19, 2021

The DMS Technical Work Group met September 29, 2021 to discuss Interagency Review Team (IRT) and DMS requirements for collecting pebble count data as part of monitoring (MY0-MYx). Agreement was reached between all attending parties that pebble count data will not be required during the monitoring period for all future projects.

Sediment data and particle distribution will still be required for the mitigation plan as part of the proposed design explanation and justification.

Pebble counts and/or particle distributions currently being conducted by providers for annual monitoring may be discontinued at the discretion of the DMS project manager. If particle distribution was listed as a performance standard in the project mitigation plan, the provider is required to communicate the intent to cease data collection with the DMS project manager. The absence of pebble count data in future monitoring reports where pebble count data was listed as part of monitoring in the mitigation plan must be documented in the monitoring report. The September 29, 2021 Technical Work Group meeting may be cited as the source of the new policy.

The IRT reserves the right to request pebble count data/particle distributions if deemed necessary during the monitoring period.

Kristi Suggs

From: Reid, Matthew <matthew.reid@ncdenr.gov>
Sent: Wednesday, October 27, 2021 1:26 PM
To: Kristi Suggs
Cc: Mimi Caddell
Subject: RE: [External] FW: Pebble Count Data Requirements

I am absolutely OK with not doing pebble counts anymore!

As stated in the memo, please add a statement in the monitoring reports citing the policy.

Thanks!

Matthew Reid
Project Manager – Western Region
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-231-7912 Mobile
matthew.reid@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Dr
Suite 102
Asheville, NC 28801

From: Kristi Suggs [mailto:ksuggs@wildlandseng.com]
Sent: Wednesday, October 27, 2021 1:24 PM
To: Reid, Matthew <matthew.reid@ncdenr.gov>
Cc: Mimi Caddell <mcaddell@wildlandseng.com>
Subject: [External] FW: Pebble Count Data Requirements

Matthew,

Jason Lorch in our Raleigh Office forwarded this meeting memo to me. It says that conducting pebble counts for DMS monitoring (MY0 – MY7) projects is no longer needed as long as it has been okayed by the DMS PM. Moving forward, are you going to allow us to stop doing them on your projects? If so, will DBB projects be treated the same? Please let me know. Thank you!

Kristi

Kristi Suggs | *Senior Environmental Scientist*
O: 704.332.7754 x110 **M**: 704.579.4828

Wildlands Engineering, Inc.
1430 S. Mint St, Suite 104
Charlotte, NC 28203

From: Jason Lorch <jlorch@wildlandseng.com>
Sent: Monday, October 25, 2021 9:05 AM
To: Kristi Suggs <ksuggs@wildlandseng.com>
Subject: FW: Pebble Count Data Requirements

FYI!

Jason Lorch, GISP | *Senior Environmental Scientist*
O: 919.851.9986 x107 **M**: 919.413.1214

Wildlands Engineering, Inc.
312 West Millbrook Road, Suite 225
Raleigh, NC 27609

From: Russell, Periann <periann.russell@ncdenr.gov>
Sent: Thursday, October 21, 2021 10:05 AM
To: King, Scott <Scott.King@mbakerintl.com>; Catherine Manner <catherine@waterlandsolutions.com>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; adam.spiller@kci.com; Brad Breslow <bbreslow@res.us>; Davis, Erin B <erin.davis@ncdenr.gov>; gginn@wolfcreekeng.com; grant lewis <glewis@axiomenvironmental.org>; Jeff Keaton <jkeaton@wildlandseng.com>; katie mckeithan <Katie.McKeithan@mbakerintl.com>; Kayne Van Stell <kayne@waterlandsolutions.com>; Kevin Tweedy <ktweedy@eprusa.net>; Reid, Matthew <matthew.reid@ncdenr.gov>; Ryan Smith <rsmith@lmgroup.net>; Melia, Gregory <gregory.melia@ncdenr.gov>; Allen, Melonie <melonie.allen@ncdenr.gov>; Famularo, Joseph T <Joseph.Famularo@ncdenr.gov>; Rich@mogmit.com; Bryan Dick <Bryan.Dick@freese.com>; Ryan Medric <rmedric@res.us>; Kim Browning <Kimberly.D.Browning@usace.army.mil>; Kayne Van Stell <kayne@waterlandsolutions.com>; Worth Creech <worth@restorationsystems.com>; Jason Lorch <jlorch@wildlandseng.com>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Wiesner, Paul <paul.wiesner@ncdenr.gov>; Tsomides, Harry <harry.tsomides@ncdenr.gov>; Reid, Matthew <matthew.reid@ncdenr.gov>; Dow, Jeremiah J <jeremiah.dow@ncdenr.gov>; Horton, Jeffrey <jeffrey.horton@ncdenr.gov>; Ullman, Kirsten J <Kirsten.Ullman@NCDENR.gov>; Ackerman, Anjie <anjie.ackerman@ncdenr.gov>; Blackwell, Jamie D <james.blackwell@ncdenr.gov>; Xu, Lin <lin.xu@ncdenr.gov>; Mir, Danielle <Danielle.Mir@ncdenr.gov>; Corson, Kristie <kristie.corson@ncdenr.gov>; Russell, Periann <periann.russell@ncdenr.gov>; Sparks, Kimberly L <Kim.sparks@ncdenr.gov>
Subject: Pebble Count Data Requirements

Please review the attached memo documenting the agreed upon policy for pebble count data requirements.
Please reply (me only) to this email if accept that this memo represents (or misrepresents) our discussion on Sept 29.
Thank you.

Periann Russell
Geomorphologist
Division of Mitigation Services, Science and Analysis
NC Department of Environmental Quality

919 707 8306 office
919 208 1426 mobile
periann.russell@ncdenr.gov

Mailing: 1652 Mail Service Center Raleigh, NC 27699-1652
Physical: 217 West Jones Street Raleigh, NC 27603

APPENDIX E. Record Drawings and Sealed As-Built Survey

April 18, 2022

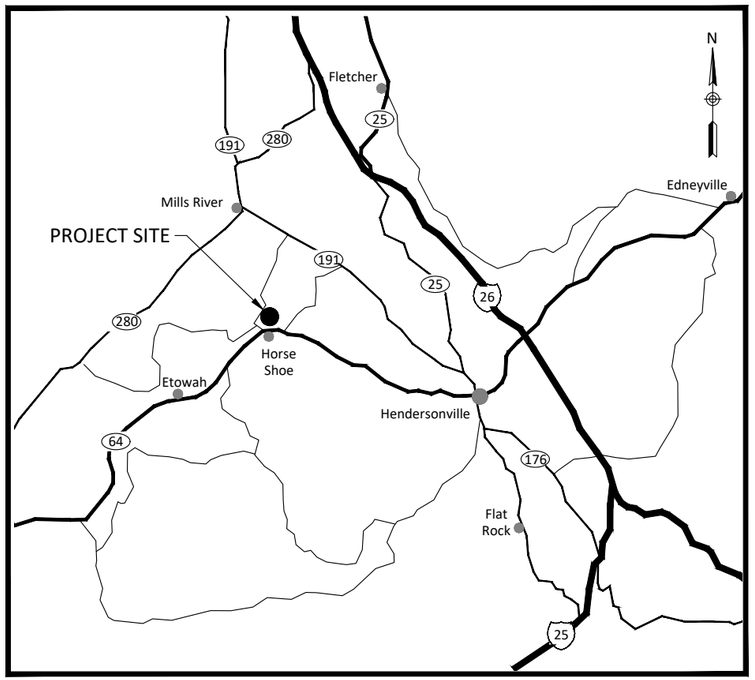
Banner Farm Mitigation Site Record Drawings

Henderson County, North Carolina

for

NCDEQ

Division of Mitigation Services



Vicinity Map
Not to Scale

Environmental Quality

RECORD DRAWINGS ISSUED
APRIL 18, 2022

Sheet Index

Project Directory

Engineering:
Wildlands Engineering, Inc
License No. F-0831
167-B Haywood Road
Asheville, NC 28806
Eric Neuhaus, PE
865-207-8835

Surveying:
Kee Mapping and Surveying
P.O. Box 2566
Asheville, NC 28802
Brad Kee, PLS
828-575-9021

Owner:
NCDEQ
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699
Matthew Reid
828-231-7912

DMS Project No. 100062

French Broad River Basin
HUC 06010105
NCDWR#: 20181032
USACE Action ID:
SAW-2018-01153

WILDLANDS ENGINEERING
167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042660 ERIC NEUHAUS

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina
Title Sheet

Revisions:

Date: 04-18-22
Job Number: WI021752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 0.1

X:\Active\Projects\WI021752_Banner Farm Mitigation\Baseline Monitoring (2022)\Plans\WI021752-All Cover and Notes.dgn

April 18, 2022

EXISTING POND

STA: 0+08
START BANNER CREEK REACH 1 - RESTORATION
N: 603273.82
E: 938940.61

Mitchell & Wendy Gaither
PIN: 9630826726
DB: 1598 PG: 219

SHEET 1.1.1

SHEET 1.1.2

BANNER CREEK

SHEET 1.1.3

STA: 9+64
END BANNER CREEK REACH 1 - RESTORATION
START BANNER CREEK REACH 2 - RESTORATION
N: 602352.96
E: 939109.42

MOUNTAIN BEAN HOLDINGS, INC.
PIN: 9630924395
DB: 3150 PG: 641
TRACK 1

VINE RIPE INVESTMENTS, INC.
PIN: 9630912884
DB: 3150 PG: 631

SHEET 1.1.4

STA: 18+00
START EASEMENT BREAK
END BANNER CREEK REACH 2 - RESTORATION
START BANNER CREEK REACH 3 - RESTORATION
N: 601815.87
E: 939875.91

SHEET 1.1.5

STA: 21+16
END EASEMENT BREAK
CONTINUE BANNER CREEK REACH 3 - RESTORATION

STA: 200+18
START UT2 - RESTORATION
N: 600898.45
E: 938925.96

BANNER FARM ROAD

STA: 100+83
START UT1 - RESTORATION
N: 602494.09
E: 940455.96

SHEET 1.2.1

UT 1

KIRBY & SHERRI JOHNSON
PIN: 9539895929
DB: 1426 PG: 625

SHEET 1.3.1

SHEET 1.3.2

UT 2

SHEET 1.3.3

SHEET 1.1.6

SHEET 1.3.4

SHEET 1.1.7

SHEET 1.2.2

KIRBY & SHERRI JOHNSON
PIN: 9630900480
DB: 3403 PG: 159

KIRBY & SHERRI JOHNSON
PIN: 9630919204
DB: 831 PG: 23

STA: 218+97
END UT2 - RESTORATION

BANNER CREEK

STA: 25+83
END BANNER CREEK REACH 3 - RESTORATION
START BANNER CREEK REACH 4A - RESTORATION
N: 601581.52
E: 940173.78

SHEET 1.2.3

MOUNTAIN BEAN HOLDINGS, INC.
PIN: 9640028341
DB: 3150 PG: 641
TRACK 2

STA: 112+82
END UT1 - RESTORATION

SHEET 1.1.8

STA: 33+63
END BANNER CREEK REACH 4A - RESTORATION
START BANNER CREEK REACH 4B - RESTORATION
N: 601706.59
E: 940792.46

FRENCH BROAD RIVER

SHEET 1.1.9

STA: 37+97
END BANNER CREEK REACH 4B - RESTORATION

K:\Shared\Projects\W02172 Banner Farm Monitoring\Baseline Monitoring (2022)\Plans\W02172a-MB-Overview.dwg

WILDLANDS ENGINEERING
167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Project Overview

Revisions:

Date: 04-18-22
Job Number: W02172
Project Engineer: DN
Drawn By: JH
Checked By: JK

Sheet 0.2

Pre-construction Features

- CE — CE — Recorded Conservation Easement
- Pre-construction Property Boundary
- Pre-construction Overhead Wire/Utility
- Pre-construction Utility Right-of-Way
- Pre-construction Road Right-of-Way
- Pre-construction Pole/Utility Tower/Guy Wire
- Pre-construction tree
- Pre-construction Jurisdictionally Delineated Wetlands
- Pre-construction Asphalt Roads

Design Features

- 10+00 — Stream Design Alignment
- 100 — Design Grading Contour 5' Major
- Design Grading Contour 1' Major
- Design Bankfull
- Design Culvert
- Design Brush Toe
- Design Riffle
- Design Log Sill
- Design Rock Sill
- Design Log J-Hook
- Design Cover Log

As-Built Features

- As-Built Thalweg
- As-Built Bankfull
- 100 — As-Built Major Contour
- As-Built Minor Contour
- As-Built Cross Section
- As-Built Culvert
- As-Built Log Sill
- As-Built Rock Sill
- As-Built Log J-Hook
- As-Built Cover Log
- As-Built Brush Toe
- As-Built Boulder Toe
- As-Built Riffle
- As-Built Crossing
- As-Built Soil Bed Farm Road

Monitoring Features

- VEG / VP# / VEG — As-Built Vegetation Monitoring Plot
- CG# — Crest Gage
- GWG# — Groundwater Gage
- BT# — Barotroll
- PP# — Photo Point

NOTE:

Deviations shown in red.

WILDLANDS ENGINEERING
167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

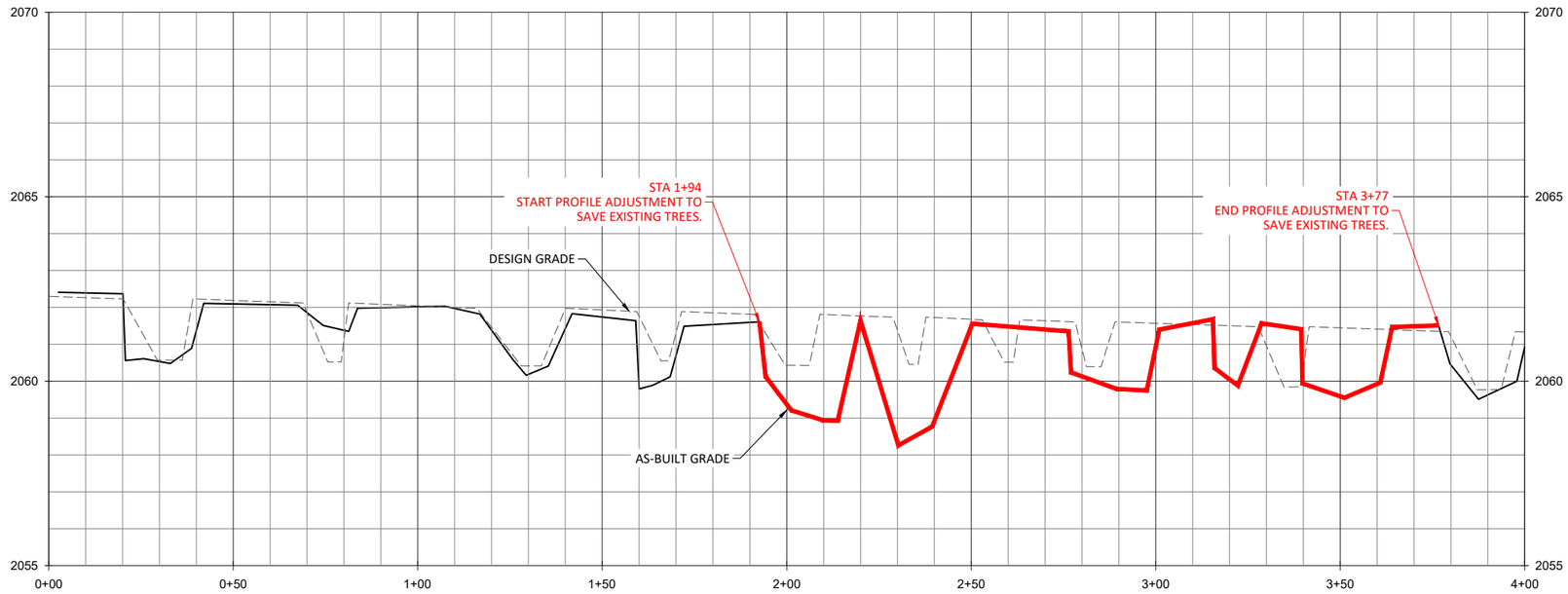
Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina
General Notes and Symbols

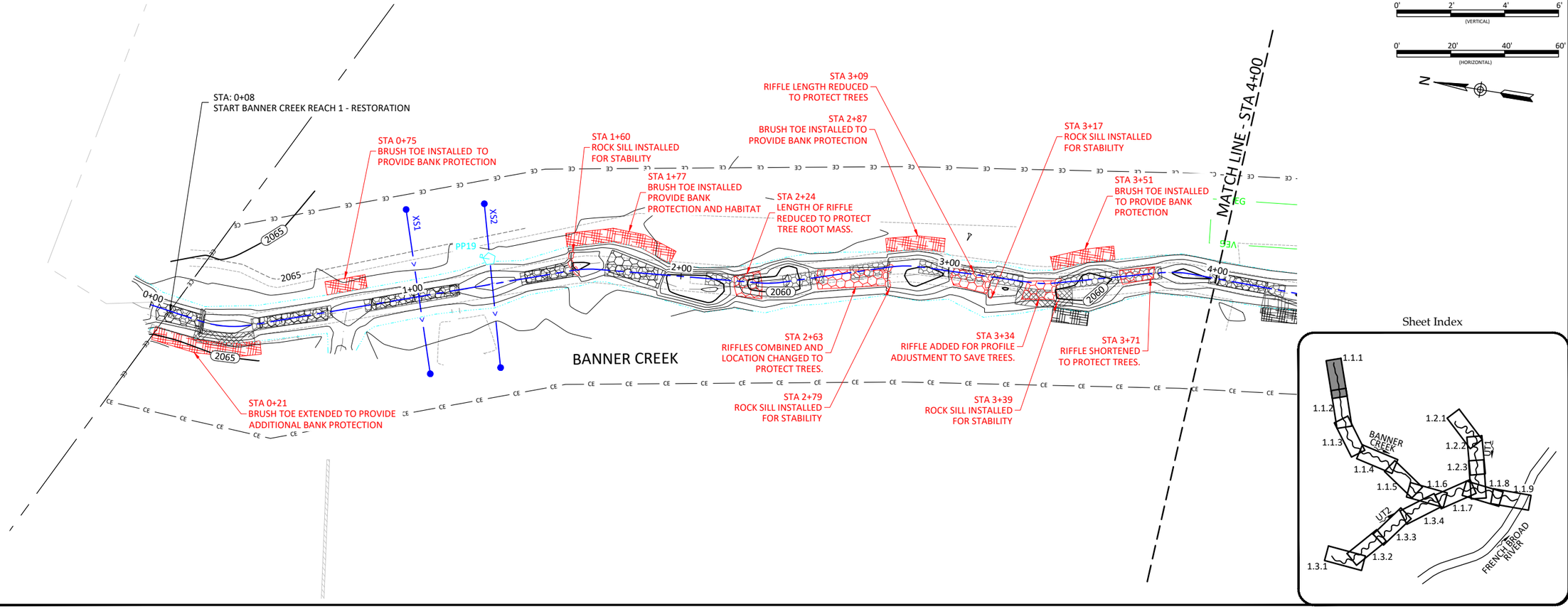
Date: 04-18-22
Job Number: W021752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Revisions:

Sheet 0.3

April 19, 2022





Sheet Index

WILDLANDS ENGINEERING
167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUHAUSER

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
Banner Creek

Revisions:

Date:	04-18-22
Job Number:	WI021752
Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

Sheet 1.1.1

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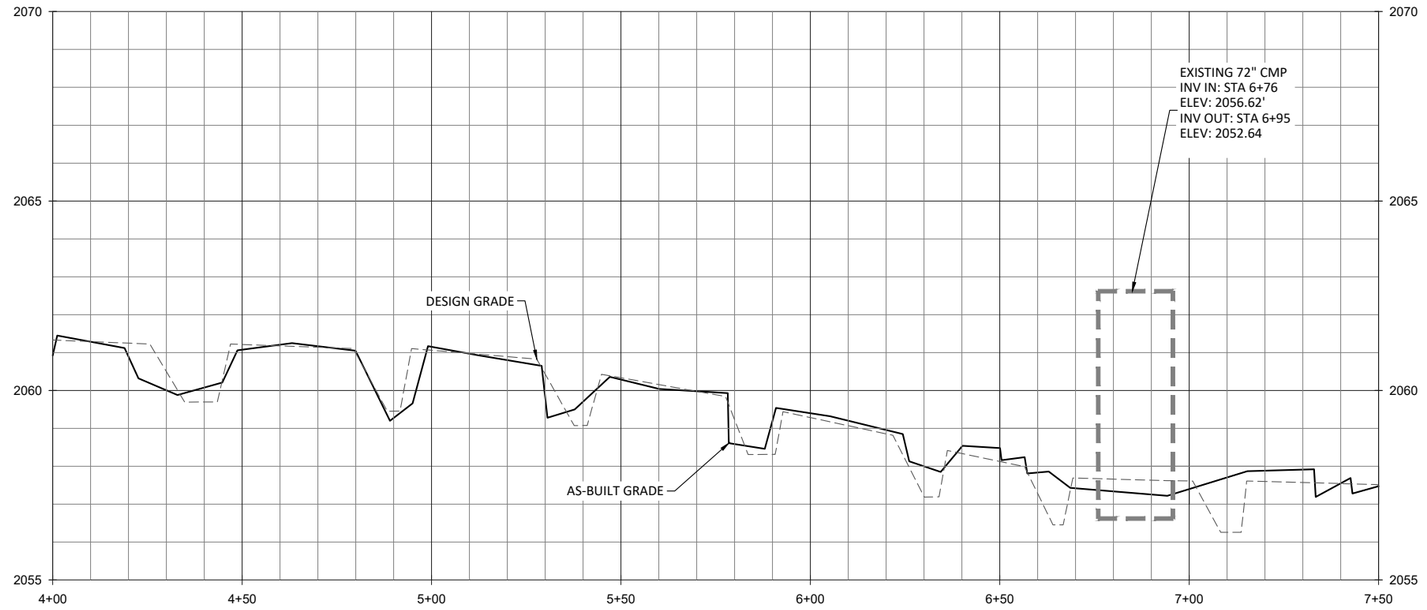
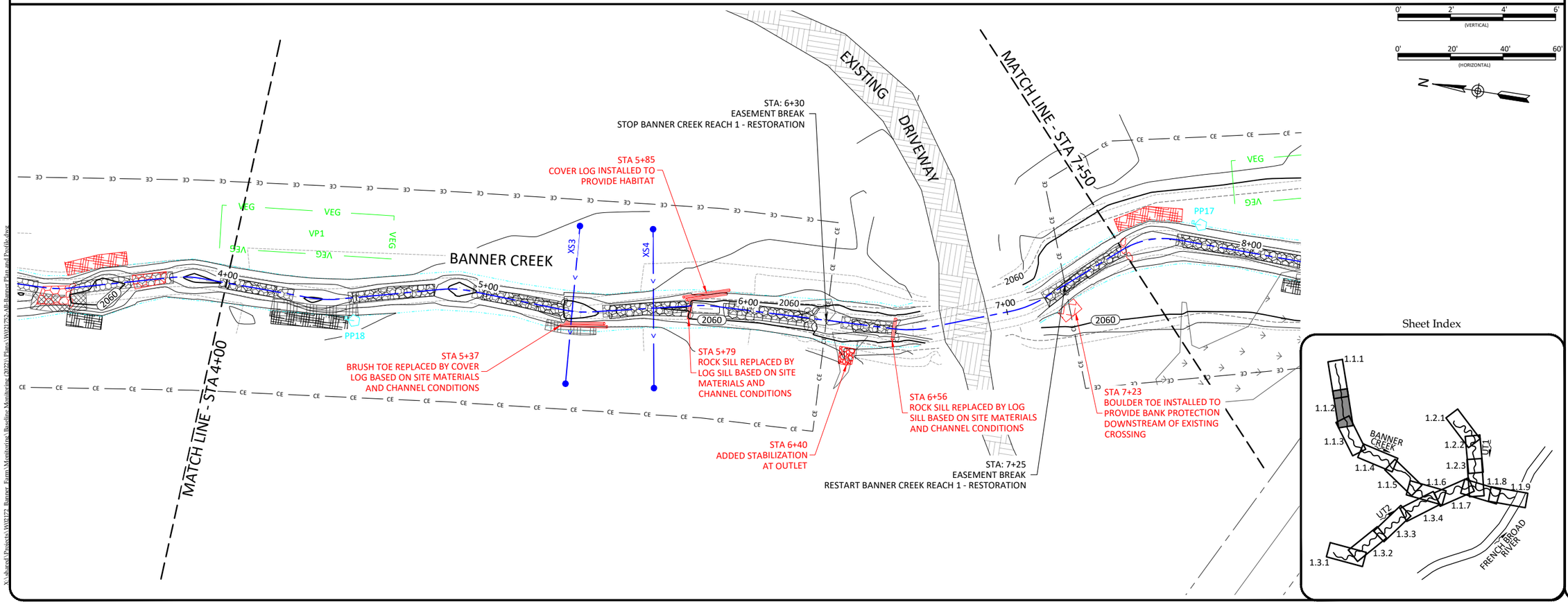
April 18, 2022





0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

N

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUHAUSER

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina
Stream Plan and Profile
Banner Creek

Revisions:

Date:	04-18-22
Job Number:	WI021752
Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

Sheet 1.1.2

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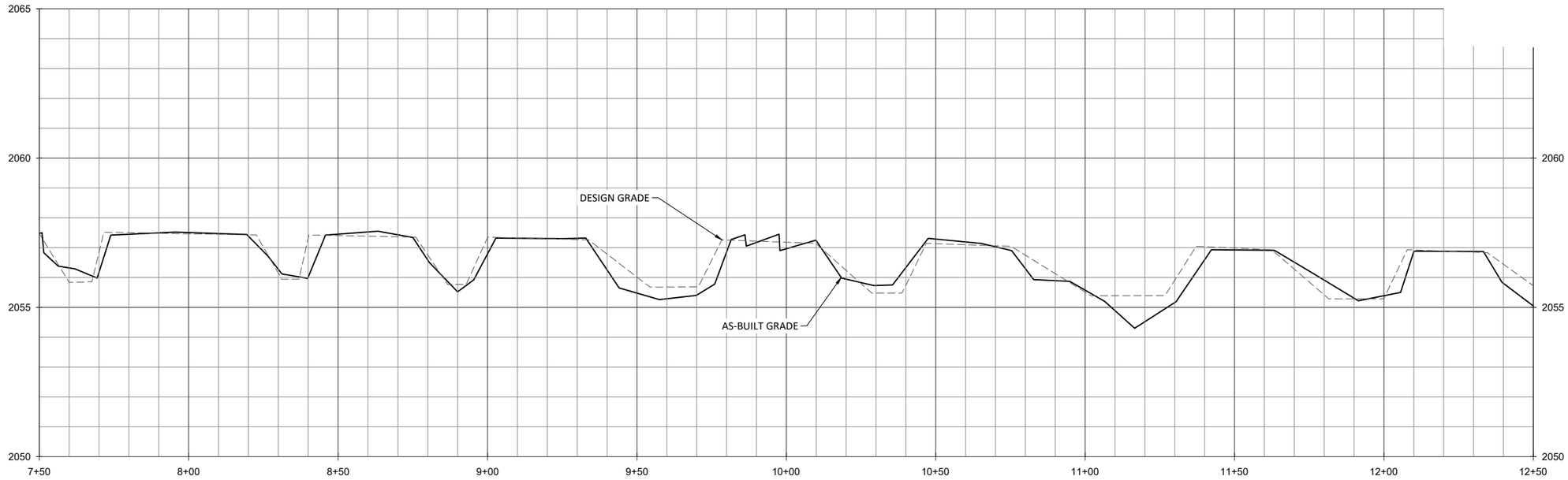

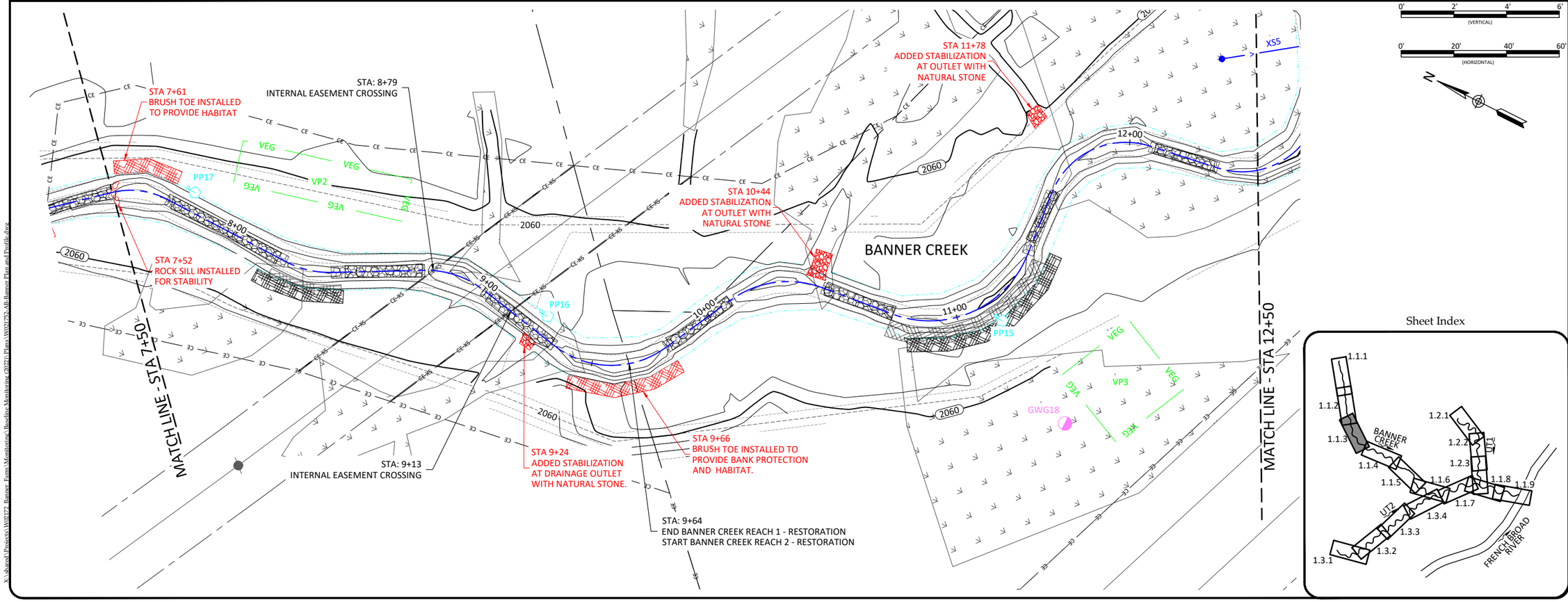

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

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Henderson County, North Carolina

Stream Plan and Profile
Banner Creek

Revisions:

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Checked By:	JK

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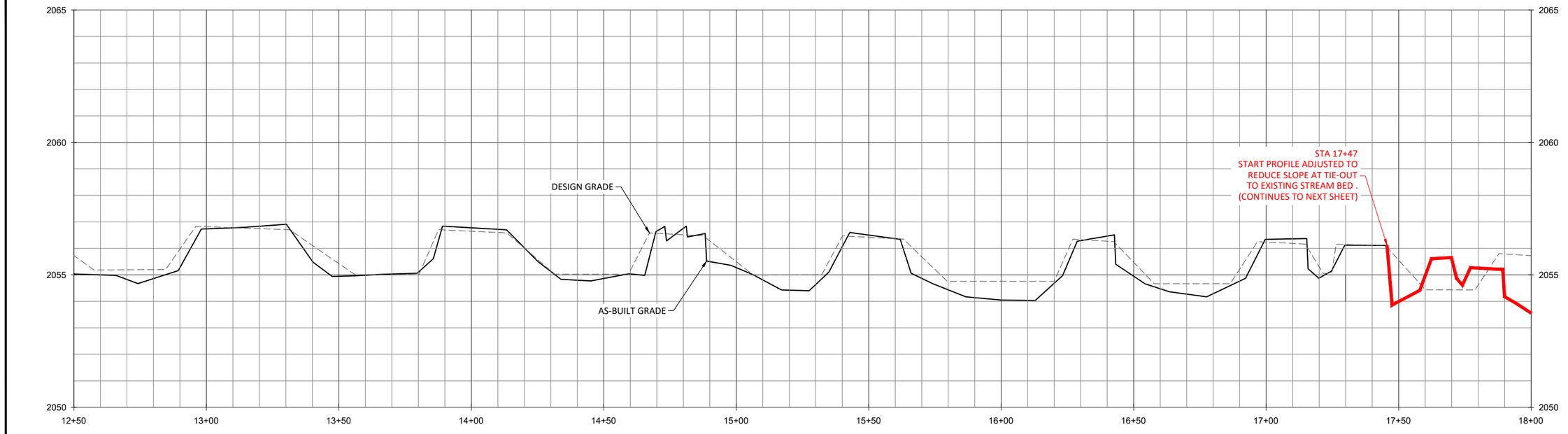
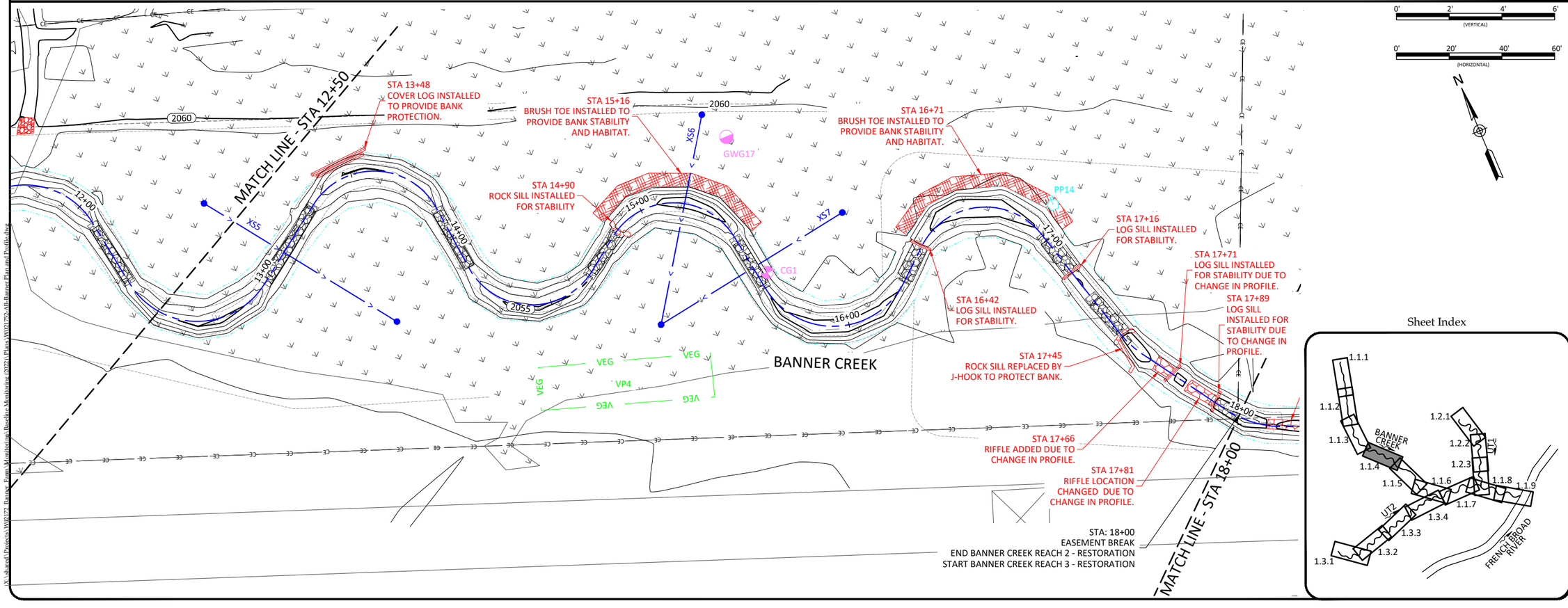
April 19, 2022

April 19, 2022





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Asheville, NC 28806
Tel: 828.774.5547
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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
Banner Creek

