



# **MONITORING YEAR 0 ANNUAL REPORT FINAL - REVISED**

Original Submittal: June 2022  
Revised Submittal: April 2023

## **OAK HILL DAIRY MITIGATION SITE**

Gaston County, NC  
Catawba River basin  
HUC 03050102

DMS Project No. 100120  
DMS Contract No. 7867  
DMS RFP No. 16-007704 (Issued: September 6, 2018)  
USACE Action ID No. SAW-2019-00833  
DWR Project No. 2019-0863  
Data Collection Dates: January 2022 – February 2023

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### **PREPARED FOR:**



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



May 1, 2023

ATTN: Matthew Reid  
Project Manager  
NCDEQ – Division of Mitigation Services  
Asheville Regional Office  
2090 U.S. 70 Highway  
Swannanoa, NC 28778

RE: Oak Hill Dairy Final Revised 2023 MY0 Report Review  
Catawba River Basin – CU# 03050102 – Gaston County  
DMS Project ID No. 100120  
Contract # 7867

Dear Mr. Matthew Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed Division of Mitigation Services' (DMS) comments from the Revised Final Monitoring Year 0 (MY0) Report for the Oak Hill Dairy Mitigation Site. The report has been updated to reflect those comments. The following Wildlands responses to DMS's comments are noted below.

***DMS Comments, Matthew Reid:***

1. *Please include the WEI memo and map (attached) in Appendix F.*

**Wildlands Response:** Wetland grading memo and figure have been included in Appendix F.

2. *Section 2: Please include a statement that the IRT was notified and approved the regrading effort and reference the memo/map in the appendix. WEI also presented this information at the August 9, 2022 IRT Meeting.*

**Wildlands Response:** The statement has been added to Section 2 of the report.

3. *Section 2: Please include a statement about the replanting that occurred in the regraded areas.*

**Wildlands Response:** A statement about the replanting in the regraded areas was included in Section 2 of the report.

4. *Recommend making it clear that the asbuilt included is the updated revised asbuilt survey post regrading effort.*

**Wildlands Response:** A statement has been included to clarify that the as-built survey and record drawings are the revised, post-regraded versions.

5. 3.2 2.1.17 *Vegetation Planting Plan and List: Poned areas: Recommend adding red line update to include that the planting plan in the poned areas deviated from design. Bare roots were not installed; however, live stakes were installed.*

**Wildlands Response:** Section 2.2.17 includes text stating that the “Plantings within poned areas of the floodplain deviated from design with live stakes being installed in lieu of bare roots species.

As requested, Wildlands has included one hard copy of the revised/updated Baseline Monitoring Document and Record Drawings which includes the DMS comment letter and our response letter for both the initial submittal and the revised final submittal. A full final electronic copy of the report and support files are included as well. Please let me know if you have any questions.

Sincerely,



Kristi Suggs

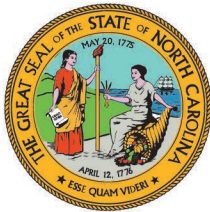
Senior Environmental Scientist

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ROY COOPER  
Governor

ELIZABETH S. BISER  
Secretary

MARC RECKTENWALD  
Director



NORTH CAROLINA  
Environmental Quality

June 9, 2022

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

Subject: Oak Hill Dairy Draft MY0 Report Review  
Catawba River Basin – CU# 03050102  
Gaston County  
DMS Project ID No. 100120  
Contract # 7867

Dear Ms. Suggs,

The Division of Mitigation Services (DMS) received the Draft Mitigation Plan for Oak Hill Dairy from Wildlands Engineering, Inc on May 23, 2022. The Project is expected to provide 4,618.933 SMUs and 7.680 WMUs. The following are the DMS review team's comments on the draft report.

- Please add "Date of Issue: September 6, 2018" following RFP number on title page.
- Table of Contents: A set of coordinates is accidentally shown under 1.3 Project Attributes. Please revise for final.
- CCPV: Recommend labeling BMP1 and BMP2.
- Photos of BMP1 and BMP2 show a considerable amount of ponded water. Does WEI expect the BMPs to hold water year-round or dry seasonally?
- 3.2 Vegetation Areas of Concern: WEI has identified and treated several of the most concerning invasive species prior to and during the construction process. Please continue aggressively treating the kudzu, knotweed, bamboo and marsh dewflower as new populations are observed on the site. Also, please note on future CCPV maps the locations of invasives and where treatment occurs.
- Several areas were not planted with bare roots due to depth of standing water. Does WEI intend to plant these areas at a later date?
- Sheet 1.14: Pools on UT2 profile are shown and noted as being filled with sediment. WEI expects the pools to adjust as vegetation becomes established. Please provide an update in MY1 regarding the UT2 stream conditions. Note that UT2 is not a credited reach.

#### Digital Deliverable Comments

- Draft digital deliverables were reviewed and complete.



North Carolina Department of Environmental Quality | Division of Mitigation Services  
217 West Jones Street | 1652 Mail Service Center | Raleigh, North Carolina 27699-1652  
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At your earliest convenience, please provide a written response letter addressing the DMS comments provided and one final hard copy of the revised/updated Baseline Monitoring Document and Record Drawings. The comment response letter should be included in the revised report after the report cover page. Please include a full final electronic copy with electronic support files on a CD or USB drive.

Sincerely,

*Matthew Reid*

Matthew Reid  
Western Project Manager  
NCDENR – Division of Mitigation Services  
5 Ravenscroft Dr., Suite 102  
Asheville, NC 28801  
828-231-7912



North Carolina Department of Environmental Quality | Division of Mitigation Services  
217 West Jones Street | 1652 Mail Service Center | Raleigh, North Carolina 27699-1652  
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June 17, 2022

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

RE: Oak Hill Dairy Draft MY0 Report Review  
Catawba River Basin – CU# 03050102 – Gaston County  
DMS Project ID No. 100120  
Contract # 7867

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed Division of Mitigation Services' (DMS) comments from the Draft Monitoring Year 0 (MY0) Report for the Oak Hill Dairy Mitigation Site. The report has been updated to reflect those comments. Wildlands responses to DMS's comments are noted below.

***DMS Comments, Matthew Reid:***

1. *Please add "Date of Issue: September 6, 2018" following RFP number on title page.*

**Wildlands Response:** Title page has been updated to include RFP date of issue.

2. *Table of Contents: A set of coordinates is accidentally shown under 1.3 Project Attributes. Please revise for final.*

**Wildlands Response:** Wildlands has removed the set of coordinates from the table of contents.

3. *CCPV: Recommend labeling BMP1 and BMP2.*

**Wildlands Response:** BMP labels are now shown on CCPV maps.

4. *Photos of BMP1 and BMP2 show a considerable amount of ponded water. Does WEI expect the BMPs to hold water year-round or dry seasonally?*

**Wildlands Response:** Wildlands expects water levels for BMP1 to drawn down when vegetation becomes established and dry-out during the drier months from late spring to early fall. BMP2 should also draw down when vegetation becomes established and during drier months; however, it will likely continue to hold a shallow pond of water especially during monitoring years or months experiencing greater than average rainfall.

Wildlands will continue to monitor, and remedial action will be initiated if it is deemed necessary.

5. *3.2 Vegetation Areas of Concern: WEI has identified and treated several of the most concerning invasive species prior to and during the construction process. Please continue aggressively treating the kudzu, knotweed, bamboo and marsh dewflower as new populations are observed on the site. Also, please note on future CCPV maps the locations of invasives and where treatment occurs.*

**Wildlands Response:** Invasive species presence will continue to be monitored, treated, and documented in future monitoring reports.

6. *Several areas were not planted with bare roots due to depth of standing water. Does WEI intend to plant these areas at a later date?*

**Wildlands Response:** Wildlands does not anticipate the installation of bare roots in these areas in the future. The areas that were not planted with bare roots due to standing water were planted with live stakes of species tolerant to inundation. Wildlands did not anticipate that these wetland areas would hold water, so these areas were not separated from the remainder of the wetland planting areas during the design phase of the project. However, after construction was complete, it was more evident that these areas may remain inundated or be inundated for long periods of time. Therefore, to increase survival and establishment of woody vegetation in these areas, Wildlands decided to use live stakes rather than bare roots in the inundated areas and based this judgement on past project experience on sites with similar site conditions and professional experience.

7. *Sheet 1.14: Pools on UT2 profile are shown and noted as being filled with sediment. WEI expects the pools to adjust as vegetation becomes established. Please provide an update in MY1 regarding the UT2 stream conditions. Note that UT2 is not a credited reach.*

**Wildlands Response:** A brief summation of UT2 stream conditions will be included in MY1.

As requested, Wildlands has included one hard copy of the revised/updated Baseline Monitoring Document and Record Drawings and has placed the DMS comment letter and our response letter after the report's cover page. A full final electronic copy of the report and support files are included on a USB drive. Please let me know if you have any questions.

Sincerely,



Kristi Suggs

Senior Environmental Scientist

[ksuggs@wildlandseng.com](mailto:ksuggs@wildlandseng.com)

**PREPARED BY:**

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**Wildlands Engineering, Inc.**  
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Phone: 704.332.7754  
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**OAK HILL DAIRY MITIGATION SITE**  
Monitoring Year 0 Annual Report

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**Correspondence**  
DMS Technical Workgroup Memo (10/19/2021)  
Pebble Count Data Requirements – M. Reid (10/27/2021 email)  
Wetland Grading Memo to IRT (8/8/2022)  
Proposed Wetland Re-grading Figure (8/8/2022)



## Section 1: PROJECT OVERVIEW

The Oak Hill Dairy Mitigation Site (Site) is in Gaston County, approximately 2 miles northeast of Cherryville and 7 miles southwest of Lincolnton. Watersheds UT1, UT1A, UT1B, and Oak Hill Creek drain into Indian Creek, which drains to the Catawba River. Both Indian Creek and Catawba River are listed as high restoration priorities in the 2013 Catawba River Basin Restoration Priorities (RBRP) and the 2008-2010 Indian Creek and Howards Creek Local Watershed Plan (LWP). Table 3 presents information related to the project attributes.

### 1.1 Project Quantities and Credits

Mitigation work within the Site included restoration, enhancement I, and enhancement II of perennial and intermittent stream channels, and the creation, re-establishment, and rehabilitation of wetland areas. Table 1 below shows stream credits by reach and the total amount of stream credits expected at closeout.

**Table 1: Project Quantities and Credits**

PROJECT MITIGATION QUANTITIES							
Project Segment	Mitigation Plan Footage Acreage <sup>1,2</sup>	As-Built Footage /Acreage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits	Comments
<b>Stream</b>							
Oak Hill Creek R1	488.527	489.000	Warm	EI	1.5	325.685	Restored dimension and profile, created a floodplain bench, planted buffers, treated invasive species, fenced out livestock, and protected with a conservation easement.
Oak Hill Creek R2	470.085	470.000	Warm	R	1.0	470.085	Restored dimension, profile pattern, and floodplain access, planted buffers, treated invasive species, fenced out livestock, and protected with a conservation easement.
Oak Hill Creek R3	877.051	877.000	Warm	R	1.0	877.051	Restored dimension, profile pattern, and floodplain access, planted buffers, treated invasive species, fenced out livestock, provided stormwater treatment, and protected with a conservation easement.
Oak Hill Creek R4	388.273	388.900	Warm	R	1.0	388.273	Restored dimension, profile pattern, and floodplain access, planted buffers, treated invasive species, fenced out livestock, and protected with a conservation easement.



**Table 1: Project Quantities and Credits**

PROJECT MITIGATION QUANTITIES							
Project Segment	Mitigation Plan Footage / Acreage <sup>1,2</sup>	As-Built Footage / Acreage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits	Comments
UT1 R1	217.749	218.000	Warm	R	1.0	217.749	Restored dimension, profile pattern, and floodplain access, planted buffers, fenced out livestock, and protected with a conservation easement.
UT1 R2	1,834.520	1,834.100	Warm	R	1.0	1,834.520	Restored dimension, profile pattern, and floodplain access, planted buffers, fenced out livestock, provided stormwater treatment, and protected with a conservation easement.
UT1A	469.110	469.600	Warm	R	1.0	469.110	Restored dimension, profile, and pattern, planted buffers, fenced out livestock, and protected with a conservation easement.
UT1B	291.680	292.100	Warm	EII	8.0	36.460	Planted buffers, treated invasive species, fenced out livestock, and protected with a conservation easement.
Wetland							
Project Segment	Mitigation Plan Footage / Acreage	As-Built Footage / Acreage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits	Comments
Wetland Re-establishment	4.859	4.863	RR	RE	1.0	4.859	Raised stream bed elevation, plugged / filled drainage features, removed berm material, planted native wetland vegetation community, treated invasive species, fenced out livestock and protected with a conservation easement.



**Table 1: Project Quantities and Credits**

PROJECT MITIGATION QUANTITIES							
Project Segment	Mitigation Plan Footage Acreage <sup>1,2</sup>	As-Built Footage /Acreage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits	Comments
Wetland Rehabilitation	1.805	1.805	RR	RH	1.0	1.805	Raised stream bed elevation, plugged/filled drainage features, removed cultivation and vegetation management impacts, removed berm material, planted native wetland vegetation community, treated invasive species, fenced out livestock, provided stormwater treatment, and protected with a conservation easement.
Wetland Rehabilitation	0.284	0.285	RR	RH	1.5	0.189	Raised stream bed elevation, plugged/filled drainage features, removed berm material, planted and supplementally planted native wetland vegetation community, treated invasive species, fenced out livestock and protected with a conservation easement.
Wetland Creation	2.481	2.480	RR	C	3.0	0.827	Raised stream bed elevation, plugged/filled drainage features, removed berm material, planted native wetland vegetation community, treated invasive species, fenced out livestock and protected with a conservation easement.
<b>Total Stream Credits:</b>						<b>4,618.933</b>	
<b>Total Wetland Credits:</b>						<b>7.680</b>	

1. Crossing lengths have been removed from restoration footage.
2. No direct credit for BMPs on site.

Restoration Level	Stream			Riparian Wetland		Non-Rip
	Warm	Cool	Cold	Riverine	Non-Riverine	Wetland
Restoration	4,256.788					
Re-establishment				4.859		
Rehabilitation (1:1 & 1.5:1)				1.994		
Enhancement						

Restoration Level	Stream			Riparian Wetland		Non-Rip
	Warm	Cool	Cold	Riverine	Non-Riverine	Wetland
Enhancement I	325.685					
Enhancement II	36.460					
Creation				0.827		
Preservation						
<b>Totals</b>	<b>4,618.933</b>			<b>7.680</b>		

## 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
Treat concentrated agricultural runoff.	Install stormwater BMPs to treat runoff areas of concentrated agricultural runoff before it enters the stream channel.	Reduce agricultural and sediment inputs to the project, which will reduce likelihood of accumulated fines and excessive algal blooms from nutrients.	There is no required performance standard for this metric.	Visually inspect BMPs and document with photos.	N/A
Exclude livestock from stream channels and riparian wetlands.	Install livestock fencing as needed to exclude livestock from stream channels, wetlands, and riparian areas, or remove livestock from adjacent fields.	Reduce agricultural and sediment inputs to the project. Reduce sediment inputs from bank erosion and degradation. Provide riparian and wetland habitat. Support all stream and wetland functions.	Prevent easement encroachments.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	No easement encroachments.
Improve the stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time. Add bank revetments and instream structures to protect restored/enhanced streams.	Reduce sediment inputs from bank erosion. Reduce shear stress on channel boundary.	ER $\geq$ 2.2 and BHR $\leq$ 1.2 with visual assessments showing progression towards stability.	14 Cross-sections will be assessed during MY1, MY2, MY3, MY5, and MY7 and visual inspections will be conducted annually.	Cross-sections show streams are stable and functioning as designed. ERs are over 2.2 and BHRs are below 1.2.