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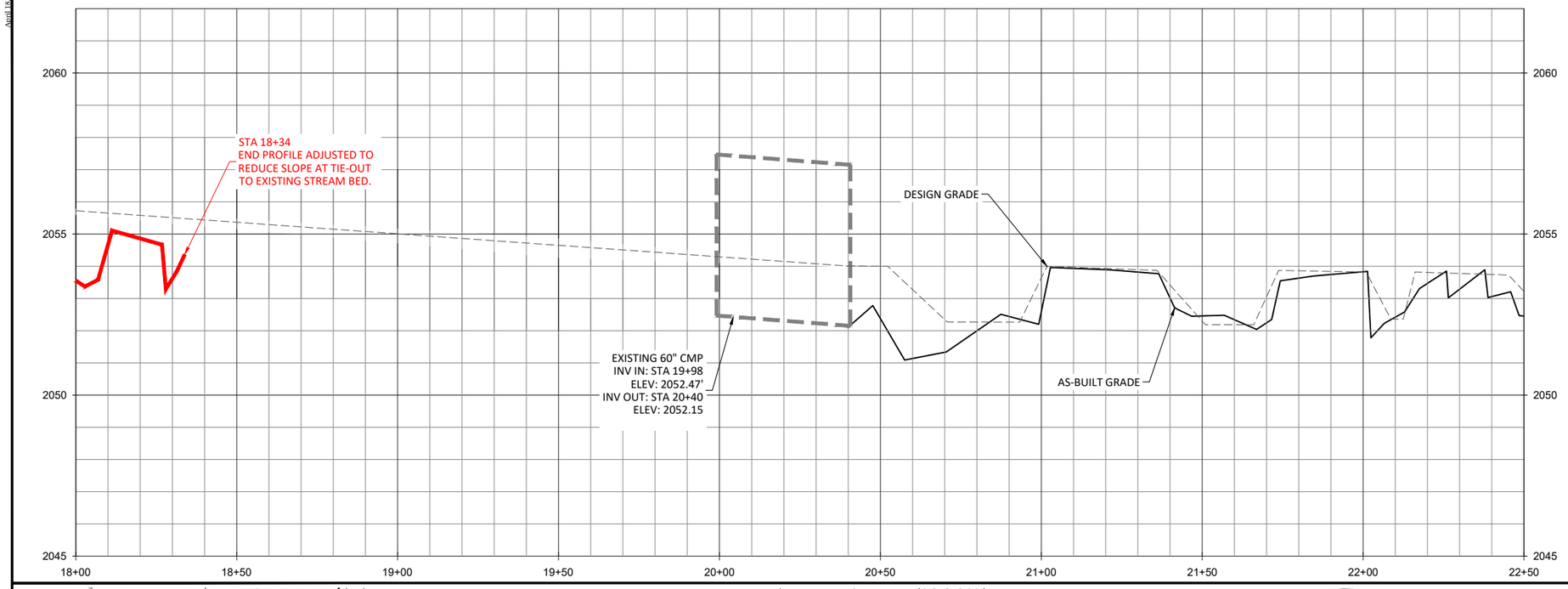
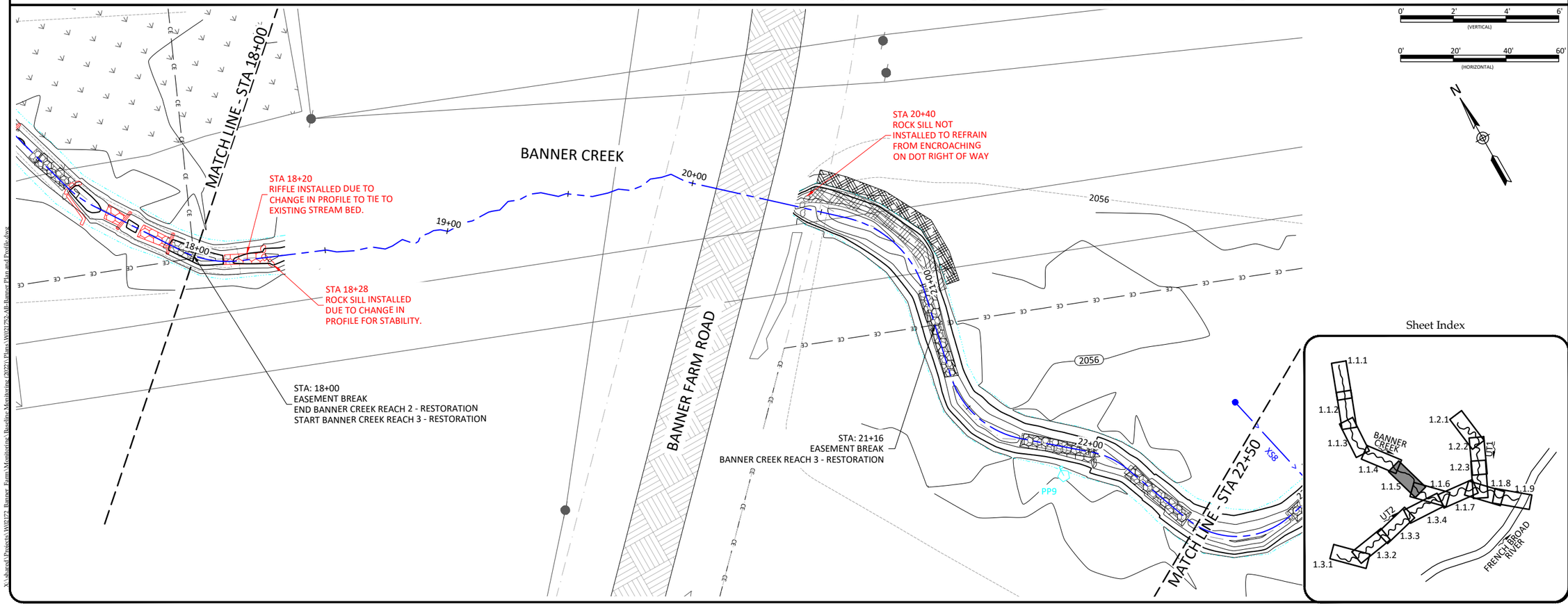
Checked By:	JK

Sheet 1.1.4





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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
Banner Creek

Revisions:

Date: 04-18-22
Job Number: WV021752
Project Engineer: DN
Drawn By: JH
Checked By: JK

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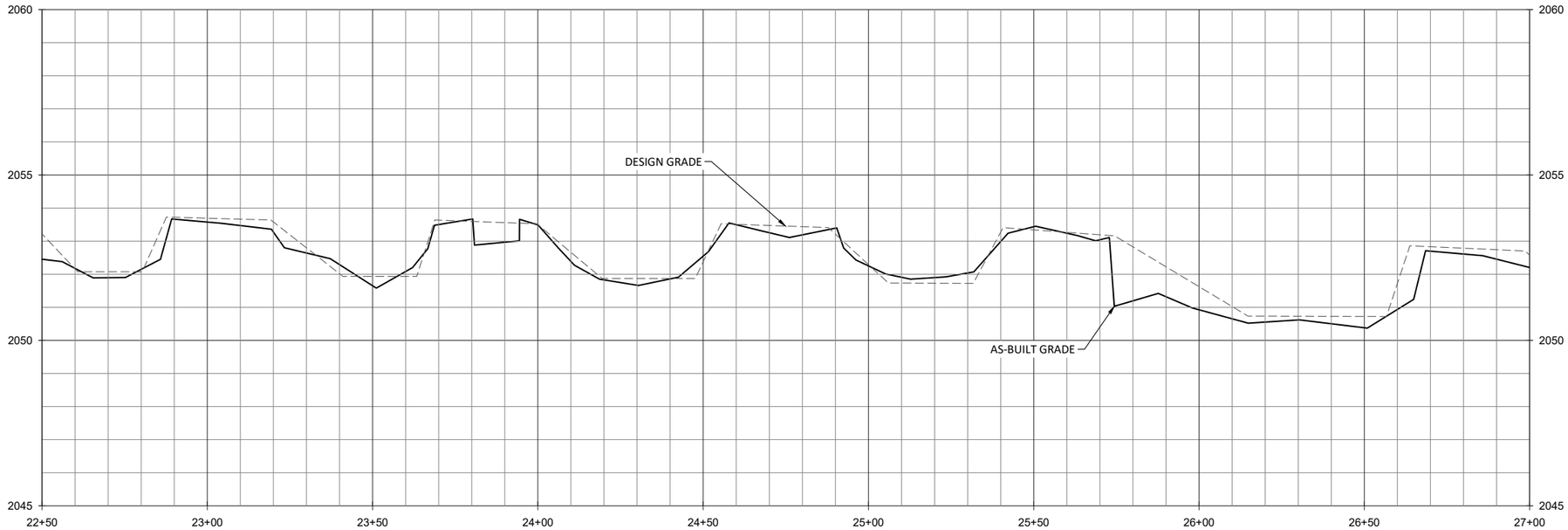

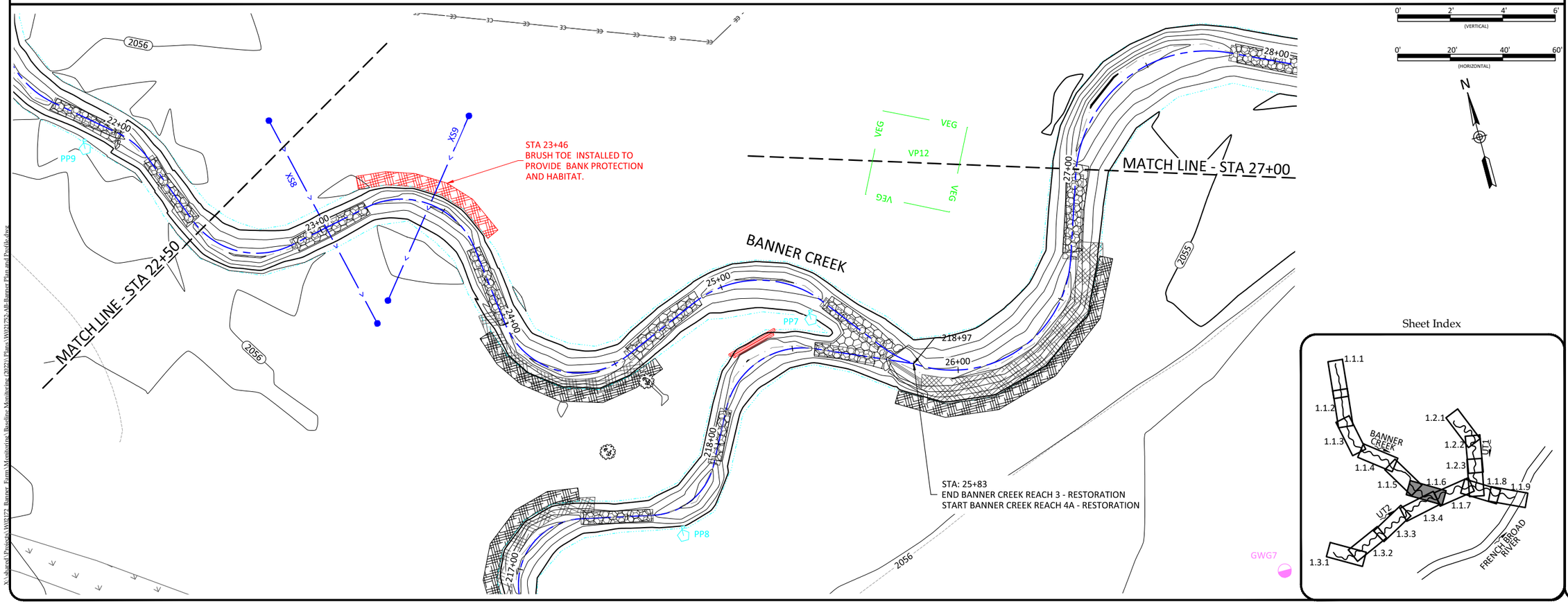

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
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Banner Creek

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Checked By:	JK

Sheet 1.1.6

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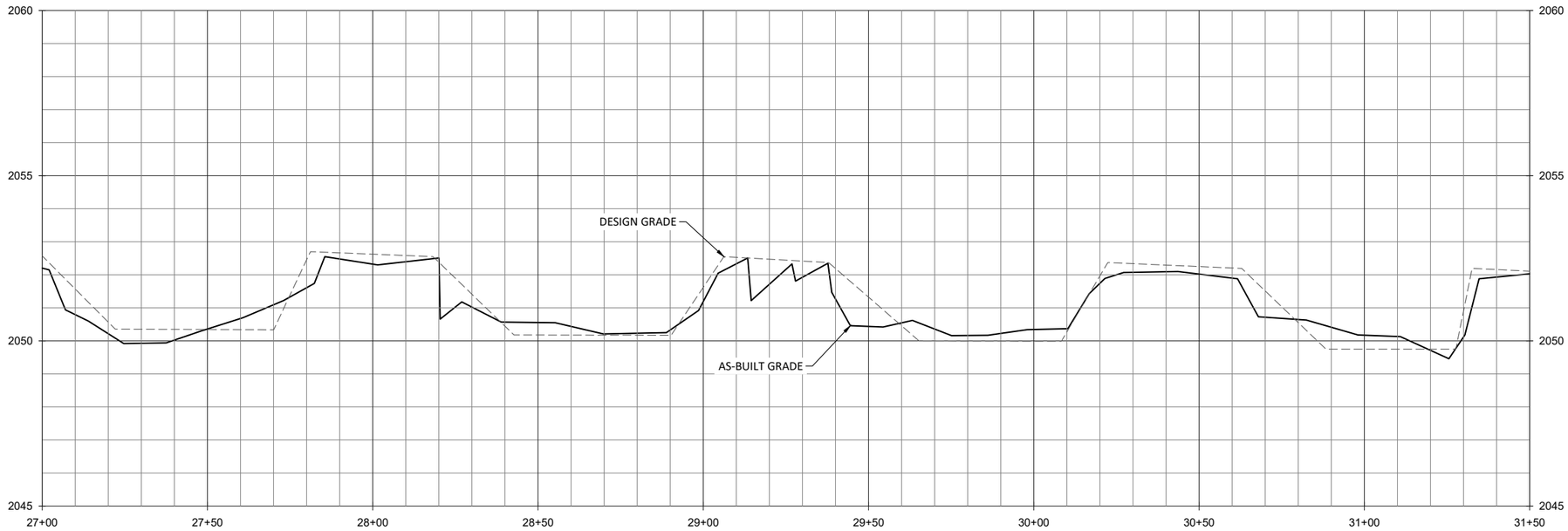

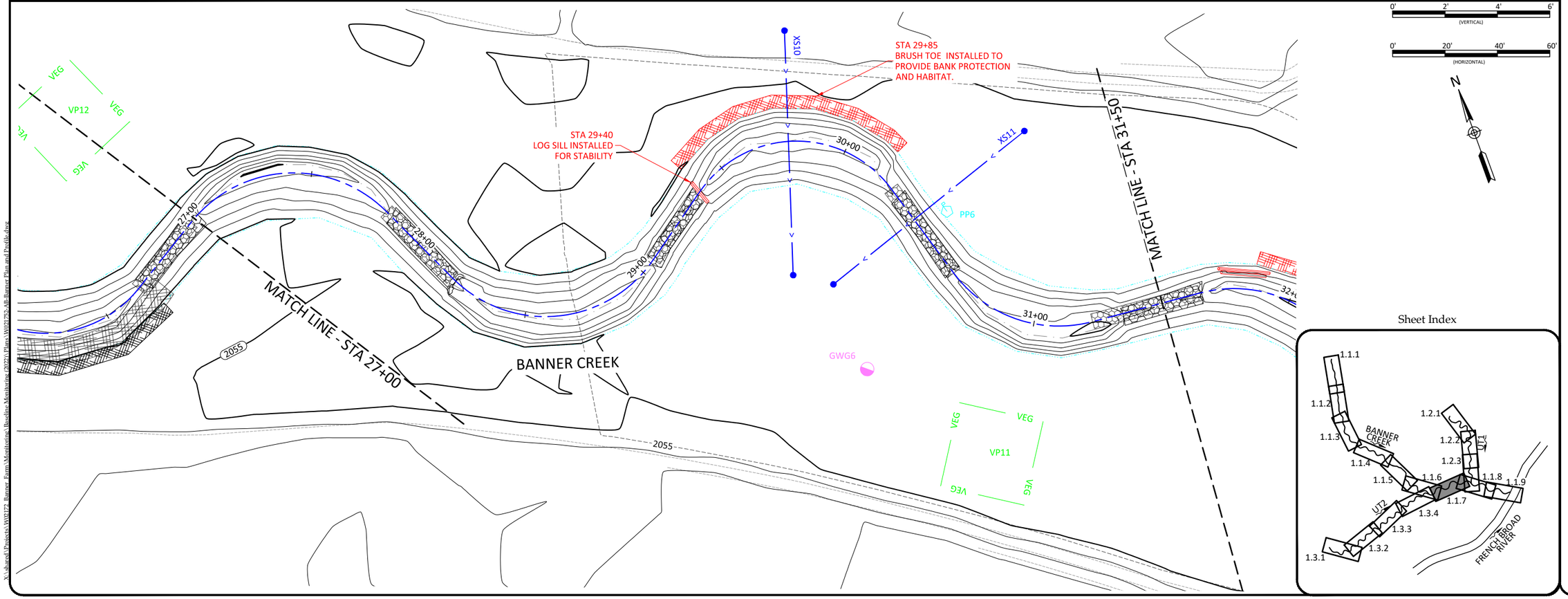

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
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Firm License No. F-0831

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Henderson County, North Carolina

Stream Plan and Profile
Banner Creek

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Checked By:	JK

Sheet 1.1.7

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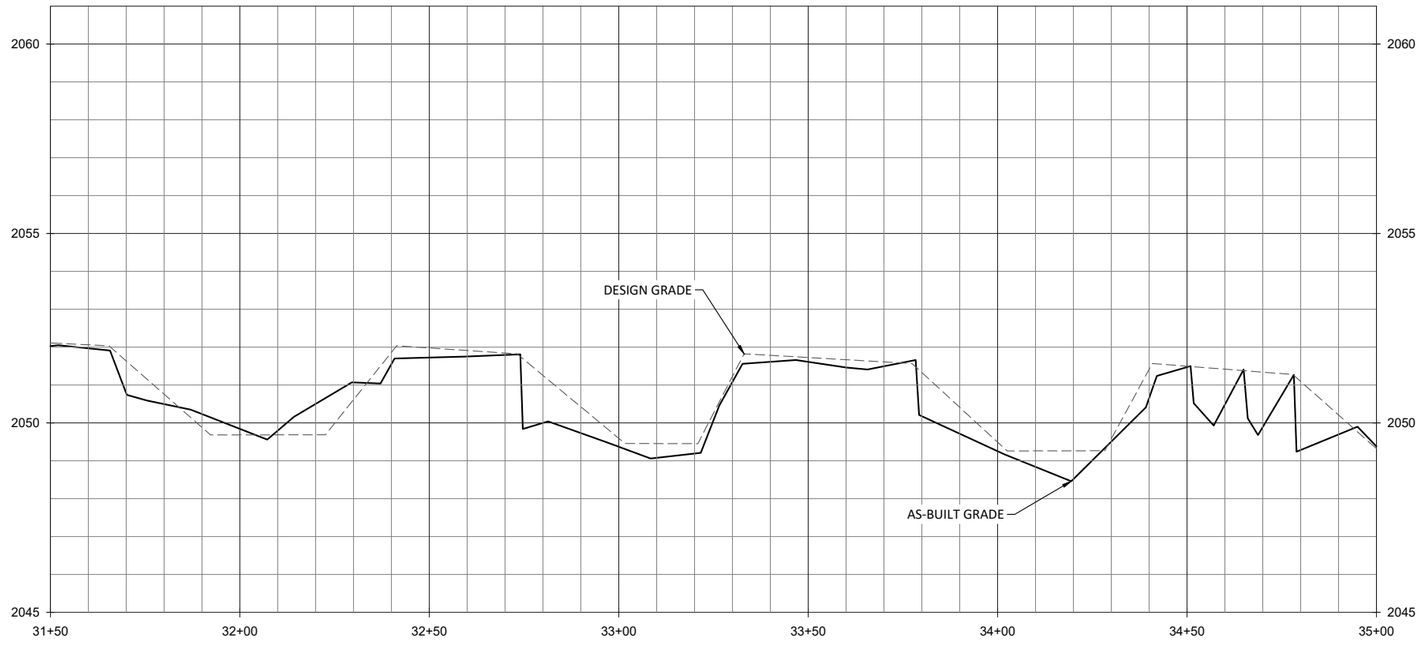
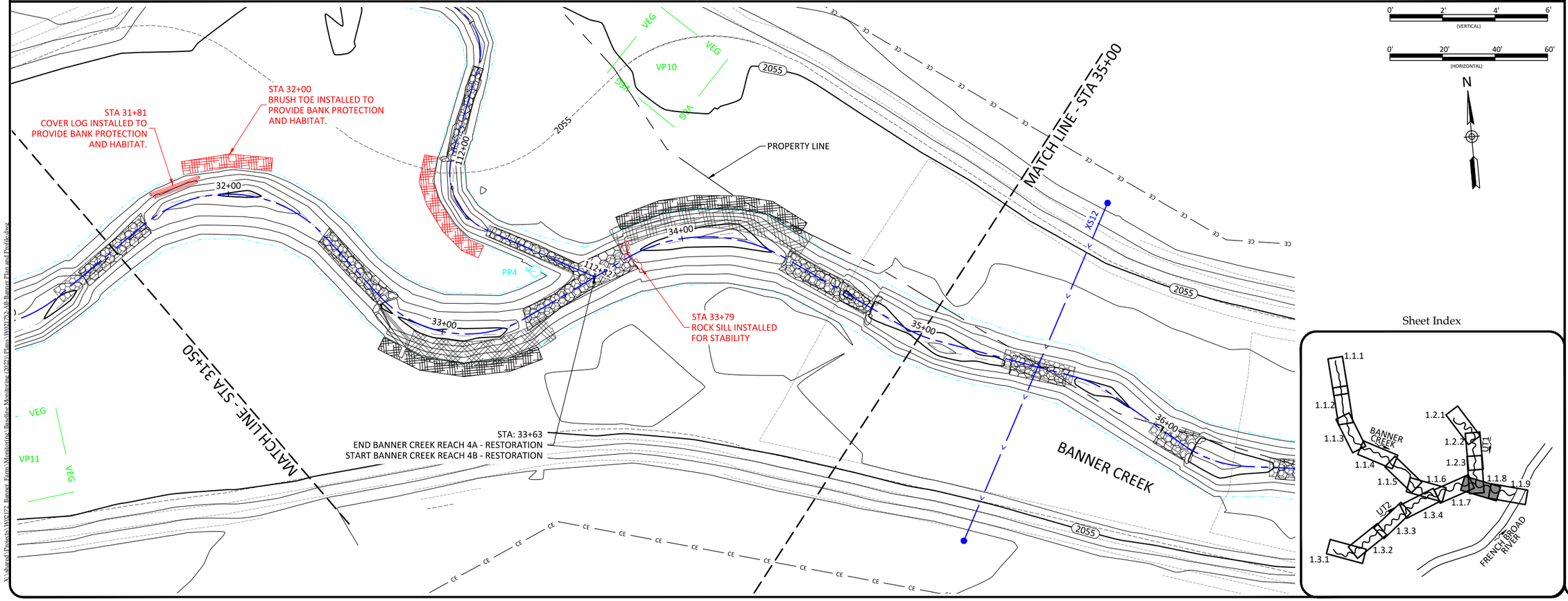
April 19, 2022





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Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

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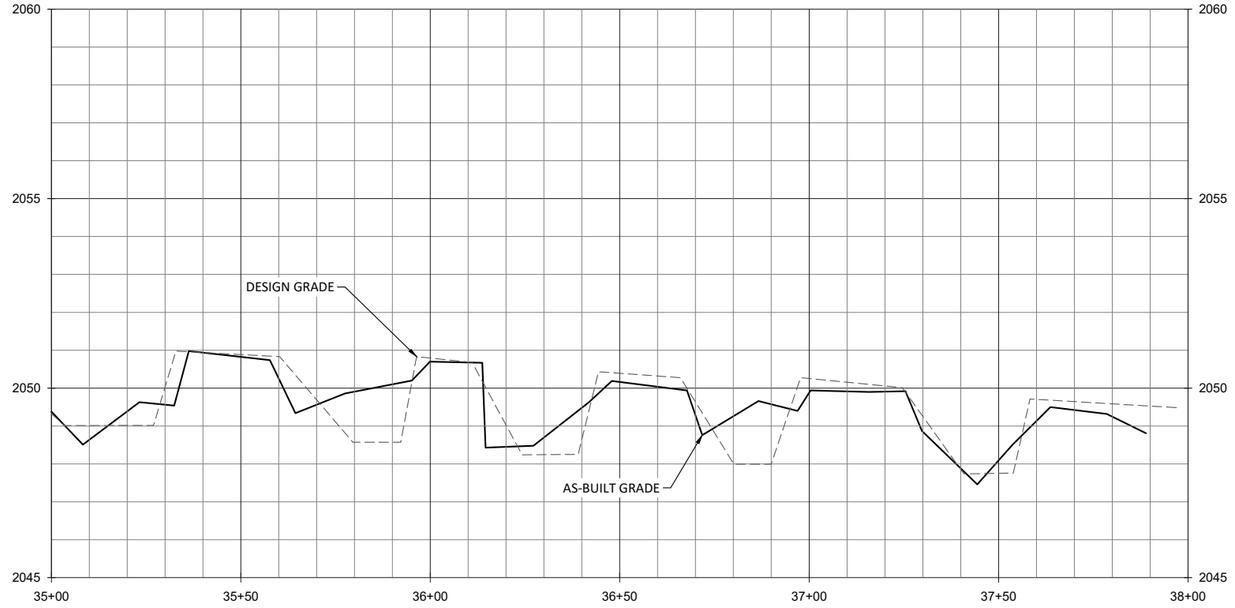
Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

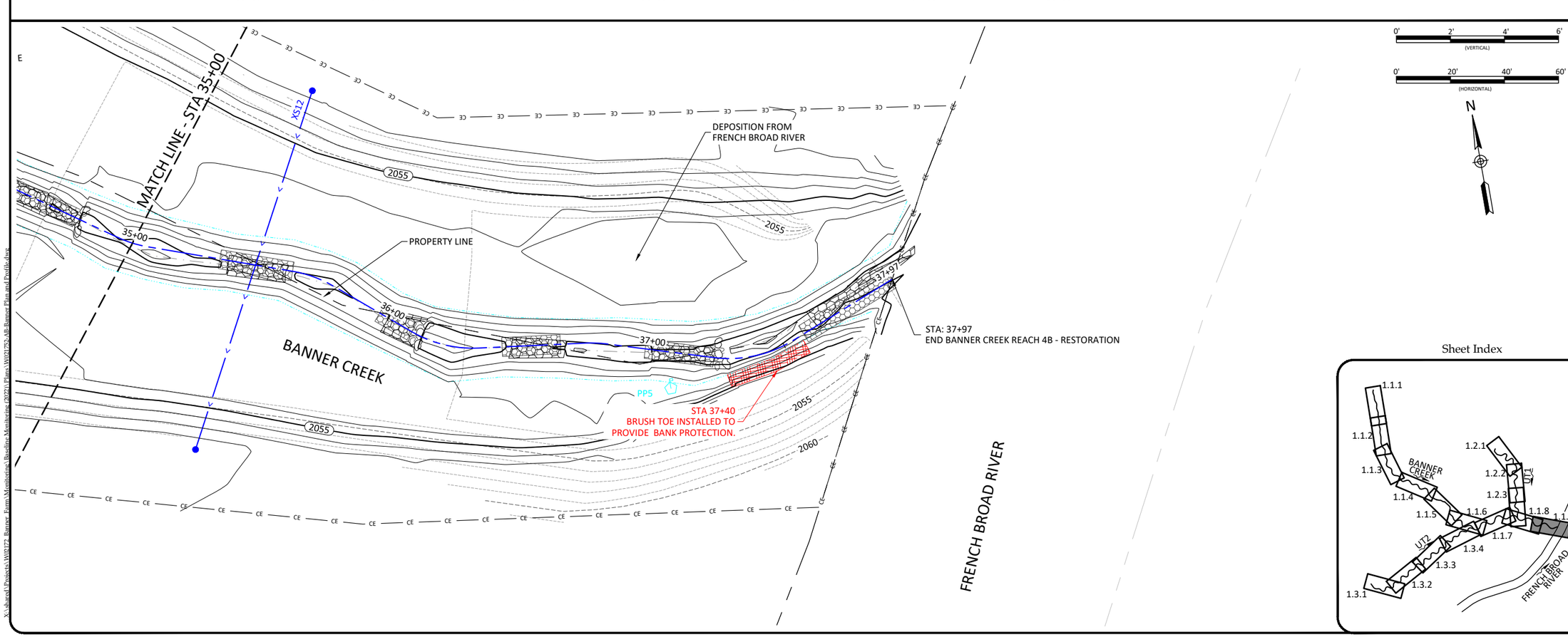
Stream Plan and Profile
Banner Creek

Revisions:

Date: 04-18-22
Job Number: W0121752
Project Engineer: DN
Drawn By: JH
Checked By: JK

Sheet 1.1.8





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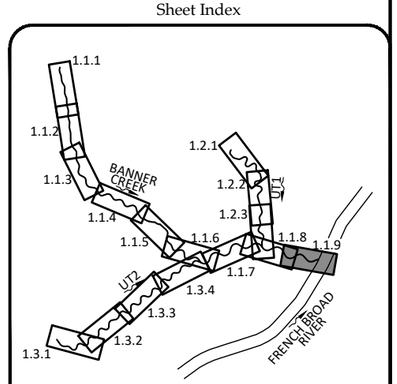

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Henderson County, North Carolina

Stream Plan and Profile
Banner Creek

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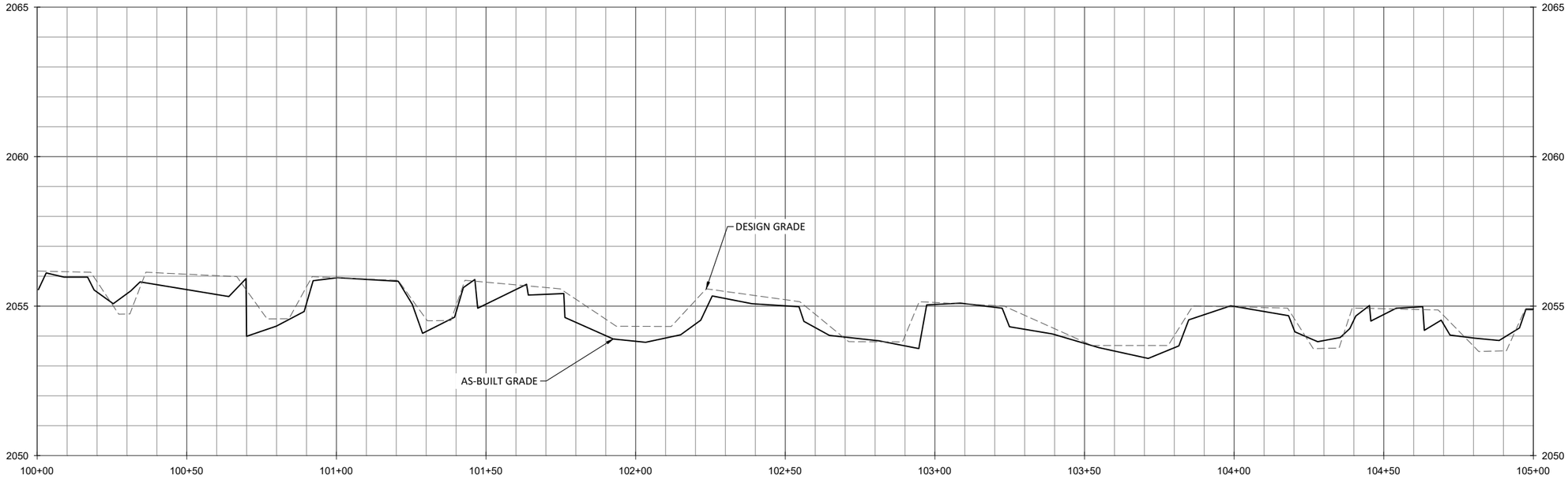
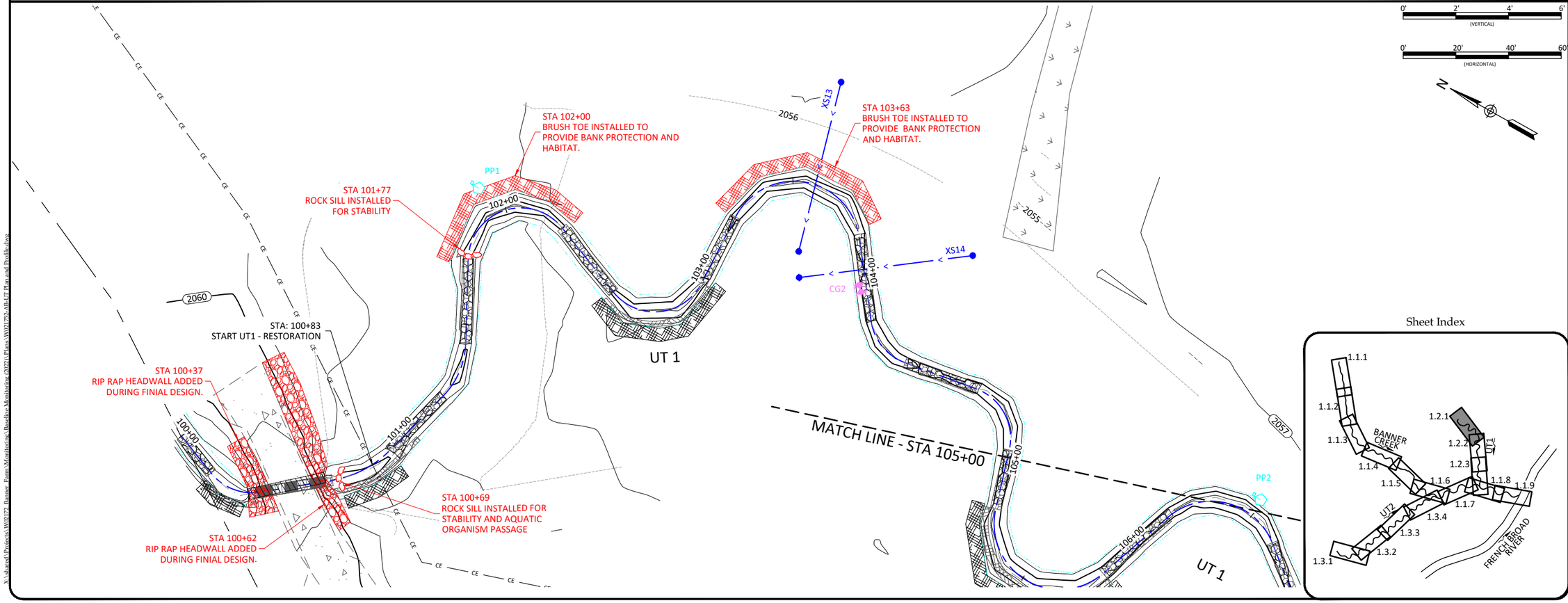
Checked By:	JK

Sheet 1.1.9

April 19, 2022





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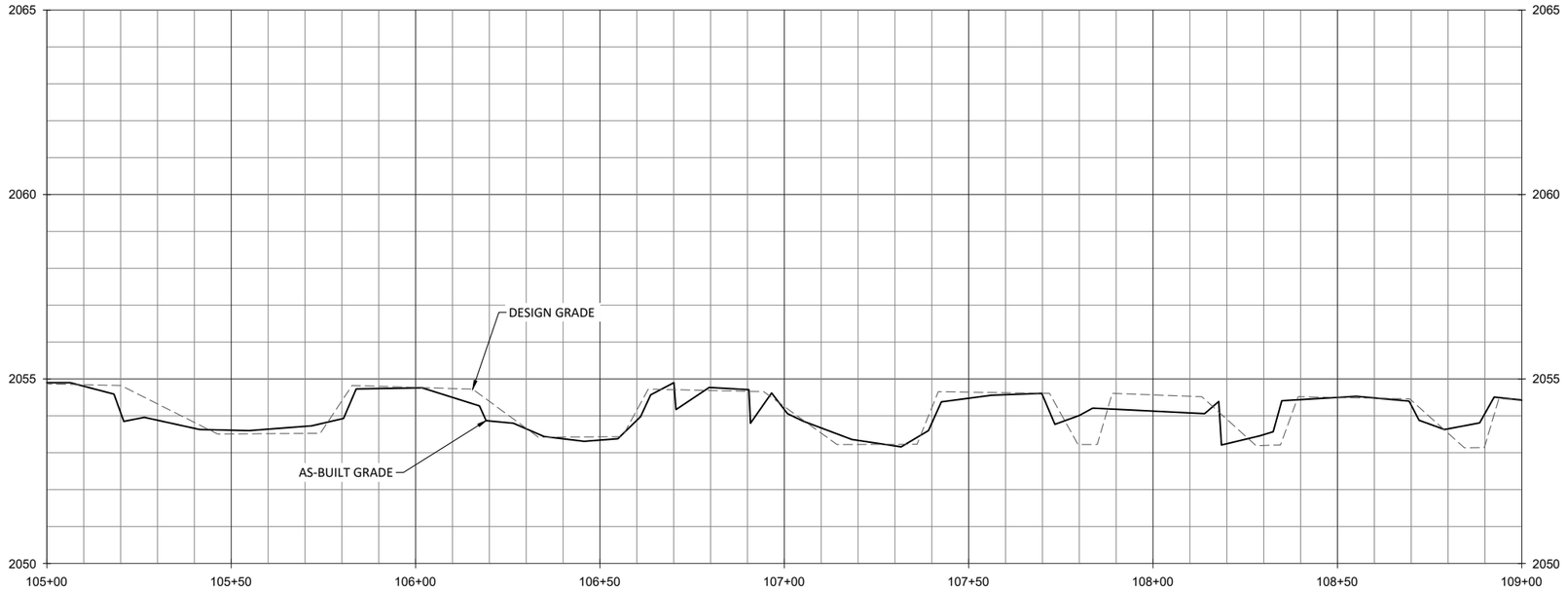
Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

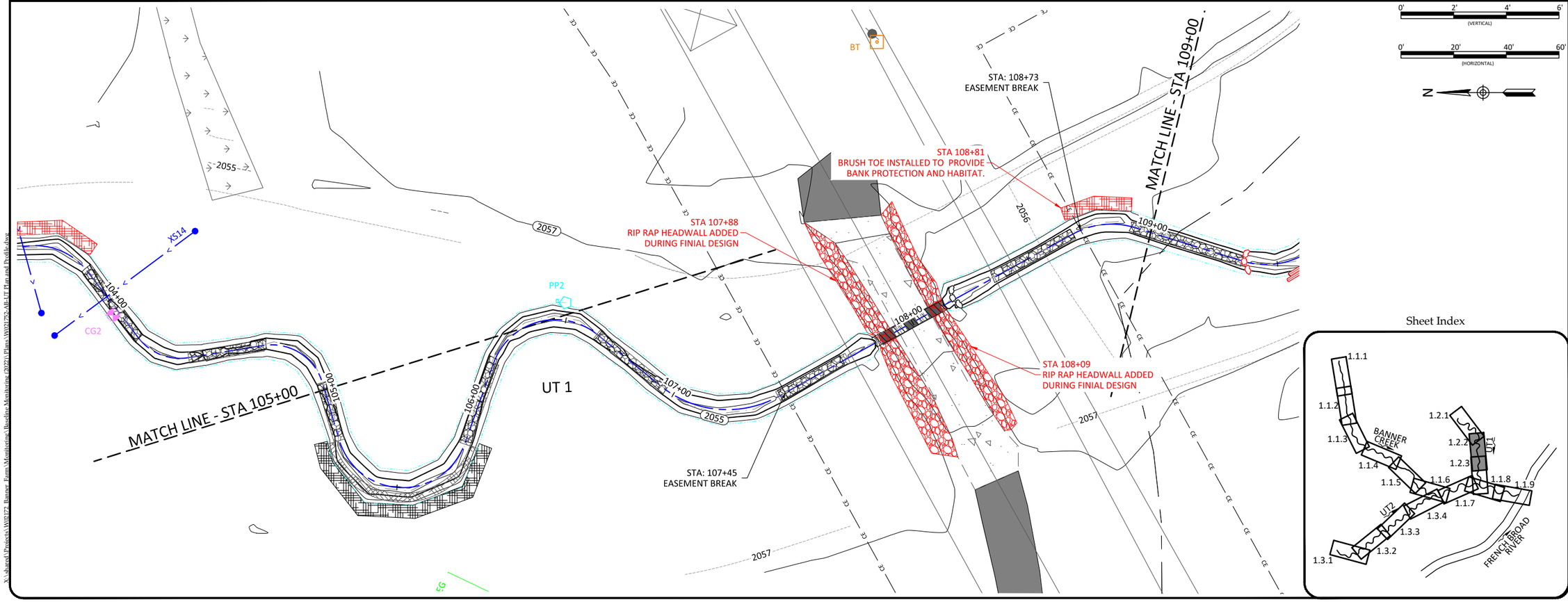
Stream Plan and Profile
UT1

Revisions:

Date: 04-18-22
Job Number: WI021752
Project Engineer: DN
Drawn By: JH
Checked By: JK

Sheet 1.2.1





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April 18, 2022

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Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
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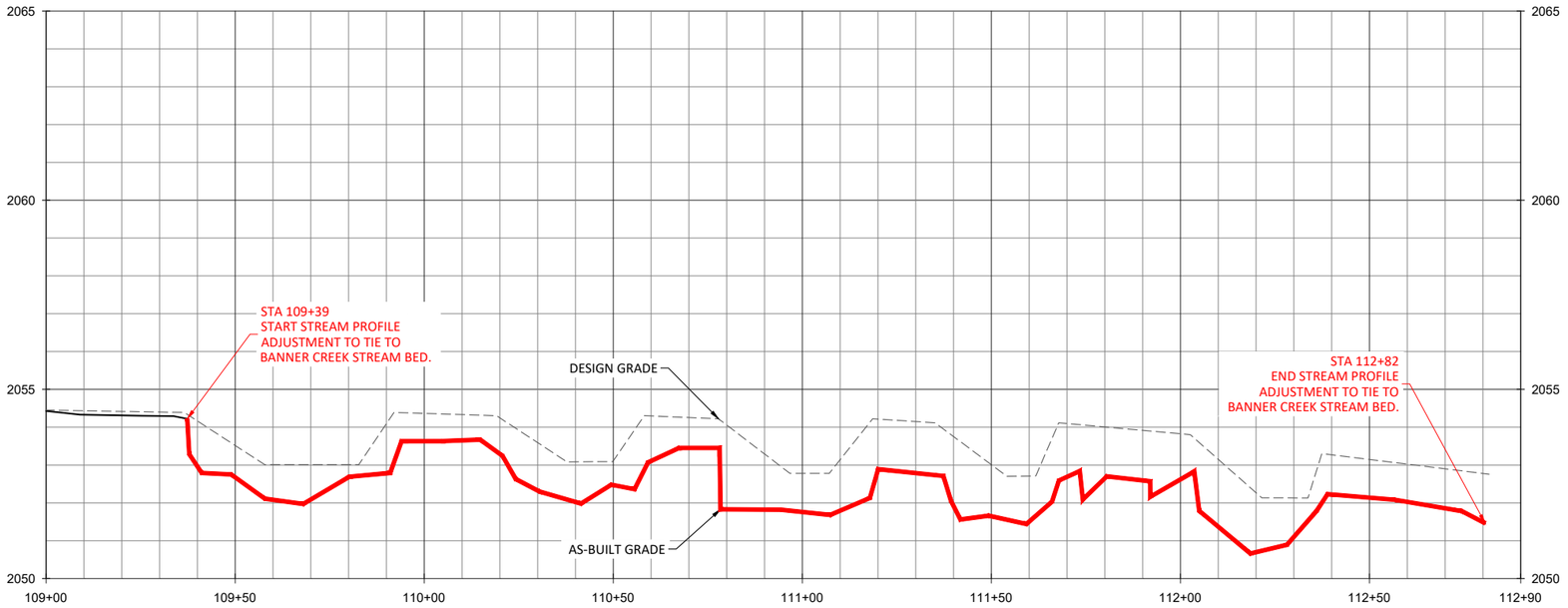
Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

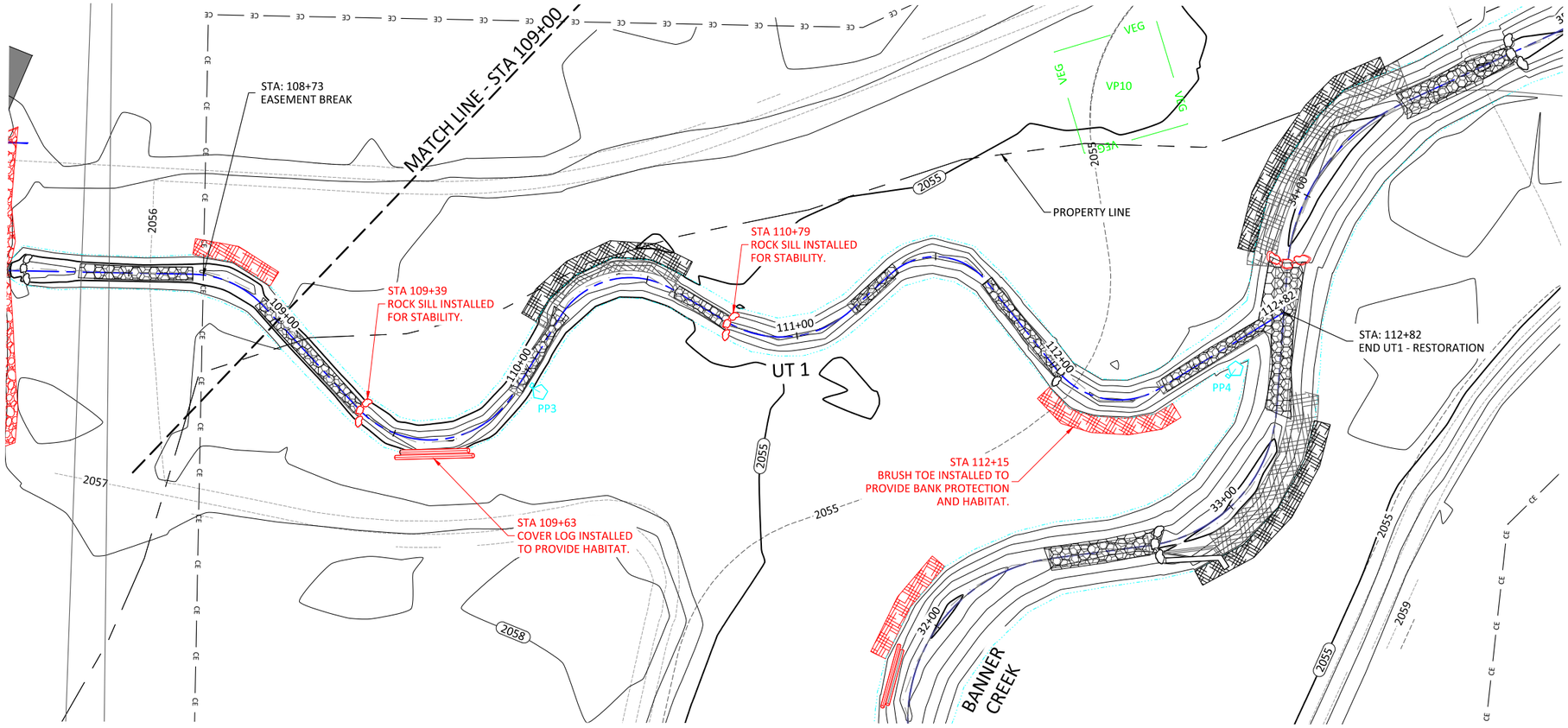
Stream Plan and Profile
UT1

Revisions:

Date: 04-18-22
Job Number: WI021752
Project Engineer: DN
Drawn By: JH
Checked By: JK

Sheet 1.2.2





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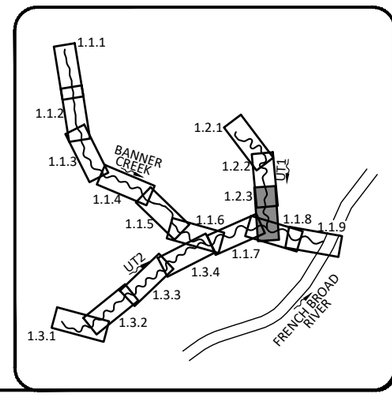

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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
UT1

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Date:	04-18-22
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Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

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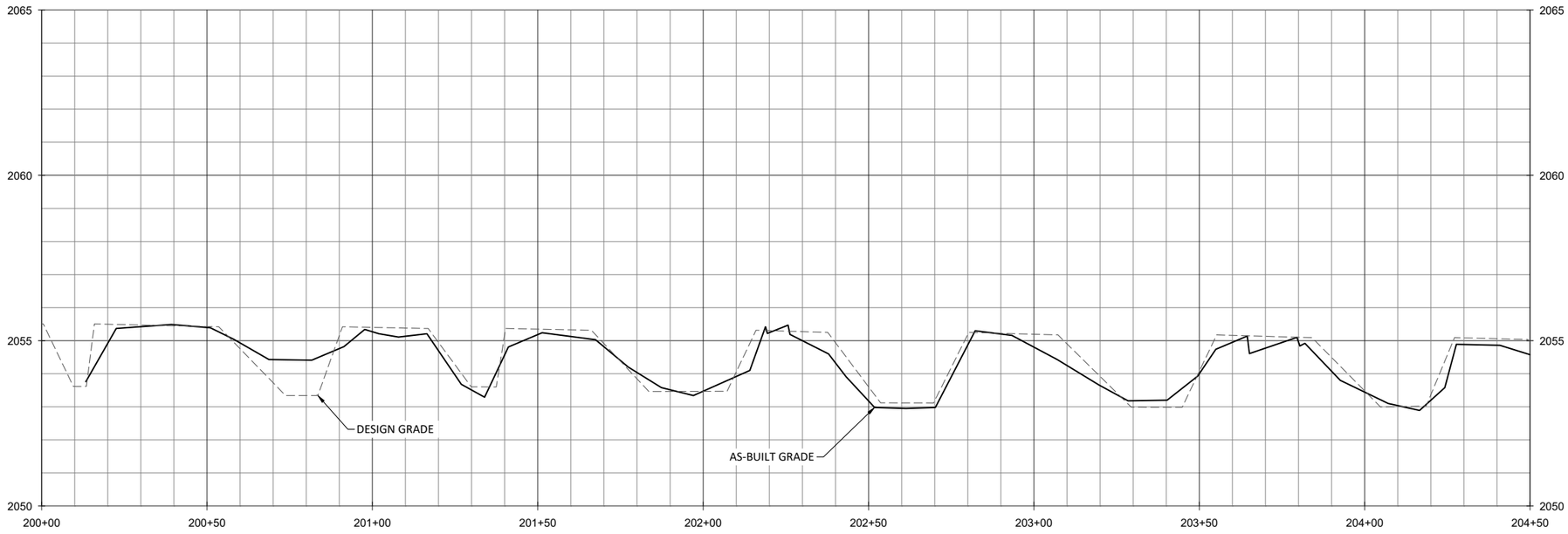

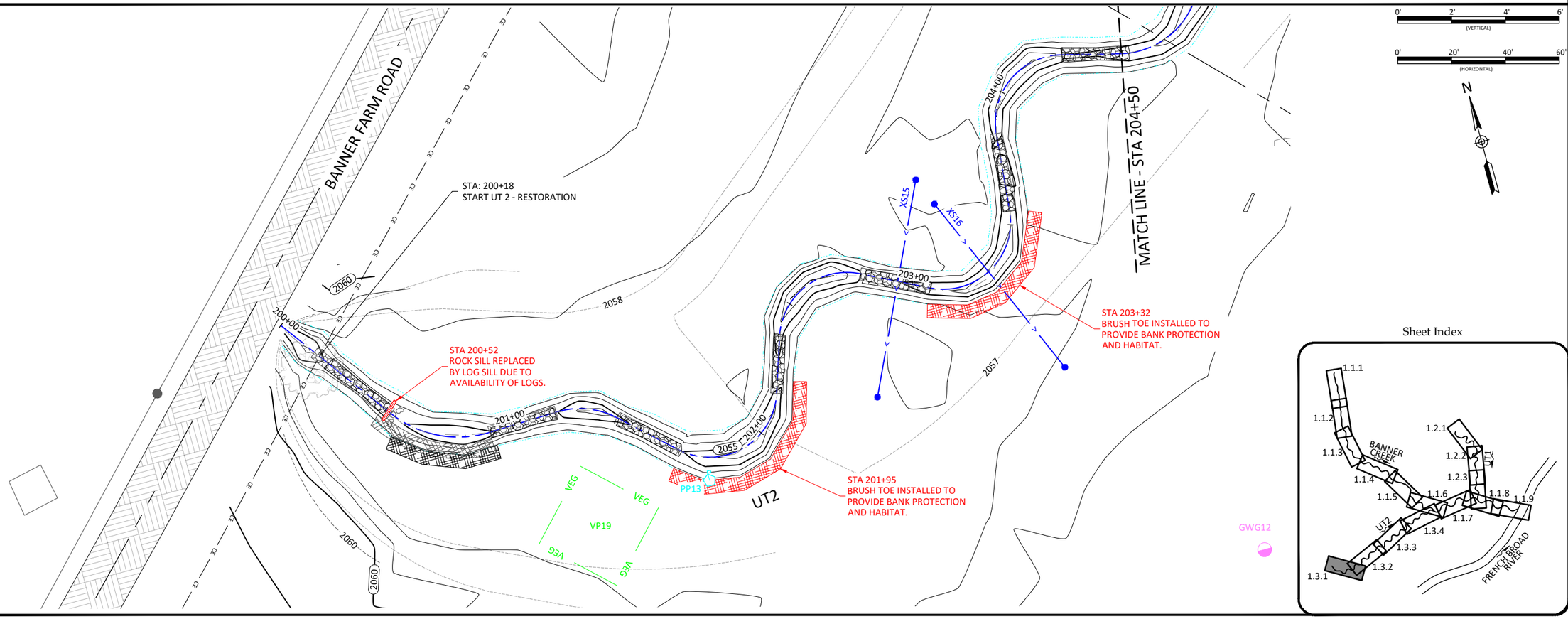

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Asheville, NC 28806
Tel: 828.774.5547
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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
UT2

Revisions:

Date:	04-18-22
Job Number:	WI021750
Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

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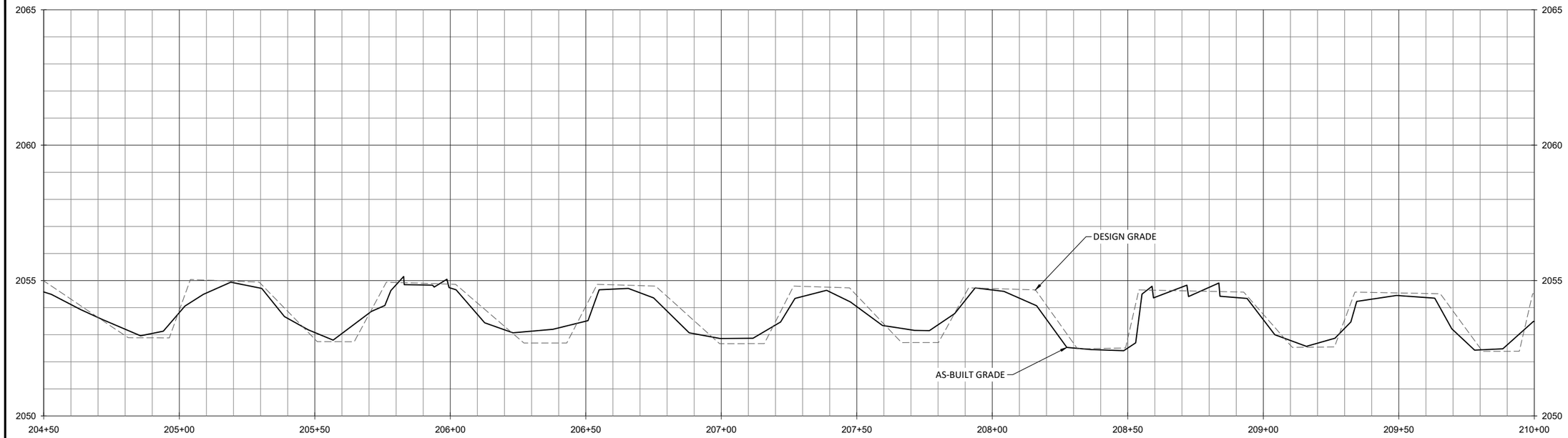
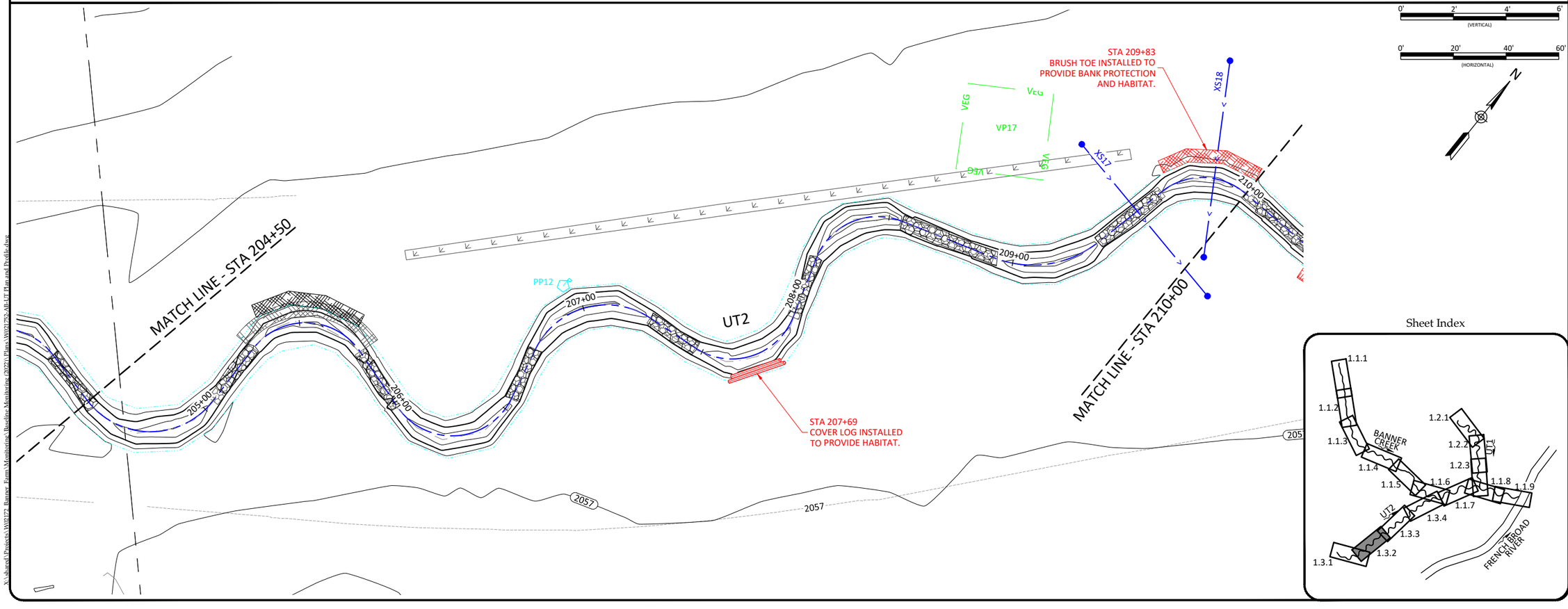
April 19, 2022





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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
UT2

Revisions:

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Job Number:	WI021752
Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

Sheet 1.3.2

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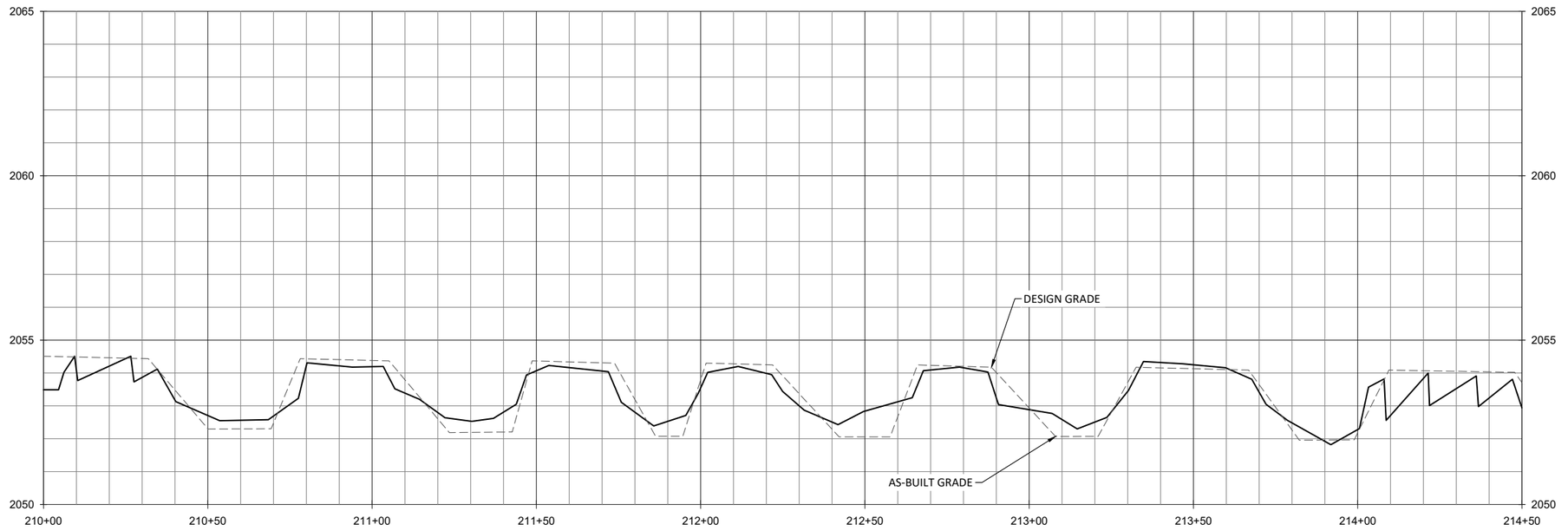

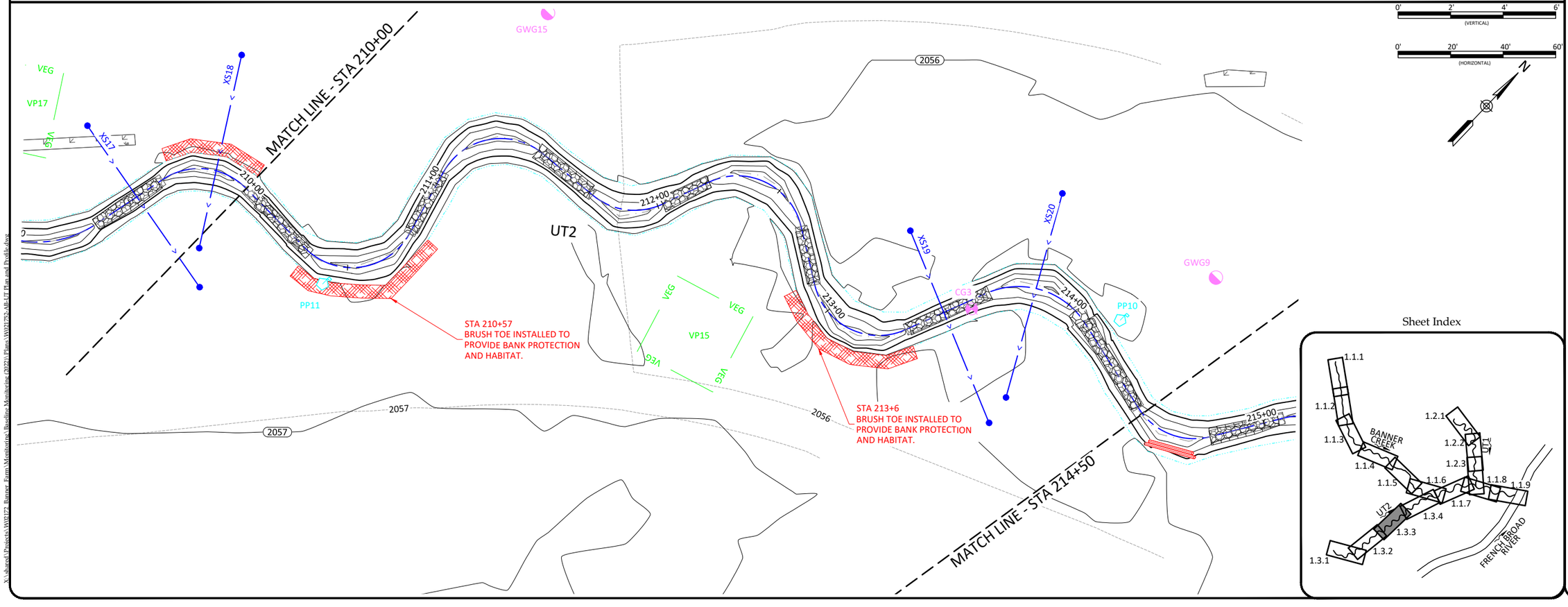

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Tel: 828.774.5547
Fax: 704.332.3305
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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina
Stream Plan and Profile
UT2

Revisions:

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Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

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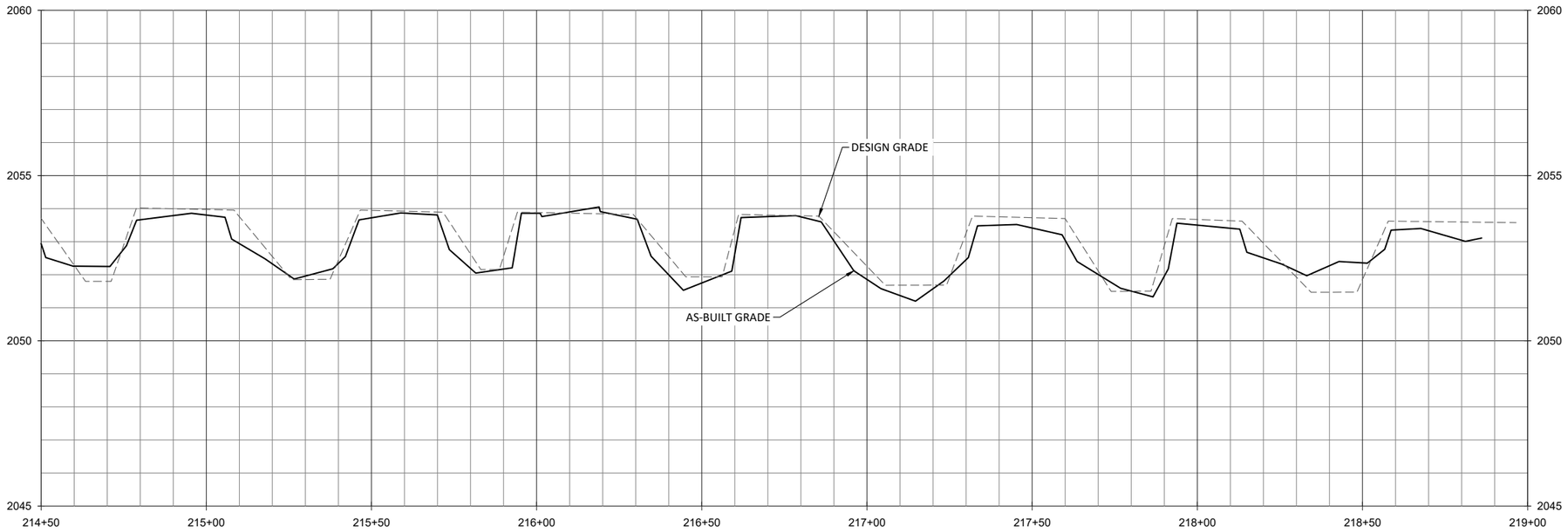

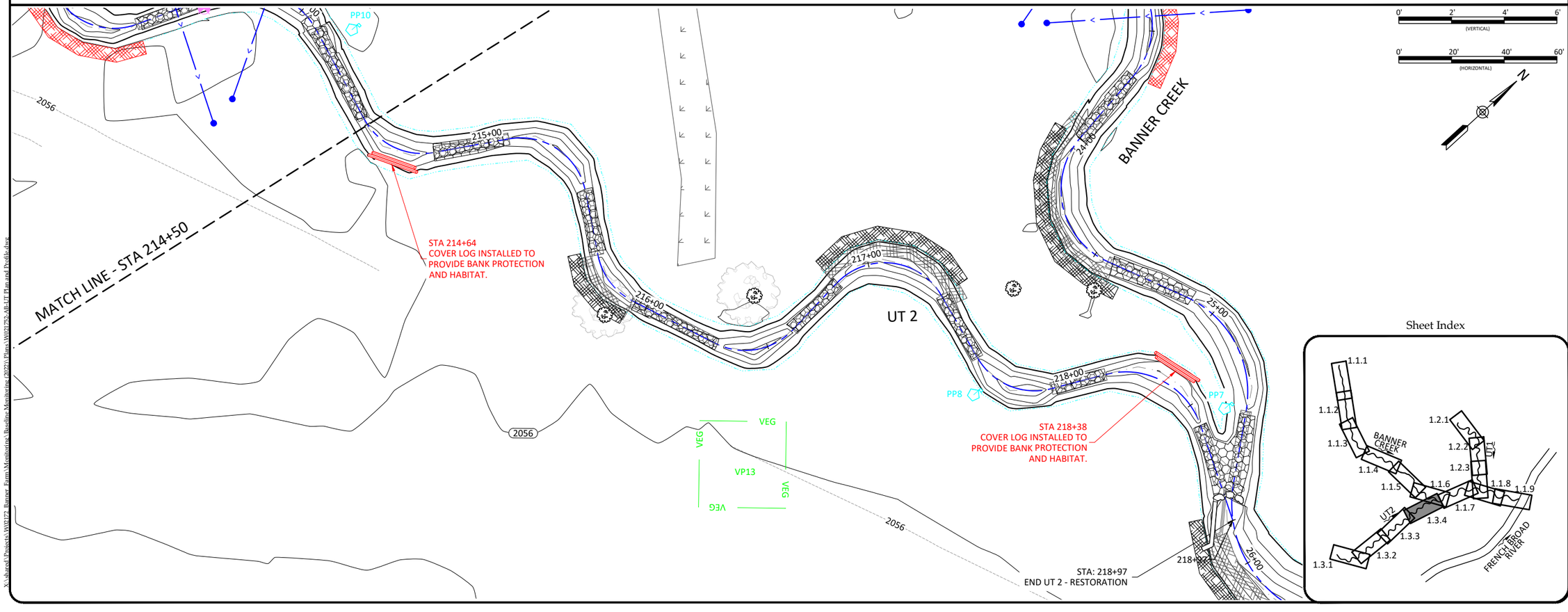

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Stream Plan and Profile
UT2

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Date: 04-18-22
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Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 1.3.4

April 19, 2022

N

0' 150' 300' 450'
(HORIZONTAL)

WETLAND RE-ESTABLISHMENT

WETLAND REHABILITATION

WETLAND CREATION

DEVIATIONS SHOWN IN RED

BANNER CREEK

SHEET 2.5

WETLAND GRADING CROSS-SECTION #6

WETLAND GRADING CROSS-SECTION #7

WETLAND GRADING CROSS-SECTION #5

WETLAND GRADING CROSS-SECTION #1

WETLAND GRADING CROSS-SECTION #2

WETLAND GRADING CROSS-SECTION #3

SHEET 2.4

WETLAND GRADING CROSS-SECTION #4

SHEET 2.3

SHEET 2.2

BANNER FARM ROAD

UT 2

UT 1

8+18

FRENCH BROAD RIVER

BANNER CREEK

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Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

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Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Overview
Wetland Grading Plan