**Table 2: Goals, Performance Criteria, and Functional Improvements**

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve instream habitat.	Install habitat features such as constructed steps, cover logs, and brush toes on restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.	Increase and diversify available habitats for macroinvertebrates, fish, and amphibians leading to colonization and increase in biodiversity over time.	There is no required performance standard for this metric.	N/A	N/A
Reconnect channels with floodplains and riparian wetlands.	Reconstruct stream channels with designed bankfull dimensions and depth based on reference reach data.	Reduce shear stress on channel; Hydrate adjacent wetland areas; Filter pollutants out of overbank flows.	Four bankfull events in separate years within the 7-year monitoring period.	Three automated pressure transducers were installed on restoration reaches and will record flow elevations and durations.	Reported in MY1.
Restore wetland hydrology, soils, and plant communities.	Restore and enhance riparian wetlands by raising stream bends, filling existing ditch network, 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 within 12 inches of soil surface for a minimum of 12% (28 consecutive days) of the growing season.	Eleven (11) groundwater gages were installed in wetland re-establishment, rehabilitation, and creation areas and monitored annually.	Reported in MY1.
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant native shrub and herbaceous species on streambanks.	Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian habitat. Add a source of large woody debris (LWD) and organic material to stream.	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5 and a height of 8 ft., and 210 stems per acre at MY7 with a height of 10 ft.	Thirteen (13) permanent and 6 mobile one hundred square meter vegetation plots are placed on 2% of the planted area of the Site and monitored during MY1, MY2, MY3, MY5, and MY7.	All 19 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. Crop field removal and exclusion of livestock.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	No easement encroachments.

### 1.3 Project Attributes

The project is bordered by residential properties and an active dairy farm comprised of cattle pastures, an outdoor feeding area, and row crops. Based on historic aerials from 1950 to 2016, the streams existed in their same location for over 60 years. Agricultural use of the land was consistent during this period as well. Several alterations to the Site visible from historical aerial photography were the addition of the large pond in northeast corner of the Site between 1964 and 1973, and the addition of the no-discharge waste lagoon south of the large pond between 2006 and 2009. Additionally, most structures were built between 1964 and 1976 with the two large feed barns being built within the last 15 years. The Site, based on aerial photography, has a history of ditching, field grading, and stream channelization which increased drainage effects and impaired wetland hydrology. Table 3 below and Tables 8a – 8d in Appendix C present additional information on pre-restoration conditions.

**Table 3: Project Attributes**

PROJECT WATERSHED SUMMARY INFORMATION				
Project Name	Oak Hill Dairy Mitigation Site	County	Gaston County	
Project Area (acres)	20.4	Project Coordinates	35.403339, -81.351724	
PROJECT WATERSHED SUMMARY INFORMATION				
Physiographic Province	Piedmont	River Basin	Catawba River	
USGS HUC 8-digit	03050102	USGS HUC 14-digit	03050102050010	
DWR Sub-basin	03-08-35	Land Use Classification	24% agriculture, 40% forested, 36% developed	
Project Drainage Area (acres)	1,070 (Oak Hill Creek)	Percentage of Impervious Area	11.6%	
RESTORATION TRIBUTARY SUMMARY INFORMATION				
Parameters	Oak Hill Creek	UT1	UT1A	UT1B
Pre-project length (feet)	2,417	1,958	482	292
Post-project (feet)	2,225	2,052	470	292
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined to Unconfined	Unconfined	Confined	Moderately Confined
Drainage area (acres)	1070	333	12	4
Perennial, Intermittent, Ephemeral	Perennial			Intermittent/Perennial
DWR Water Quality Classification	C			
Dominant Stream Classification (existing)	B4c/G4c/C4/E5	F4/G4	F6b	Cb
Dominant Stream Classification (proposed)	C4	C4	E4b	Cb
Dominant Evolutionary class (Simon) if applicable	Stage IV/V	Stage IV/V	Stage IV	Stage I
REGULATORY CONSIDERATIONS				
Parameters	Applicable?	Resolved?	Supporting Documentation	
Water of the United States - Section 404	Yes	Yes	SAW-2019-00833	
Water of the United States - Section 401	Yes	Yes	DWR# 2019-0863	
Endangered Species Act	Yes	Yes	Categorical Exclusion in Mitigation Plan (Wildlands, 2021)	
Historic Preservation Act	Yes	Yes		
FEMA Floodplain Compliance	Yes	Yes	Conditional Letter of Map Revision (CLOMR)	
Essential Fisheries Habitat	No	N/A	N/A	
Coastal Zone Management Act	No	N/A	N/A	



**Table 3: Project Attributes**

Wetland Summary Information				
Parameters	Wetland A	Wetland B	Wetland C	Wetland D
Pre-project area (acres)	2.203	0.138	0.021	0.028
Wetland Type	Bottom Hardwood Forest	Headwater Forest	Headwater Forest	Headwater Forest
Mapped Soil Series	Chewacla loam, Wedowee sandy loam, Worsham loam	Chewacla loam, Pacolet sandy clay loam, Pacolet sandy loam	Chewacla loam, Pacolet sandy loam	Pacolet sandy loam
Drainage Class	Somewhat poorly drained, Well-drained, Poorly drained	Somewhat poorly drained, Well-drained, Well-drained	Somewhat poorly drained, Well-drained	Well drained
Soil Hydric Status	No, No, Yes	No, No, No	No, No	No
Source of Hydrology	Groundwater/Overbank	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method	Enhancement	Enhancement	Enhancement	Enhancement
Wetland Summary Information				
Parameters	Wetland F	Wetland J	Wetland K <sup>1</sup>	
Pre-project area (acres)	0.131	0.047	<0.000	
Wetland Type (non-riparian, riparian)	Headwater Forest	Headwater Forest	Bottomland Hardwood Forest	
Mapped Soil Series	Chewacla loam	Helena sandy loam	Chewacala loam	
Drainage Class	Somewhat poorly drained	Moderately well drained	Somewhat poorly drained	
Soil Hydric Status	No	No	No	
Source of Hydrology	Groundwater	Groundwater/Overbank	Groundwater	
Restoration or Enhancement Method	Enhancement	Enhancement	None	

<sup>1</sup>No wetland credit is being sought for Wetland K.



## Section 2: As-Built Condition (Baseline)

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Initially the Site's construction was completed in January 2022, and as-built surveys were completed in March 2022. The survey included developing an as-built topographic surface, as well as surveying the as-built channel centerlines, top of banks, structures, and monitoring components. Planting was completed in February 2022, as well as vegetative and substrate data collection.

As-built surveys revealed that portions of wetland areas in the left and right floodplain of Oak Hill Creek Reach 3, Reach 4, and UT1 Reach 2 were built at elevations higher than designed. The Interagency Review Team (IRT) was notified of the regrading effort in a memo dated August 8, 2022. The effort was approved by the IRT and subsequently presented during the IRT Meeting on August 9, 2022. See Appendix F for a copy of the memo and the regrading area map.

To correct the grading errors, these areas were regraded in October 2022, and an additional as-built topographic survey was completed in these areas in November 2022. The Site was reassessed in late November 2022 and early February 2023. It was determined that the grading activities were isolated within the areas of intent and that any disturbance to the previously installed monitoring devices was minimal. These are discussed in Section 2.1.19. Regraded areas were replanted in February 2023 using the same approved species and densities as the original planting.

### 2.1 As-Built/Record Drawings

A sealed half-size set of the record drawing and as-built survey are in Appendix E which includes the post-construction survey, alignments, structures, and monitoring features. The baseline monitoring (MY0) report, the record drawings, and the as-built survey included in this submittal have been revised to show the re-grading efforts discussed above. Field adjustments made during construction that differ from the design plans are shown as red lines on the record drawing. These adjustments were made during construction, where needed, based on field evaluations and are listed below.

#### 2.1.1 Oak Hill Creek Reach 1

- STA: 100+31 – Increased bank grading to stabilize beginning of stream enhancement.
- STA: 102+17 – Bank roughening added to increase floodplain stability.
- STA: 102+21 – Log sill added in place of rock sill due to excess logs.
- STA: 102+98 – Log sill added for extra grade control.
- STA: 104+58 – Log vane replaced by log j-hook for additional grade control.
- STA: 104+91 – Log vane not built to avoid disturbance to stable bank and toe.

#### 2.1.2 Oak Hill Creek Reach 2

- STA: 107+30 – Log sill not built due to sufficient grade control provided by riffle.
- STA: 110+23 – Brush toe added to protect bank at confluence.

#### 2.1.3 Oak Hill Creek Reach 3

- STA: 110+69 – Log j-hook added in place of rock sill for extra stability.
- STA: 112+63 and 112+66 – Geolift not built due to sufficient bank stability.
- STA: 115+29 – Log j-hook added in place of rock sill for added pool stability.
- STA: 116+56 – Log sill added in place of log j-hook; bend sufficiently protected by brush toe.
- STA: 117+84 – Log j-hook added in place of log sill for added stability.
- STA: 118+18 – Bank roughening extended to improve confluence stability.

#### 2.1.4 Oak Hill Creek Reach 4

- STA: 120+34 – Log sill added in place of rock sill due to preference for use of onsite material.



- STA: 120+86 – Bank roughening added for stability.
- STA: 122+57 – Adjusted alignment of outlet channel that was added for roadside culvert drainage.
- STA: 122+71 – Log j-hook not built due to extension of geolift and augmentation of geolift with brush toe.
- STA: 122+92 – Extended pipe in downstream direction to daylight outside of easement. Swale as eliminated.

#### **2.1.5 UT1 Reach 1**

- STA: 200+21 – Riprap added to stabilize bank.
- STA: 200+37 – Rock sill not installed due to adequate stability.
- STA: 200+88 – Log sill not built due to tree save on right bank and adequate grade control from riffle.
- STA: 201+63 – Bank roughening added to roughen floodplain.

#### **2.1.6 UT1 Reach 2**

- STA: 202+26 – Log j-hook built in place of rock sill to increase confluence stability.
- STA: 205+04, 205+93, AND 206+80 – Bank roughening installed for additional bank stability.
- STA: 207+42 – Log sill not installed due to adequate grade control.
- STA: 208+49 – Log sill built in place of rock sill due to preference for use of onsite material.
- STA: 209+43 – Vegetated soil lift not built due to adequate bank stability.
- STA: 210+63 – Log sill built at tail of riffle in log step riffle sequence.
- STA: 212+51 – Rock sill not installed due to adequate grade control.
- STA: 214+38 – Rock sill not installed due to adequate stability.
- STA: 217+03 – Bridge replaced culvert crossing for landowner access.
- STA: 217+24 – Rock sill not installed because additional grade control wasn't needed.
- STA: 219+02 – Log sill installed instead of rock sill as continuation of log drop riffle.
- STA: 219+99 – Log sill not installed due to adequate grade control.
- STA: 220+78 – Rock sill not installed due to adequate stability.
- Floodplain grading was modified during construction on right floodplain near 213+00 to save large trees.

#### **2.1.7 UT1A**

- STA: 300+63 and 300+96 – Log sill installed instead of rock sill for diversity.
- STA: 301+00 – 302+20 – Profile adjusted between 60% and final plans for constructability and to raise downstream confluence to increase priority 1 grading on UT1.
- STA: 301+06 AND 301+32 – Riffle and rock sill not built for pool expansion.
- STA: 301+45 – Log sill installed instead of rock sill for diversity.
- STA: 301+52 – Riprap added in left floodplain to stabilize bank.
- STA: 302+05 – Installed (1) long riffle with (1) log sill instead of (2) riffles with (1) log sill and (1) rock sill for added stream stability.
- STA: 302+60 – 304+90 – Profile adjusted between 60% and final plans for constructability and to raise downstream confluence to increase priority 1 grading on UT1.
- STA: 302+79 – Installed (1) long riffle and (1) log sill instead of (2) riffles and (2) log sills for stream stability.



- STA: 303+16 – Installed (1) long riffle and (1) log sill instead of (2) riffles and (2) rock sills for stream stability.
- STA:303+54 – Installed (1) long riffle with (1) log sill instead of (2) riffles with (1) log sill and (1) rock sill for added stream stability.
- STA: 303+83 – Installed (1) long riffle and (1) rock sill instead of (2) riffles with (1) rock sill and (1) log sill for stream stability.
- STA: 304+19 – Riffle and rock sill not built for pool expansion.
- STA: 304+59 – Log sill built in place of rock sill for added diversity.

#### **2.1.8 UT1B**

- No changes.

#### **2.1.9 UT2**

- STA: 2+33 – Riprap added to stabilize inlet of drainage pipe.
- STA: 2+79 – Boulder toe installed instead of brush toe for additional bank stability.
- STA: 3+25 – Brush toe not installed due to adequate bank stability.

#### **2.1.10 UT3**

- STA: 300+50 – (1) 48” CMP installed rather than (2) 36” CMP. Invert in: 790.97; Invert out: 790.45
- STA: 300+52 – Riprap added to stabilize culvert inlet.
- STA: 300+83 – Riprap added to stabilize culvert outlet.
- STA: 302+18 – Brush toe not installed due to adequate bank stability.

#### **2.1.11 Wetland #1 Grading**

- No changes.

#### **2.1.12 Wetland #2 Grading**

- No changes.

#### **2.1.13 Wetland Grading #3**

- No changes.

#### **2.1.14 Wetland Grading #4**

- Cross-section #6 – Grading deviates from design to accomplish planned tree save.
- Cross-section #6 – Final design adjusted to roughen but leave a low-lying flood bench.

#### **2.1.15 BMP #1**

- Riprap added for stability.

#### **2.1.16 BMP #2**

- BMP grading revised based on field conditions at the time of construction.

#### **2.1.17 Vegetation Planting List & Plan**

As-built changes in species planted and densities were minimal when compared to design. Species replacements and planting density adjustments were made due to availability of the species at the time of planting. All bare root species replacements consisted of either an approved species or an alternate



species within the Final Mitigation Plan’s planting list (Wildlands, 2021). Plantings within ponded areas of the floodplain deviated from design with live stakes being installed in lieu of bare roots species. See below and sheets 3.1 – 3.5 of the record drawings for the planting list and plan revisions.

#### Open Area Buffer Planting Zone

- The stem density of persimmon (*Diospyros virginiana*) bare roots was increased from 5% to 6%.
- Tag alder (*Alnus serrulata*) was replaced by elderberry (*Sambucus canadensis*).
- Northern red oak (*Quercus rubra*), slippery elm (*Ulmus rubra*), and sweet shrub (*Calycanthus floridus*) were added at densities of 5%, 1%, and 1%, respectively.

#### Wetland Planting Zone

- Tag alder was reduced from 5% to 1%.
- Silky dogwood (*Cornus amomum*) was added at a density of 1%.
- Silky willow (*Salix sericea*) was added at a density of 2%.
- Live stakes of black willow (*Salix nigra*) were added at a density of 1%.

#### Partially Vegetated Buffer Zone

- Stem densities for American hornbeam (*Carpinus caroliniana*), strawberry bush (*Euonymus americana*), pawpaw (*Asima triloba*), and American beech (*Fagus grandifolia*) were increased from 10% to 14%.
- Densities for spicebush (*Lindera benzoin*) and northern red oak were reduced from 10% to 8%.
- Densities for slippery elm, witch hazel (*Hamamelis virginiana*), sweet shrub, and flowering dogwood (*Cornus florida*) were decreased from 10% to 7%.

#### Wetland Seeding Open Canopy

- Total pounds of seed per acre increased from 19 to 20 pounds.
- Seed densities of beaked panicgrass (*Coleataenia anceps*) and bur-marigold (*Bidens aristosa*) were decreased from 3 pounds to 1 pound.
- Seed density of fox sedge (*Carex vulpinoidea*) was increased from 2 to 3 pounds.
- Seed density of switchgrass (*Panicum virgatum*) was decreased from 2 pounds to 1 pound.
- Smartweed (*Polygonum pensylvanicum*) and narrowleaf sunflower (*Helianthus augustifolia*) were removed from the seed mix.
- Deertongue (*Dichantheium clandestinum*), eastern gammagrass (*Tripsacum dactyloides*), riverbank wild rye (*Elymus riparius*), and lurid sedge (*Carex lurida*) were added to the seed mix at densities of 1.5, 2.0, 2.0, and 1.0 pound/s, respectively.

#### Planting Plan

- UT1 Reach 2 (Sheet 3.3) – No bare roots in two areas of the right floodplain due to the depth of standing water.
- Oak Hill Creek Reach 2 (Sheet 3.4) – No bare roots were planted in one area of the left floodplain due to the depth of standing water.
- Oak Hill Creek Reach 3 (Sheet 3.5) – No bare roots were planted in one area of the left floodplain due to the depth of standing water.
- BMP 2 (Sheet 3.5) – Vegetative densities were reduced due to the depth of standing water.