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Drawn By:	JH
Checked By:	JK

Sheet 2.1

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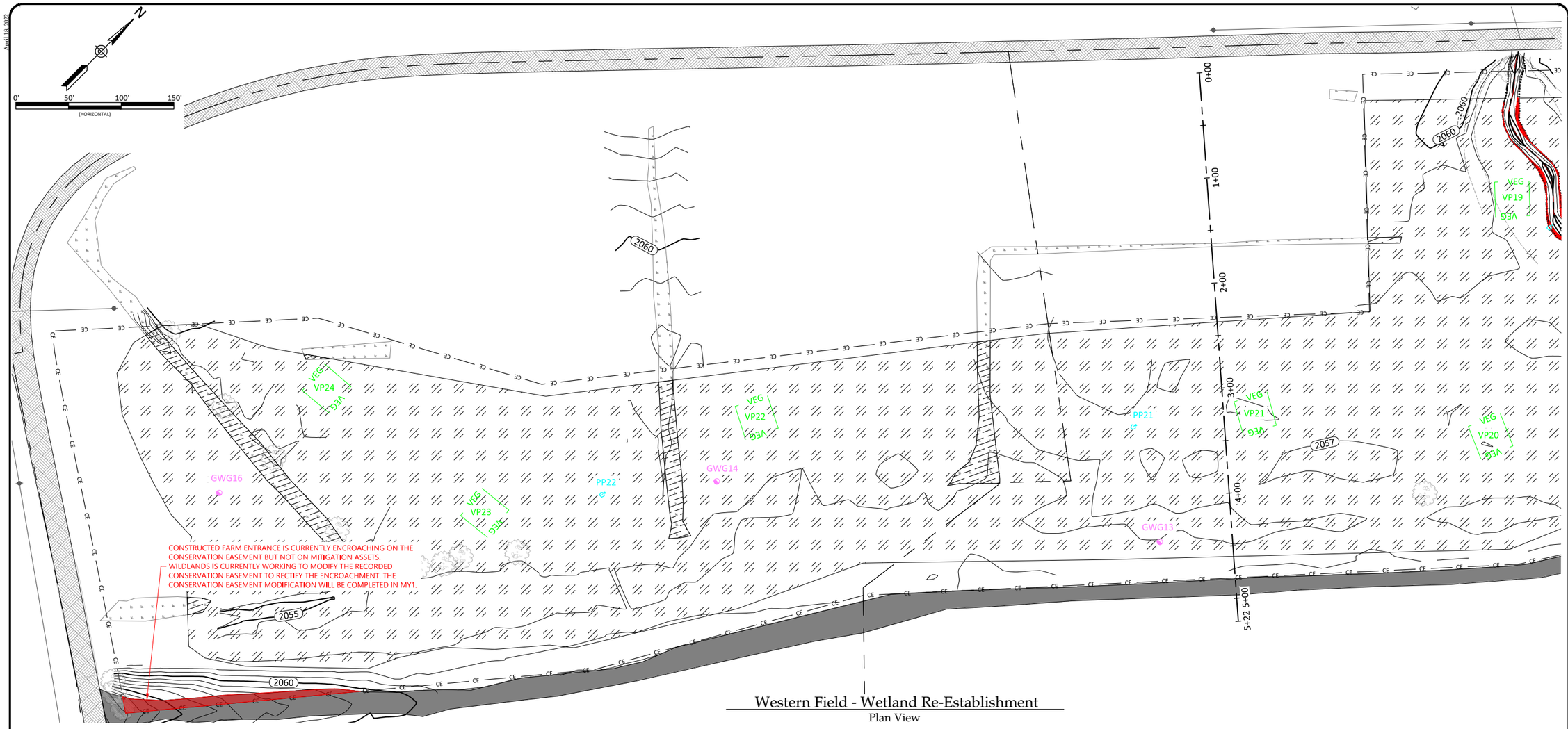
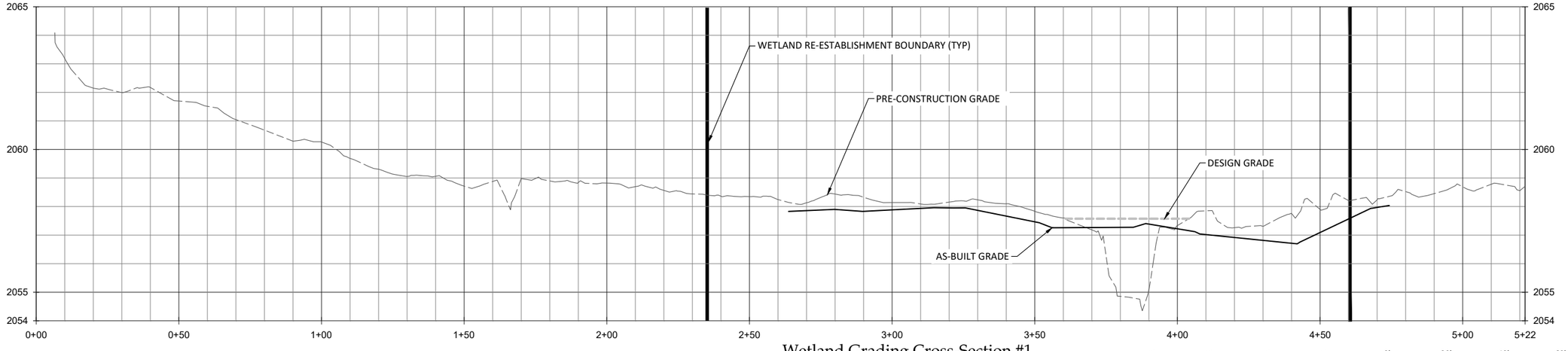


Western Field - Wetland Re-Establishment
Plan View



Wetland Grading Cross-Section #1
Section View

X:\Shared\Projects\WO\P2 Banner Farm\Monitoring\Baseline Monitoring (2020)\Plans\WO#2752-AR-Wetland Grading.dwg

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Tel: 828.774.5547
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Firm License No. F-0831

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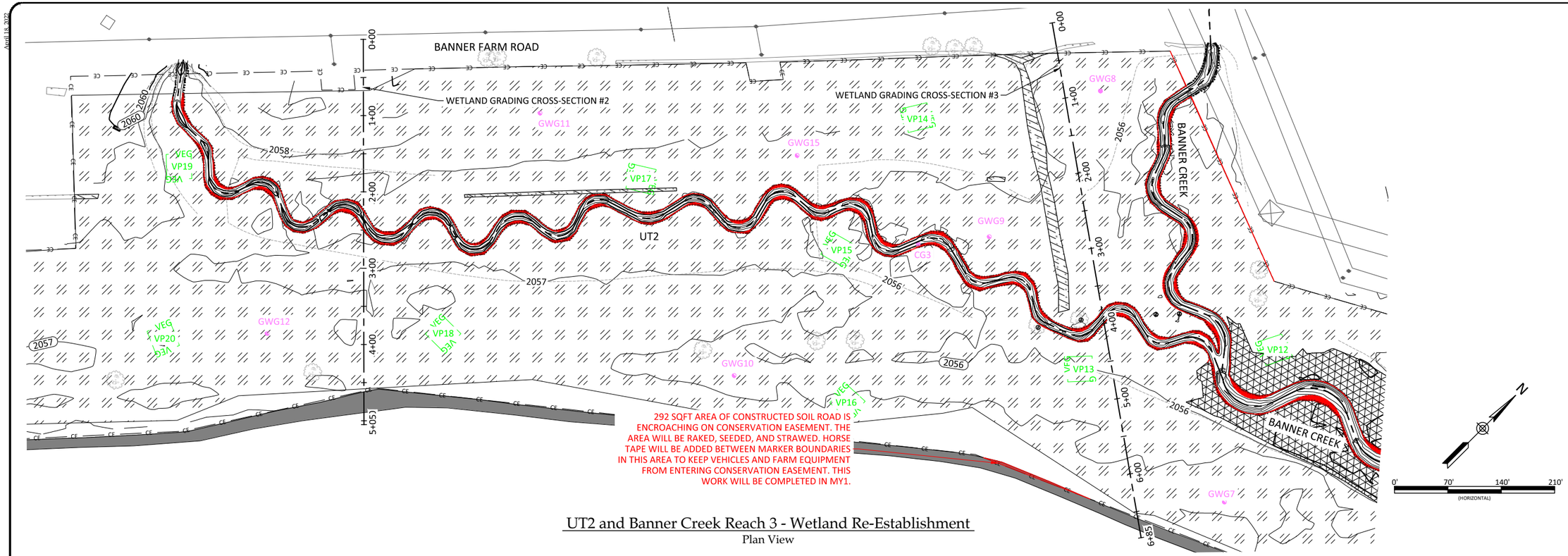
Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Western Field
Wetland Grading Plan

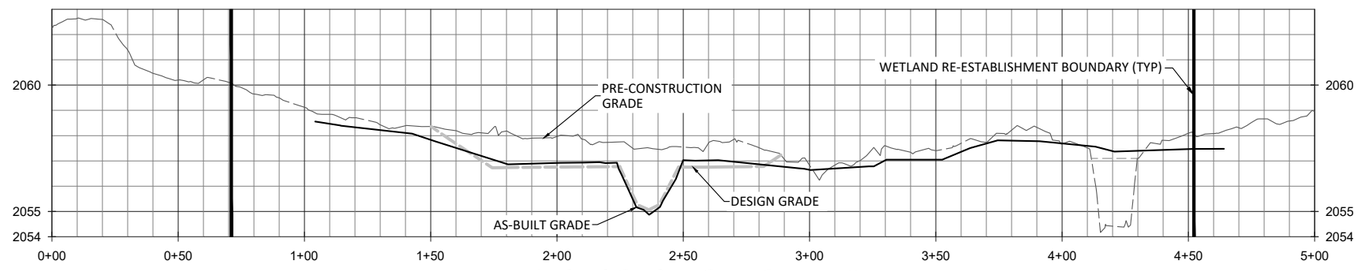
Revisions:

Date: 04-18-22
Job Number: WO21752
Project Engineer: EN
Drawn By: JH
Checked By: JK

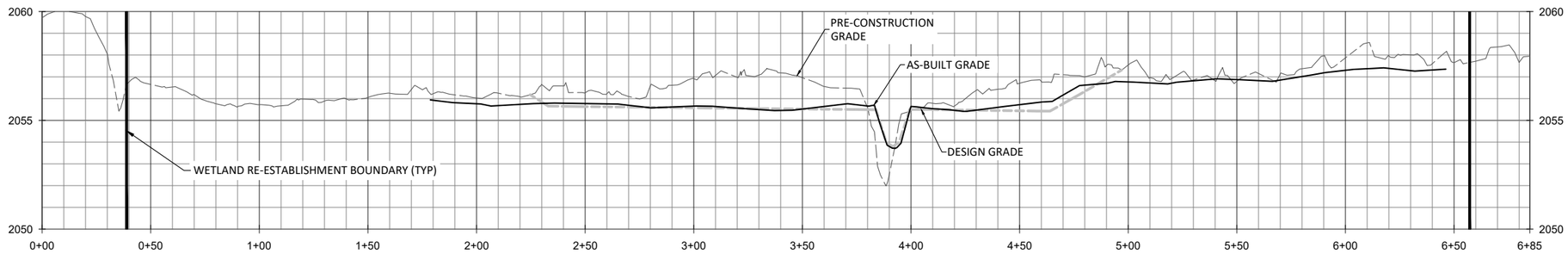
Sheet 2.2



UT2 and Banner Creek Reach 3 - Wetland Re-Establishment
Plan View



Wetland Grading Cross-Section #2
Section View



Wetland Grading Cross-Section #3
Section View

WILDLANDS ENGINEERING
167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Banner Creek & UT2
Wetland Grading Plan

Revisions:

Date: 04-18-22
Job Number: WI021752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 2.3

X:\Shared\Projects\WI021752-Banner Farm\Monitoring\Baseline Monitoring (2022)\Plans\WI021752-MB-Wetland Grading.dwg

April 18, 2022

April 19, 2022

N

0' 70' 140' 210'
(HORIZONTAL)

WETLAND GRADING CROSS-SECTION #4

WETLAND GRADING CROSS-SECTION #3

BANNER CREEK

UT1

PROPOSED WETLAND BOUNDARY ADJUSTED BASED ON AS-BUILT BANKFULL LOCATION.

WETLAND GRADING CROSS-SECTION #5

2 SQFT AREA OF CONSTRUCTED SOIL ROAD IS ENCROACHING ON CONSERVATION EASEMENT. THE AREA WILL BE RAKED, SEEDED, AND STRAWED. THIS WORK WILL BE COMPLETED IN MY1.

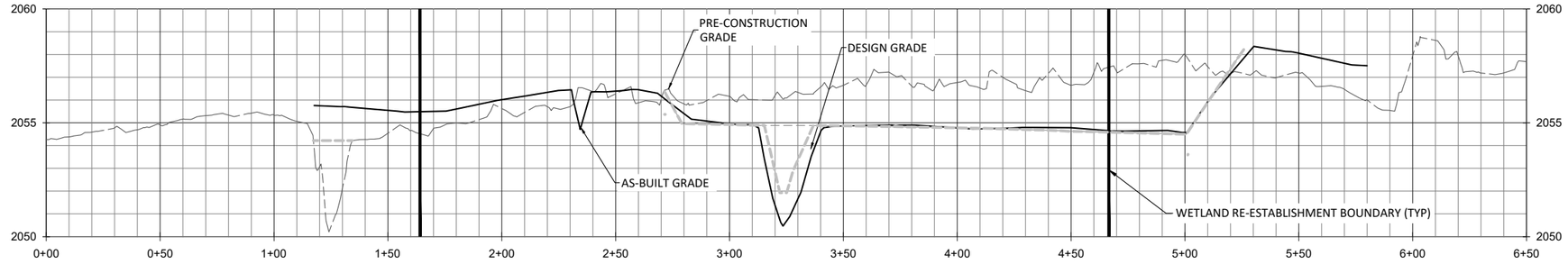
GWG1 GWG2 GWG3 GWG4 GWG5 GWG6 GWG7

VP5 VP6 VP7 VP8 VP9 VP10 VP11 VP12 VP13

PP20

8+18

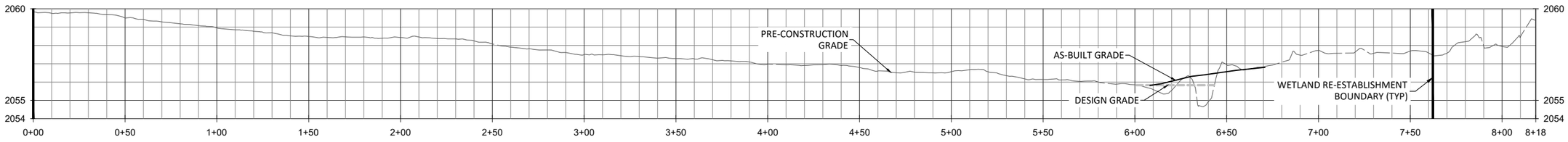
UT1 and Banner Creek Reach 4 - Wetland Re-Establishment
Plan View



Wetland Grading Cross-Section #4
Section View

0' 30' 60' 90'
(HORIZONTAL)

0' 3' 6' 9'
(VERTICAL)



Wetland Grading Cross-Section #5
Section View

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

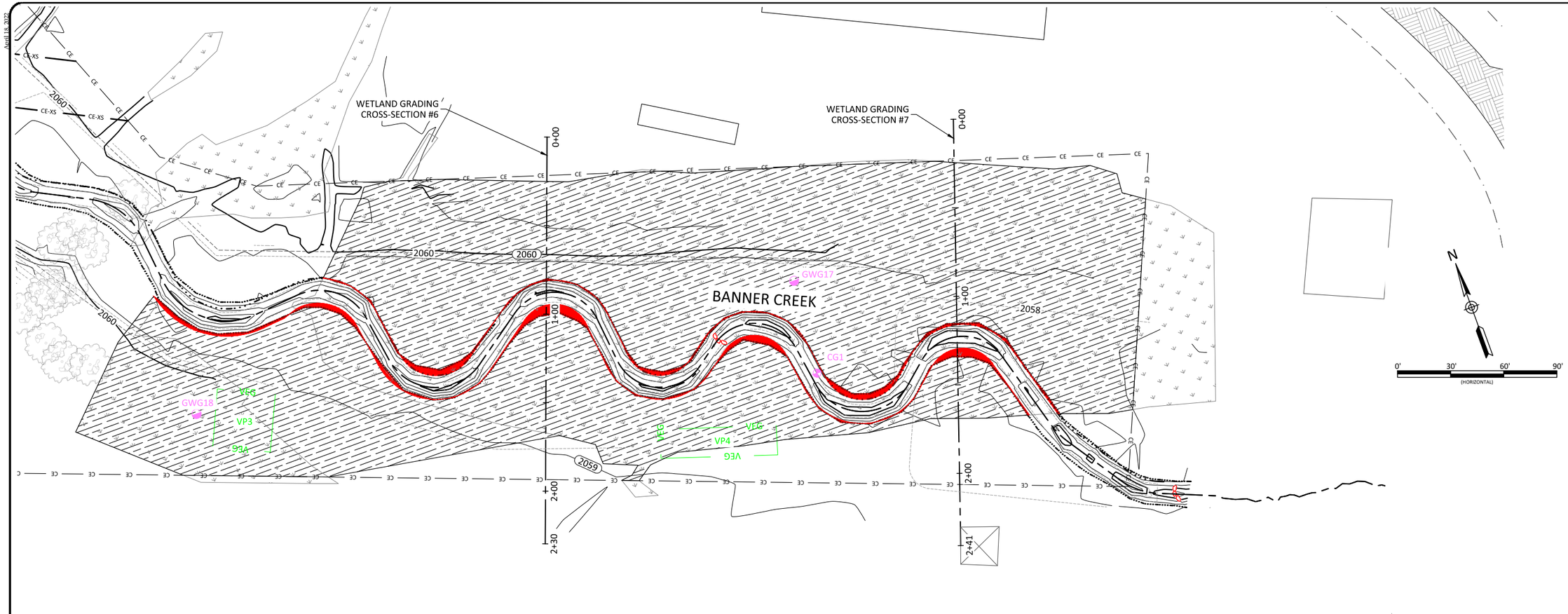
UT1 and Banner Creek Reach 4
Wetland Grading Plan

Revisions:

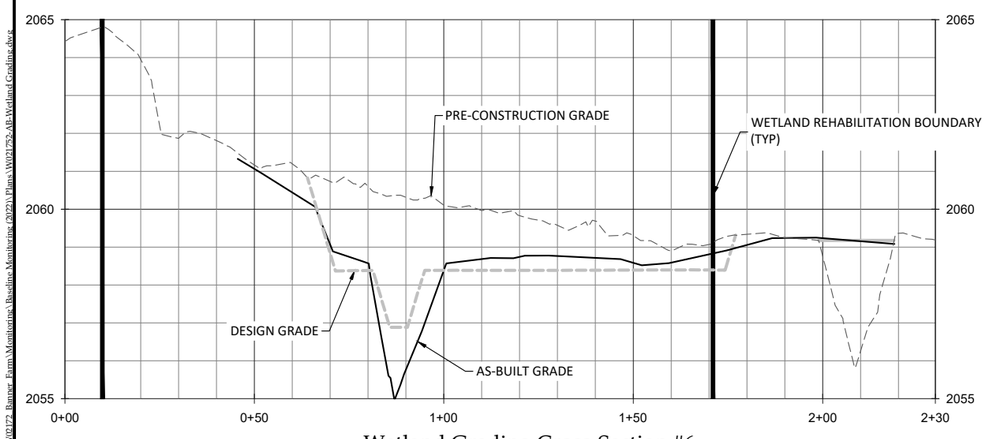
Date: 04-18-22
Job Number: WI021752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 2.4

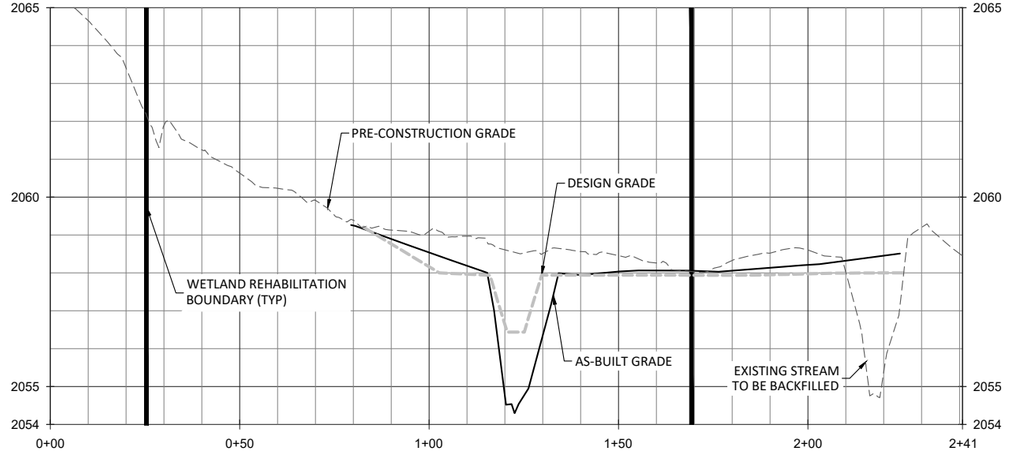
X:\Shared\Projects\WI0217-Banner Farm Monitoring\Baseline Monitoring (2022)\Plans\WI021752-AR-WetlandGrading.dwg



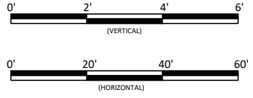
Banner Creek Reach 2 - Wetland Rehabilitation
Plan View



Wetland Grading Cross-Section #6
Section View



Wetland Grading Cross-Section #7
Section View



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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
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NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Banner Creek Reach 2
Wetland Grading Plan

Revisions:

Date: 04-18-22
Job Number: WI021752
Project Engineer: ENN
Drawn By: JH
Checked By: JK

Sheet 2.5

K:\Shared\Projects\WI021752_Banner_Farm\Monitoring\Baseline Monitoring (2022)\Plans\WI021752-AB-WetlandGrading.dwg

April 18, 2022

April 18, 2022

Open Area Buffer Planting

Open Buffer Planting Zone Trees							
Bare Root							
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Caliper Size**	**Stratum**	**# of Stems**	Wetland Indicator
Nyssa sylvatica	Black Gum	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	5%	FAC
Platanus occidentalis	Sycamore	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	15%	FACW
Betula nigra	River Birch	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	12%	FACW
Liriodendron tulipifera	Tulip Poplar	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	10%	FACU
Fraxinus pennsylvanica	Green Ash	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	4%	FACW
Prunus serotina	Black Cherry	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	9%	FACU
Quercus rubra	Red Oak	12ft.	6-12 ft.	0.25"-1.0"	Canopy	10%	FACU
~~*Betula lenta*~~	~~Sweet Birch~~	~~12 ft.~~	~~6-12 ft.~~	~~0.25"-1.0"~~	~~Canopy~~	~~8%~~	~~FACU~~
Quercus falcata	Southern Red Oak	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	10%	FACU
Diospyros virginiana	Persimmon	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	5%	FAC
Fagus grandifolia	American Beech	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	2%	FACU
					Total	~~90%~~	82%
Alternates							
Acer saccharinum	Silver Maple	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	~~0%~~ 8%	FACW
Halesia caroliniana	Carolina Silverbell	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	0%	FAC
Fraxinus americana	White Ash	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	0%	FACU
					Total	~~0%~~ 8%	

Open Buffer Planting Zone Small Trees / Shrubs							
Bare Root							
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Caliper Size**	**Stratum**	**# of Stems**	Wetland Indicator
Alnus serrulata	Tag Alder	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	2%	OBL
Hamamelis virginiana	Witch Hazel	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	2%	FACU
Cornus florida	Flowering Dogwood	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	2%	FACU
Lindera benzoin	Spicebush	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	2%	FAC
Amelanchier arborea	Serviceberry	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	2%	FAC
					Total	**10%**	

Notes:
Transplants from on-site to be used at Designer's discretion for streambank and floodplain planting.
Percentages of each species may be varied at Designer's discretion but shall not exceed 20% per each species.
Designer may substitute container plantings or other plantings for bare roots.

Partially Vegetated Buffer Area Planting

Notes:
used open area buffer planting list and percentages.

Wetland Planting

Wetland Planting Zone Trees							
Bare Root							
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Caliper Size**	**Stratum**	**# of Stems**	Wetland Indicator
Platanus occidentalis	Sycamore	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	15%	FACW
Betula nigra	River Birch	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	~~15%~~ 15.5%	FACW
Liriodendron tulipifera	Tulip Poplar	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	~~15%~~ 5%	FACU
~~*Diospyros virginiana*~~	~~Persimmon~~	~~12 ft.~~	~~6-12 ft.~~	~~0.25"-1.0"~~	~~Canopy~~	~~5%~~	~~FAC~~
Acer negundo	Box elder	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	~~15%~~ 15.5%	FAC
Nyssa sylvatica	Black gum	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	10%	FAC
Salix nigra	Black Willow	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	15%	OBL
					Total	~~90%~~	76%
Alternates							
Acer saccharinum	Silver Maple	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	0%	FACW
Acer Rubrum	Red Maple	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	0%	FAC
Ulmus americana	American elm	12 ft.	6-12 ft.	0.25"-1.0"	Canopy	~~0%~~ 10%	FACW
					Total	~~0%~~	10%

Wetland Planting Zone Small Trees/Shrubs							
Bare Root							
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Caliper Size**	**Stratum**	**# of Stems**	Wetland Indicator
Alnus serrulata	Tag Alder	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	~~2%~~ 3.5%	OBL
Carpinus caroliniana	Ironwood	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	2%	FAC
Lindera benzoin	Spicebush	12 ft.	6-12 ft.	0.25"-1.0"	Shrub	~~2%~~ 2.5%	FAC
Asiminia triloba	Pawpaw	12 ft.	6-12 ft.	0.25"-1.0"	Sub-Canopy	2%	FAC
~~Leucothoe fontanesiana~~	~~Mountain doghobble~~	~~12 ft.~~	~~6-12 ft.~~	~~0.25"-1.0"~~	~~Shrub~~	~~1%~~	~~FACW~~
Ilex opaca	American Holly	12 ft.	6-12 ft.	0.25"-1.0"	shrub	~~1%~~ 2%	FACW
Sambucus canadensis	Elderberry	12 ft.	6-12 ft.	0.25"-1.0"	shrub	2%	FAC
					Total	~~10%~~	14%

Notes:
Transplants from on-site to be used at Designer's discretion for streambank and floodplain planting.
Percentages of each species may be varied at Designer's discretion but shall not exceed 20% per each species.
Designer may substitute container plantings or other plantings for bare roots.

Rivercane Planting

Rivercane Planting Zone							
Bare Root							
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Size**	**Stratum**	**% of Stems**	Wetland Indicator
Arundinaria gigantea	Rivercane	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	100%	FACW

Riparian Corridor Planting (Streambanks)

Streambank Planting Zone							
Live Stakes							
Species	**Common Name**	**Max Spacing**	**Indiv. Spacing**	**Min. Size**	**Stratum**	**% of Stems**	Wetland Indicator
Salix nigra	Black Willow	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	~~10%~~ 11%	OBL
Cornus amomum	Silky Dogwood	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	20%	FACW
Salix sericea	Silky Willow	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	20%	OBL
Physocarpos opulifolius	Ninebark	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	20%	FACW
Cephalathus occidentalis	Buttonbush	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	~~15%~~ 14.5%	OBL
Sambucus canadensis	Elderberry	8 ft.	6-8 ft.	0.5"-1.5" cal.	Shrub	~~15%~~ 15.5%	FAC
					Total	**100%**	
Herbaceous Plugs							
Juncus effusus	Common Rush	5 ft.	3-5 ft.	1.0"- 2.0" plug	Herb	40%	FACW
Carex alata	Broadwing Sedge	5 ft.	3-5 ft.	1.0"- 2.0" plug	Herb	20%	OBL
Carex lurida	Lurid Sedge	5 ft.	3-5 ft.	1.0"- 2.0" plug	Herb	20%	OBL
Scirpus cyperinus	Woolgrass	5 ft	3-5 ft.	1.0"-2.0" plug	Herb	20%	FACW
					Total	**100%**	

Note: See detail for Live Staking instructions on streambanks.

Permanent Seeding

Riparian Seeding - Open Canopy					
Pure Live Seed (20 lbs/ acre)					
Approved Date	**Species Name**	**Common Name**	**Stratum**	**Density (lbs/acre)**	Wetland Indicator
All Year	*Panicum rigidulum*	Redtop Panicgrass	Herb	1.0	FACW
All Year	*Panicum virgatum*	Switchgrass	Herb	1.0	FAC
All Year	*Chasmanthium latifolium*	River Oats	Herb	1.0	FACU
All Year	*Rudbeckia hirta*	Blackeyed Susan	Herb	1.0	FACU
All Year	*Coreopsis lanceolata*	Lanceleaf Coreopsis	Herb	1.0	FACU
All Year	*Carex vulpinoidea*	Fox Sedge	Herb	2.0	OBL
All Year	*Panicum clandestinum*	Deertongue	Herb	4.0	FAC
All Year	*Elymus virginicus*	Virginia Wild Rye	Herb	4.0	FACW
All Year	*Sorghastrum nutans*	Indiangrass	Herb	3.0	FACU
All Year	*Bidens aristosa*	Bur-Marigold	Herb	1.0	FACW
All Year	*Helianthus angustifolius*	Swamp Sunflower	Herb	1.0	FACW

Wetland Seeding - Open Canopy					
Pure Live Seed (20 lbs/ acre)					
Approved Date	**Species Name**	**Common Name**	**Stratum**	**Density (lbs/acre)**	Wetland Indicator
All Year	*Panicum rigidulum*	Redtop Panicgrass	Herb	3.0	FACW
All Year	*Chasmanthium latifolium*	River Oats	Herb	2.0	FACU
All Year	*Carex vulpinoidea*	Fox Sedge	Herb	2.0	OBL
All Year	*Elymus virginicus*	Virginia Wild Rye	Herb	4.0	FACW
All Year	*Helianthus angustifolius*	Swamp Sunflower	Herb	3.0	FACW
All Year	Glyceria septentrionalis	Eastern Manna Grass	Herb	3.0	OBL
All Year	Glyceria striata	Fowl Manna Grass	Herb	3.0	OBL

Pasture Seeding

Pasture Seeding		
Pure Live Seed (32 lbs/ac)		
Species Name	**Common Name**	**lbs/acre**
Festuca arundinacea	Fescue (KY 31)	20
Dactylis glomerata	Orchard Grass	12

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Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042680 ERIC NEUHAUS 4/18/22

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Planting List

Revisions:

Date: 04-18-22
Job Number: W021752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 3.1

X:\shared\Projects\W02172_Banner_Farm\Monitoring\Baseline Monitoring (2022)\Plans\W02172-AB-Planting Plan.dwg

April 19, 2022

N

0' 150' 300' 450'
(HORIZONTAL)

Open Area Buffer Planting

Wetland Planting

Riparian Corridor Planting (Streambanks)

Partially Vegetated Buffer Area Planting

Rivercane Planting

DEVIATIONS ARE SHOWN IN RED

SHEET 3.5

SHEET 3.3

SHEET 3.4

BANNER FARM ROAD

BANNER CREEK

UT 1

UT 2

FRENCH BROAD RIVER

VP1 VP2 VP3 VP4 VP5 VP6 VP7 VP8 VP9 VP10 VP11 VP12 VP13 VP14 VP15 VP16 VP17 VP18 VP19 VP20 VP21 VP22 VP23 VP24

X:\Shared\Projects\W0212_Banner_Farm\Monitoring\Baseline Monitoring (2022)\Plans\W0212_MY-Planting Plan.dwg

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Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
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NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Planting Overview
Planting Plan

Revisions:

Date: 04-18-22
Job Number: W0212752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 3.2

April 19, 2022

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

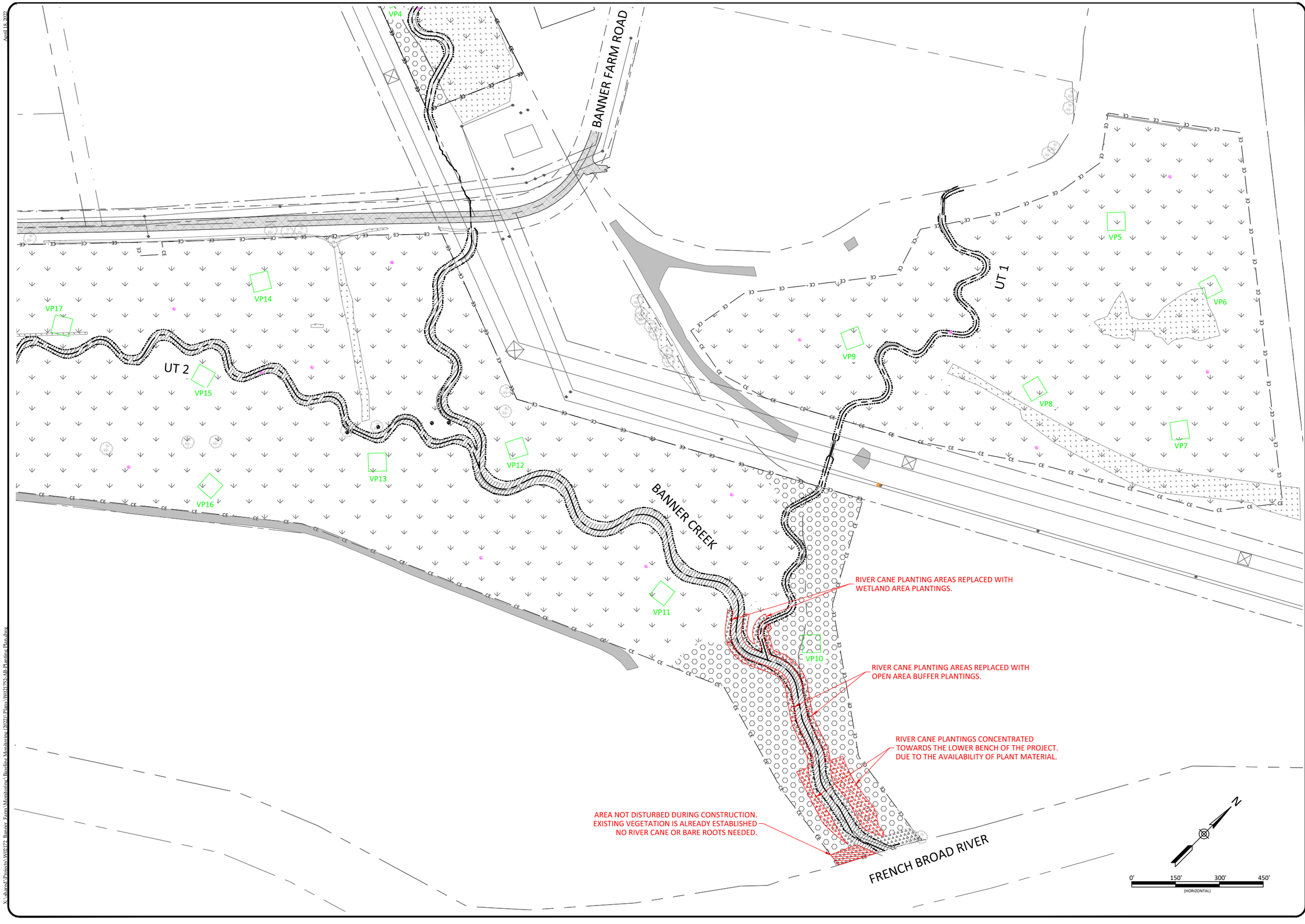
Wetland and UT2
Planting Plan

Revisions:

Date:	04-18-22
Job Number:	WO21752
Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

Sheet 3.3

X:\Shared\Projects\WO\752-Banner Farm\Monitoring\Baseline Monitoring (2022)\Plans\WO752-As-Planting Plan.dwg



April 19, 2022

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Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3305
Firm License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUMANN

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina
Wetland UT1, UT2, and Banner Creek
Planting Plan

Revisions:

Date: 04-18-22
Job Number: W0212752
Project Engineer: EN
Drawn By: JH
Checked By: JK

Sheet 3.4

Date:	04-18-22
Job Number:	W021752
Project Engineer:	EN
Drawn By:	JH
Checked By:	JK

3.5
Sheet

Revisions:

Banner Farm Mitigation Site Record Drawings
Henderson County, North Carolina

Banner Creek Reach 2

NORTH CAROLINA PROFESSIONAL SEAL 042660 ENGINEER ERIC NEUHAUS 4/18/22

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167-B Haywood Road
Asheville, NC 28806
Tel: 828.774.5547
Fax: 704.332.3306
Firm License No. F-0831

AN AS-BUILT SURVEY FOR:

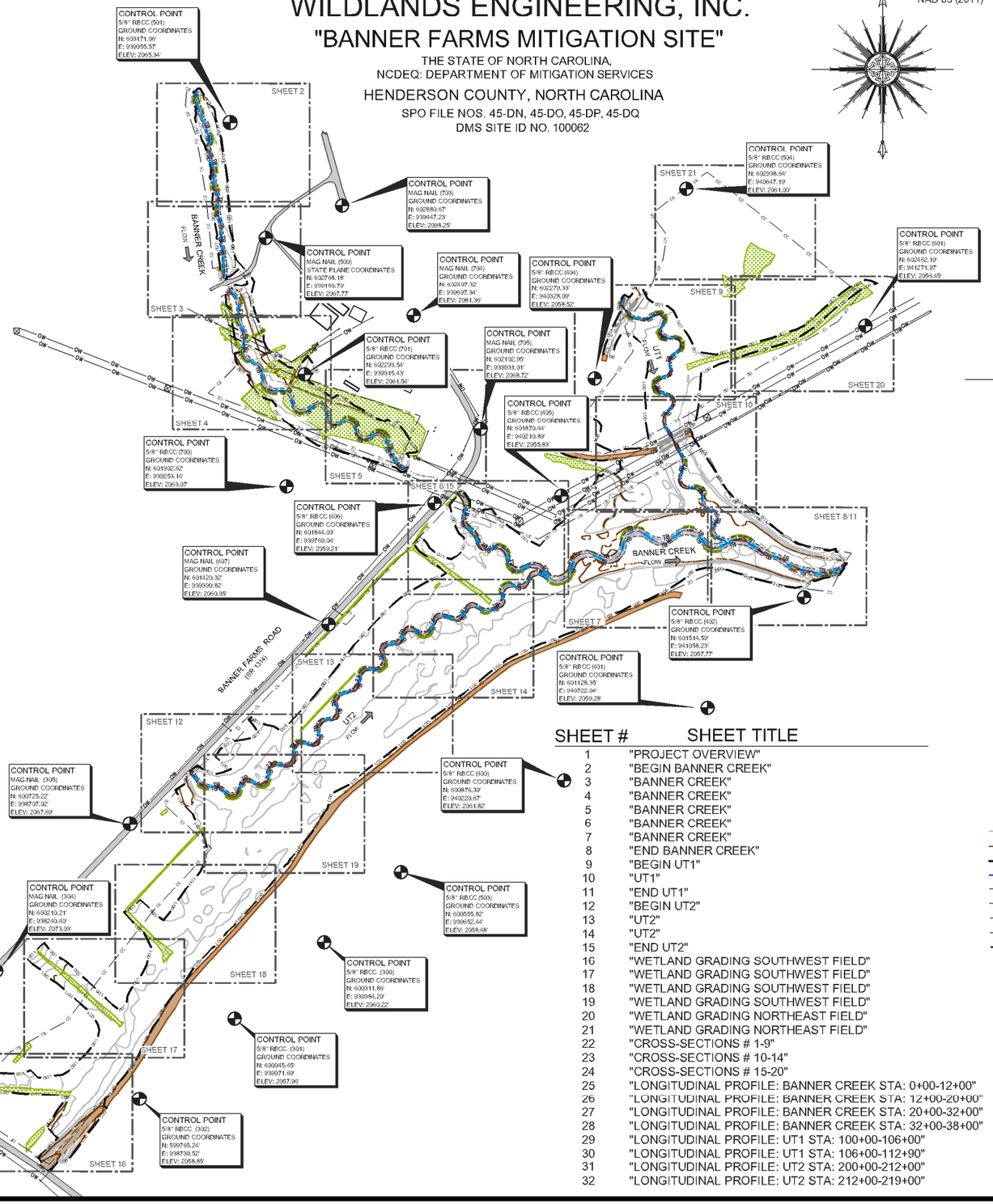
WILDLANDS ENGINEERING, INC.

"BANNER FARMS MITIGATION SITE"

THE STATE OF NORTH CAROLINA,
NCDEQ: DEPARTMENT OF MITIGATION SERVICES

HENDERSON COUNTY, NORTH CAROLINA

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ
DMS SITE ID NO. 100062



SURVEYOR'S NOTES:

1. ALL DISTANCES AND COORDINATES ARE GROUND MEASUREMENTS IN US SURVEY FEET UNLESS OTHERWISE NOTED.
2. PROPERTY SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS AND RESTRICTIONS THAT ARE RECORDED, UNRECORDED, WRITTEN AND UNWRITTEN.
3. CONSERVATION EASEMENT BOUNDARIES SHOWN HEREON WERE TAKEN FROM PLATS OF SURVEY ENTITLED: "A CONSERVATION EASEMENT SURVEY FOR THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES, "BANNER FARMS MITIGATION SITE" AND RECORDED IN BOOK: 2020 SLIDES: 12507–12511 DATED APRIL 28, 2020, RECORDED IN THE HENDERSON COUNTY REGISTRY.
4. **HENDERSON** COUNTY GIS WEBSITE USED TO IDENTIFY ADJOINING PROPERTY OWNERS.
5. BY GRAPHIC DETERMINATION, A PORTION OF THE SUBJECT PROPERTY APPEARS TO LIE WITHIN A SPECIAL FLOOD HAZARD AREA (SFHA) AS DETERMINED BY THE FIRM. MAP# **3700953900J, 3700963000J, 3700964000J DATED 10/02/2008**
6. STATE PLANE COORDINATES AND ELEVATIONS WERE DERIVED FROM THE CONTROL SURVEY PREPARED BY **KEE MAPPING & SURVEYING**. THE HORIZONTAL DATUM IS **NAD 83 (2011)** AND THE VERTICAL DATUM IS **NAVD 88**. ALL COORDINATES SHOWN HEREON ARE GROUND MEASUREMENTS IN US SURVEY FEET.
7. UTILITIES WERE LOCATED BASED ON VISIBLE ABOVE GROUND STRUCTURES, THEREFORE THE LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE OR MAY BE PRESENT AND NOT SHOWN HEREON. CALL 1–800–632–4949 BEFORE DIGGING.
8. STATIONING AND STREAM LABELS FOR PLAN AND PROFILES ARE BASED OFF OF FINAL PLANS AND DESIGN CENTERLINES PROVIDED BY WILDLANDS ENGINEERING, INC.
9. CONTOUR INTERVAL: **1 FOOT**
   VERTICAL DATUM: **NAVD 88**
10. AREA OF LIMITS OF DISTURBANCE: **34.88** ACRES
11. WETLANDS SHOWN HEREON WERE PROVIDED BY WILDLANDS ENGINEERING, INC.

CERTIFICATE OF SURVEY AND ACCURACY

I, **PHILLIP B. KEE**, CERTIFY THAT THE GROUND TOPOGRAPHIC SURVEY PORTION OF THIS PROJECT WAS COMPLETED UNDER MY DIRECT SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY DIRECT SUPERVISION; THAT THIS SURVEY WAS PERFORMED AT THE 95% CONFIDENCE LEVEL TO MEET THE FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THIS SURVEY WAS PERFORMED TO THE CLASS A HORIZONTAL AND CLASS C VERTICAL WHERE APPLICABLE; THAT THE ORIGINAL DATA WAS OBTAINED BETWEEN THE DATES OF **10/26/21–01/25/22**; THAT THE CONTOURS SHOWN AS BROKEN LINES MAY NOT MEET THE STATED STANDARD AND ALL COORDINATES ARE BASED ON NAD 83 (NSRS 2011) AND ALL ELEVATIONS ARE BASED ON NAVD 88; THAT THE GPS PORTION OF THIS PROJECT WAS TO PERFORM A GRID TIE TO THE NC STATE PLANE COORDINATE SYSTEM AND THE INFORMATION USED IS SHOWN & NOTED HEREON; THAT THIS MAP MEETS THE SPECIFICATIONS FOR TOPOGRAPHIC SURVEYS AS STATED IN TITLE 21, CHAPTER 56, SECTION .1606; THAT THIS MAP WAS NOT PREPARED IN ACCORDANCE WITH G.S. 47–30, AS AMENDED AND DOES NOT REPRESENT AN OFFICIAL BOUNDARY SURVEY.

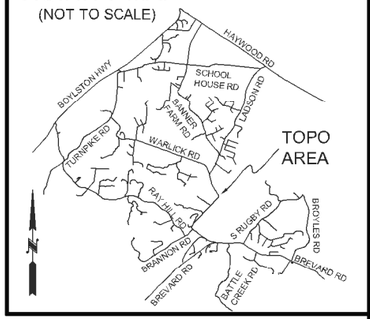
GPS METADATA
SEE SURVEY CONTROL WILDLANDS ENGINEERING, INC. BY KEE MAPPING & SURVEYING, PA (LICENSE # C–3039); SIGNED, SEALED AND DATED ON JULY 24, 2019 BY PHILLIP B. KEE, NC PLS (LICENSE #4647).

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, AND SEAL THIS **31ST** DAY OF **MARCH**, **2022**, A.D.

DocuSigned by:
Phillip B. Kee
PHILLIP B. KEE, PLS L–4647
D965004A7692407...

SHEET #	SHEET TITLE
1	"PROJECT OVERVIEW"
2	"BEGIN BANNER CREEK"
3	"BANNER CREEK"
4	"BANNER CREEK"
5	"BANNER CREEK"
6	"BANNER CREEK"
7	"BANNER CREEK"
8	"END BANNER CREEK"
9	"BEGIN UT1"
10	"UT1"
11	"END UT1"
12	"BEGIN UT2"
13	"UT2"
14	"UT2"
15	"END UT2"
16	"WETLAND GRADING SOUTHWEST FIELD"
17	"WETLAND GRADING SOUTHWEST FIELD"
18	"WETLAND GRADING SOUTHWEST FIELD"
19	"WETLAND GRADING SOUTHWEST FIELD"
20	"WETLAND GRADING NORTHEAST FIELD"
21	"WETLAND GRADING NORTHEAST FIELD"
22	"CROSS-SECTIONS # 1-9"
23	"CROSS-SECTIONS # 10-14"
24	"CROSS-SECTIONS # 15-20"
25	"LONGITUDINAL PROFILE: BANNER CREEK STA: 0+00-12+00"
26	"LONGITUDINAL PROFILE: BANNER CREEK STA: 12+00-20+00"
27	"LONGITUDINAL PROFILE: BANNER CREEK STA: 20+00-32+00"
28	"LONGITUDINAL PROFILE: BANNER CREEK STA: 32+00-38+00"
29	"LONGITUDINAL PROFILE: UT1 STA: 100+00-106+00"
30	"LONGITUDINAL PROFILE: UT1 STA: 106+00-112+90"
31	"LONGITUDINAL PROFILE: UT2 STA: 200+00-212+00"
32	"LONGITUDINAL PROFILE: UT2 STA: 212+00-219+00"

VICINITY MAP
(NOT TO SCALE)



LEGEND

#	STRUCTURE NUMBER
●	1/2" RBCC (CROSS-SECTION REBAR)
⊕	5/8" RBCC W/ "KEE" CONTROL CAP
⊕	GAUGE (AS NOTED)
●	UTILITY POLE
⊠	UTILITY TOWER
	LOG SILL
	ROCK SILL
	COVER LOG
	LOG J-HOOK
	DECIDUOUS TREE (AS NOTED)
	BRUSH TOE
	RIFFLE
	BOULDER TOE
	GRAVEL
	WETLAND
	RIP RAP
	SOIL ROADBED
	ASPHALT
	MINOR CONTOUR
2580	MAJOR CONTOUR
LOD	LIMITS OF DISTURBANCE
	THALWEG
TB	TOP OF BANK
	DESIGN CENTERLINE
OW	OVERHEAD WIRE
CE	CONSERVATION EASEMENT
CE-XS	INTERNAL EASEMENT CROSSING
RBCC	REBAR W/ CAP SET IN CONCRETE
INV	INVERT
ELEV	ELEVATION
NAVD	NORTH AMERICAN VERTICAL DATUM
NAD	NORTH AMERICAN DATUM
NSRS	NATIONAL SPATIAL REFERENCE SYSTEM
CMP	CORRUGATED METAL PIPE
VP	VEGETATED PLOT
PG	PAGE
NCDEQ	NORTH CAROLINA DEPARTMENT OF ENVIROMENTAL QUALITY
SPO	STATET PROPERTY OFFICE
STA	STATION
NO.	NUMBER
SR	SECONDARY ROAD

SEAL:
NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE
DocuSigned by:
D965004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:
WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:
BANNER FARMS MITIGATION SITE

SHEET TITLE:
PROJECT OVERVIEW

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100–AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET: 1 OF 32

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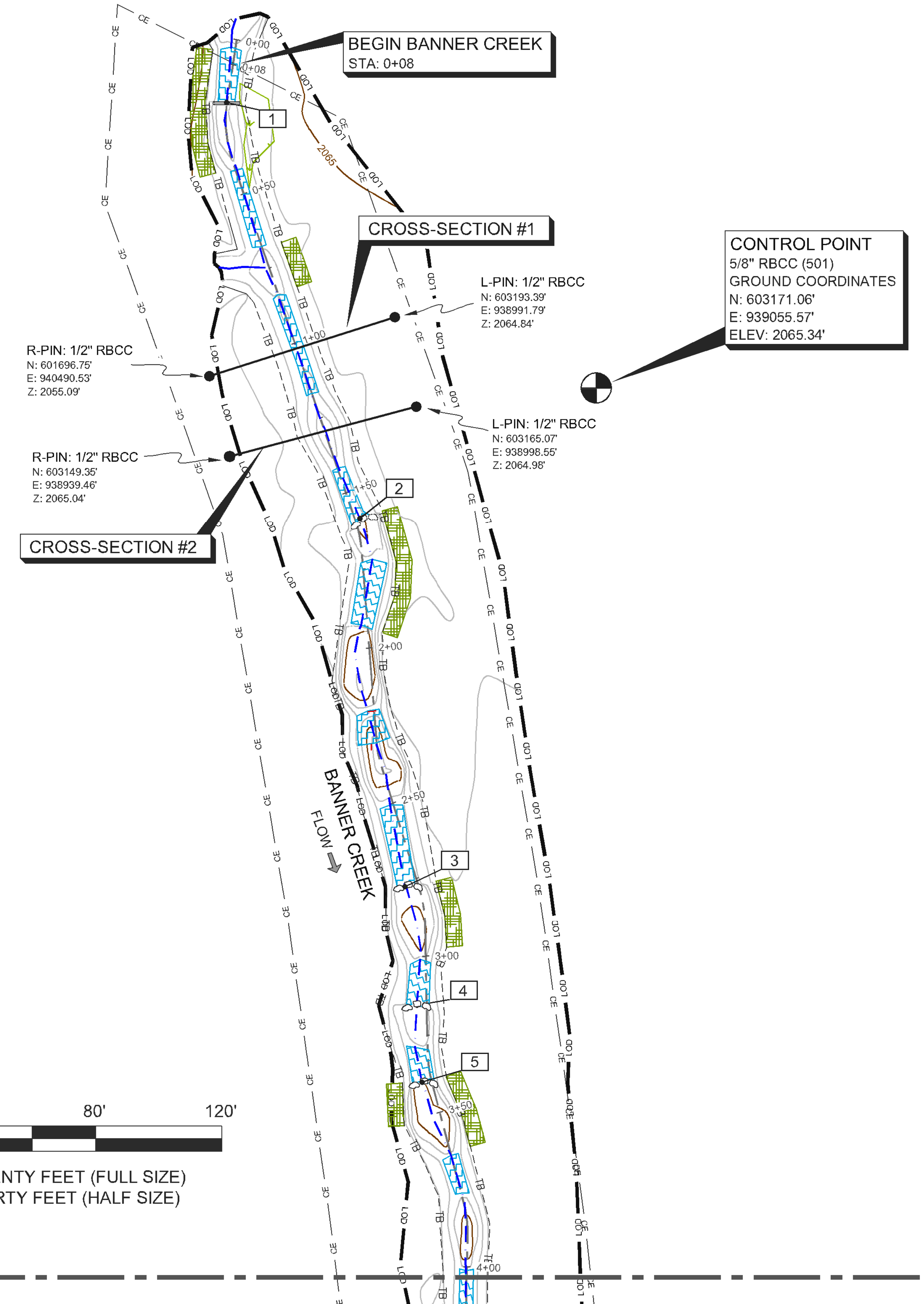

GRID NORTH
NAD 83 (2011)

0' 40' 80' 120'

ONE INCH = TWENTY FEET (FULL SIZE)
ONE INCH = FORTY FEET (HALF SIZE)

SHEET 2

SHEET 3

BANNER CREEK STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
1	LOG SILL	2062.37
2	ROCK SILL	2061.64
3	ROCK SILL	2061.35
4	ROCK SILL	2061.68
5	ROCK SILL	2061.41

SEAL:
NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE
DocuSigned by:
0D96604A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BEGIN BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:
2 OF 32

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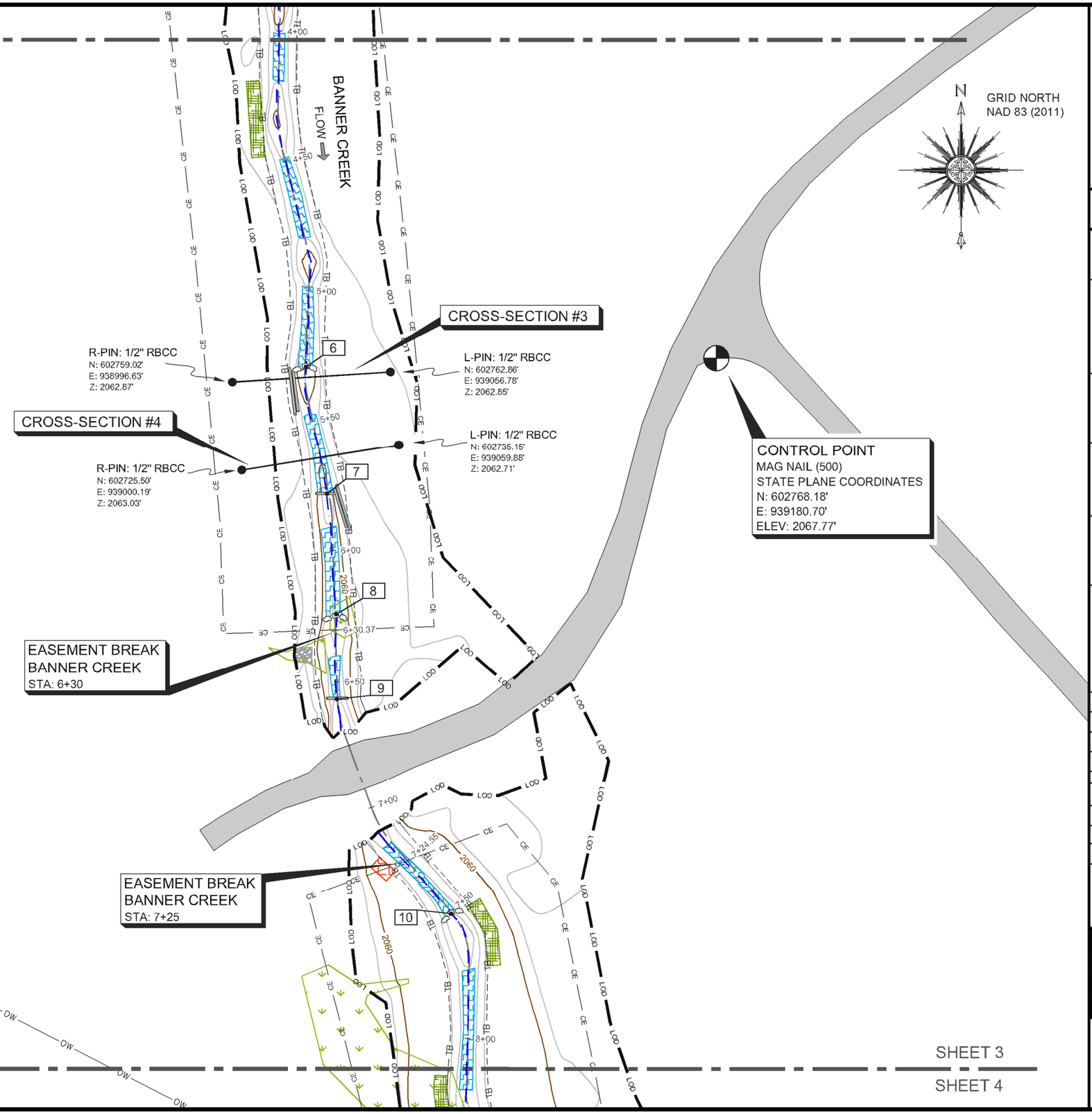
SHEET 2

SHEET 3

BANNER CREEK STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
6	ROCK SILL	2060.65
7	LOG SILL	2059.93
8	ROCK SILL	2058.85
9	LOG SILL	2058.24
10	ROCK SILL	2057.50



SHEET 3

SHEET 4

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D96B0044A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET: 3 OF 32

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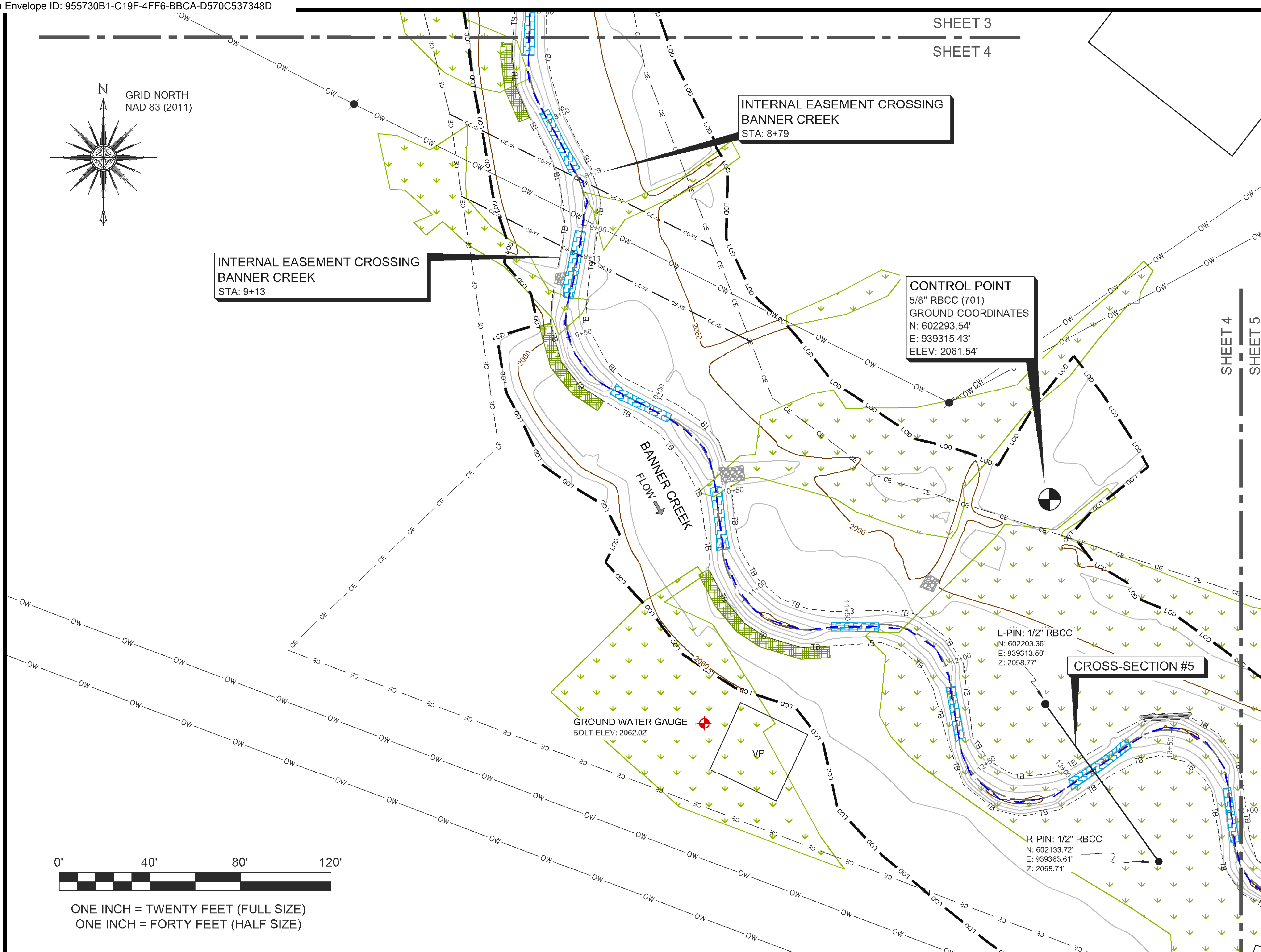

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:

5965004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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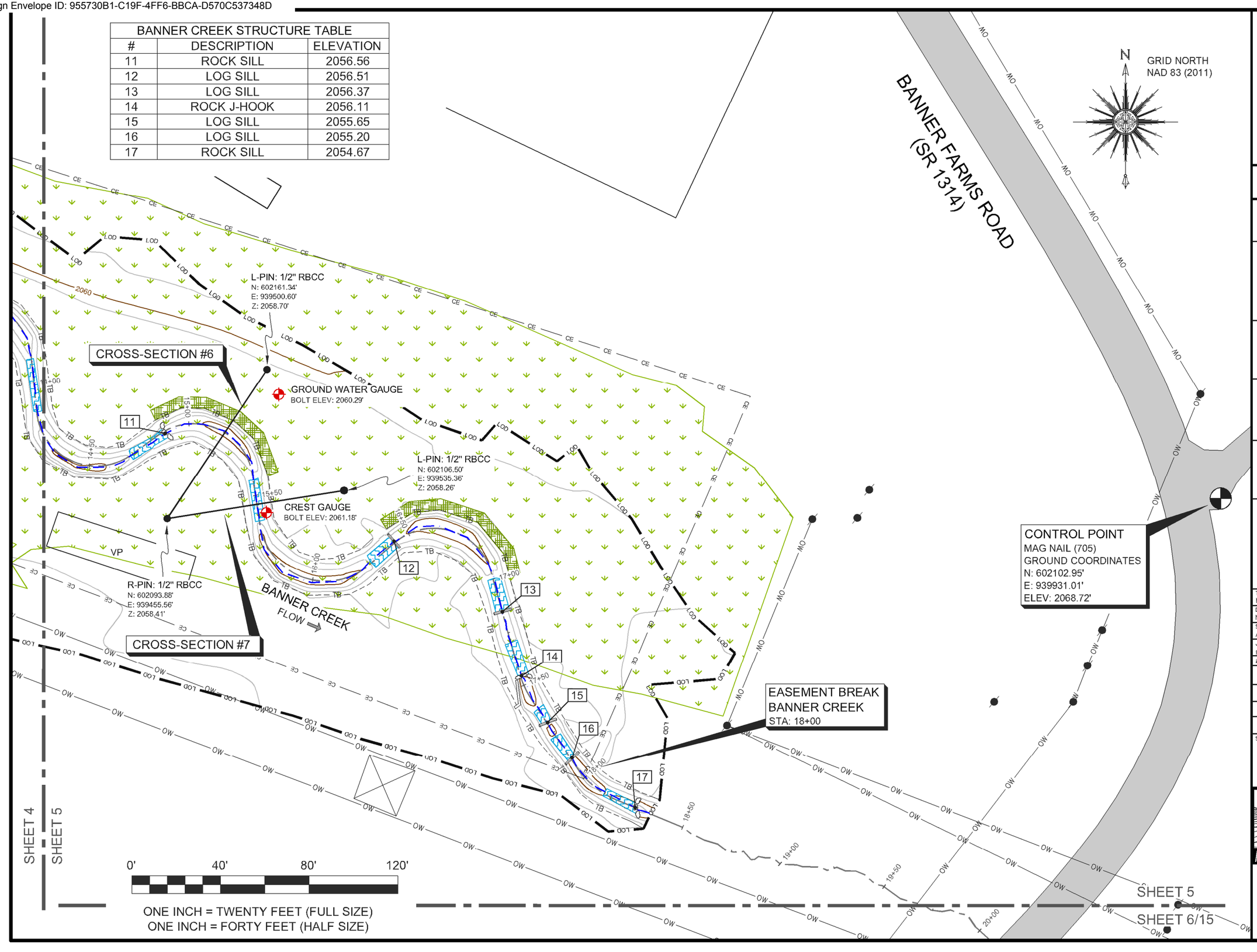
BANNER CREEK STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
11	ROCK SILL	2056.56
12	LOG SILL	2056.51
13	LOG SILL	2056.37
14	ROCK J-HOOK	2056.11
15	LOG SILL	2055.65
16	LOG SILL	2055.20
17	ROCK SILL	2054.67



SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D965004A7892401...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET: 5 OF 32

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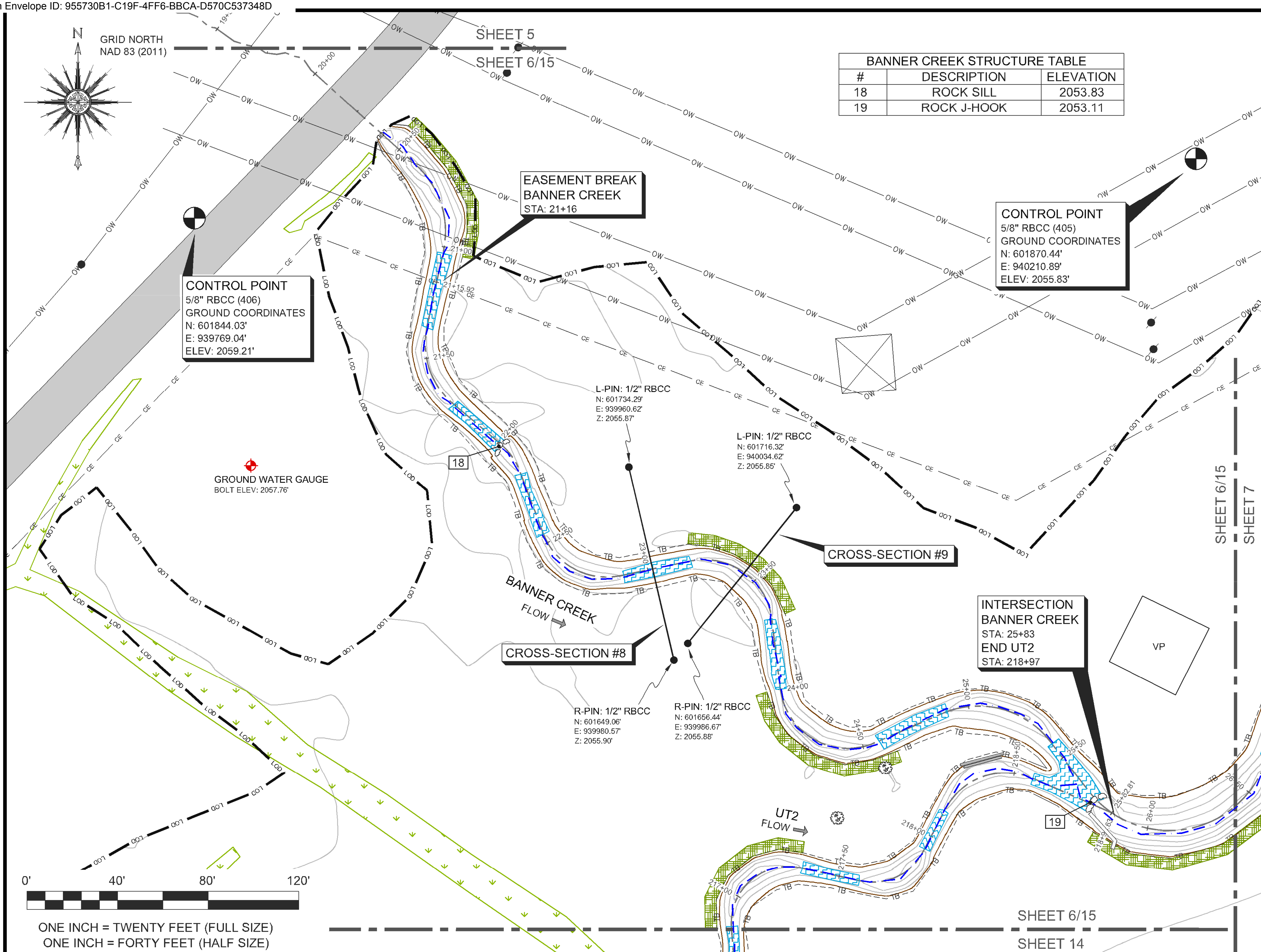

BANNER CREEK STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
18	ROCK SILL	2053.83
19	ROCK J-HOOK	2053.11

SEAL:

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-4647 PHILLIP B. KEE

DocuSigned by: D66600A47692407

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

6 OF 32

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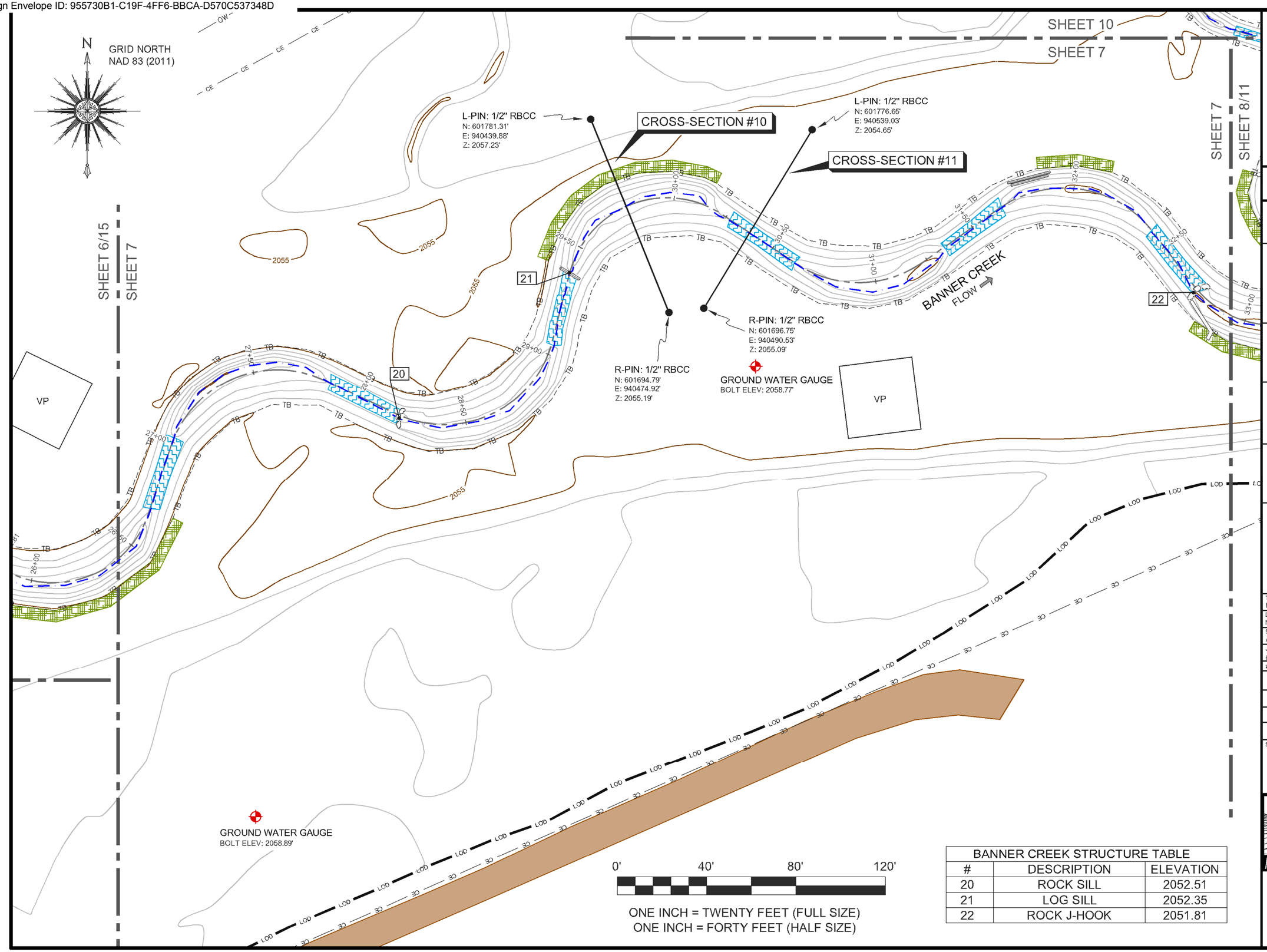

BANNER CREEK STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
20	ROCK SILL	2052.51
21	LOG SILL	2052.35
22	ROCK J-HOOK	2051.81

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D965004A7682407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:
WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:
BANNER FARMS MITIGATION SITE

SHEET TITLE:
BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:
7 OF 32

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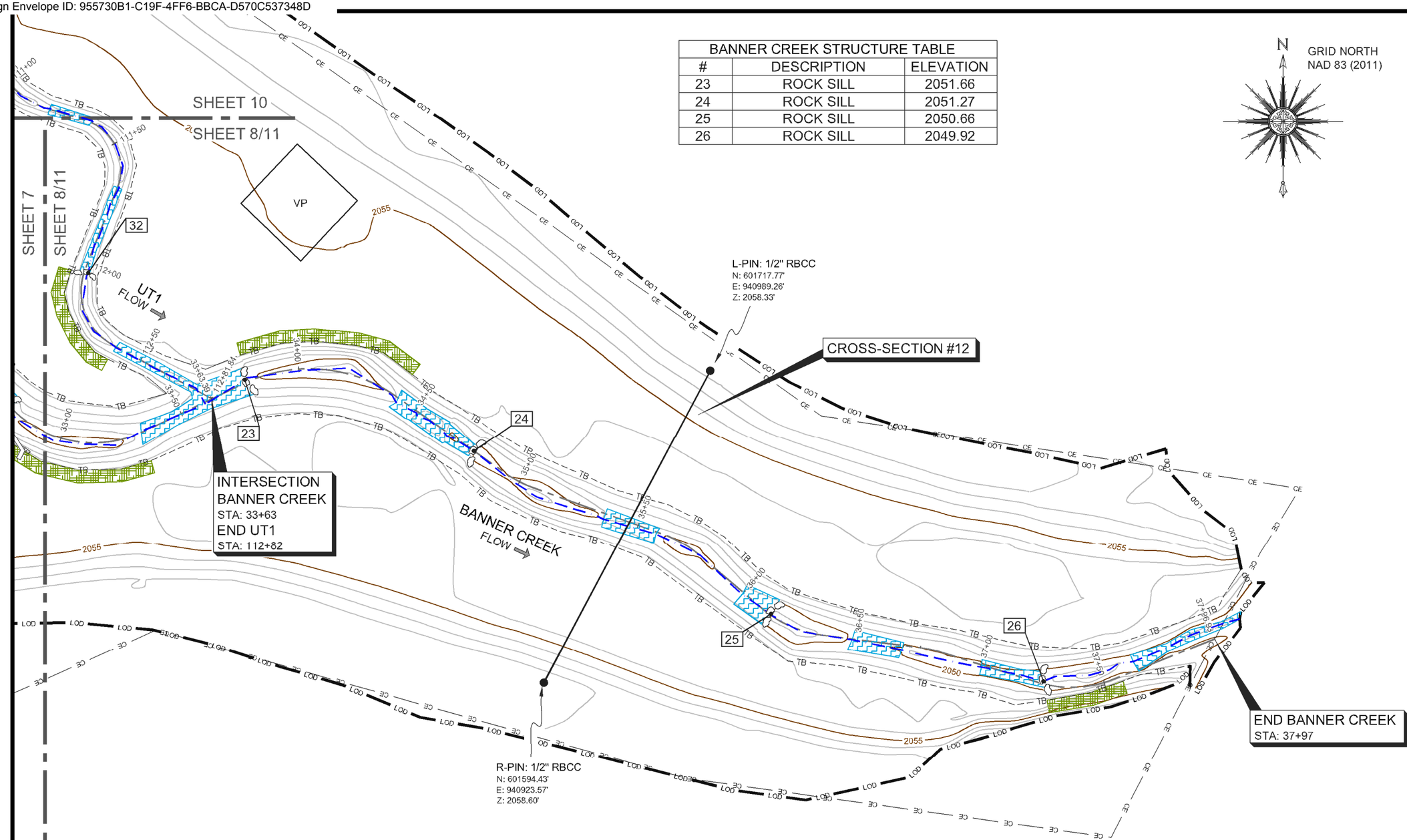
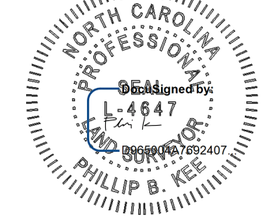
BANNER CREEK STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
23	ROCK SILL	2051.66
24	ROCK SILL	2051.27
25	ROCK SILL	2050.66
26	ROCK SILL	2049.92