#### **2.1.18 Fencing Plan**

- Oak Hill Creek Reach 1 & 2 – Fence line straightened, and gate relocated.
- UT1 Reach 2 – Fence removed. Additional fence added to close pasture and tied to an existing fence on adjacent property that was not surveyed.



### **2.1.19 Monitoring Components**

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.

As previously mentioned in Section 2.0, regrading activities conducted October of 2022 were isolated within the areas of intent and any disturbance to the previously installed monitoring devices was minimal. Devices that were disturbed included ground water gage (GWG) 3, GWG6, GWG9, and GWG10 and mobile vegetation plots (MVP) 5 and MVP6. Ground water well locations were not affected; however, their installation elevations were resurveyed in November of 2022 to account for the new floodplain elevations. Cross-sections established within the regrading areas were not affected. MVP5 and MVP6 were re-established, and vegetative data was collected in February of 2023.

#### Vegetation Monitoring Plots

- Permanent vegetation plot 1 (VP1) was moved from the right side of UT1A to the left side of UT1A.
- VP2 was moved from the left side on UT1 Reach 1 to the right side of UT1 Reach 1.
- Mobile vegetation plot 5 (MVP5) was moved to the left floodplain near the confluence of UT1 Reach 2 and the reach break between Oak Hill Reach 2 and Reach 3. When re-established, it was slightly readjusted to capture the newly planted vegetation in the regraded areas. The proposed location for this mobile vegetation plot was inadvertently located within the extents of BMP2.

#### Cross-sections

- Cross-section 3 (XS3) was moved upstream on UT1 Reach 1 due to a large diameter tree located along the left bank.



## Section 3: Monitoring Year 0 Data Assessment

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Annual monitoring and site visits were conducted during MY0 to assess the condition of the project. The vegetation and stream success criteria for the Site follow the approved success criteria presented in the Mitigation Plan (Wildlands, 2021). Performance criteria for vegetation, stream, and hydrologic assessment 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 2023, 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 2029.

### 3.1 Vegetative Assessment

The MY0 vegetative survey was completed in February 2022 for the initial planting and February 2023 for the replanted areas. Vegetation monitoring for the permanent vegetation plots resulted in a stem density range from 526 to 688 planted stems per acre, while the mobile vegetation plots ranged from 445 to 648 planted stems per acre. All 13 permanent and 6 mobile vegetation plots met the interim success criteria 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 the vegetation plot photographs and the vegetation condition assessment and Appendix B for the vegetation plot data.

### 3.2 Vegetation Areas of Concern

Vegetation management and herbicide applications were implemented prior and during construction to prevent the spread of invasive species that could compete with planted native species. A dense stand of bamboo (*Phyllostachys aurea*) was mechanically removed along UT1A during construction. Kudzu (*Pueraria montana*) was removed along UT1B. Other areas of Chinese privet (*Lingustrum sinense*), Japanese privet (*Lonicera japonica*), Japanese knotweed (*Polygonum cuspidatum*), English Ivy (*Hedera helix*), marsh dewflower (*Murdannia keisak*), and multiflora rose (*Rosa multiflora*), were treated on the Site during construction. Invasive species will continue to be monitored, mapped, and controlled as necessary throughout the monitoring period.

### 3.3 Stream Assessment

Morphological surveys for MY0 were conducted from February 2022 to March 2022. All streams within the Site are stable and functioning as designed. All 14 cross-sections show little to no change from design in the bankfull area and width-to-depth ratio, and bank height ratios are less than 1.2. Reachwide and riffle 100-count substrate sampling were conducted during baseline condition assessment to classify the reach and characterize the riffle pavement. Riffles along most reaches have a median particle size classification of medium gravel to small cobble. 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.

### 3.4 Stream Areas of Concern

Inspection of stream structures and banks did not identify any stream areas of concern, indicating that the stream is performing as designed. The Site will continue to be monitored and any issues will be mapped and reported throughout the monitoring period.



### **3.5 Hydrology Assessment**

Crest Gages (CG) were installed on Oak Hill Creek, UT1, and UT1A to monitor bankfull events. Hydrologic data will be collected and reported during MY1.

### **3.6 Wetland Assessment**

Eleven groundwater gages were installed in early 2022, before the start of the growing season, in wetland creation, rehabilitation, and re-establishment areas to determine wetland hydrology success across different restoration levels. Soil profile descriptions and groundwater gage photographs were taken during installation and are located in Appendix A. Groundwater gage data will be collected and reported during MY1.

### **3.7 Adaptive Management Plan**

Site maintenance and adaptive measurement implementation will follow those outlined in the project's Final Mitigation Plan (Wildlands, 2021). No adaptive management plans are needed at this time.

### **3.8 Monitoring Year 0 Summary**

Overall, the Site looks good, is performing as intended, and is on track to meet success criteria. All vegetation plots are exceeding the MY3 interim requirement of 320 planted stems per acre, and all streams within the Site are stable and meeting project goals. Herbaceous vegetation is establishing itself across the site. Invasive species were treated and/or physically removed across the Site prior to and during construction and will continue to be assessed throughout the monitoring years.

Summary information and data related to the performance of 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

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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, 2021). 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).

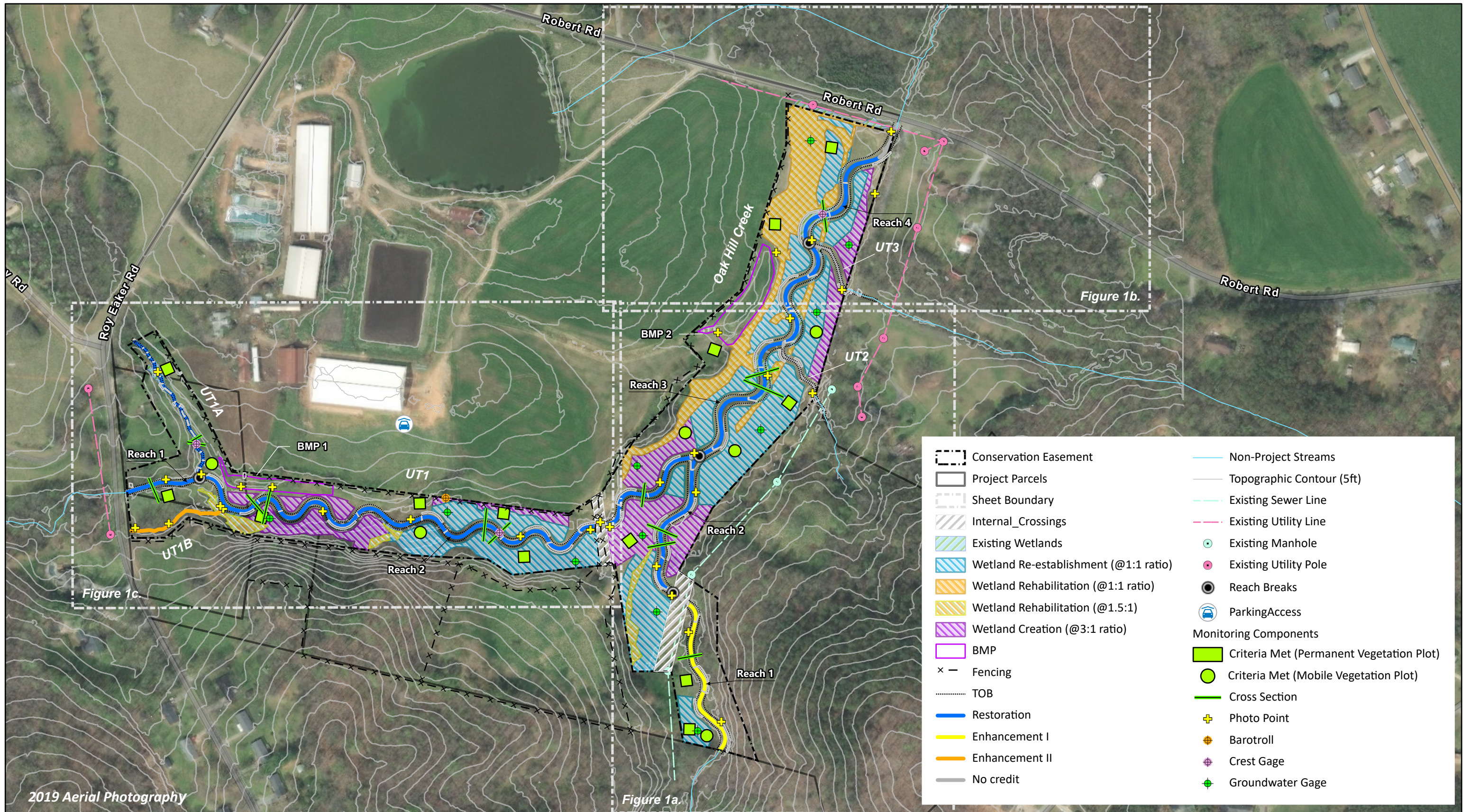


## Section 5: REFERENCES

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2019 Aerial Photography

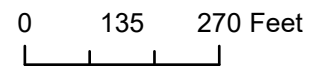


Figure 1. Current Condition Plan View Key  
 Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

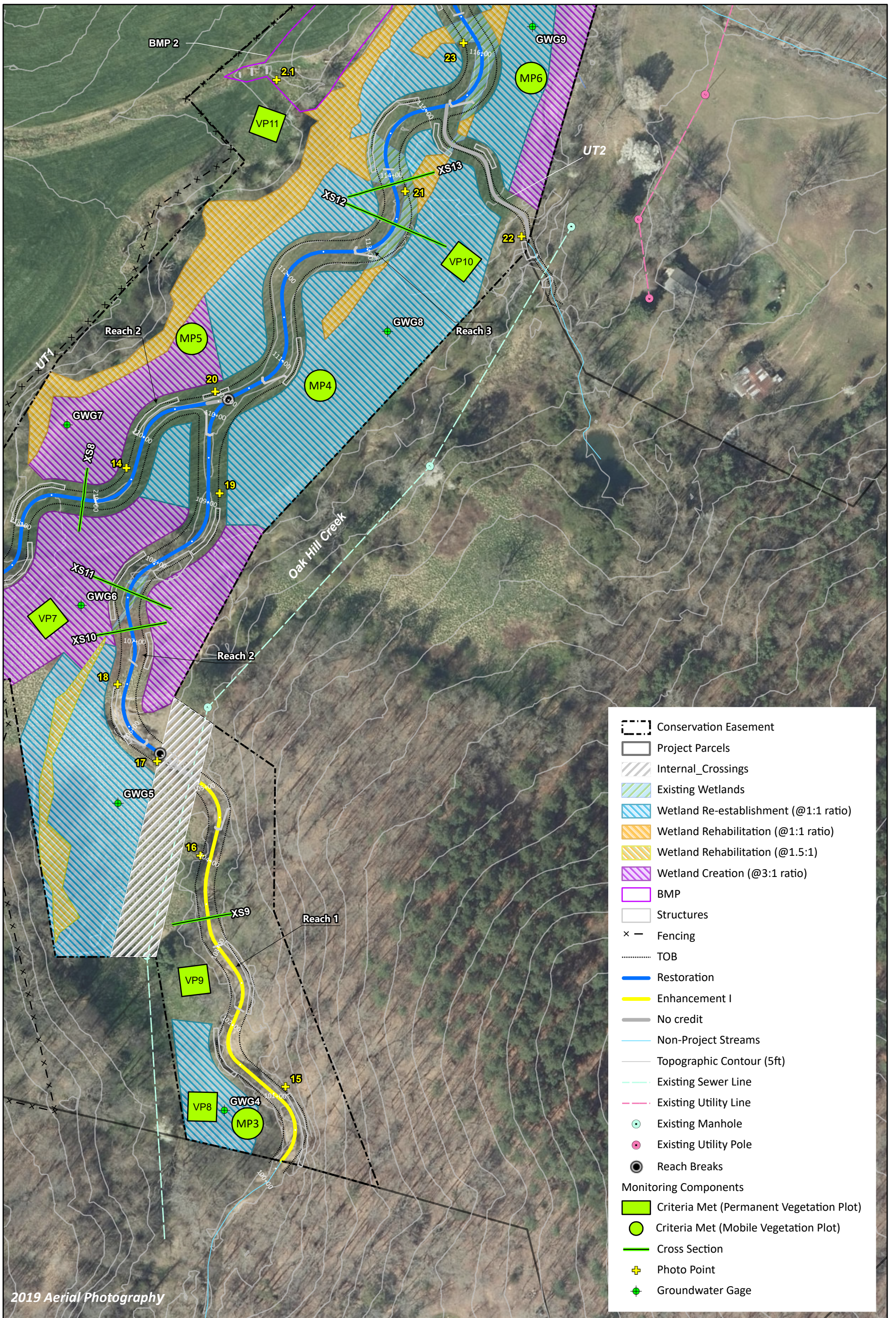
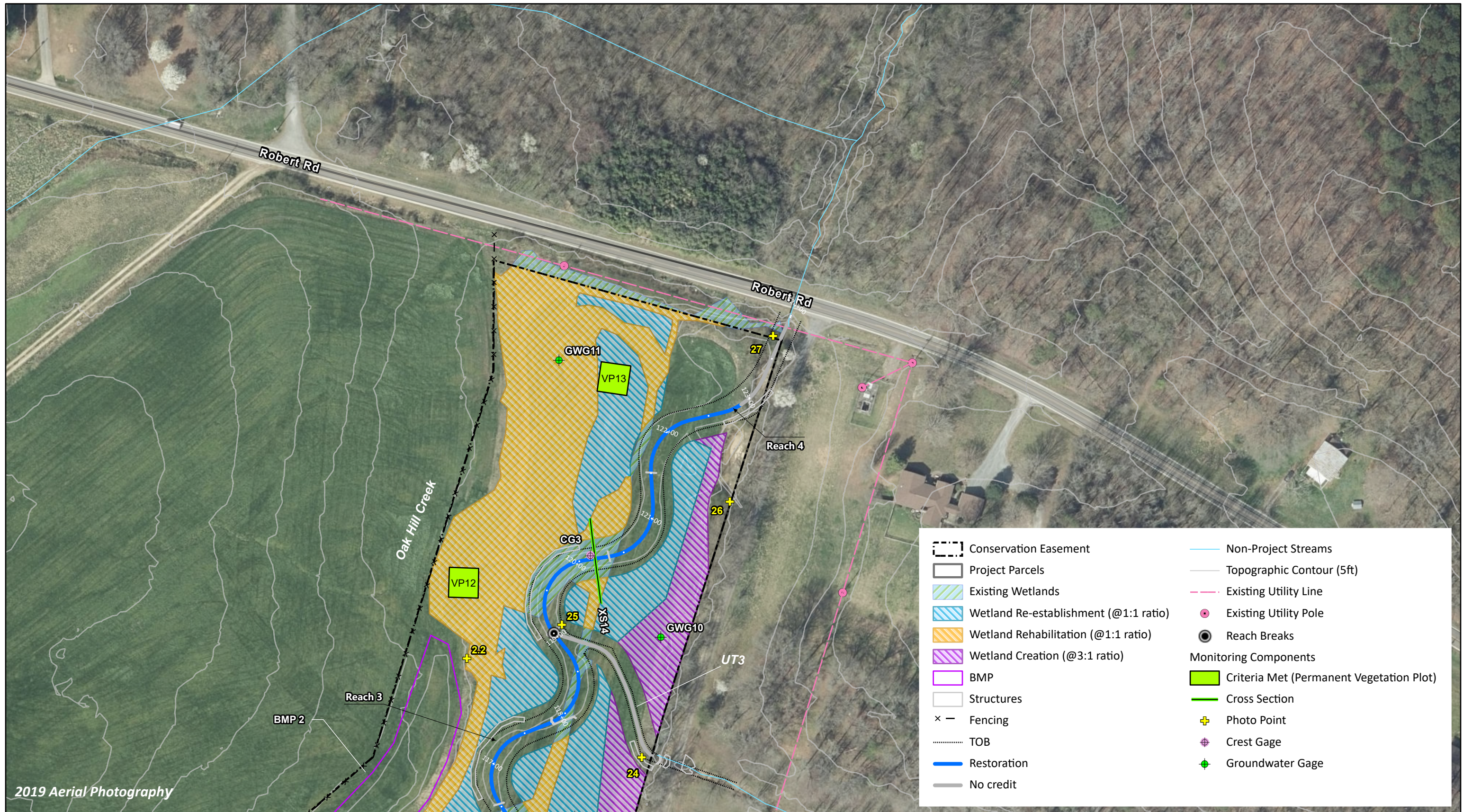
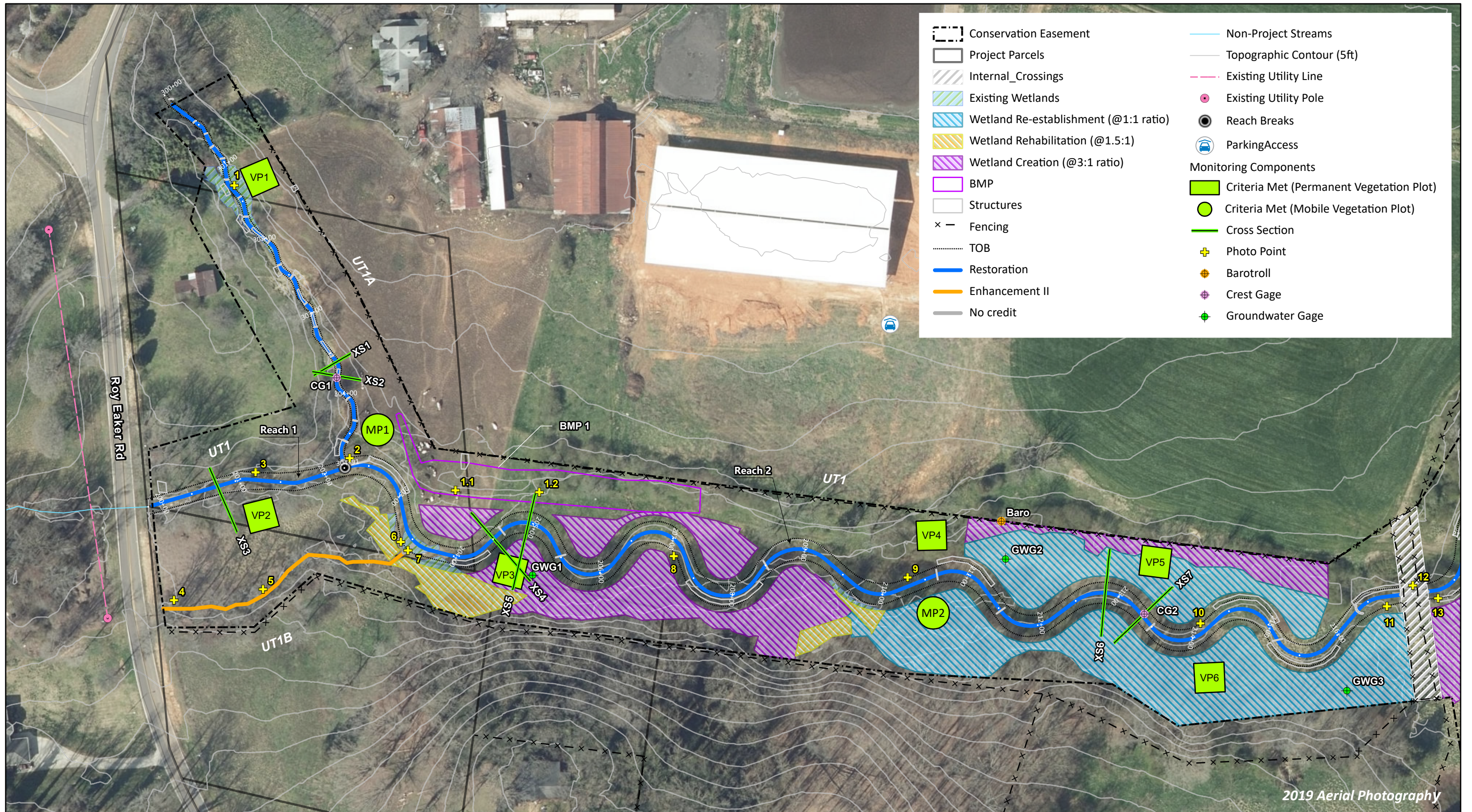