SEAL:

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

END BANNER CREEK

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

8 OF 32

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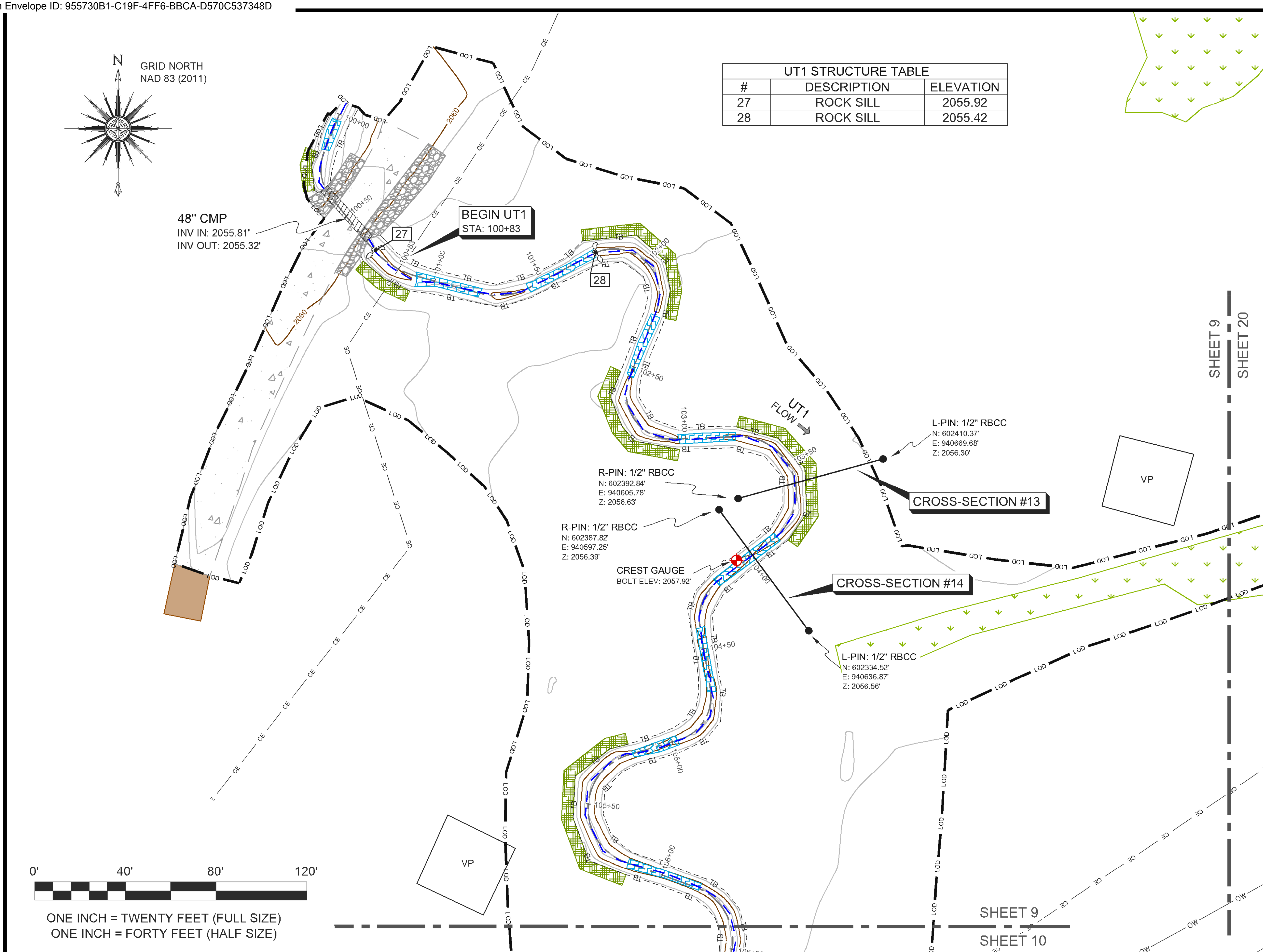
UT1 STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
27	ROCK SILL	2055.92
28	ROCK SILL	2055.42



SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BEGIN UT1

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

9 OF 32

Kee MAPPING & SURVEYING

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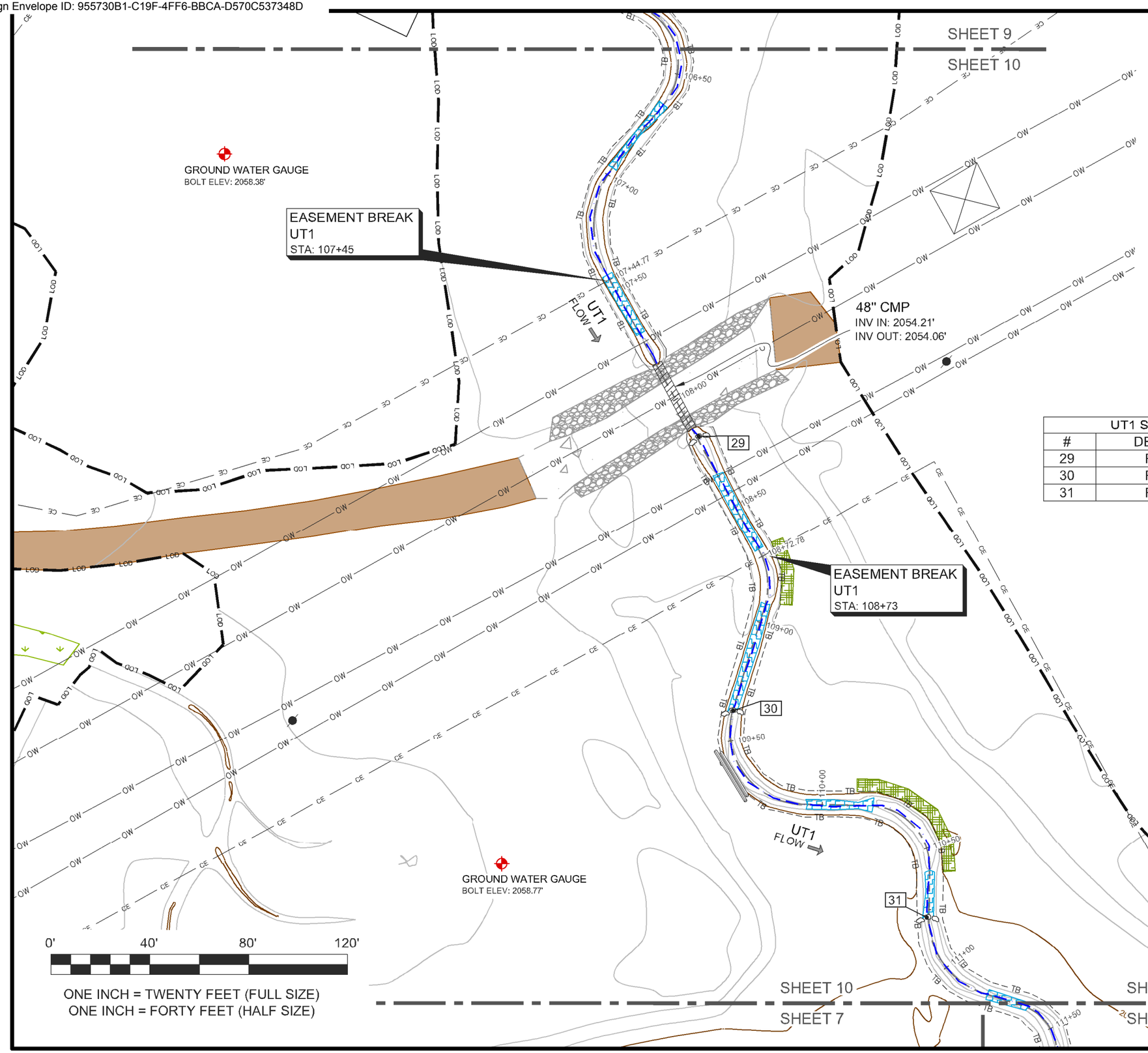

N

GRID NORTH
NAD 83 (2011)

UT1 STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
29	ROCK SILL	2054.39
30	ROCK SILL	2054.22
31	ROCK SILL	2053.45

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D96500447892407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

UT1

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

10 OF 32

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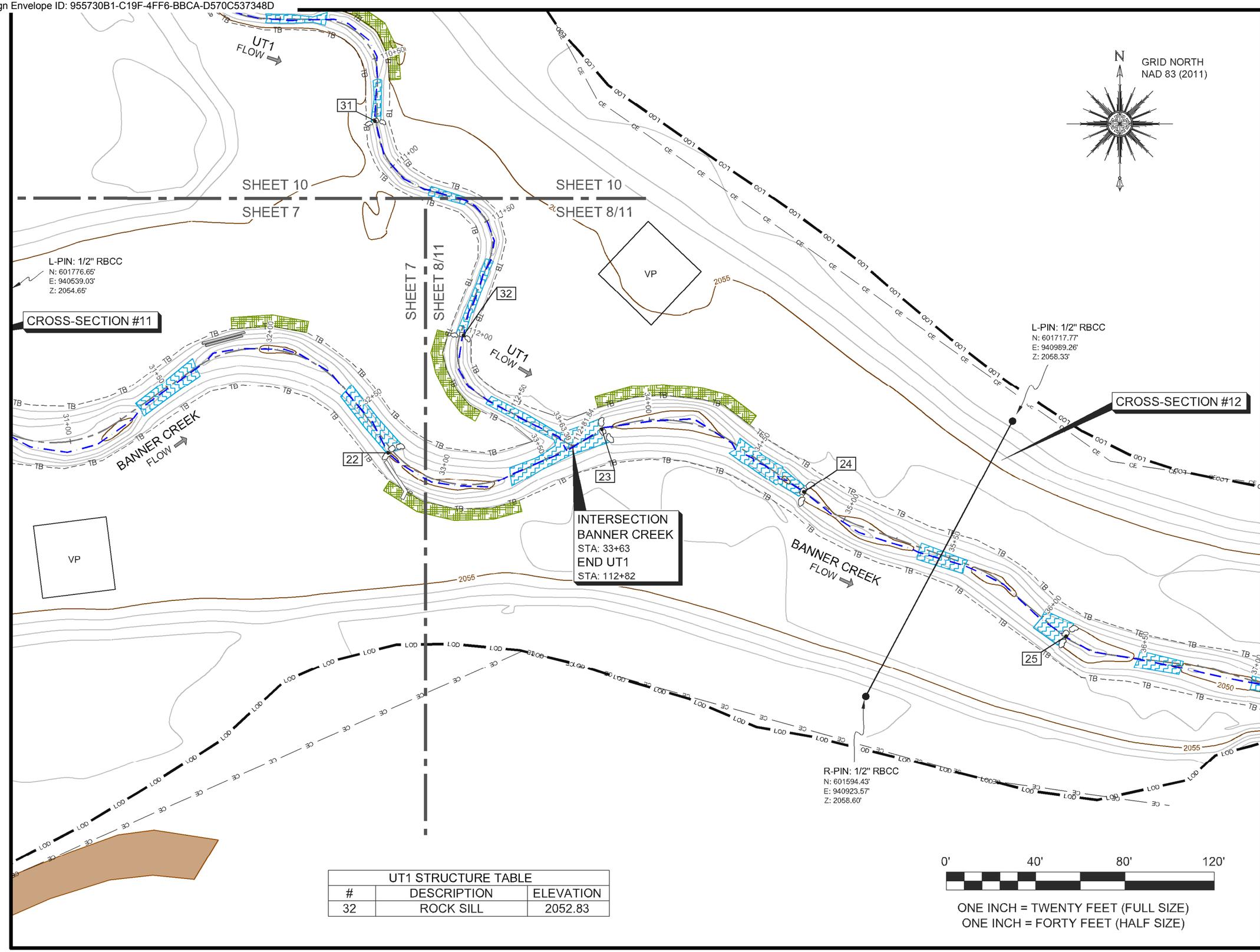

UT1 STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
32	ROCK SILL	2052.83

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D9B3084A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

END UT1

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

11 OF 32

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N

GRID NORTH
NAD 83 (2011)

UT2 STRUCTURE TABLE		
#	DESCRIPTION	ELEVATION
33	LOG SILL	2055.39

BEGIN UT2
STA: 200+18

CROSS-SECTION #15

CROSS-SECTION #16

L-PIN: 1/2" RBCC
N: 600893.13'
E: 939161.36'
Z: 2057.11'

L-PIN: 1/2" RBCC
N: 600903.87'
E: 939157.01'
Z: 2057.21'

R-PIN: 1/2" RBCC
N: 600829.70'
E: 939122.28'
Z: 2057.06'

R-PIN: 1/2" RBCC
N: 600822.30'
E: 939192.39'
Z: 2057.32'

UT2
FLOW

VP

GROUND WATER GAUGE
BOLT ELEV: 2059.57'

SHEET 12

SHEET 13

0' 40' 80' 120'

ONE INCH = TWENTY FEET (FULL SIZE)
ONE INCH = FORTY FEET (HALF SIZE)

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4698 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:
D965004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

BEGIN UT2

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

12 OF 32

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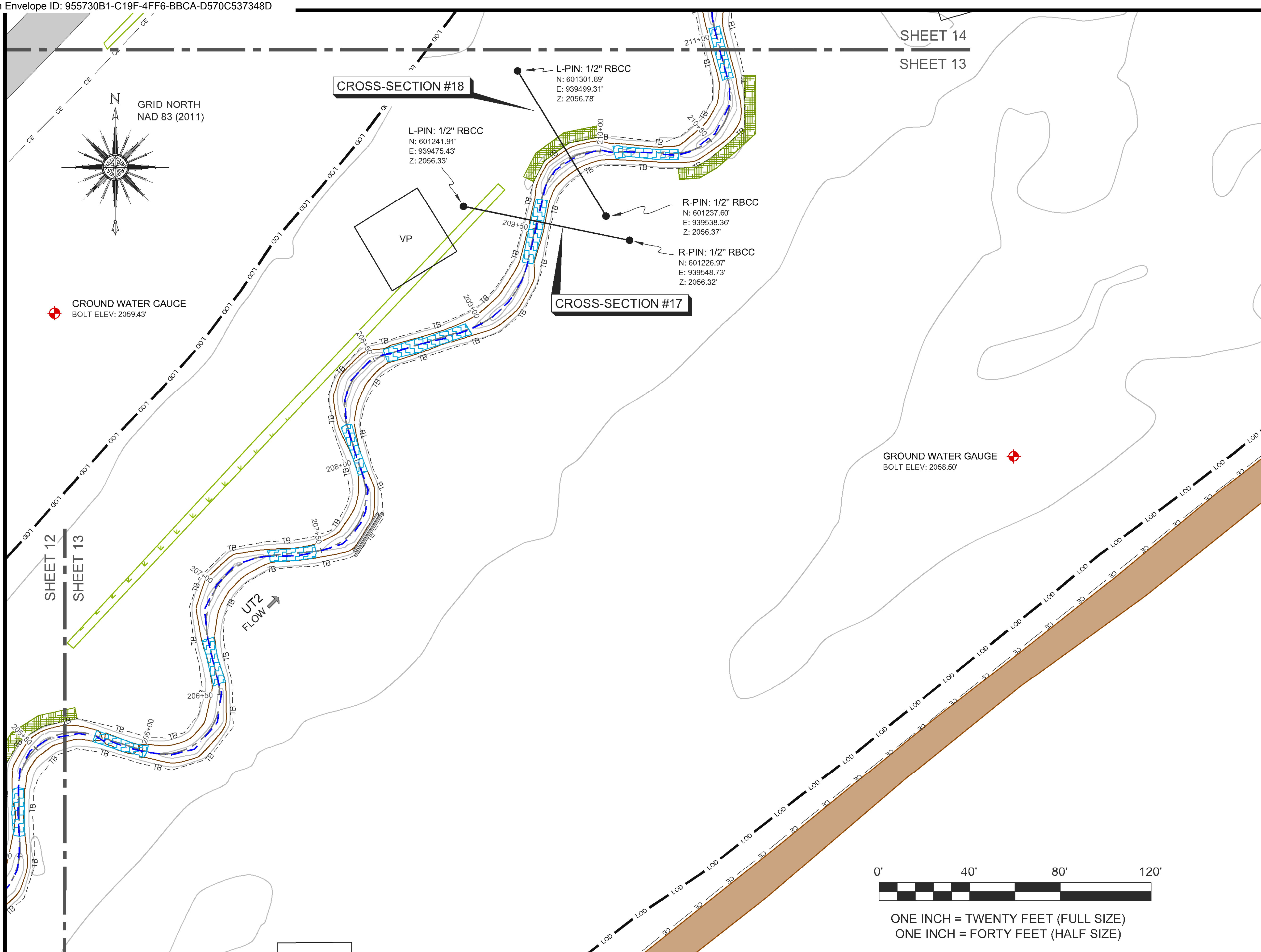

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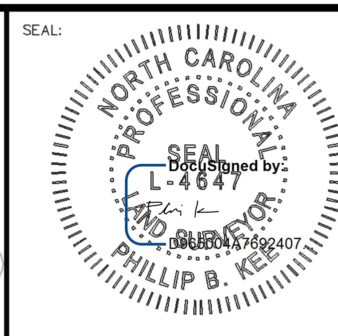

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

UT2

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

13 OF 32

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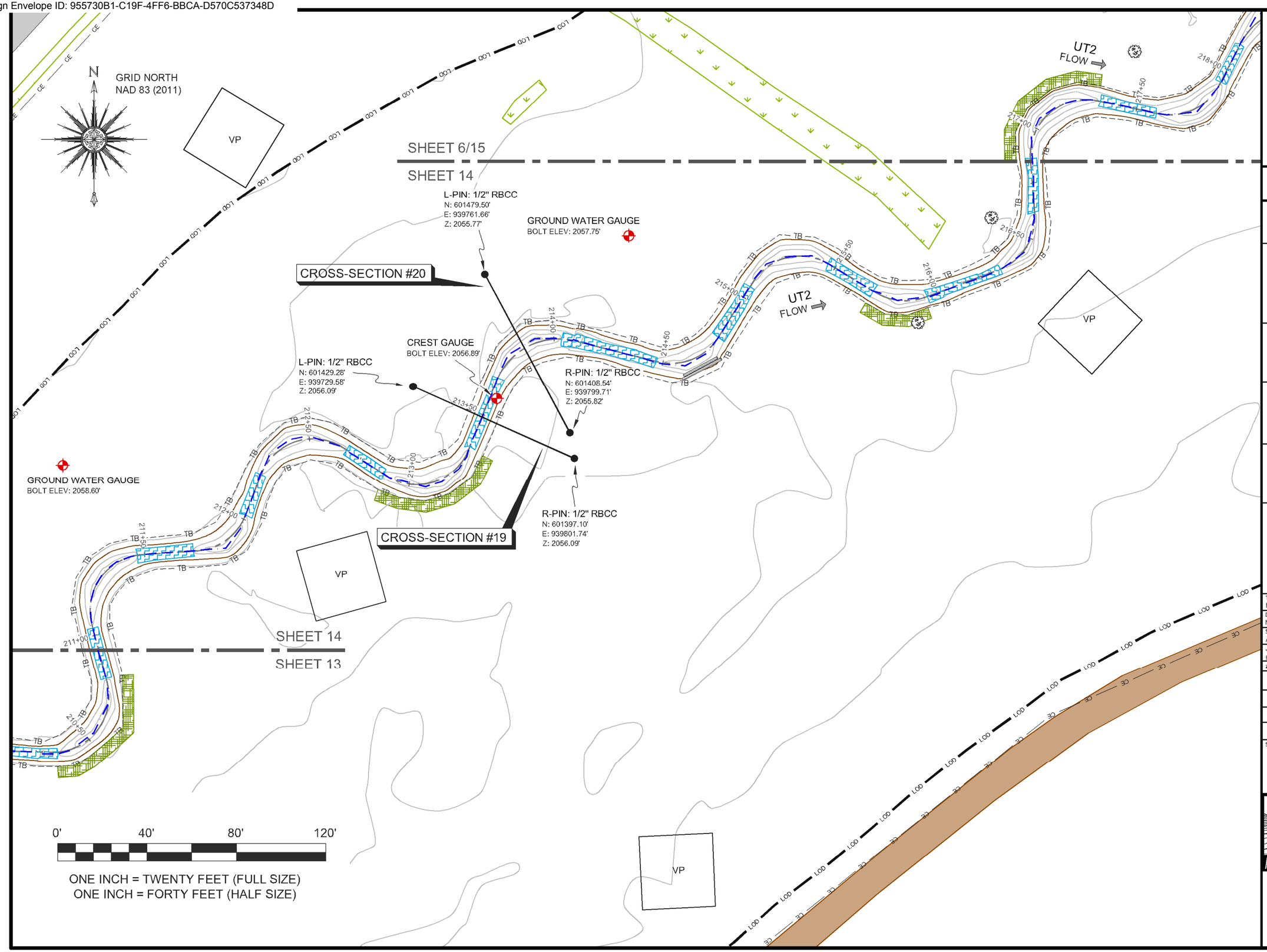

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D9650044A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

UT2

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

14 OF 32

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SHEET 5

SHEET 6/15

N

GRID NORTH
NAD 83 (2011)

EASEMENT BREAK
BANNER CREEK
STA: 21+16

CONTROL POINT
5/8" RBCC (406)
GROUND COORDINATES
N: 601844.03'
E: 939769.04'
ELEV: 2059.21'

CONTROL POINT
5/8" RBCC (405)
GROUND COORDINATES
N: 601870.44'
E: 940210.89'
ELEV: 2055.83'

L-PIN: 1/2" RBCC
N: 601734.29'
E: 939960.62'
Z: 2055.87'

L-PIN: 1/2" RBCC
N: 601716.32'
E: 940034.62'
Z: 2055.85'

GROUND WATER GAUGE
BOLT ELEV: 2057.76'

CROSS-SECTION #9

BANNER CREEK
FLOW

CROSS-SECTION #8

R-PIN: 1/2" RBCC
N: 601649.06'
E: 939980.57'
Z: 2055.90'

R-PIN: 1/2" RBCC
N: 601656.44'
E: 939986.67'
Z: 2055.88'

INTERSECTION
BANNER CREEK
STA: 25+83
END UT2
STA: 218+97

VP

UT2
FLOW

SHEET 6/15

SHEET 7

SHEET 6/15

SHEET 14

0' 40' 80' 120'

ONE INCH = TWENTY FEET (FULL SIZE)
ONE INCH = FORTY FEET (HALF SIZE)

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:
D9650004A7682407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

END UT2

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

15 OF 32

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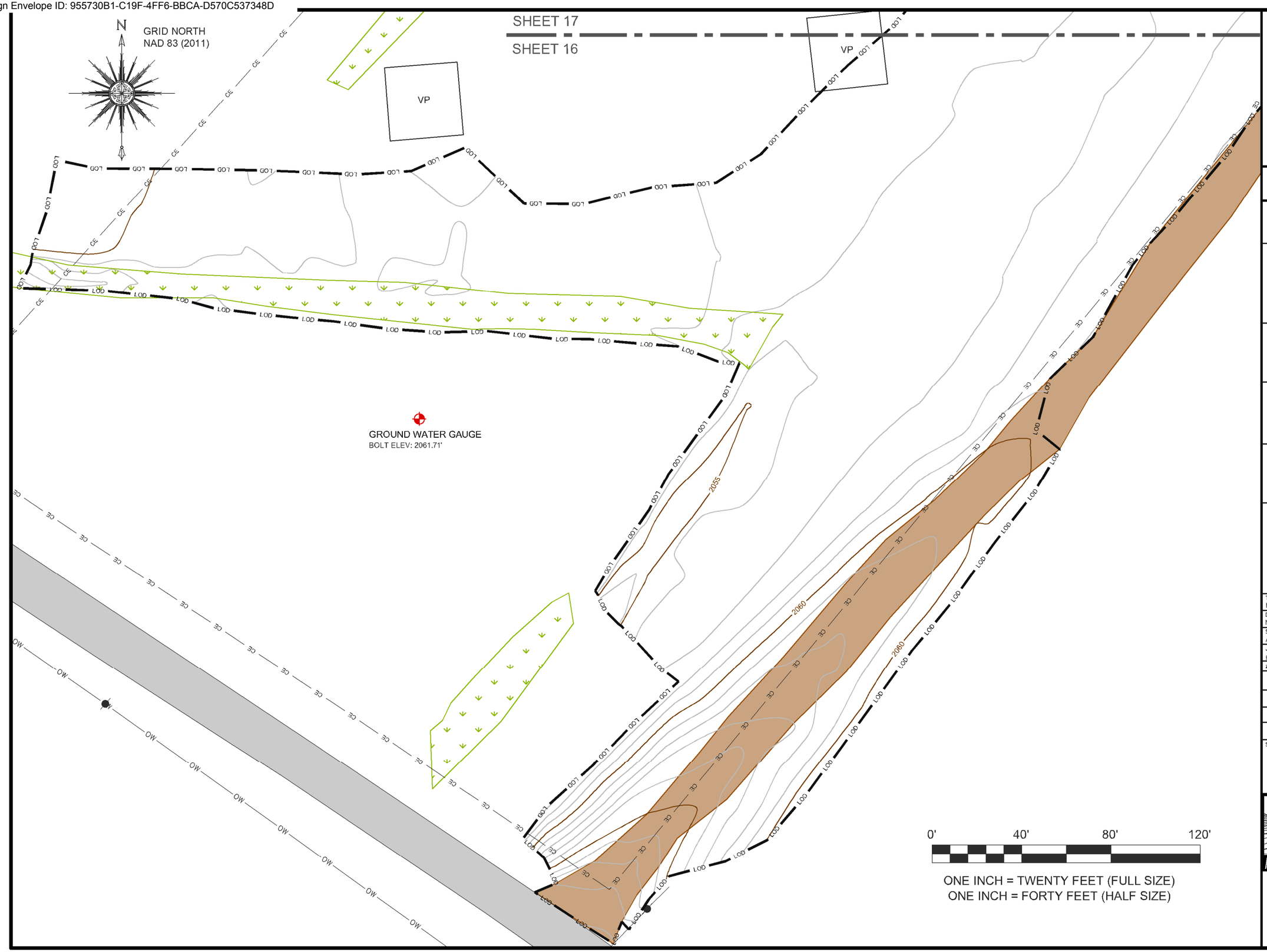

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D96500AA7592407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

WETLAND GRADING SOUTHWEST FIELD

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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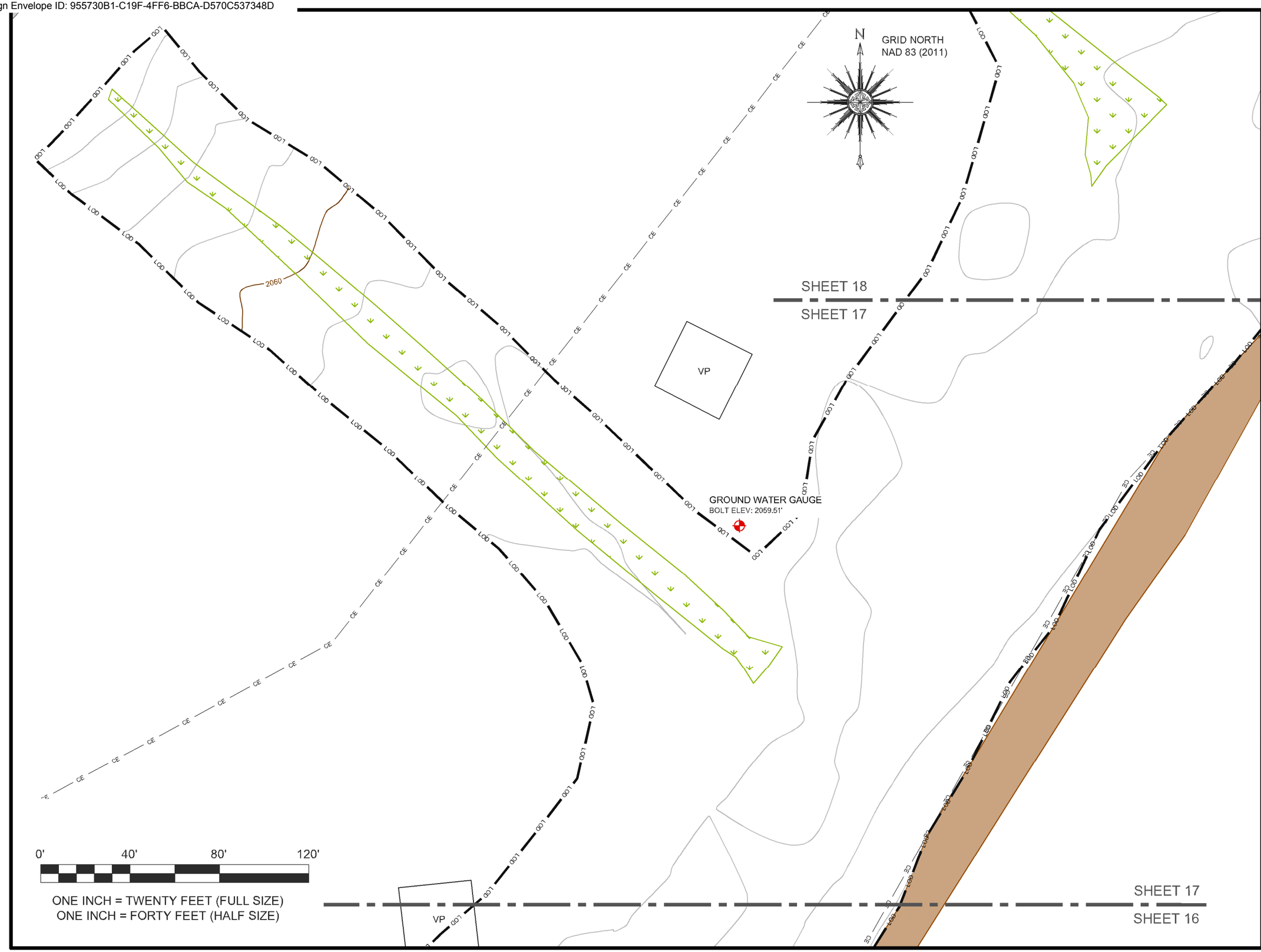

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D966004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

WETLAND GRADING SOUTHWEST FIELD

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

17 OF 32

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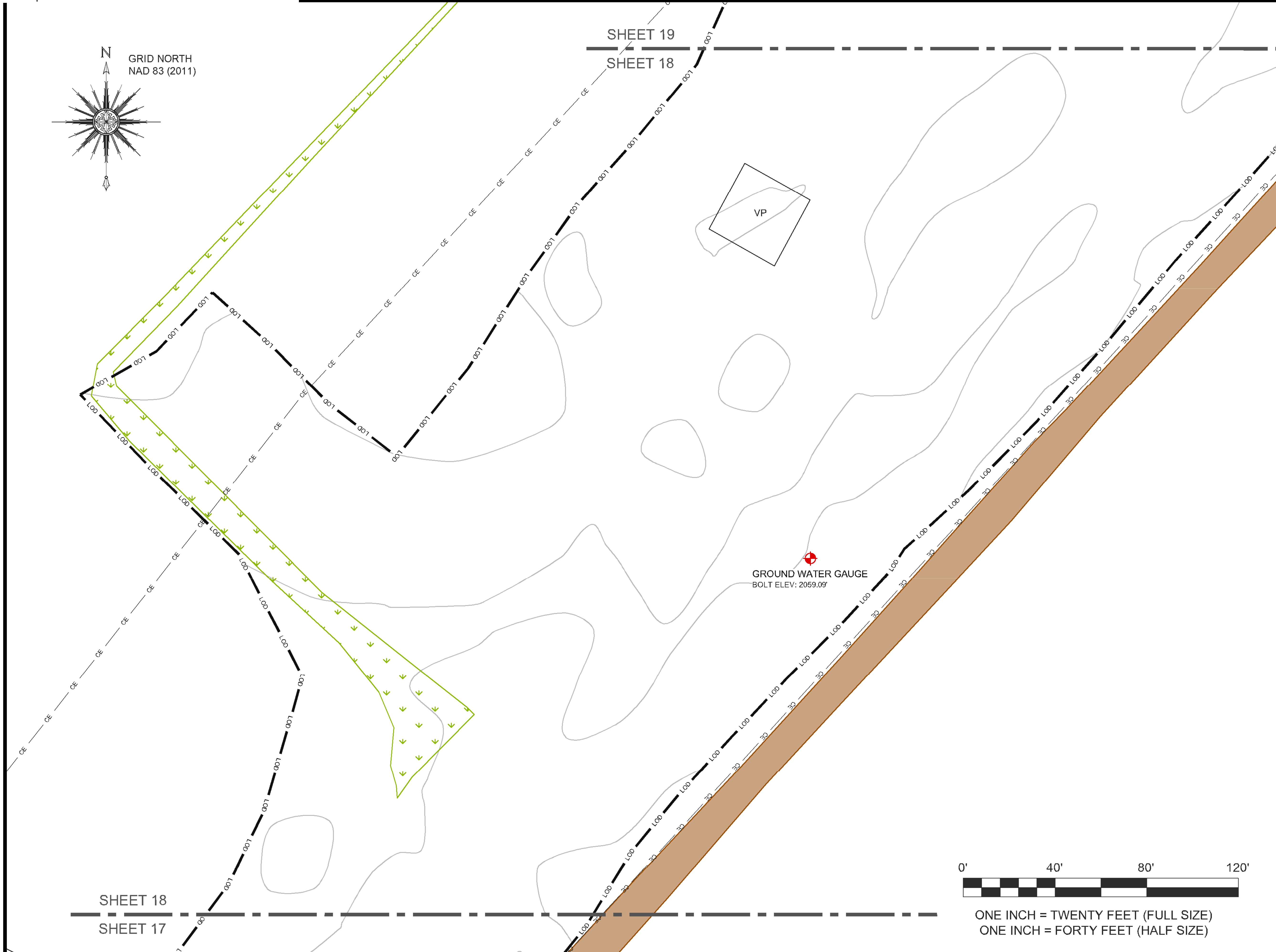

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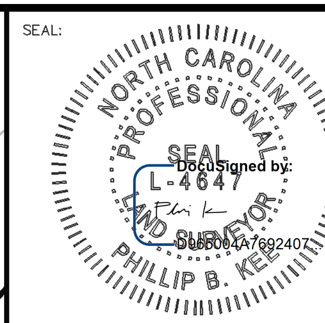

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ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