Figure 1a. Current Condition Plan View  
 Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023





**Appendix A**  
**Visual Assessment Data**

**Table 4. Visual Stream Morphology Stability Assessment Table**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023  
 Assessment Date: 2/6/2023

**Oak Hill Creek Reach 1**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	489
					<b>Assessed Bank Length</b>	978
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 <u>NOT</u> 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%
					<b>Totals:</b>	<b>0</b>
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 <u>not</u> exceed 15%.	3	3		100%

**Oak Hill Creek Reach 2**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	470
					<b>Assessed Bank Length</b>	940
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 <u>NOT</u> 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%
					<b>Totals:</b>	<b>0</b>
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 <u>not</u> exceed 15%.	5	5		100%



**Table 4. Visual Stream Morphology Stability Assessment Table**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023  
 Assessment Date: 2/6/2023

**Oak Hill Creek Reach 3**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	877
					<b>Assessed Bank Length</b>	1,754
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 <b>NOT</b> 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%
<b>Totals:</b>					<b>0</b>	<b>100%</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%.	4	4		100%

**Oak Hill Creek Reach 4**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	389
					<b>Assessed Bank Length</b>	778
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 <b>NOT</b> 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%
<b>Totals:</b>					<b>0</b>	<b>100%</b>
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 <u>not</u> exceed 15%.	2	2		100%

**Table 4. Visual Stream Morphology Stability Assessment Table**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

Assessment Date: 2/6/2023

**UT1 Reach 1**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	218
					<b>Assessed Bank Length</b>	436
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 <b>NOT</b> 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%
					<b>Totals:</b>	<b>0</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	0	0		N/A
	Bank Protection	Bank erosion within the structures extent of influence does <b>not</b> exceed 15%.	0	0		N/A

**UT1 Reach 2**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	1,834
					<b>Assessed Bank Length</b>	3,668
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 <b>NOT</b> 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%
					<b>Totals:</b>	<b>0</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	11	11		100%
	Bank Protection	Bank erosion within the structures extent of influence does <b>not</b> exceed 15%.	10	10		100%

**Table 4. Visual Stream Morphology Stability Assessment Table**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

Assessment Date: 2/6/2023

UT1A

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					<b>Assessed Stream Length</b>	470
					<b>Assessed Bank Length</b>	940
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 <u>NOT</u> 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%
					<b>Totals:</b>	<b>0</b>
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	18	18		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%.	5	5		100%

**Table 5. Vegetation Condition Assessment Table**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**  
**Assessment Date: 2/21/23**

**Planted Acreage 19.9**

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

**Easement Acreage 20.4**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Easement Acreage
<b>Invasive Areas of Concern</b>	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%
<b>Easement Encroachment Areas</b>	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**



**PP1 – UT1A looking upstream (02/24/2022)**



**PP1 – UT1A looking downstream (02/24/2022)**



**PP2 – UT1A looking upstream (02/24/2022)**



**PP2 – UT1 R1 looking upstream (02/24/2022)**



**PP2 – UT1 R2 looking downstream (02/24/2022)**



**PP3 – UT1 R1 looking upstream (02/24/2022)**



**PP3 – UT1 R1 looking downstream (02/24/2022)**



**PP4 – UT1B looking upstream (02/24/2022)**



**PP4 – UT1B looking downstream (02/24/2022)**



**PP5 – UT1B looking upstream (02/24/2022)**



**PP5 – UT1B looking downstream (02/24/2022)**



**PP6 – UT1 R2 looking upstream (02/24/2022)**



**PP6 – UT1 R2 looking downstream (02/24/2022)**



**PP7 – UT1B looking upstream (02/24/2022)**



**PP7 – UT1B – UT1 R2 Confluence (02/24/2022)**



**PP8 – UT1 R2 looking upstream (02/24/2022)**



**PP8 – UT1 R2 looking downstream (02/24/2022)**





**PP9 – UT1 R2 looking upstream (02/24/2022)**



**PP9 – UT1 R2 looking downstream (02/24/2022)**



**PP10 – UT1 R2 looking upstream (02/24/2022)**



**PP10 – UT1 R2 looking downstream (02/24/2022)**



**PP11 – UT1 R2 looking upstream (02/24/2022)**



**PP11 – UT1 R2 looking downstream (02/24/2022)**



**PP12** – UT1 R2 looking upstream (02/24/2022)



**PP12** – UT1 R2 looking downstream (02/24/2022)



**PP13** – UT1 R2 looking upstream (02/24/2022)



**PP13** – UT1 R2 looking downstream (02/24/2022)



**PP14** – UT1 R2 looking upstream (02/24/2022)



**PP14** – UT1 R2 looking downstream (02/24/2022)



**PP15 – Oak Hill R1 looking upstream (02/24/2022)**



**PP15 – Oak Hill R1 looking downstream (02/24/2022)**



**PP16 – Oak Hill R1 looking upstream (02/24/2022)**



**PP16 – Oak Hill R1 looking downstream (02/24/2022)**



**PP17 – Oak Hill R2 looking upstream (02/24/2022)**



**PP17 – Oak Hill R2 looking downstream (02/24/2022)**



**PP18** – Oak Hill R2 looking upstream (02/24/2022)



**PP18** – Oak Hill R2 looking downstream (02/24/2022)



**PP19** – Oak Hill R2 looking upstream (02/24/2022)



**PP19** – Oak Hill R2 looking downstream (02/24/2022)



**PP20** – UT1 R2 looking upstream (02/24/2022)



**PP20** – Oak Hill R3 looking downstream (02/24/2022)



**PP20 –Oak Hill R2 upstream (02/24/2022)**



**PP21 – Oak Hill R3 looking upstream (02/24/2022)**



**PP21 – Oak Hill R3 looking downstream (02/24/2022)**



**PP22 – UT2 looking upstream (02/24/2022)**



**PP22 – UT2 looking downstream (02/24/2022)**



**PP23** – Oak Hill R3 looking upstream (02/24/2022)



**PP23** – Oak Hill R3 looking downstream (02/24/2022)



**PP24** – UT3 looking upstream (02/24/2022)



**PP24** – UT3 looking downstream (02/24/2022)



**PP25** – Oak Hill R4 looking upstream (02/24/2022)



**PP25** – Oak Hill R4 looking downstream (02/24/2022)



**PP25** –UT3 looking upstream (02/24/2022)



**PP26** – Right floodplain ditch looking upstream (02/24/2022)



**PP26** – Right floodplain ditch looking downstream (02/24/2022)



**PP27** – Oak Hill R4 upstream (02/24/2022)



**PP27** – Oak Hill R4 downstream (02/24/2022)



**PP27** – Left floodplain ditch looking upstream (02/24/2022)



**PP1.1** – BMP 1 looking north (02/24/2022)



**PP1.1** – BMP 1 looking northwest (02/24/2022)



**PP1.2** – BMP 1 looking west (02/24/2022)



## **Regrading Area Photographs**



**RFP UT3 – STA 301+05 NORTH (10/24/2022)**



**LFP OAK HILL CRK R4 – STA 121+00 NORTHWEST (10/24/2022)**



**LFP OAK HILL CRK R4 – STA 121+00 SOUTHWEST (10/24/2022)**



**LFP OAK HILL CRK R4 – STA 119+80 SOUTHEAST (10/24/2022)**



**LFP OAK HILL CRK R3 – STA 116+60 SOUTH (10/24/2022)**



**LFP OAK HILL CRK R3 – 111+98 SOUTHEAST (10/24/2022)**



**RFP UT2 – STA 219+00 SOUTHEAST (10/24/2022)**



**RFP UT1 R2 – STA 115+75 NORTHWEST (10/24/2022)**



**RFP UT1 R2 – STA 115+75 NORTHEAST (10/24/2022)**

## **Vegetation Plot Photographs**



**PERMANENT VEGETATION PLOT 1 (02/21/2022)**



**PERMANENT VEGETATION PLOT 2 (02/21/2022)**



**PERMANENT VEGETATION PLOT 3 (02/21/2022)**



**PERMANENT VEGETATION PLOT 4 (02/21/2022)**



**PERMANENT VEGETATION PLOT 5 (02/21/2022)**



**PERMANENT VEGETATION PLOT 6 (02/21/2022)**



**PERMANENT VEGETATION PLOT 7 (02/21/2022)**



**PERMANENT VEGETATION PLOT 8 (02/21/2022)**



**PERMANENT VEGETATION PLOT 9 (02/21/2022)**



**PERMANENT VEGETATION PLOT 10 (02/21/2022)**



**PERMANENT VEGETATION PLOT 11 (02/21/2022)**



**PERMANENT VEGETATION PLOT 12 (02/21/2022)**



**PERMANENT VEGETATION PLOT 13** (02/21/2022)



**MOBILE VEGETATION PLOT 1** (02/21/2022)



**MOBILE VEGETATION PLOT 2** (02/21/2022)



**MOBILE VEGETATION PLOT 3** (02/21/2022)



**MOBILE VEGETATION PLOT 4** (02/21/2022)



**MOBILE VEGETATION PLOT 5** (02/20/2023)



**MOBILE VEGETATION PLOT 6** (02/20/2023)



## **Groundwater Gage Photographs**



**Groundwater Gage 1 - (01/28/2022)**



**Groundwater Gage 2 - (01/28/2022)**



**Groundwater Gage 3 - (11/09/2022)**



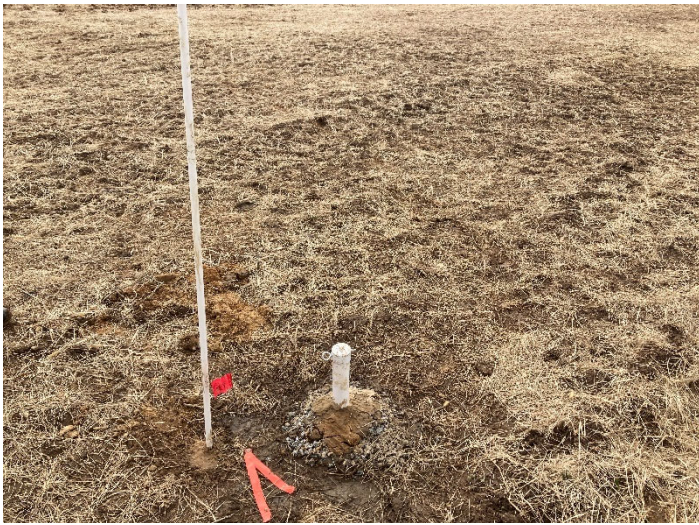
**Groundwater Gage 4 - (01/28/2022)**



**Groundwater Gage 5 - (01/28/2022)**



**Groundwater Gage 6 - (11/09/2022)**



**Groundwater Gage 7 - (01/28/2022)**



**Groundwater Gage 8 - (01/28/2022)**



**Groundwater Gage 9 - (11/09/2022)**



**Groundwater Gage 10 - (11/09/2022)**



**Groundwater Gage 11 - (01/28/2022)**

**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHU  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

Gauge ID: GWG1  
 Serial Number: \_\_\_\_\_  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): \_\_\_\_\_  
 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: \_\_\_\_\_

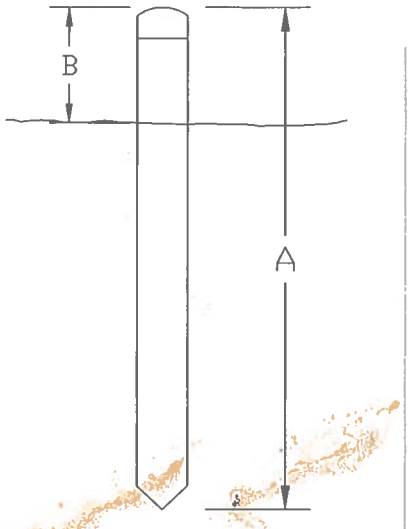
Notes:

hit rock layer at 4 ft (soil is super sandy)

**Soil Profile Description at Location of Well:**

Depth Range (in.)	Color	Redox	Texture	Notes
0-0.9	7.5YR 6/1	5YR 9/6	Sandy silt	Redox 20%
0.9-1.7	5YR 5/4	—	Silty sand	
1.7-2.7	10YR 4/3	10YR 5/6	Silty fine sand	Redox 10%
2.7-4.1	10YR 5/4	5YR 3/4	Silty sand	Redox 5%
4.1-4.3	5Y 8/1	7.5YR 5/6	Course sand w gravel	Redox 5%
4.3-5.2	7.5YR 4/4	—	Course sand	

tenths



Revisit w/  
Rock bar

Reconstructing  
 5YR 3/4 (5%)  
 7.5YR 5/6 (20%)

Bolt to Probe is 6.51  
 Standing water: 0.2  
 Bolt to ground: 1.39

**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OPD  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

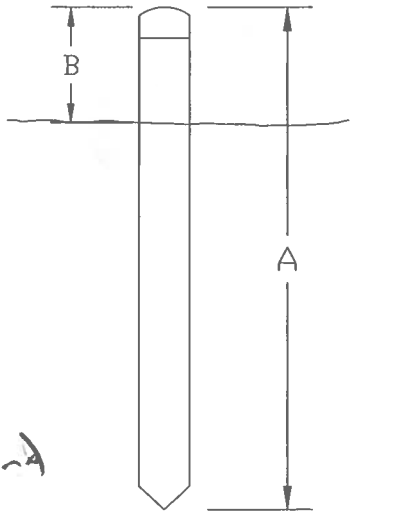
Gauge ID: GW92  
 Serial Number: \_\_\_\_\_  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): \_\_\_\_\_  
 Distance From Eye Bolt To Probe Sensor: \_\_\_\_\_  
 Material: 2" PVC Well Screen  
 Type of Measurement: Pressure, Temperature, & Depth  
 Type of Logger: In-Situ Level Troll 100  
 Gauge Location: \_\_\_\_\_

**Notes:**

Water level 1.4 FT down from surface

**Soil Profile Description at Location of Well:**

Depth Range (ft)	Color	Redox	Texture	Notes
0 - .7	10YR 4/2	7.5YR 5/4	sandy silt	Redox 10%
.7 - 1.1	7.5YR 4/6		silty sand	
1.1 - 1.6	7.5YR 5/3	7.5YR 5/6	fine sand	Redox 5%
1.6 - 2.0	7.5YR 5/3	7.5YR 4/6	silty sand	Redox 7%
2.0 - 2.3	2.5Y 6/3	5YR 4/6	silt loam	Redox 35%
2.3 - 3.4	2.5Y 4/2	7.5YR 4/6	clay loam	Redox 30%
3.4 - 4.9	7.5YR 5/2		silty sand	
4.9 - 5.2	10YR 3/1		Medium sand	Organic debris + s-proliferated



- Bolt to probe  
 - 6.43  
 - Bolt to ground  
 - 1.30

**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHV  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

Gauge ID: AW53  
 Serial Number: 700011  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): \_\_\_\_\_  
 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: \_\_\_\_\_

**Notes:**

\_\_\_\_\_

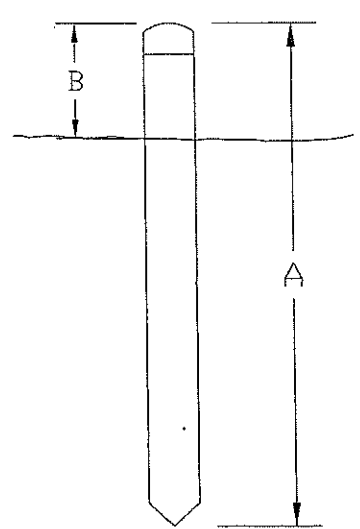
**Soil Profile Description at Location of Well:**

Depth Range (ft.)	Color	Redox	Texture	Notes
0 - 1.1	4YR 5/8	10YR 5/1	S, IT loam	capillary 10%
1.1 - 2.6	7.5Y 6/2	7.5YR 4/1	Sandy loam	capillary 30%
2.6 - 3.5	10YR 3/2	7.5YR 5/1	S, IT, sandy	Redox 10%
3.5 - 4.8	7.5Y 4/1	-	Sandy S, IT	Spot saturated, uncolored

Bolt to Probe  
6.37

Standing Water  
0.92

Bolt to ground  
1.58



**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OPD  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

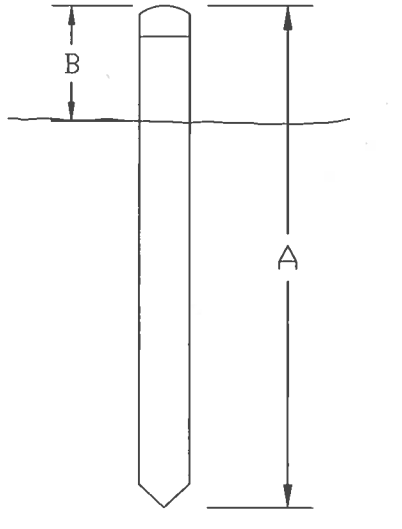
Gauge ID: SW94  
 Serial Number: 700456  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): 1.32  
 Distance From Eye Bolt To Probe Sensor: 6.36  
 Material: 2" PVC Well Screen  
 Type of Measurement: Pressure, Temperature, & Depth  
 Type of Logger: In-Situ Level Troll 100  
 Gauge Location: \_\_\_\_\_

**Notes:**

Free water @ 4.8'

**Soil Profile Description at Location of Well:**

Depth Range (ft.)	Color	Redox	Texture	Notes
<u>0 - 0.3</u>	<u>7.5YR 4/2</u>	<u>—</u>	<u>Clayey silt</u>	
<u>0.3 - 0.7</u>	<u>10YR 5/4</u>	<u>5YR 4/6</u>	<u>silt-sand</u>	<u>15% Redox</u>
<u>0.7 - 1.8</u>	<u>10YR 5/3</u>	<u>7.5YR 4/6</u>	<u>Silt-sand</u>	<u>10% Redox</u>
<u>1.8 - 2.2</u>	<u>10YR 5/8</u>	<u>10YR 6/1</u>	<u>sandy loam</u>	<u>15% Depletions</u>
<u>2.2 - 2.9</u>	<u>10YR 6/1</u>	<u>10YR 5/8</u>	<u>clay loam</u>	<u>30% Redox</u>
<u>2.9 - 4.1</u>	<u>10YR 6/1</u>	<u>10YR 6/4</u>	<u>silty sand</u>	<u>5% Redox</u>
<u>4.1 - 5.2</u>	<u>7.5YR 4/1</u>	<u>—</u>	<u>loamy sand</u>	<u>20% gravel</u>



**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHIO  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

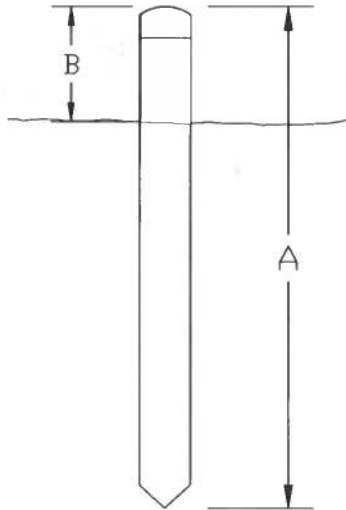
Gauge ID: GWG5  
 Serial Number: \_\_\_\_\_  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): 1.91  
 Distance From Eye Bolt To Probe Sensor: 6.5  
 Material: 2" PVC Well Screen  
 Type of Measurement: Pressure, Temperature, & Depth  
 Type of Logger: In-Situ Level Troll 100  
 Gauge Location: \_\_\_\_\_

Free water 1.3

**Notes:**

**Soil Profile Description at Location of Well:**

Depth Range (ft.)	Color	Redox	Texture	Notes
0 - 0.4	7.5Y1.4-3	-	Loam	
0.4 - 1.1	2.5Y1.6-7	7.5Y1.3-6	Sand. 1mm	Redox 10%
1.1 - 1.4	10Y1.5-1	7.5Y1.4-6	→	Redox 20% → Text - coarse sandy loam
1.4 - 2.6	10Y1.5-1	7.5Y1.4-8	Sandy loam	Redox 15%
2.6 - 3.6	10Y1.5-1	7.5Y1.4-8	Sandy loam	Redox 25%
3.6 - 4.1	5Y1.4-1	7.5Y1.4-6	→	Redox 5% → Text coarse sandy loam
4.1 - 5.2	2.5Y5-1		Small Gravel	





**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHD  
 Project Location:   
 Purpose of Gauge: Water Table Monitoring

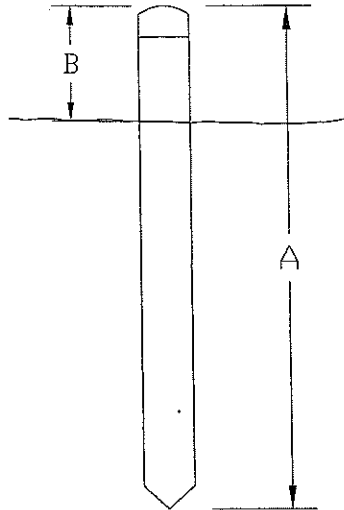
**Gauge Description:**

Gauge ID: GWG 6  
 Serial Number: 657710  
 Total Well Casing Length (A):   
 Well Casing Height Above Ground (B):   
 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:

**Notes:**

**Soil Profile Description at Location of Well:**

Depth Range (ft)	Color	Redox	Texture	Notes
0 - 0.7	7.5 YR 4/6	-	Lean loam	Small Gravel w/in
0.7 - 2.0	10 YR 5/4	5 YR 4/6	Silt loam	Redox 25%
2.0 - 3.7	5Y 5/1	2.5 YR 4/8	Silt loam	Redox 15%
3.7 - 5.0	7.5 Y 5/1	7.5 YR 3/6	Sandy loam	Redox 3%



Bolt to Probe  
6.49

Steady Water  
1.03

Bolt to Ground  
1.41

**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHIO  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

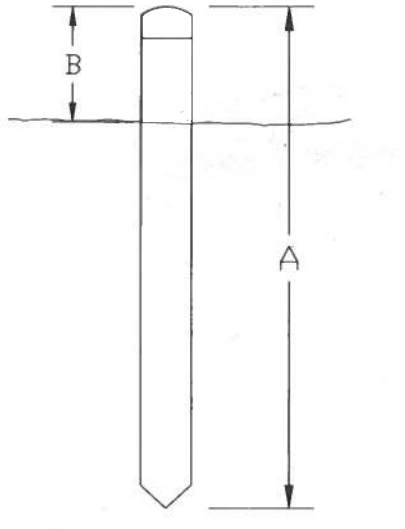
Gauge ID: GWG 7  
 Serial Number: 699928  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): 1.2  
 Distance From Eye Bolt To Probe Sensor: 6.39  
 Material: 2" PVC Well Screen  
 Type of Measurement: Pressure, Temperature, & Depth  
 Type of Logger: In-Situ Level Troll 100  
 Gauge Location: \_\_\_\_\_

**Notes:**

1.2' to standing water

*leathy* **Soil Profile Description at Location of Well:**

Depth Range (ft.)	Color	Redox	Texture	Notes
<u>0 - 0.4</u>	<u>10YR 3/3</u>	<u>—</u>	<u>clayey loam</u>	
<u>0.4 - 0.8</u>	<u>5YR 4/5</u>	<u>2.5Y 5/2</u>	<u>silty sand</u>	<u>Depletion (15%)</u>
<u>0.8 - 1.6</u>	<u>10YR 5/4</u>	<u>5YR 4/6</u>	<u>loamy sand</u>	<u>Redox (20%)</u>
<u>1.6 - 2.4</u>	<u>2.5Y 5/2</u>	<u>5YR 4/6</u>	<u>clay loam</u>	<u>Redox (20%)</u>
<u>2.4 - 3.5</u>	<u>2.5Y 3/1</u>	<u>5YR 3/4</u>	<u>clay loam</u>	<u>Redox (15%)</u>
<u>3.5 - 5.2</u>	<u>2.5Y 2.5/1</u>	<u>—</u>	<u>swampy silt loam</u>	



**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OFID  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

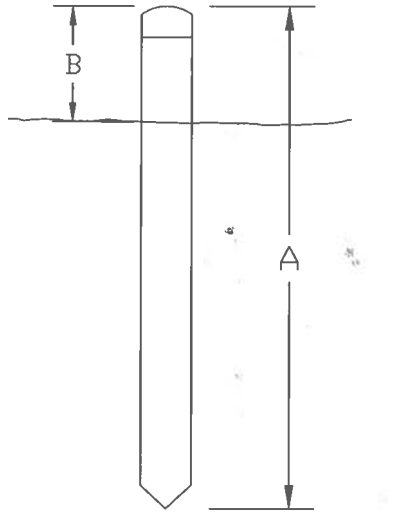
Gauge ID: GWG 8  
 Serial Number: 890051  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): 1.39  
 Distance From Eye Bolt To Probe Sensor: 6.39  
 Material: 2" PVC Well Screen  
 Type of Measurement: Pressure, Temperature, & Depth  
 Type of Logger: In-Situ Level Troll 100  
 Gauge Location: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Notes:**

Fill water at 2.4'

**Soil Profile Description at Location of Well:**

Depth Range (ft.)	Color	Redox	Texture	Notes
<u>0 - 0.65</u>	<u>7.5YR 4/4</u>	<u>—</u>	<u>loam</u>	
<u>0.65 - 1.2</u>	<u>10YR 5/3</u>	<u>5YR 4/6</u>	<u>silt loam</u>	<u>Redox 5%</u>
<u>1.2 - 1.8</u>	<u>10YR 4/2</u>	<u>5YR 4/6</u>	<u>clay silt</u>	<u>Redox 40%</u>
<u>1.8 - 2.6</u>	<u>2.5Y 5/2</u>	<u>7.5YR 3/4</u>	<u>clay silt</u>	<u>Redox 20%</u>
<u>2.6 - 3.2</u>	<u>2.5Y 3/1</u>	<u>2.5YR 3/6</u>	<u>silty clay</u>	<u>Redox 5%</u>
<u>3.2 - 4.2</u>	<u>2.5Y 4/1</u>	<u>2.5YR 4/8</u>	<u>silty clay</u>	<u>Redox 10%</u>
<u>4.2 - 5.2</u>	<u>5Y 3/1</u>	<u>5YR 5/8</u>	<u>clay</u>	<u>Redox 50%</u>



**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHD  
 Project Location:    
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

Gauge ID: GWG 9  
 Serial Number: 807208  
 Total Well Casing Length (A):    
 Well Casing Height Above Ground (B):    
 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:  

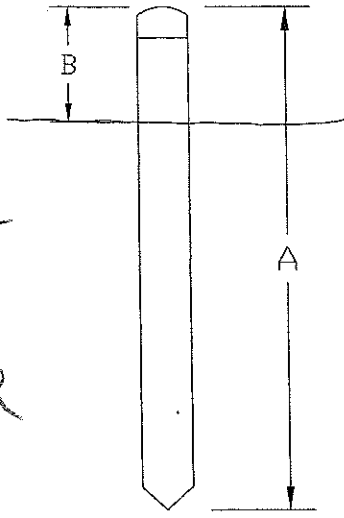
   
 

**Notes:**

**Soil Profile Description at Location of Well:**

Depth Range (in) <sup>tenths</sup>	Color	Redox	Texture	Notes
0 - 0.17	10 YR 4/7	-	Silt loam	
0.2 - 1.0	7.5 YR 5/6	7.5 YR 4/8	Silt loam	Redox 30%
1.0 - 1.6	5 YR 4/6	-	Coarse Sand	
1.6 - 2.5	7.5 Y 5/2	5 YR 5/8	Clay loam	Redox 10%
2.5 - 3.6	7.5 Y 3/2	10 YR 3/6	Clay loam	Redox 20%
3.6 - 5.0	5 Y 5/1	5 YR 5/8	Clay	Redox 10%



Bolt to Probe  
6.40

Bolt to Ground  
1.52

**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: \_\_\_\_\_  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: \_\_\_\_\_

OHD

Water Table Monitoring

**Gauge Description:**

Gauge ID: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): \_\_\_\_\_  
 Distance From Eye Bolt To Probe Sensor: \_\_\_\_\_  
 Material: \_\_\_\_\_  
 Type of Measurement: \_\_\_\_\_  
 Type of Logger: \_\_\_\_\_  
 Gauge Location: \_\_\_\_\_