WETLAND GRADING SOUTHWEST FIELD

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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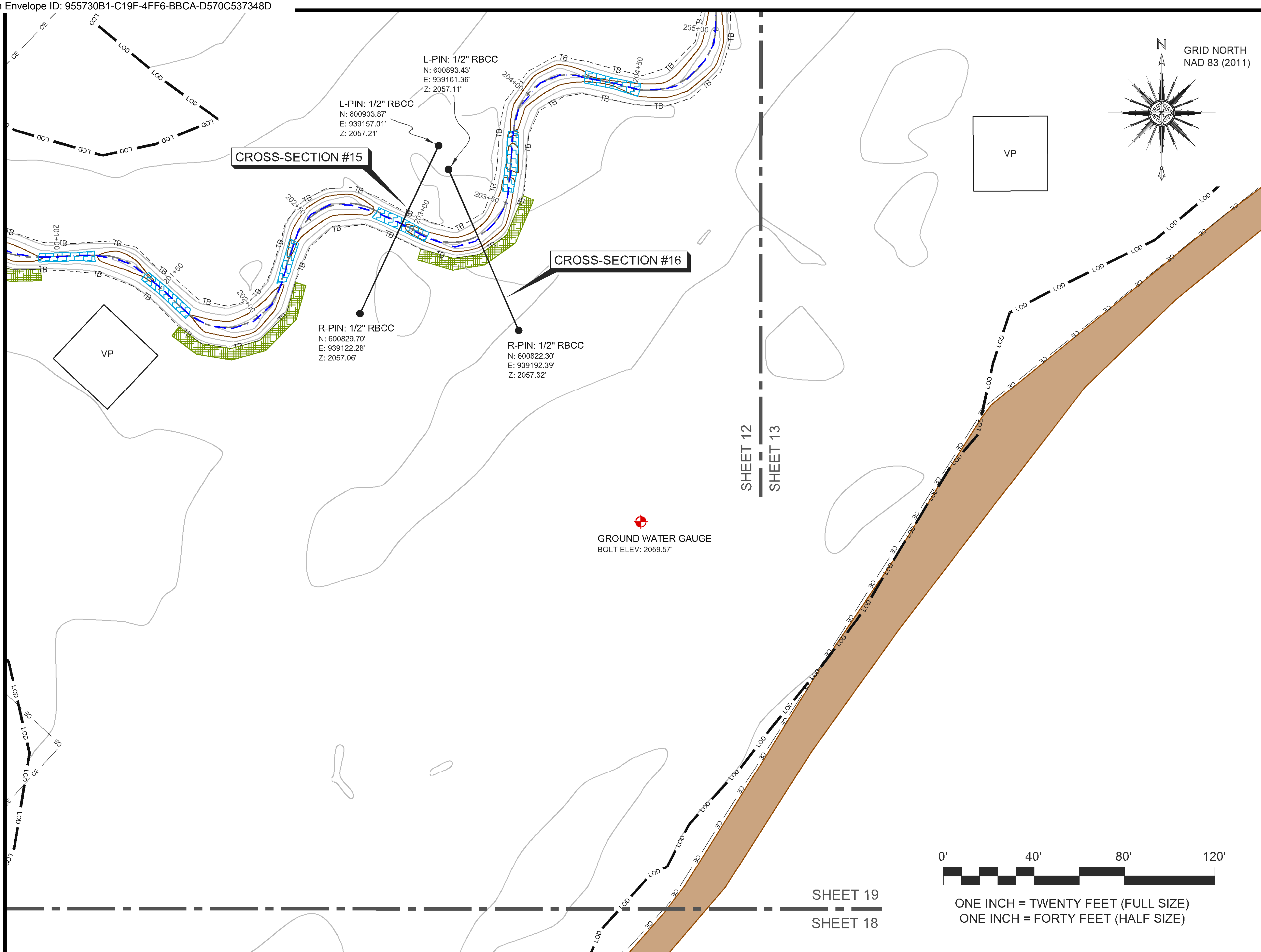

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:
D965004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

WETLAND GRADING SOUTHWEST FIELD

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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SHEET 21

SHEET 20

SHEET 9

SHEET 20

N

GRID NORTH
NAD 83 (2011)

VP

CONTROL POINT
5/8" RBCC (601)
GROUND COORDINATES
N: 602462.19'
E: 941271.97'
ELEV: 2056.45'

GROUND WATER GAUGE
BOLT ELEV: 2058.20'

0' 40' 80' 120'

ONE INCH = TWENTY FEET (FULL SIZE)
ONE INCH = FORTY FEET (HALF SIZE)

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:
D9850D4A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

WETLAND GRADING NORTHEAST FIELD

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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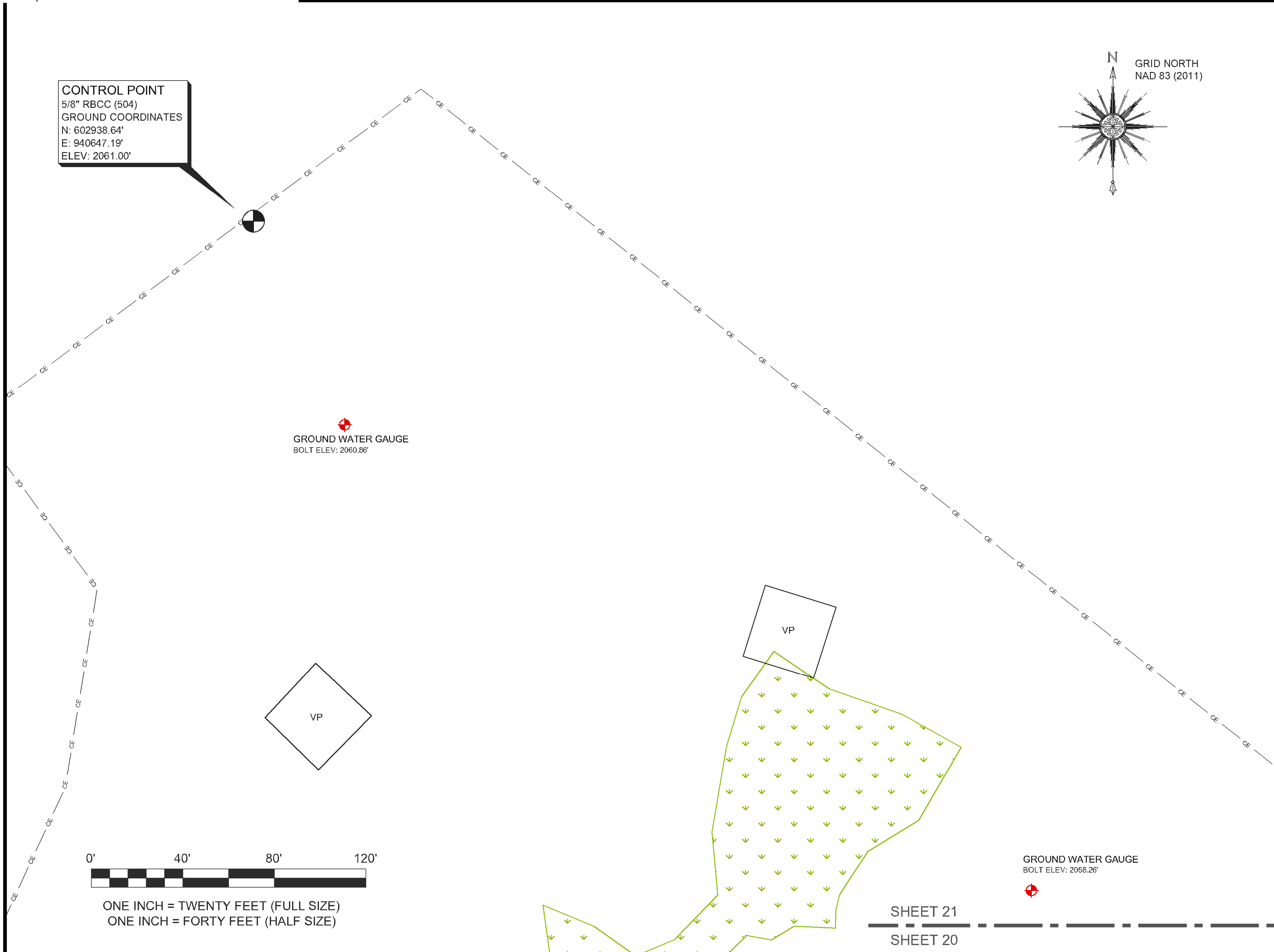

SEAL:
NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

WETLAND GRADING NORTHEAST FIELD

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

21 OF 32

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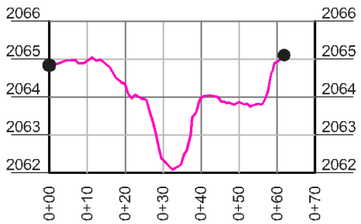
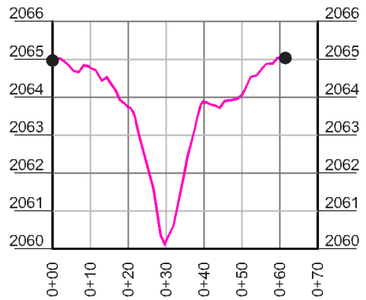
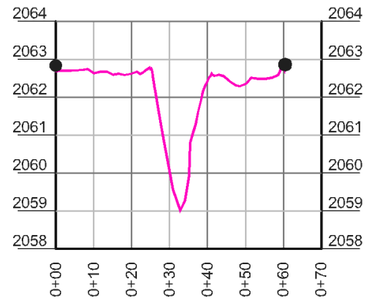
License # C-3039



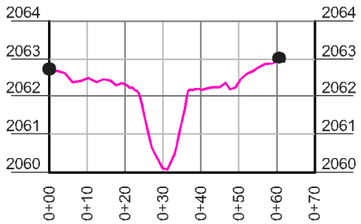
CROSS-SECTION #1 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



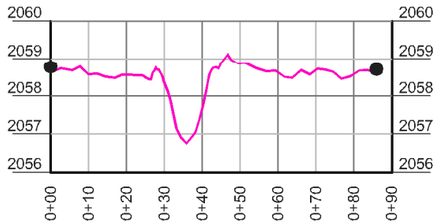
CROSS-SECTION #2 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



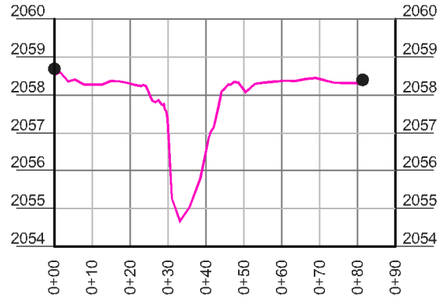
CROSS-SECTION #3 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



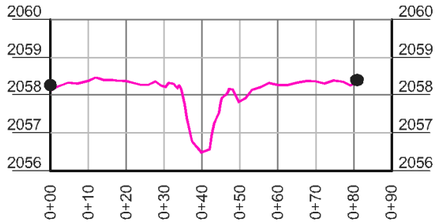
CROSS-SECTION #4 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



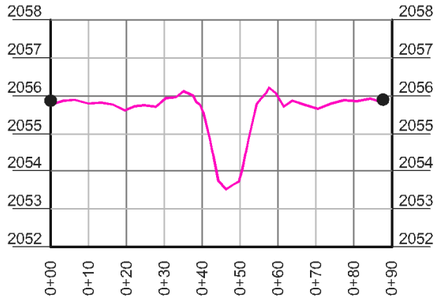
CROSS-SECTION #5 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



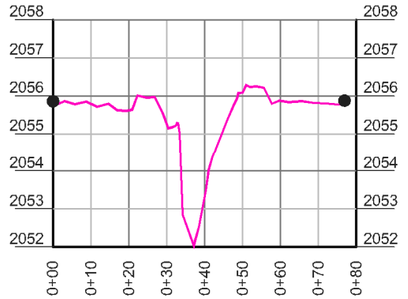
CROSS-SECTION #6 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #7 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #8 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #9 -BANNER CREEK
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

● CROSS-SECTION REBAR

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE
DocuSigned by:
Q965D04A7E92407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

CROSS-SECTIONS # 1-9

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

22 OF 32

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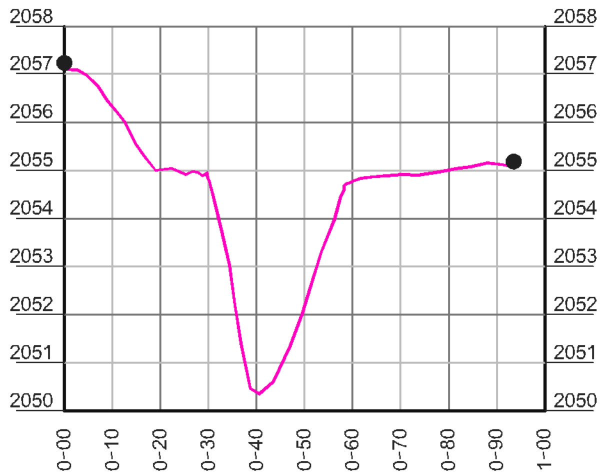
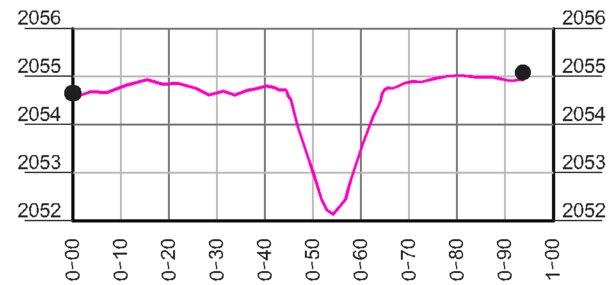


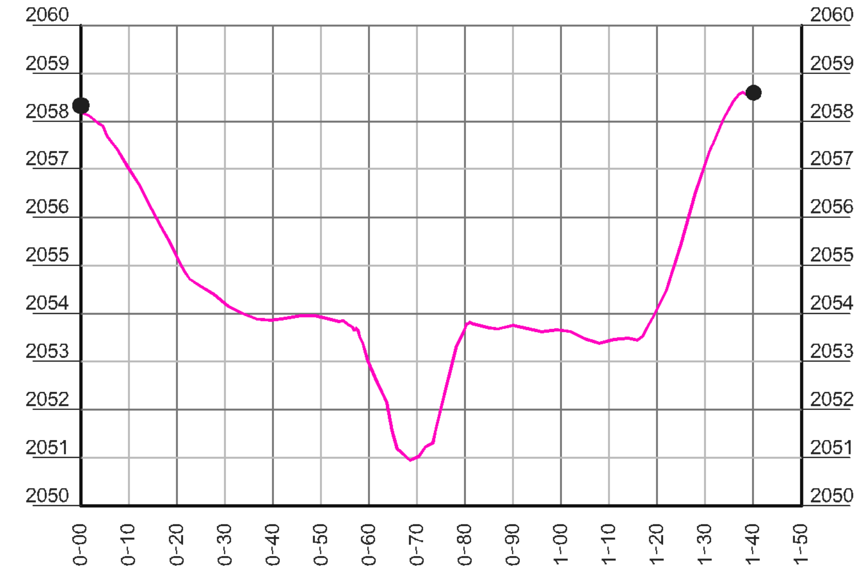
CROSS-SECTION #10 -BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



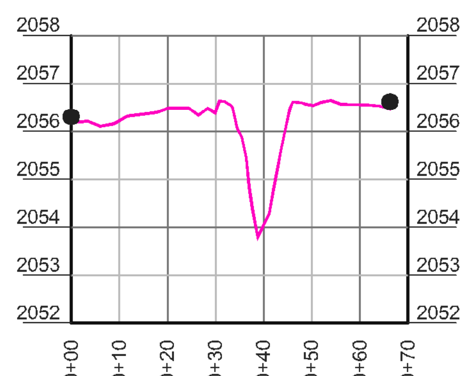
CROSS-SECTION #11 -BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



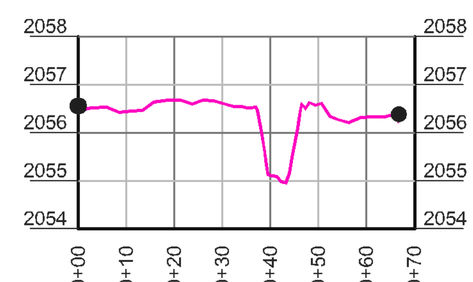
CROSS-SECTION #12 -BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #13 -UT1

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



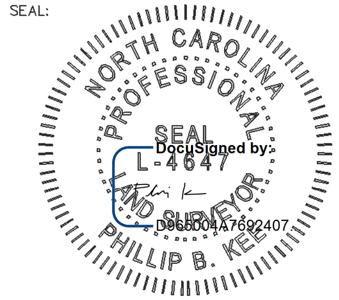
CROSS-SECTION #14 -UT1

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

● CROSS–SECTION REBAR

SEAL:



NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

CROSS-SECTIONS # 10-14

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

23 OF 32

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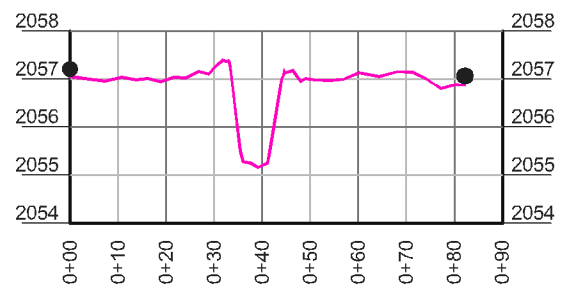
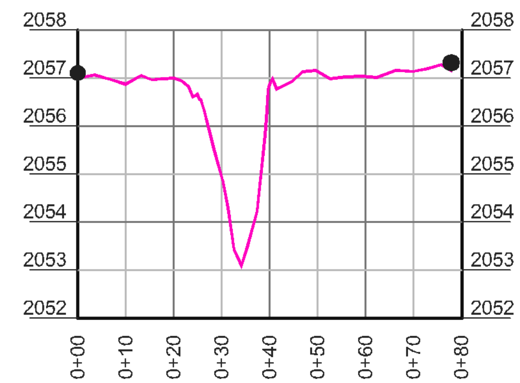
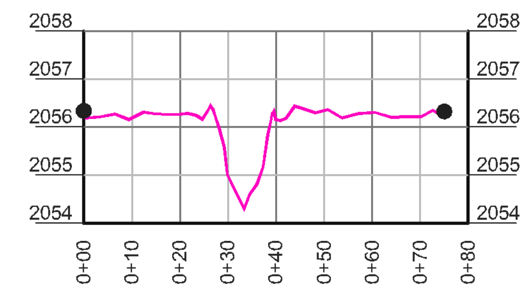


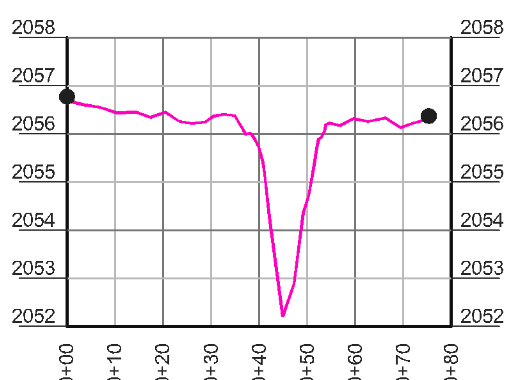
CROSS-SECTION #15 -UT2
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



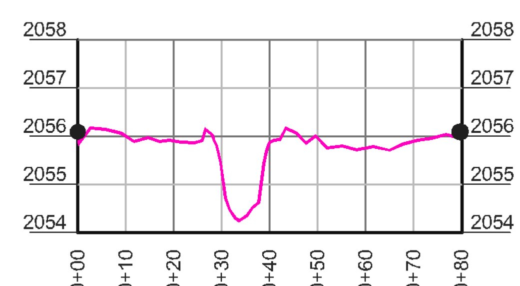
CROSS-SECTION #16 -UT2
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



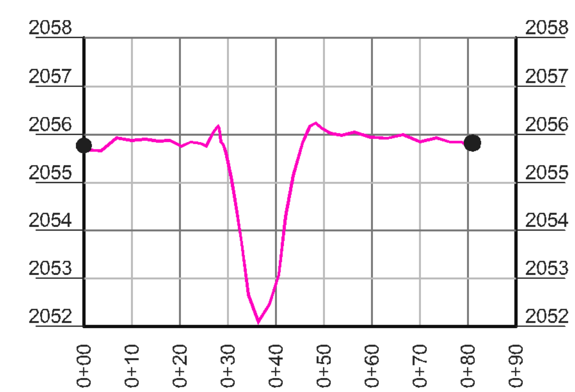
CROSS-SECTION #17 -UT2
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #18 -UT2
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #19 -UT2
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE



CROSS-SECTION #20 -UT2
HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

● CROSS–SECTION REBAR

SEAL:
NORTH CAROLINA PROFESSIONAL LAND SURVEYOR
SEAL L-4647
PHILLIP B. KEE
DocuSigned by:
D965096A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

CROSS-SECTIONS # 15-20

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:
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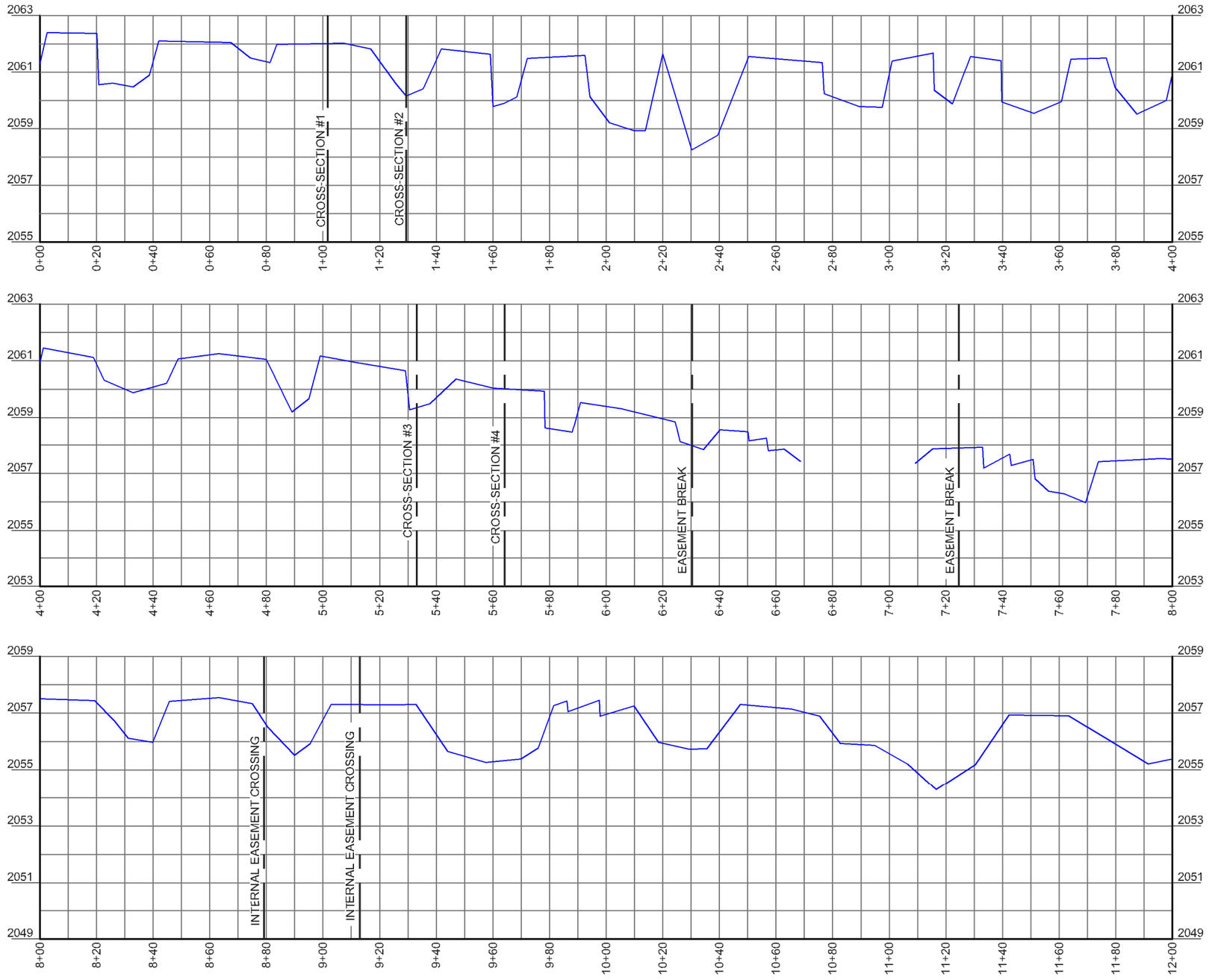

LONGITUDINAL PROFILE- BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:
D9B3004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:
WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:
BANNER FARMS MITIGATION SITE

SHEET TITLE:
LONGITUDINAL PROFILE: BANNER CREEK
STA: 0+00-12+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:
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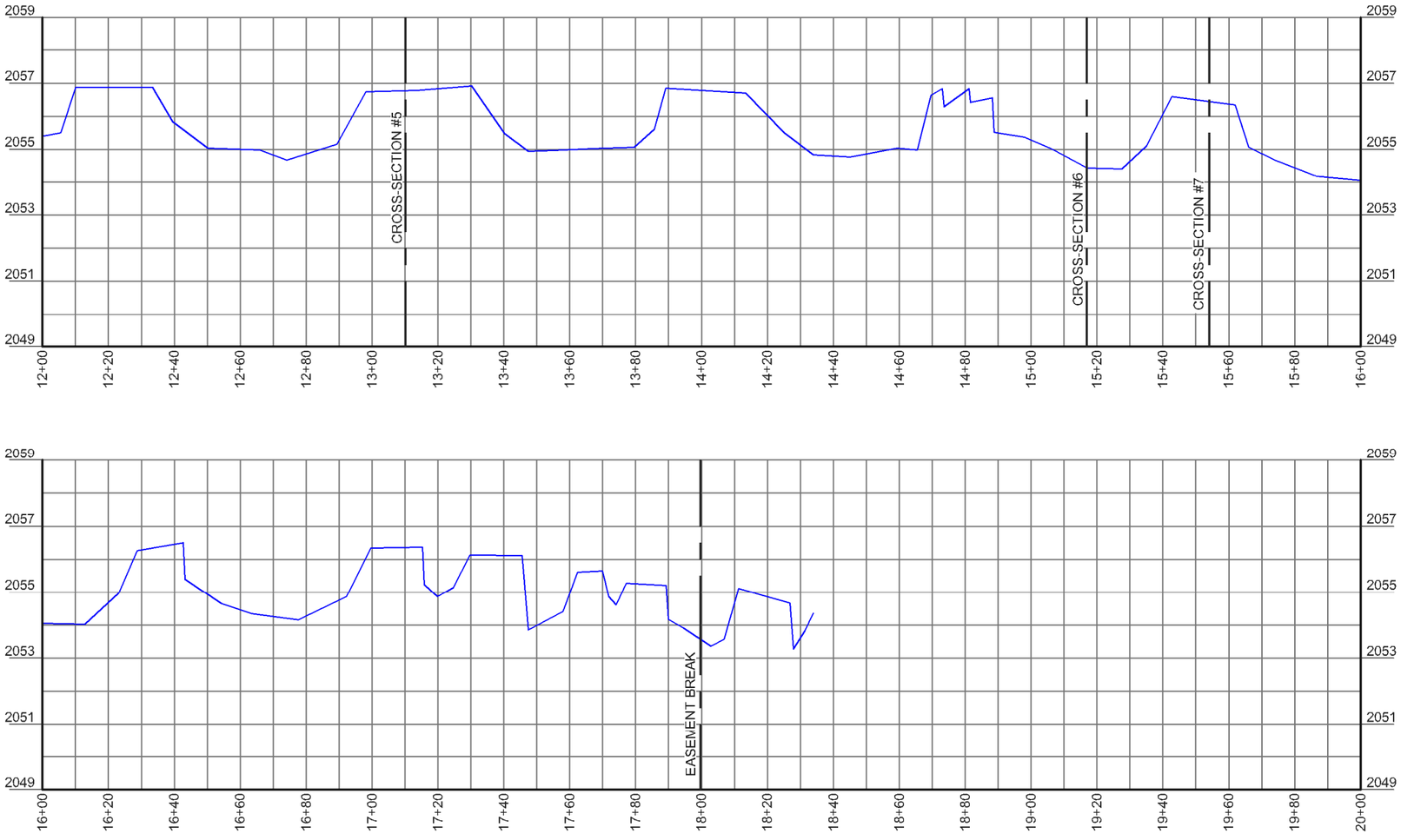

LONGITUDINAL PROFILE- BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE

VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4047 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D9650094A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88

CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: BANNER CREEK STA: 12+00-20+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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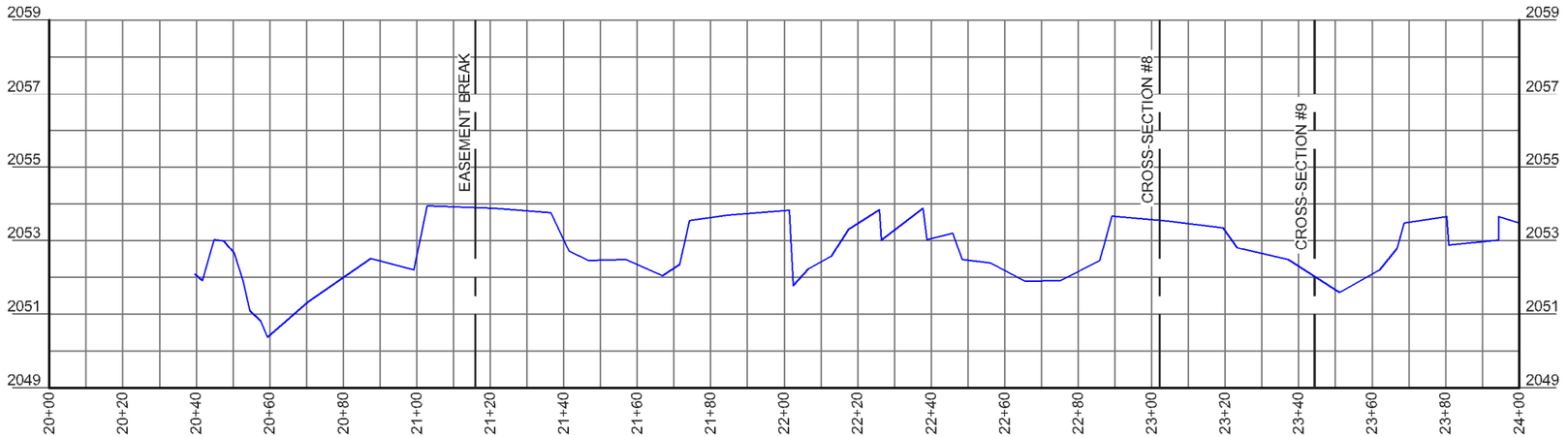

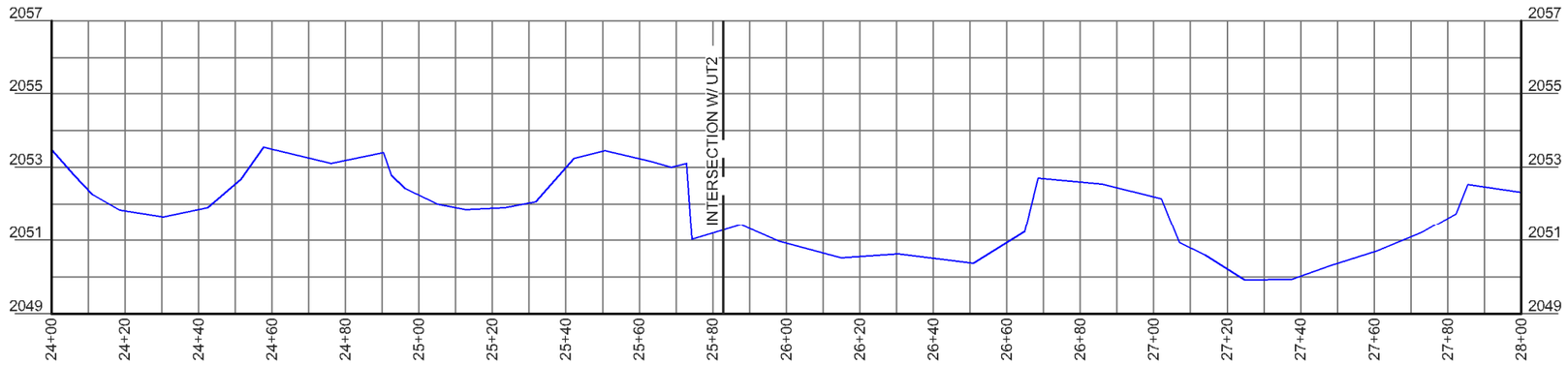

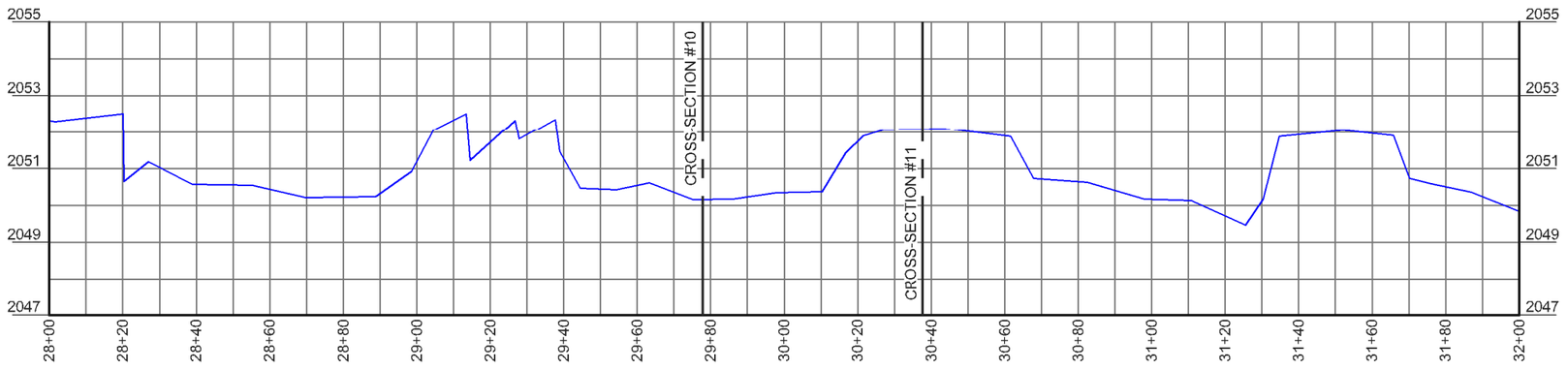

LONGITUDINAL PROFILE- BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4587 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D966004A7682407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: BANNER CREEK STA: 20+00-32+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

27 OF 32

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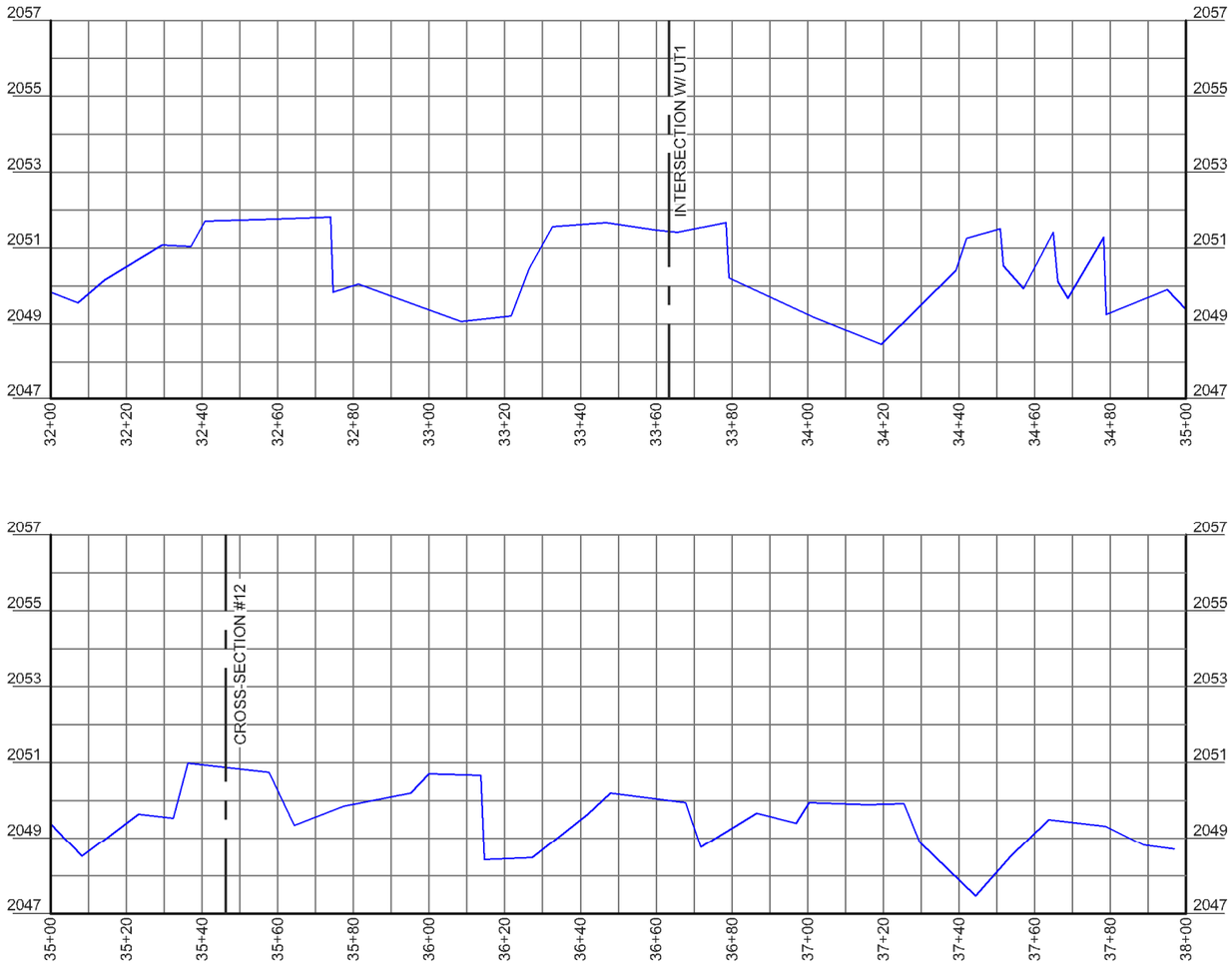