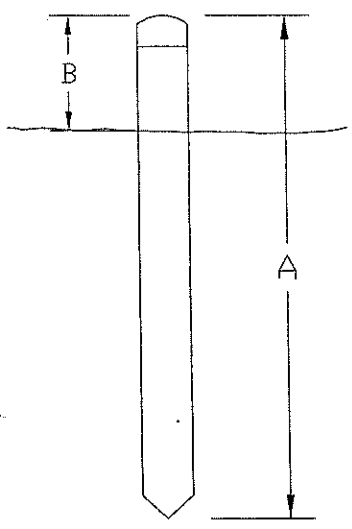
GWG 10  
 883380

2" PVC Well Screen  
 Pressure, Temperature, & Depth  
 In-Situ Level Troll 100

**Notes:**

**Soil Profile Description at Location of Well:**

Depth Range (in.)	Color	Redox	Texture	Notes
0 - 1.3	7.5 YR 4/1	-	Sandy loam	
1.3 - 2.0	7.5 YR 5/1	5 YR 4/0	Silty Sand	Redox 70% 2-day 15% 15%
2.0 - 2.5	2.5 Y 5/1	5 YR 4/0	Silty Sand	
2.5 - 2.8	5 YR 5/6	-	Silt	
2.8 - 3.8	10 YR 4/1	-	loamy Sand	
3.8 - 5.0	2.5 Y 3/2	5 Y 4/0	Clay	Redox 40% 10%



Bolt to Probe  
 6.441

Bolt to Ground  
 1.60

Water  
 2.0

**MONITORING GAUGE INSTALLATION DATA SHEET**

Project Name: OHJ  
 Project Location: \_\_\_\_\_  
 Purpose of Gauge: Water Table Monitoring

**Gauge Description:**

Gauge ID: GWG 11  
 Serial Number: 874844  
 Total Well Casing Length (A): \_\_\_\_\_  
 Well Casing Height Above Ground (B): \_\_\_\_\_  
 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: \_\_\_\_\_

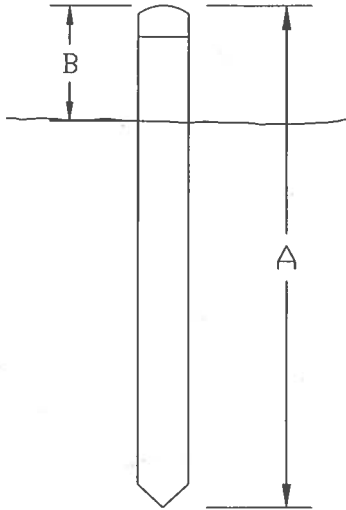
\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Notes:**

overcast

*feet* **Soil Profile Description at Location of Well:**

Depth Range (ft.)	Color	Redox	Texture	Notes
<u>0 - .3</u>	<u>10YR 2-2</u>	<u>-</u>	<u>Silty loam</u>	<u>Organic</u>
<u>.3 - .9</u>	<u>5YR 5-6</u>	<u>-</u>	<u>Coarse sand</u>	<u>no depletion</u>
<u>.9 - 2.9</u>	<u>2.5Y 6-2</u>	<u>5YR 6-6</u>	<u>Clay loam</u>	<u>2.5% Redox</u>
<u>2.9 - 3.9</u>	<u>2.5Y 5-3</u>	<u>5YR 5-8</u>	<u>Clay silty loam</u>	<u>410% Redox</u>
<u>3.9 - 5.2</u>	<u>Gray 2.5/IV</u>	<u>-</u>	<u>Clay sand</u>	<u>Super Block, coarse water</u>



Free water = .5

Bolt to Probe = 6.34

Bolt to Ground = 1.14

**Appendix B**  
**Vegetation Plot Data**

**Table 6. Vegetation Plot Data**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Planted Acreage	19.9
Date of Initial Plant	2022-02-21
Date(s) of Supplemental Plant(s)	2023-02-15
Date(s) Mowing	NA
Date of Current Survey	2023-02-20
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	<i>Acer negundo</i>	boxelder	Tree	FAC							1	1			1	1
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL											1	1
	<i>Amelanchier arborea</i>	common serviceberry	Tree	FAC			2	2								
	<i>Betula nigra</i>	river birch	Tree	FACW	1	1	2	2	3	3	5	5	3	3	2	2
	<i>Calycanthus floridus</i>	eastern sweetshrub	Shrub	FACU	2	2										
	<i>Carya cordiformis</i>	bitternut hickory	Tree	FACU	2	2										
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW					1	1			1	1	1	1
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL											2	2
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW					1	1						
	<i>Cornus florida</i>	flowering dogwood	Tree	FACU	2	2										
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC	1	1	1	1								
	<i>Hamamelis virginiana</i>	American witchhazel	Tree	FACU			1	1								
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC									2	2		
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU	1	1	1	1								
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC					5	5	1	1	1	1		
	<i>Oxydendrum arboreum</i>	sourwood	Shrub	UPL			1	1								
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	3	3	3	3	1	1	1	1	2	2
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC	1	1										
	<i>Quercus alba</i>	white oak	Tree	FACU							1	1				
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW					1	1			2	2		
<i>Quercus nigra</i>	water oak	Tree	FAC									1	1	4	4	
<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW													
<i>Quercus phellos</i>	willow oak	Tree	FAC							2	2	1	1			
<i>Quercus rubra</i>	northern red oak	Tree	FACU	1	1					1	1					
<i>Salix sericea</i>	silky willow	Shrub	OBL													
<i>Sambucus canadensis</i>	American black elderberry	Tree		1	1			1	1	2	2	1	1	1	1	
<i>Ulmus americana</i>	American elm	Tree	FACW					2	2	2	2	4	4	1	1	
<i>Ulmus rubra</i>	slippery elm	Tree	FAC			2	2									
Sum	Performance Standard				15	15	13	13	17	17	16	16	17	17	15	15
Mitigation Plan Performance Standard	Current Year Stem Count				15		13		17		16		17		15	
	Stems/Acre				607		526		688		648		688		607	
	Species Count				10		8		8		9		10		9	
	Dominant Species Composition (%)				20		23		29		31		24		27	
	Average Plot Height (ft.)				2		2		2		2		2		2	
% Invasives				0		0		0		0		0		0		
Post Mitigation Plan Performance Standard	Current Year Stem Count				15		13		17		16		17		15	
	Stems/Acre				607		526		688		648		688		607	
	Species Count				10		8		8		9		10		9	
	Dominant Species Composition (%)				20		23		29		31		24		27	
	Average Plot Height (ft.)				2		2		2		2		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 6. Vegetation Plot Data**

Oak Hill Dairy Mitigation Site  
DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Planted Acreage	19.9
Date of Initial Plant	2022-02-21
Date(s) of Supplemental Plant(s)	2023-02-15
Date(s) Mowing	NA
Date of Current Survey	2023-02-20
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		Veg Plot 13 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Acer negundo</i>	boxelder	Tree	FAC	2	2	1	1	1	1	1	1	1	1	1			
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL											1	1		
	<i>Amelanchier arborea</i>	common serviceberry	Tree	FAC					1	1								
	<i>Betula nigra</i>	river birch	Tree	FACW	1	1	4	4	4	4	1	1	4	4	1	1	5	5
	<i>Calycanthus floridus</i>	eastern sweetshrub	Shrub	FACU														
	<i>Carya cordiformis</i>	bitternut hickory	Tree	FACU														
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW	1	1	1	1									1	1
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL	1	1					1	1			1	1	1	1
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW	1	1					1	1						
	<i>Cornus florida</i>	flowering dogwood	Tree	FACU					1	1								
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC														
	<i>Hamamelis virginiana</i>	American witchhazel	Tree	FACU					1	1			1	1				
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC			1	1	1	1	2	2	2	2	1	1	1	1
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU														
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC							1	1			2	2	1	1
	<i>Oxydendrum arboreum</i>	sourwood	Shrub	UPL									1	1				
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	5	5	2	2	1	1			2	2	1	1
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC					2	2			3	3				
	<i>Quercus alba</i>	white oak	Tree	FACU					1	1			2	2				
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW	1	1	1	1			1	1			1	1	1	1
<i>Quercus nigra</i>	water oak	Tree	FAC	1	1					3	3					2	2	
<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW															
<i>Quercus phellos</i>	willow oak	Tree	FAC	2	2	1	1							3	3	2	2	
<i>Quercus rubra</i>	northern red oak	Tree	FACU					1	1									
<i>Salix sericea</i>	silky willow	Shrub	OBL							1	1							
<i>Sambucus canadensis</i>	American black elderberry	Tree				2	2			1	1					1	1	
<i>Ulmus americana</i>	American elm	Tree	FACW	1	1					1	1			2	2			
<i>Ulmus rubra</i>	slippery elm	Tree	FAC					1	1									
Sum	Performance Standard				14	14	16	16	16	16	15	15	14	14	14	14	16	16
Mitigation Plan Performance Standard	Current Year Stem Count				14		16		16		15		14		14		16	
	Stems/Acre				567		648		648		607		567		567		648	
	Species Count				<b>10</b>		<b>8</b>		<b>11</b>		<b>12</b>		<b>7</b>		<b>9</b>		<b>10</b>	
	Dominant Species Composition (%)				<b>21</b>		<b>31</b>		<b>25</b>		<b>20</b>		<b>29</b>		<b>21</b>		<b>31</b>	
	Average Plot Height (ft.)				2		3		2		3		3		2		2	
% Invasives				<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		
Post Mitigation Plan Performance Standard	Current Year Stem Count				14		16		16		15		14		14		16	
	Stems/Acre				567		648		648		607		567		567		648	
	Species Count				<b>10</b>		<b>8</b>		<b>11</b>		<b>12</b>		<b>7</b>		<b>9</b>		<b>10</b>	
	Dominant Species Composition (%)				<b>21</b>		<b>31</b>		<b>25</b>		<b>20</b>		<b>29</b>		<b>21</b>		<b>31</b>	
	Average Plot Height (ft.)				2		3		2		3		3		2		2	
% Invasives				<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		

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 6. Vegetation Plot Data**

Oak Hill Dairy Mitigation Site  
DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Planted Acreage	19.9
Date of Initial Plant	2022-02-21
Date(s) of Supplemental Plant(s)	2023-02-15
Date(s) Mowing	NA
Date of Current Survey	2023-02-20
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
					Total	Total	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	<i>Acer negundo</i>	boxelder	Tree	FAC			1		1	1
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL			1			
	<i>Amelanchier arborea</i>	common serviceberry	Tree	FAC						
	<i>Betula nigra</i>	river birch	Tree	FACW	2	1	1	1	4	3
	<i>Calycanthus floridus</i>	eastern sweetshrub	Shrub	FACU						
	<i>Carya cordiformis</i>	bitternut hickory	Tree	FACU	2					
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW	1					
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL		1	2	1		
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW				1		
	<i>Cornus florida</i>	flowering dogwood	Tree	FACU						
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC						
	<i>Hamamelis virginiana</i>	American witchhazel	Tree	FACU						
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC	1	1				
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU						
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC	1					1
	<i>Oxydendrum arboreum</i>	sourwood	Shrub	UPL						
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	2	3	1	5	2	4
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC	1		1			
	<i>Quercus alba</i>	white oak	Tree	FACU						
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW		2			2	1
<i>Quercus nigra</i>	water oak	Tree	FAC			1	1			
<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW				2			
<i>Quercus phellos</i>	willow oak	Tree	FAC	1	2	2	1	1	1	
<i>Quercus rubra</i>	northern red oak	Tree	FACU	2	1					
<i>Salix sericea</i>	silky willow	Shrub	OBL	2		3	1		2	
<i>Sambucus canadensis</i>	American black elderberry	Tree					1	1	1	
<i>Ulmus americana</i>	American elm	Tree	FACW					3	2	
<i>Ulmus rubra</i>	slippery elm	Tree	FAC			2				
Sum	Performance Standard				15	11	15	14	14	16
Mitigation Plan Performance Standard	Current Year Stem Count				15	11	15	14	14	16
	Stems/Acre				607	445	607	567	567	648
	Species Count				10	7	10	9	7	9
	Dominant Species Composition (%)				13	27	20	36	29	25
	Average Plot Height (ft.)				2	2	2	2	3	2
	% Invasives				0	0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count				15	11	15	14	14	16
	Stems/Acre				607	445	607	567	567	648
	Species Count				10	7	10	9	7	9
	Dominant Species Composition (%)				13	27	20	36	29	25
	Average Plot Height (ft.)				2	2	2	2	3	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 7. Vegetation Performance Standards Summary Table**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

Vegetation Performance Standards Summary Table												
	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	607	2	10	0	526	2	8	0	688	2	8	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	648	2	9	0	688	2	10	0	607	2	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	567	2	10	0	648	3	8	0	648	2	11	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	3	12	0	567	3	7	0	567	2	9	0
	Veg Plot 13 F				Veg Plot Group 1 R				Veg Plot Group 2 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	648	2	10	0	607	2	10	0	445	2	7	0
	Veg Plot Group 3 R				Veg Plot Group 4 R				Veg Plot Group 5 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	607	2	10	0	567	2	9	0	567	3	7	0
	Veg Plot Group 6 R											
	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	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.

**Appendix C**  
**Stream Geomorphology Data**

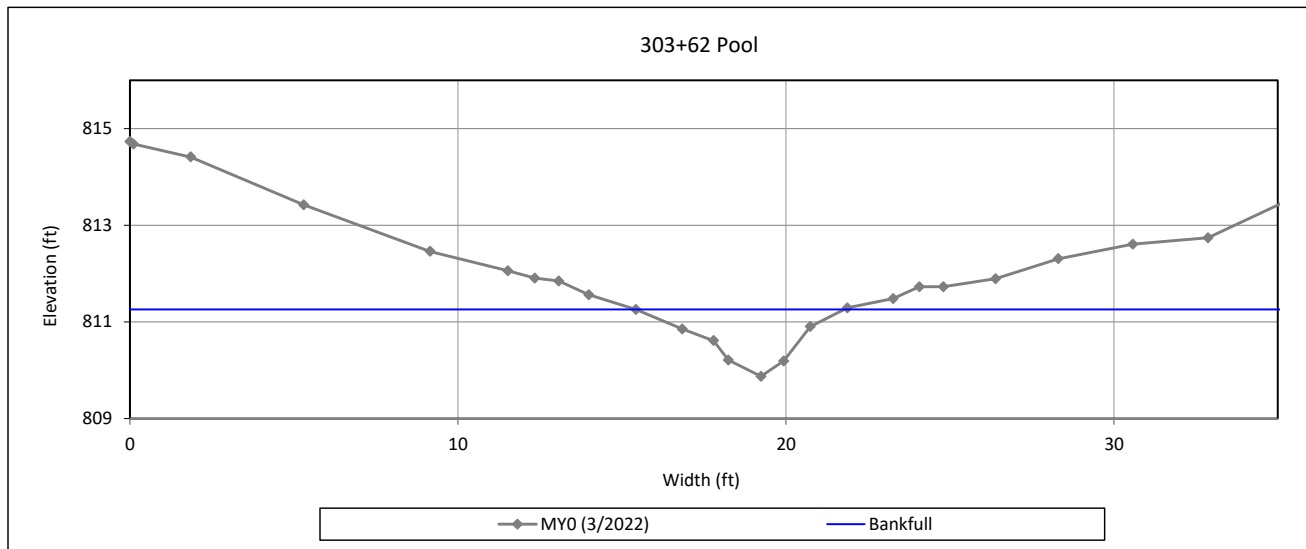
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 1-UT1A



#### Bankfull Dimensions

4.0	x-section area (ft.sq.)
6.4	width (ft)
0.6	mean depth (ft)
1.4	max depth (ft)
7.1	wetted perimeter (ft)
0.6	hydraulic radius (ft)
10.1	width-depth ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

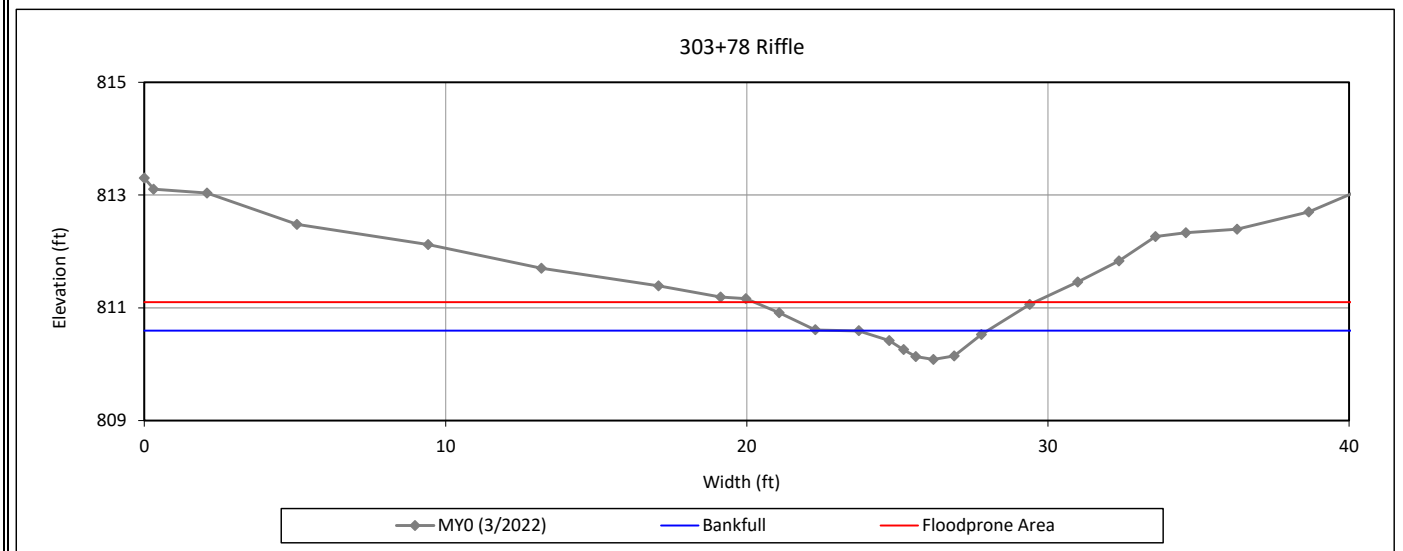
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 2-UT1A



#### Bankfull Dimensions

1.2	x-section area (ft.sq.)
4.3	width (ft)
0.3	mean depth (ft)
0.5	max depth (ft)
4.4	wetted perimeter (ft)
0.3	hydraulic radius (ft)
15.0	width-depth ratio
9.3	W flood prone area (ft)
2.2	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

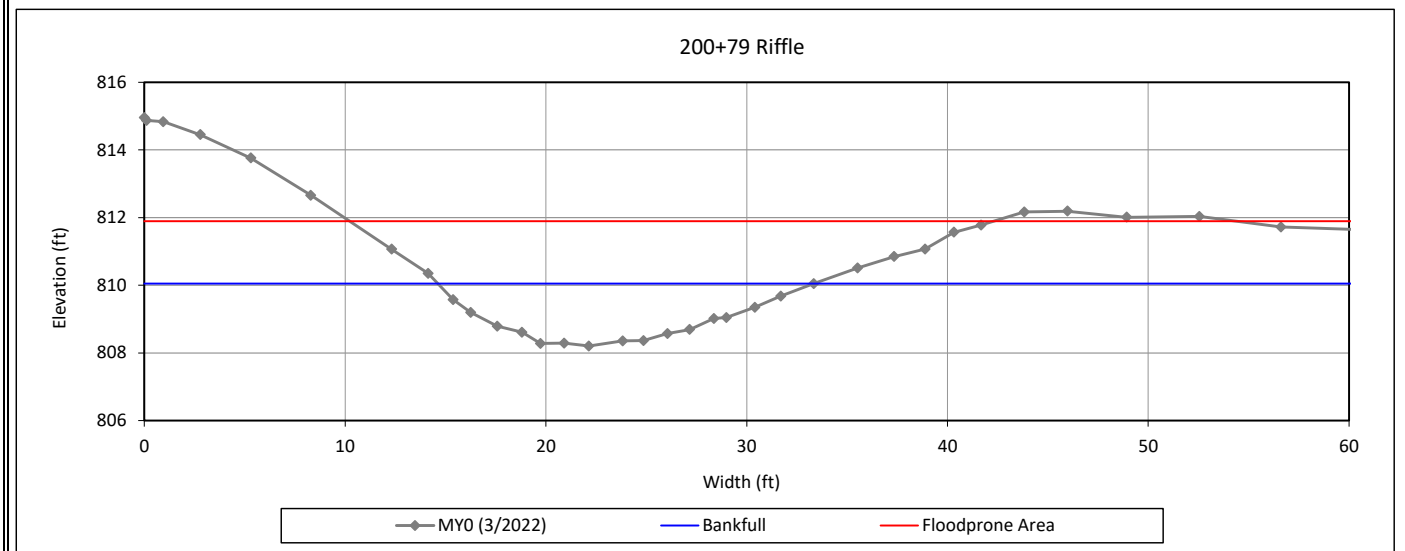
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 3-UT1 Reach 1



#### Bankfull Dimensions

22.0	x-section area (ft.sq.)
18.7	width (ft)
1.2	mean depth (ft)
1.8	max depth (ft)
19.3	wetted perimeter (ft)
1.1	hydraulic radius (ft)
15.9	width-depth ratio
54.8	W flood prone area (ft)
2.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

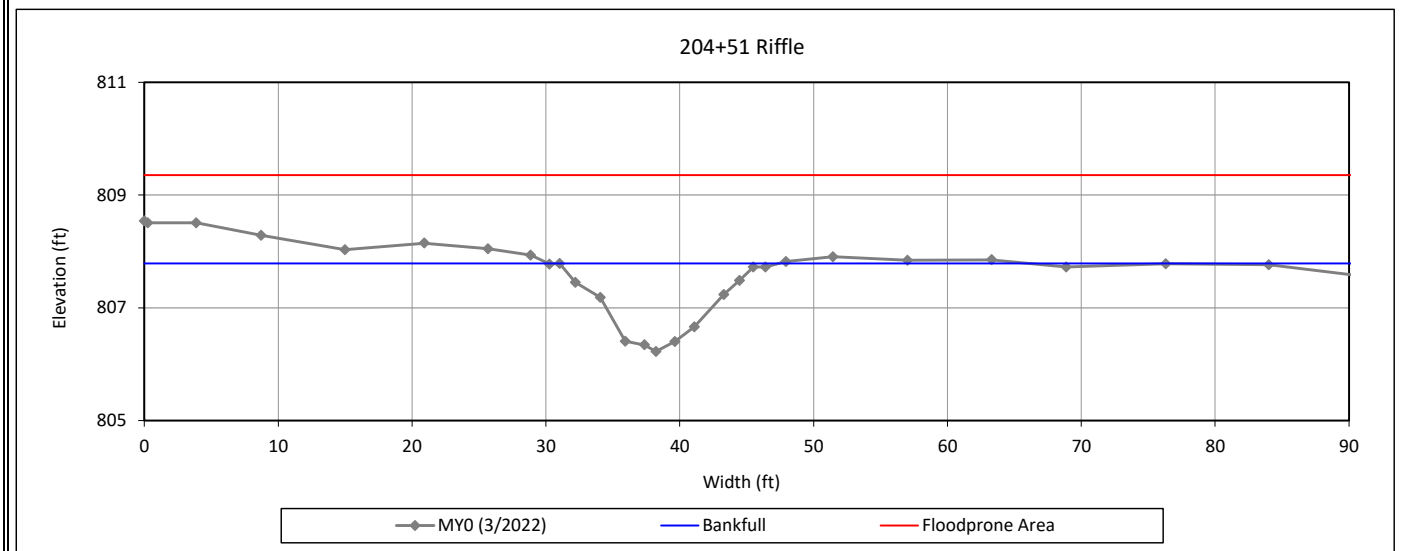
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 4-UT1 Reach 2



#### Bankfull Dimensions

12.8	x-section area (ft.sq.)
16.4	width (ft)
0.8	mean depth (ft)
1.6	max depth (ft)
16.8	wetted perimeter (ft)
0.8	hydraulic radius (ft)
21.0	width-depth ratio
100.0	W flood prone area (ft)
6.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream



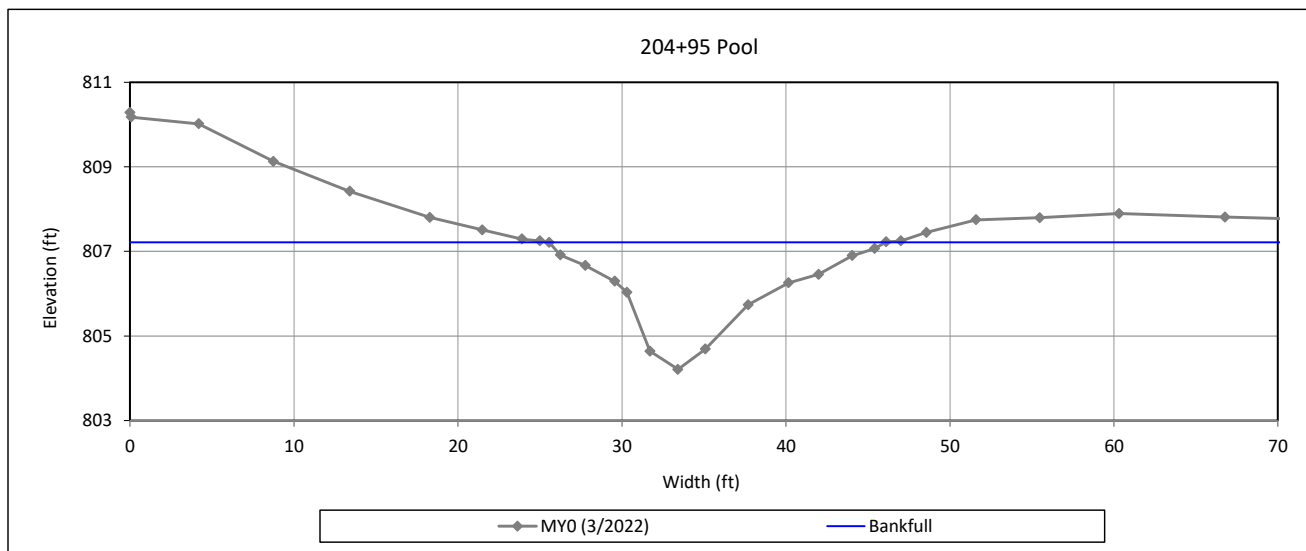
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 5-UT1 Reach 2



#### Bankfull Dimensions

26.1	x-section area (ft.sq.)
20.5	width (ft)
1.3	mean depth (ft)
3.0	max depth (ft)
21.7	wetted perimeter (ft)
1.2	hydraulic radius (ft)
16.1	width-depth ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

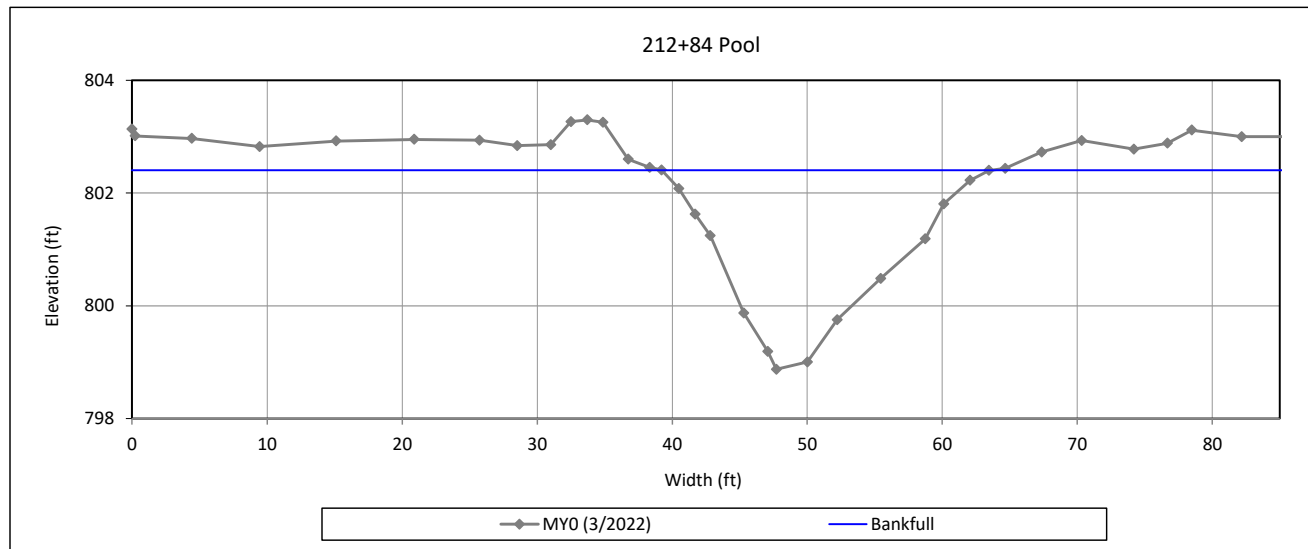
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 6-UT1 Reach 2



#### Bankfull Dimensions

43.0	x-section area (ft.sq.)
24.2	width (ft)
1.8	mean depth (ft)
3.5	max depth (ft)
25.4	wetted perimeter (ft)
1.7	hydraulic radius (ft)
13.6	width-depth ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

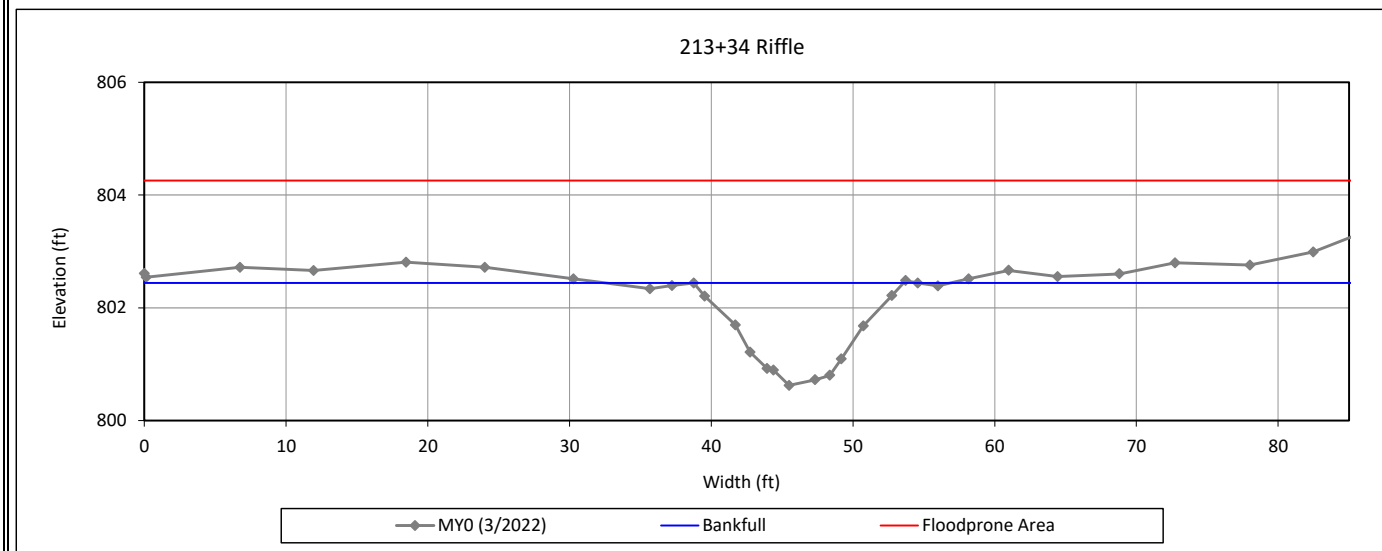
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 7-UT1 Reach 2



#### Bankfull Dimensions

15.2	x-section area (ft.sq.)
14.8	width (ft)
1.0	mean depth (ft)
1.8	max depth (ft)
15.3	wetted perimeter (ft)
1.0	hydraulic radius (ft)
14.3	width-depth ratio
89.6	W flood prone area (ft)
6.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