LONGITUDINAL PROFILE- BANNER CREEK

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE

VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D9650041...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88

CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: BANNER CREEK STA: 32+00-38+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

28 OF 32

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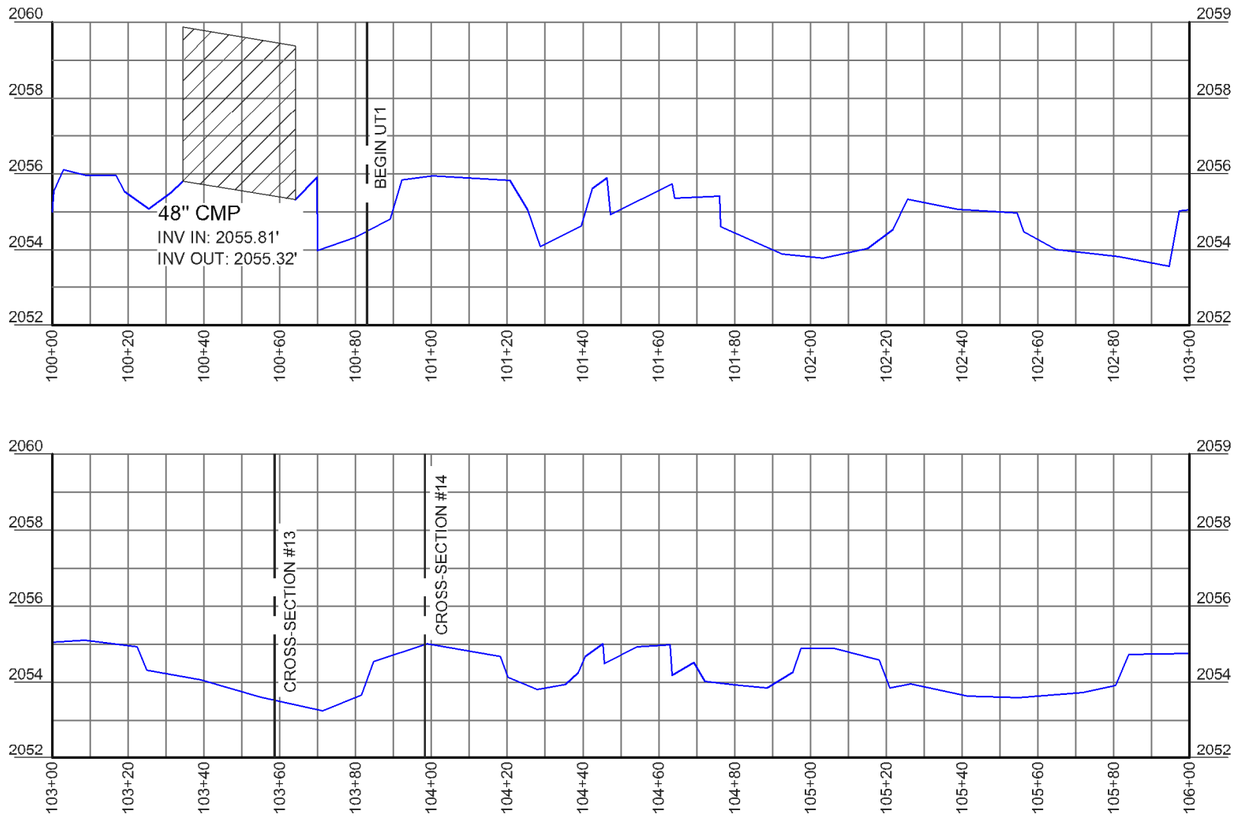

LONGITUDINAL PROFILE- UT1

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4945 LAND SURVEYOR PHILLIP B. KEE
DocuSigned by: D965004A7662407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: UT1
STA: 100+00-106+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET: 29 OF 32

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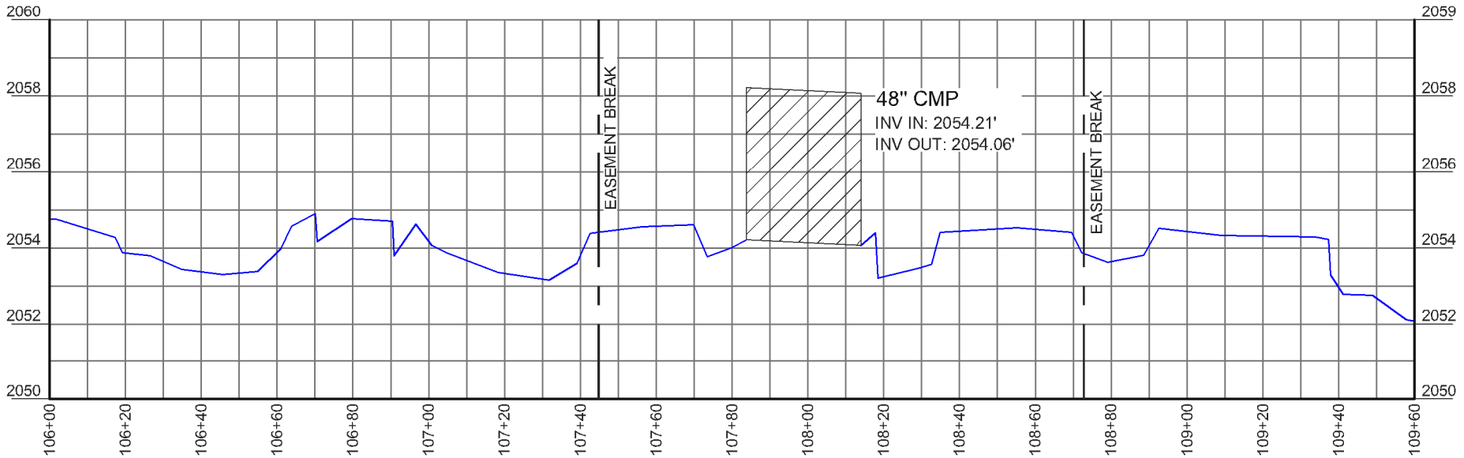

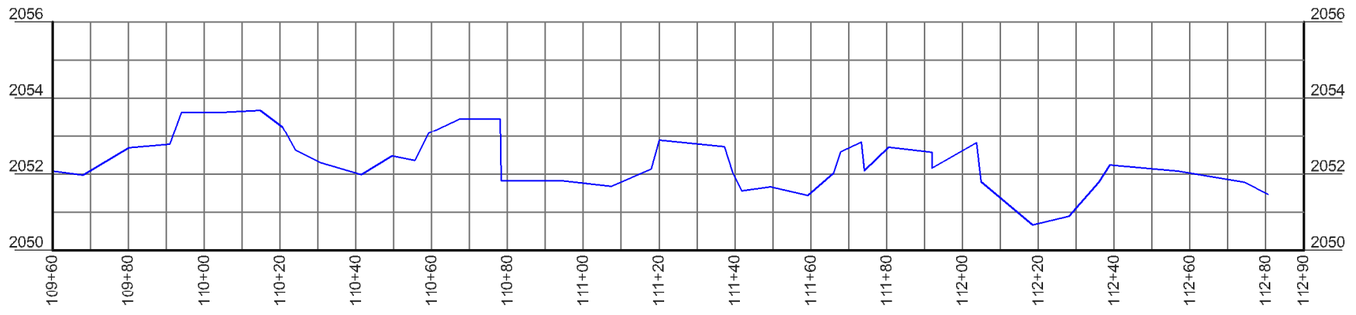

LONGITUDINAL PROFILE- UT1

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE
DocuSigned by:
D9E5004A7692407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: UT1
STA: 106+00-112+90

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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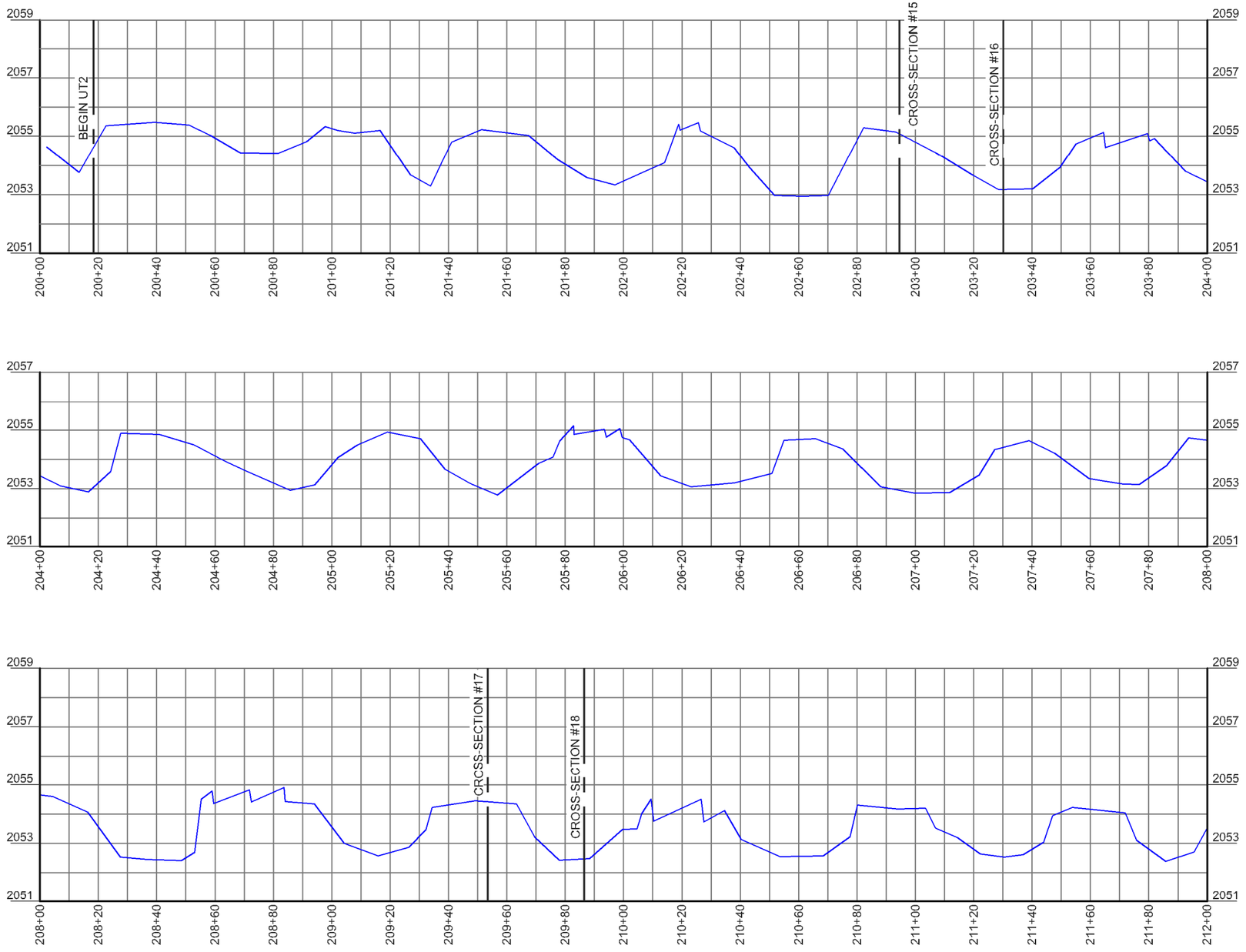

LONGITUDINAL PROFILE- UT2

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE
VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4544 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by: D965004A7892407...

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88
CONTOUR INTERVAL: 1 FOOT

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AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: UT2
STA: 200+00-212+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

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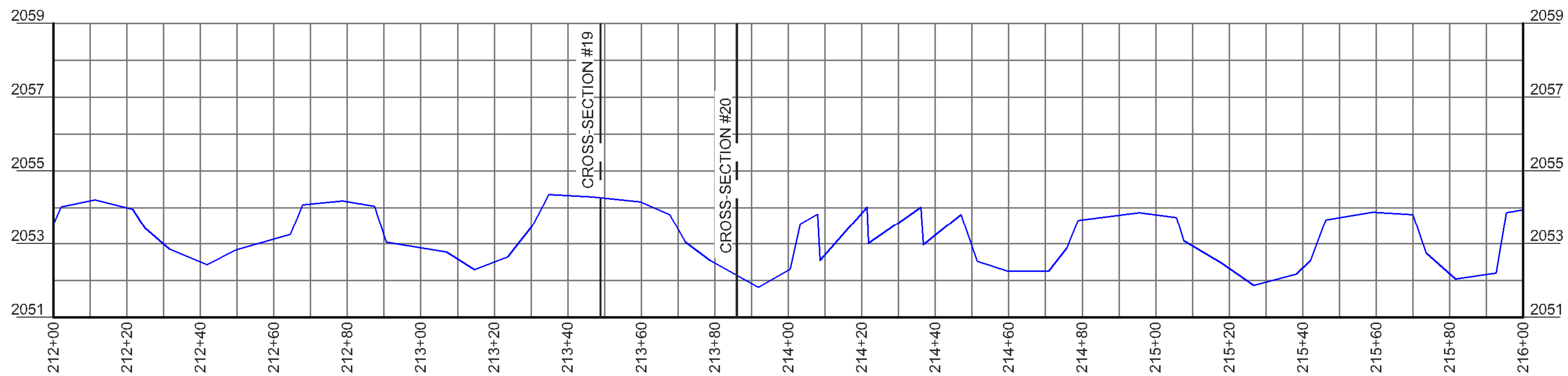
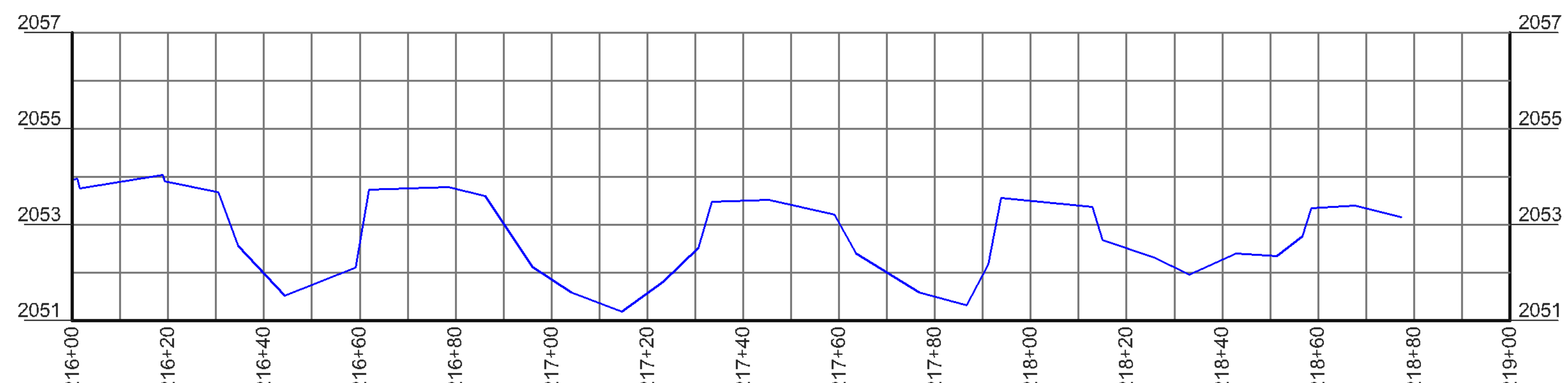
License # C-3039





LONGITUDINAL PROFILE- UT2

HORIZONTAL SCALE: 1" = 20' FULL SIZE, 1" = 40' HALF SIZE

VERTICAL SCALE: 1" = 2' FULL SIZE, 1" = 4' HALF SIZE

LEGEND

THALWEG

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL L-4647 LAND SURVEYOR PHILLIP B. KEE

DocuSigned by:

D6B5001A7692407

NOTE: SEE SHEET 1 FOR SURVEYOR'S NOTES, LEGEND & STATEMENT OF CERTIFICATION

ELEVATION DATUM: NAVD 88

CONTOUR INTERVAL: 1 FOOT

THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.

AN AS-BUILT SURVEY FOR:

WILDLANDS ENGINEERING, INC

SPO FILE NOS. 45-DN, 45-DO, 45-DP, 45-DQ

DMS SITE ID NO. 100062

PROJECT:

BANNER FARMS MITIGATION SITE

SHEET TITLE:

LONGITUDINAL PROFILE: UT2

STA: 212+00-219+00

TOWNSHIP: MILLS RIVER	COUNTY: HENDERSON	STATE: NORTH CAROLINA
DRAWN BY: NH	CHECKED BY: PBK	SURVEY BY: JB, PD, HW, ZC, KP, AC
SCALE: AS SHOWN	SURVEY DATE: 03/31/22	
JOB: #2110100-AB	SHEET SIZE: 11" X 17" (HALF SIZE)	

#	DATE	REVISIONS

SHEET:

32 OF 32

Kee MAPPING & SURVEYING

P.O. Box 2566
Asheville, NC 28802
(828) 575-9021
www.keemap.com
License # C-3039

APPENDIX F. Other Data

MONITORING GAUGE INSTALLATION DATA SHEET

12/2/2021

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

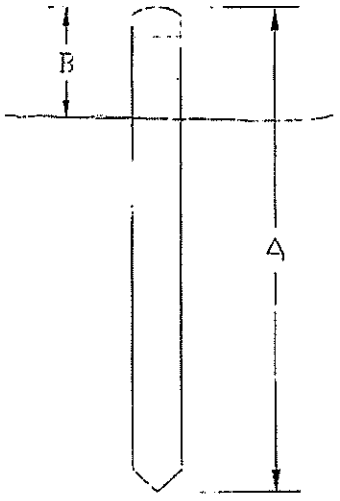
Gauge ID:	GWG 2
Serial Number:	1n500965
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.83
Distance From Eye Bolt To Probe Sensor	6.30
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.354374, -82.553519

Ground Elevation = 2059.0015

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0 - 13	10YR 4/2	2.5YR 4/8 3%	clay	
0 - 50	10YR 5/1	10YR 6/8, 30%	Clay	
50 - 60	10YR 4/1	10YR 5/8, 10%	silty clay	



12/2/2021

MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farms
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

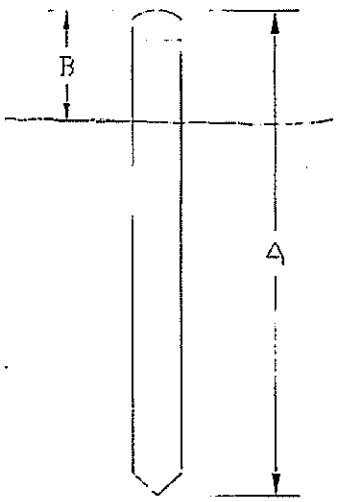
Gauge ID:	GW/G-2
Serial Number:	611012
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	2.12
Distance From Eye Bolt To Probe Sensor	5.74
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.353831, -87.552493

Ground elevation (ft): 2056.169

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-30	10YR 3/1	10YR 6/8, 2%	SiCl/Clay loam	
30-38	10YR 3/1	10YR 5/8, 15%	SiCl/Clay loam	
38-60	10YR 3/1	10YR 6/8, 60%	SiCl/Clay loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

12/2/2021

Gauge Description:

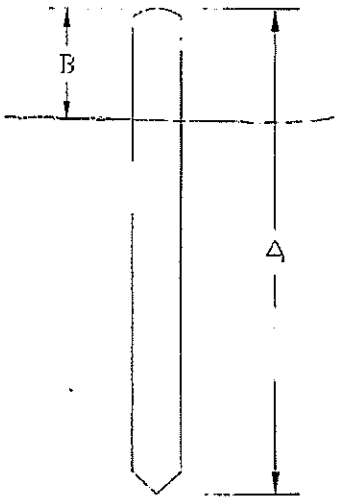
Gauge ID:	GWG 3
Serial Number:	611013
Total Well Casing Length (A):	—
Well Casing Height Above Ground (B):	2.11
Distance From Eye Bolt To Probe Sensor	6.18
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.352455, -82.554348

Ground Elevation (ft): 2056.279

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-34	10YR 3/2		clay	
34-38	10YR 4/2		silty clay	
38-52	10YR 4/1	10YR 6/8, 5%	mfg clay	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner farms
Project Location:	Henderson county
Purpose of Gauge:	Water Table Monitoring

12/2/2021

Gauge Description:

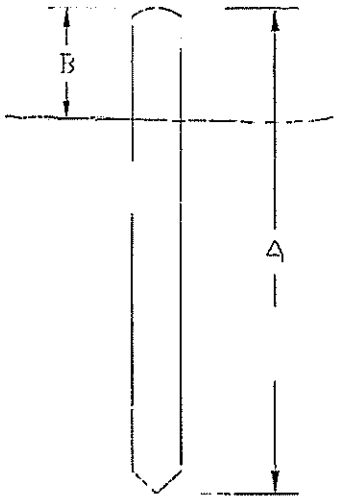
Gauge ID:	GWG 4
Serial Number:	61332.3
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.75
Distance From Eye Bolt To Probe Sensor	16.10
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.354126, -82.550847

Grand Elevation (ft): 2056.456

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-25	10YR 3/2		clay	
25-38	10YR 4/2		silty clay	
38-45	10YR 5/2	10YR 5/8 10%	silty clay	
45-50	10YR 5/2	10YR 4/8, 50%	silty clay	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

12/2/2021

Gauge Description:

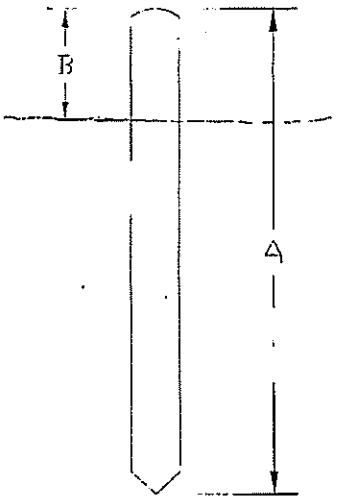
Gauge ID:	GWG 5
Serial Number:	610995
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.78
Distance From Eye Bolt To Probe Sensor	6.50
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.351670, -82.553925

Ground Elevation(ft): 2056.853

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-15	10YR 3/2		silty clay loam	
15-33	10YR 8/1		silty clay loam	
33-44	10YR 3/2		silty clay loam	
44-60	10YR 4/3		silty clay loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

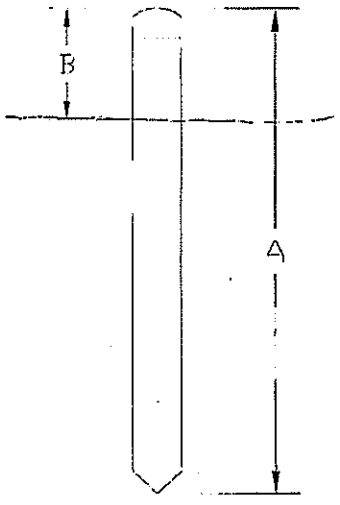
12/2/2021

Gauge ID:	GWG 6
Serial Number:	650686
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.98
Distance From Eye Bolt To Probe Sensor	5.99
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.351100, -82.553962
GroundElevation(ft):	2054.827

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-25	7.5YR 4/6	—	Clay Loam	
25-48	10YR 4/4	—	Sandy loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

Gauge ID:	GWG-7
Serial Number:	650040
Total Well Casing Length (A):	5.26
Well Casing Height Above Ground (B):	1.26
Distance From Eye Bolt To Probe Sensor	5.26
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.350304 / -82.554718 / -82.554718

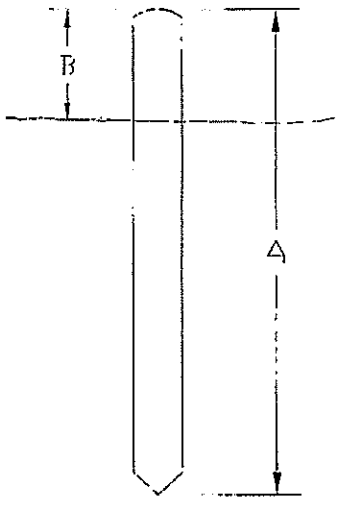
12/3/2021

Grand elevation (ft): 2057.227

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-20	10YR 3/2		S:1 f	
21-42	10YR 4/4		S:1 f clay	
43-60	10YR 5/6		S:1 f clay	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

Gauge ID:	GWG8
Serial Number:	650099
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	2.08
Distance From Eye Bolt To Probe Sensor	6.28
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.351207, -82.556364

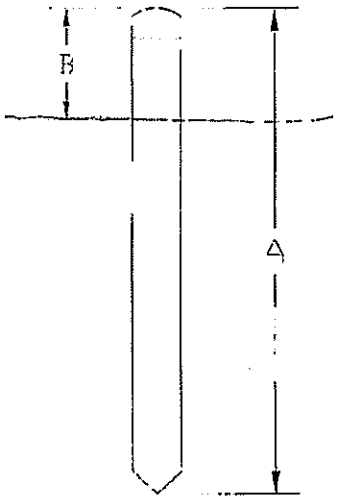
12/03/2021

Ground elevation (ft): 2055.74

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0 - 8	10YR 4/1 40%	7.5Y 4/6 1%	Silt loam	
8-18	10YR 2/1		loam	
18-50	10YR 5/1 70%	7.5Y 5/8 2%	Clay loam	
51 - 60	2.5Y 6/1 30%	7.5Y 5/8 2%	Silt	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Bonner Farm
Project Location:	Hendersonville County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

Gauge ID:	GWG-9
Serial Number:	867909
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.48
Distance From Eye Bolt To Probe Sensor	6.31
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.350558, -82.556243

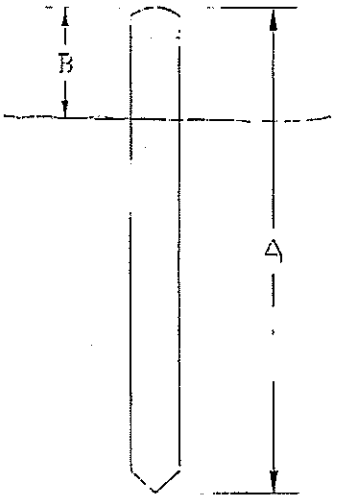
Ground elevation (ft): 2055.854

12/3/2021

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-4	7.5YR 3/2		loam	
5-12	10YR 3/1 95%	7.5YR 5/4 5%	5.1+ loam	
13-29	10YR 2/1		5.1+ loam	
30-45	10YR 4/1 ~ 5%	7.5YR 4/6 <5%	clay loam	
46-60	10YR 2/1		clay loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

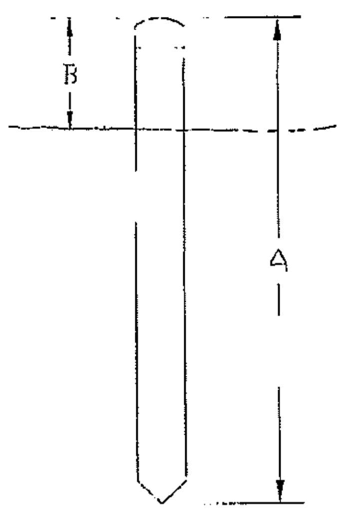
12/3/2021

Gauge ID:	GWG 10
Serial Number:	869193
Total Well Casing Length (A):	—
Well Casing Height Above Ground (B):	1.90
Distance From Eye Bolt To Probe Sensor	6.50
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.349525, -82.556553
Grand Elevation (ft): 2056.58	

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0 - 12	10YR 3/2		loam	
13 - 20	10YR 3/3		loam	
21 - 42	10YR 3/3 95%	7.5YR 5/6 5%	loam	
43 - 60	10YR 5/2 70%	7.5YR 5/8 30%	clay loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Bunner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

Gauge ID:	EWC-11
Serial Number:	650677
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.83
Distance From Eye Bolt To Probe Sensor	5.46
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.749682, -82.554981

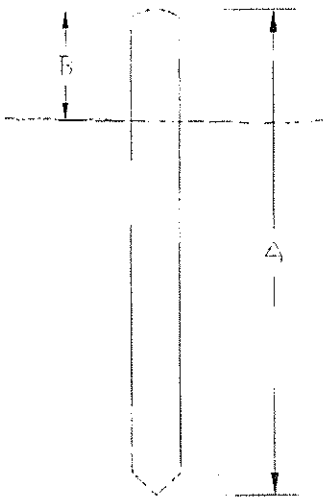
Ground elevation (ft): 2057.63

12/3/2021

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox 5%	Texture	Notes
0-13	10YR 4/1 95%	7.5YR 4/6 5%	loam	
14-21	10YR 4/1 85%	7.5YR 4/6 15%	loam	
22-60	10YR 3/1 75%	7.5YR 4/6 25%	silt loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

12/06/2021

Gauge Description:

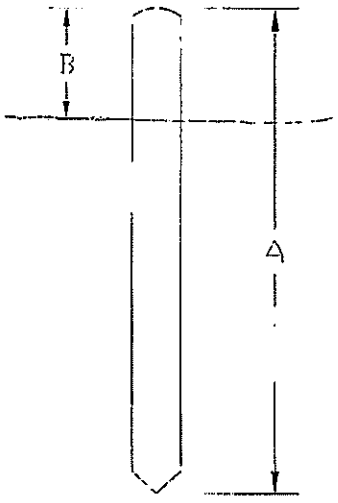
Gauge ID:	GWG12
Serial Number:	6500606
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.97
Distance From Eye Bolt To Probe Sensor	0.00
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.348438, -82.558076

Ground Elevation(A): 2097.603

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-25	10YR 2/2		silt loam	
25-60	10YR 5/2	10YR 5/8, 10%	clay loam	



MONITORING GAUGE INSTALLATION DATA SHEET

12/06/2021

Project Name:	Rainer Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

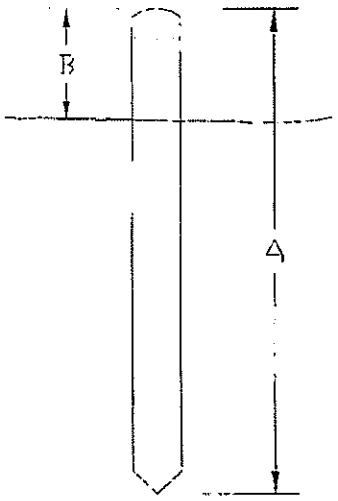
Gauge ID:	GWPT 13
Serial Number:	1450668
Total Well Casing Length (A):	7.80
Well Casing Height Above Ground (B):	5.95
Distance From Eye Bolt To Probe Sensor	
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.347331, -82.355856

Ground elevation (ft): 2057.276

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-10	10YR 4/2		SiL	
10-24	10YR 4/1	10YR 5/8 5%	Clay loam	
24-39	10YR 5/2	10YR 5/8 10%	Clay loam	
39-60	10YR 5/2	10YR 4/6 20%	Clay Loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Kanner Farms
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

12/6/2021

Gauge Description:

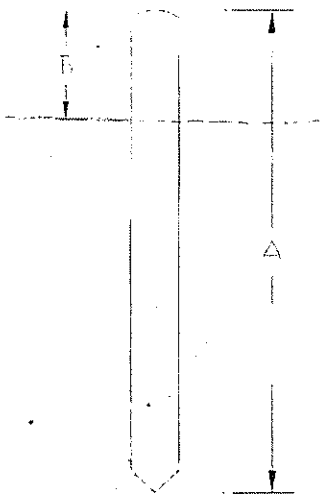
Gauge ID:	GW17-14
Serial Number:	650360
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.2'
Distance From Eye Bolt To Probe Sensor:	5.90
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.346553, -82.559953

Ground elevation (ft): 2057.595

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0 - 27	10YR 4/2	5YR 4/6 2%	clay loam	
27 - 41	10YR 5/2	10YR 5/8 30%	clay loam	
41 - 51	10YR 4/1	10YR 6/8 5%	clay loam	
51 - 60	10YR 6/1	10YR 4/6 10%	silty	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Danner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

Gauge ID:	GWW7 15
Serial Number:	613834
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.87
Distance From Eye Bolt To Probe Sensor	10.08
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.350249, -82.551099

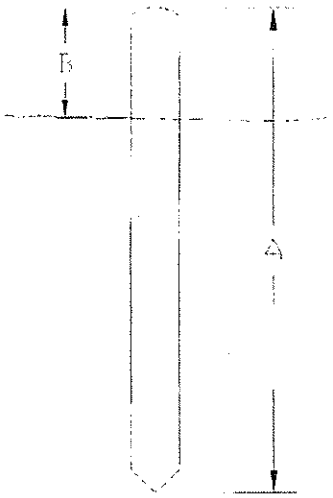
Ground elevation (ft): 2056.733

12/6/2021

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-16	10YR 2/1			
16-47	10YR 5/2	10YR 4/6, 20%		
47-120	25Y 6/3			



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

12/06/2021

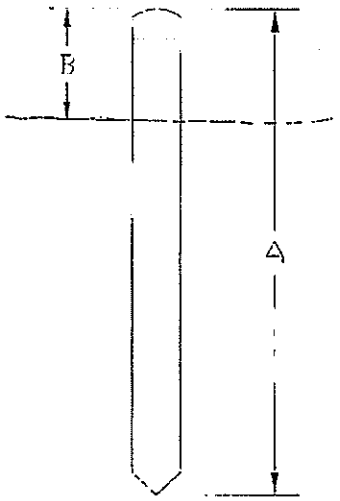
Gauge Description:

Gauge ID:	GW016
Serial Number:	613841
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	2.11
Distance From Eye Bolt To Probe Sensor	6.19
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.345592, -82.561015
Ground elevation (ft):	2059.602

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-9	10YR 3/2	5YR 6/8 2%	Clay	
9-29	10YR 6/1	10YR 6/8, 30%	Clay	
29-43	2.5Y 5/1	10YR 6/8, 15%	Silty (fine) loam	
43-60	2.5Y 5/1	10YR 6/8, 15%	Sand	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner Farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

12/06/2021

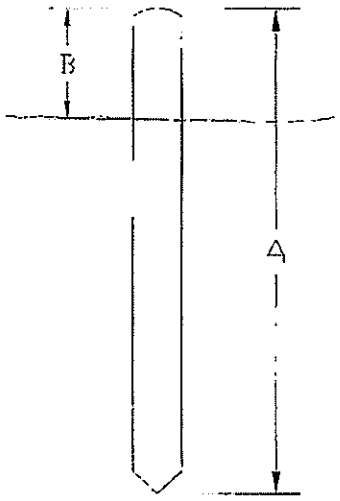
Gauge Description:

Gauge ID:	GWG 17
Serial Number:	613815
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.96
Distance From Eye Bolt To Probe Sensor	5.10
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.352265 -82.657391
Ground elevation(ft): 2058.3643	

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-15	2.5Y 6/1	10YR 6/8, 20%	clay	
15-25	2.5Y 6/2	10YR 5/6, 5%	silty clay loam	
25-40	5Y 6/1	10YR 7/8, 15%	sandy loam	



MONITORING GAUGE INSTALLATION DATA SHEET

Project Name:	Banner farm
Project Location:	Henderson County
Purpose of Gauge:	Water Table Monitoring

Gauge Description:

Gauge ID:	GWG 1X
Serial Number:	8109171
Total Well Casing Length (A):	
Well Casing Height Above Ground (B):	1.78
Distance From Eve Bolt To Probe Sensor	10.48
Material:	2" PVC Well Screen
Type of Measurement:	Pressure, Temperature, & Depth
Type of Logger:	In-Situ Level Troll 100
Gauge Location:	35.352400, -82.558554

12/6/2021

Ground Elevation (ft): 2060.27

Notes:

Soil Profile Description at Location of Well:

Depth Range (in.)	Color	Redox	Texture	Notes
0-15	2.5 4/6	10YR 5/8 10%	silty clay loam	
15-33	2.5 4/1	10YR 5/8 ; 3%	silty clay loam	
33-44	10YR 3/1		silty clay loam	
	10YR 2/2		silty clay loam	lots of organic material comprised