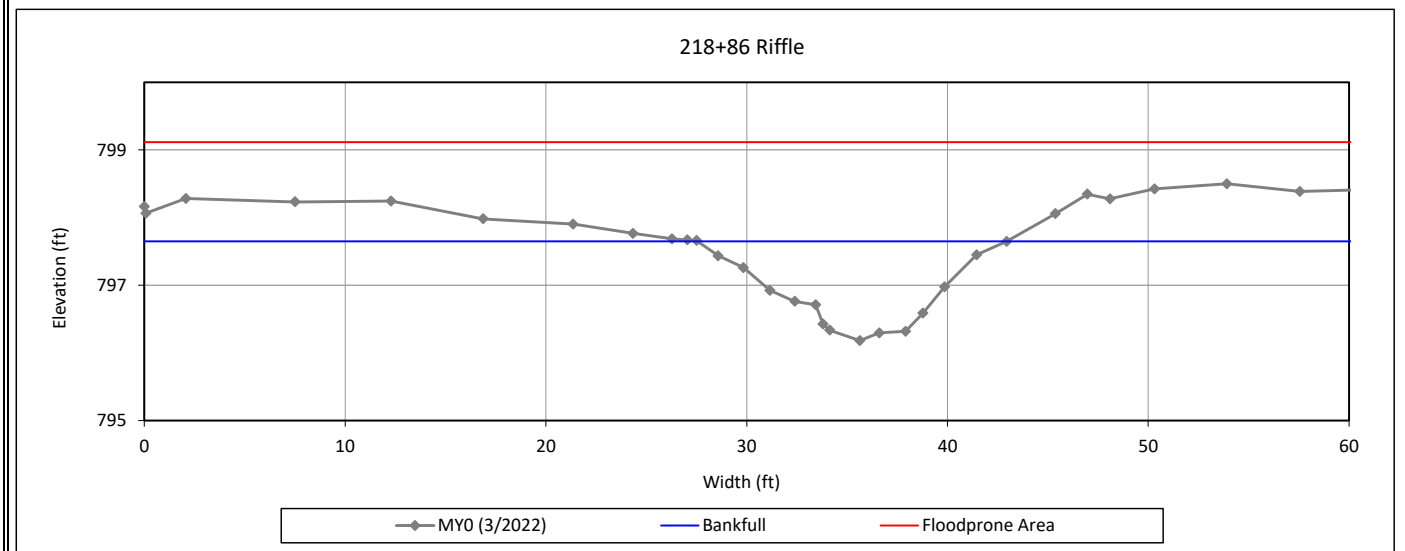
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 8-UT1 Reach 2



#### Bankfull Dimensions

12.0	x-section area (ft.sq.)
15.4	width (ft)
0.8	mean depth (ft)
1.5	max depth (ft)
15.8	wetted perimeter (ft)
0.8	hydraulic radius (ft)
19.8	width-depth ratio
72.6	W flood prone area (ft)
4.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

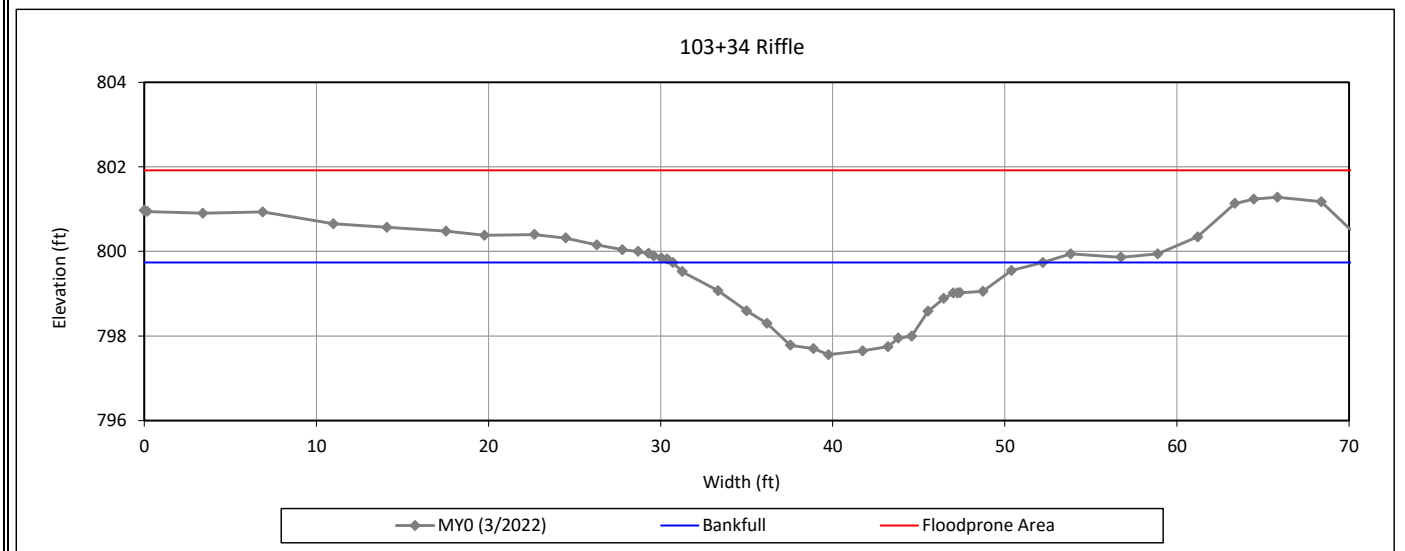
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 9-Oak Hill Reach 1



#### Bankfull Dimensions

25.3	x-section area (ft.sq.)
21.5	width (ft)
1.2	mean depth (ft)
2.2	max depth (ft)
22.1	wetted perimeter (ft)
1.1	hydraulic radius (ft)
18.2	width-depth ratio
72.4	W flood prone area (ft)
3.4	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

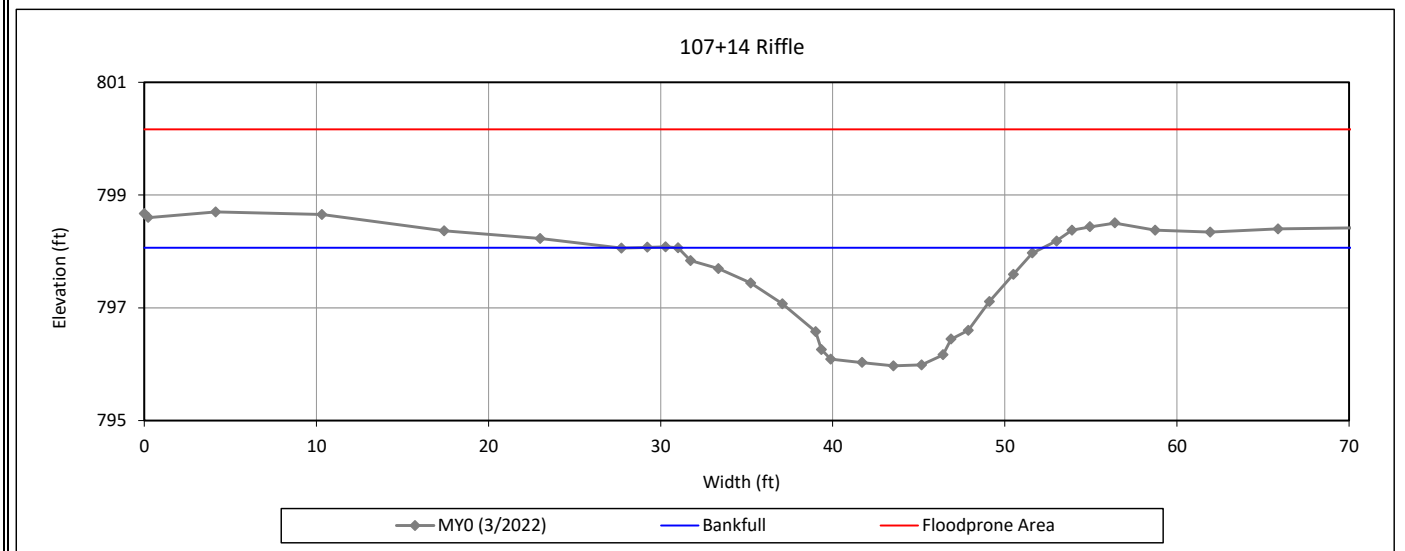
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 10-Oak Hill Reach 2



#### Bankfull Dimensions

25.5	x-section area (ft.sq.)
21.2	width (ft)
1.2	mean depth (ft)
2.1	max depth (ft)
21.9	wetted perimeter (ft)
1.2	hydraulic radius (ft)
17.7	width-depth ratio
83.8	W flood prone area (ft)
4.0	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

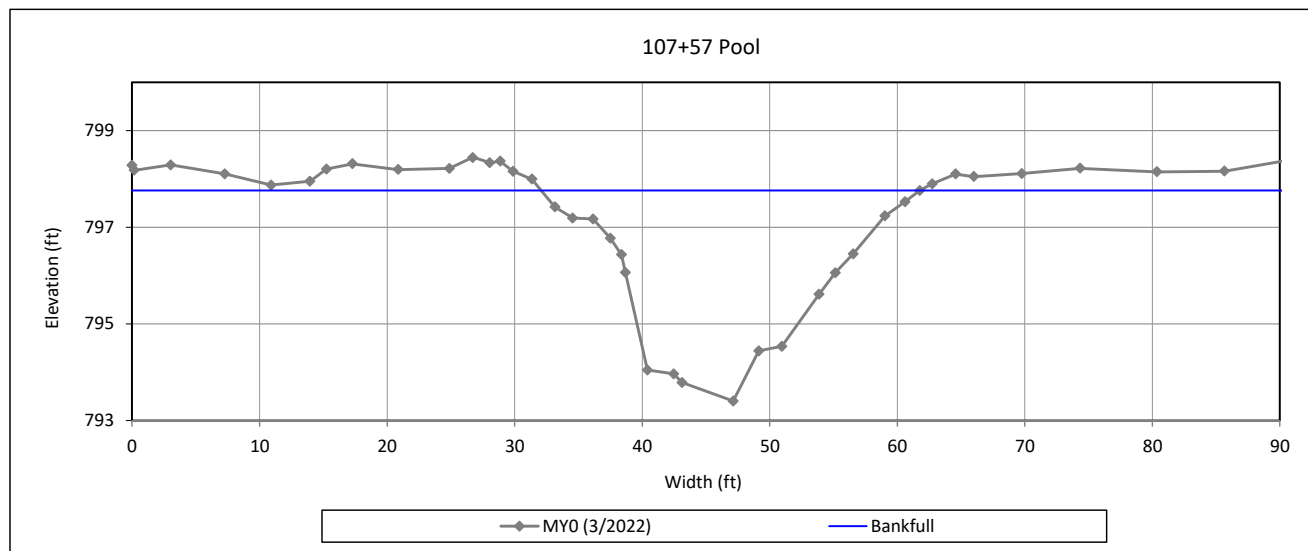
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 11-Oak Hill Reach 2



#### Bankfull Dimensions

64.9	x-section area (ft.sq.)
29.7	width (ft)
2.2	mean depth (ft)
4.4	max depth (ft)
31.8	wetted perimeter (ft)
2.0	hydraulic radius (ft)
13.6	width-depth ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

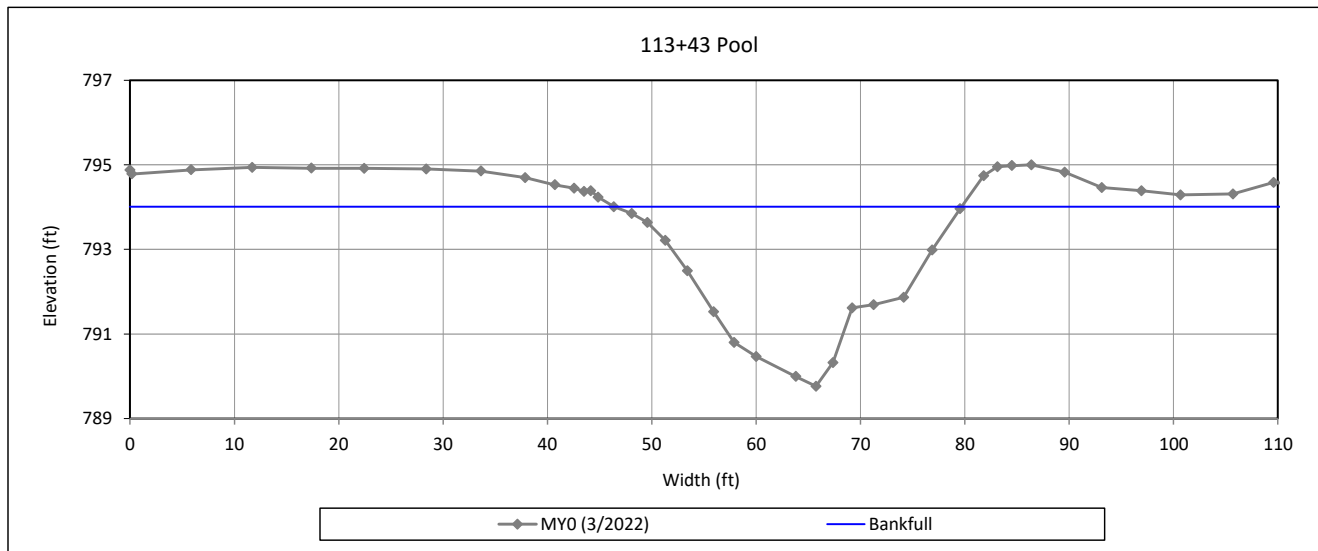
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 12-Oak Hill Reach 3



#### Bankfull Dimensions

73.1	x-section area (ft.sq.)
33.3	width (ft)
2.2	mean depth (ft)
4.2	max depth (ft)
34.8	wetted perimeter (ft)
2.1	hydraulic radius (ft)
15.2	width-depth ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream



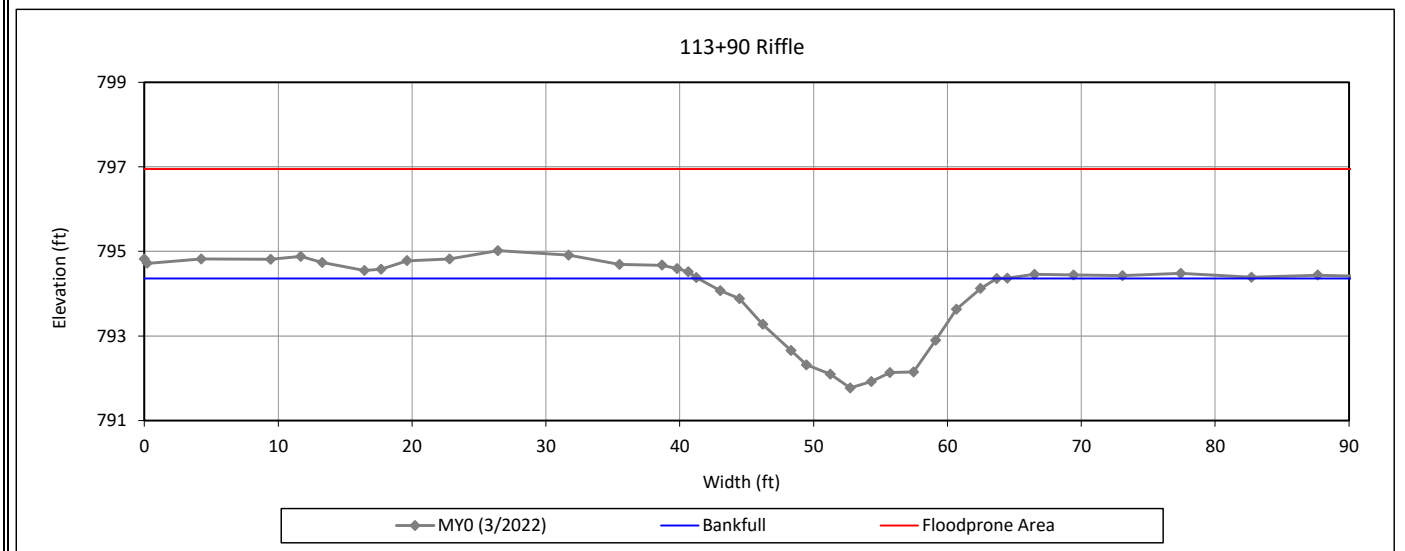
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 13-Oak Hill Reach 3



#### Bankfull Dimensions

31.5	x-section area (ft.sq.)
22.3	width (ft)
1.4	mean depth (ft)
2.6	max depth (ft)
23.1	wetted perimeter (ft)
1.4	hydraulic radius (ft)
15.8	width-depth ratio
102.5	W flood prone area (ft)
4.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

Field Crew: Kee Mapping & Surveying



View Downstream

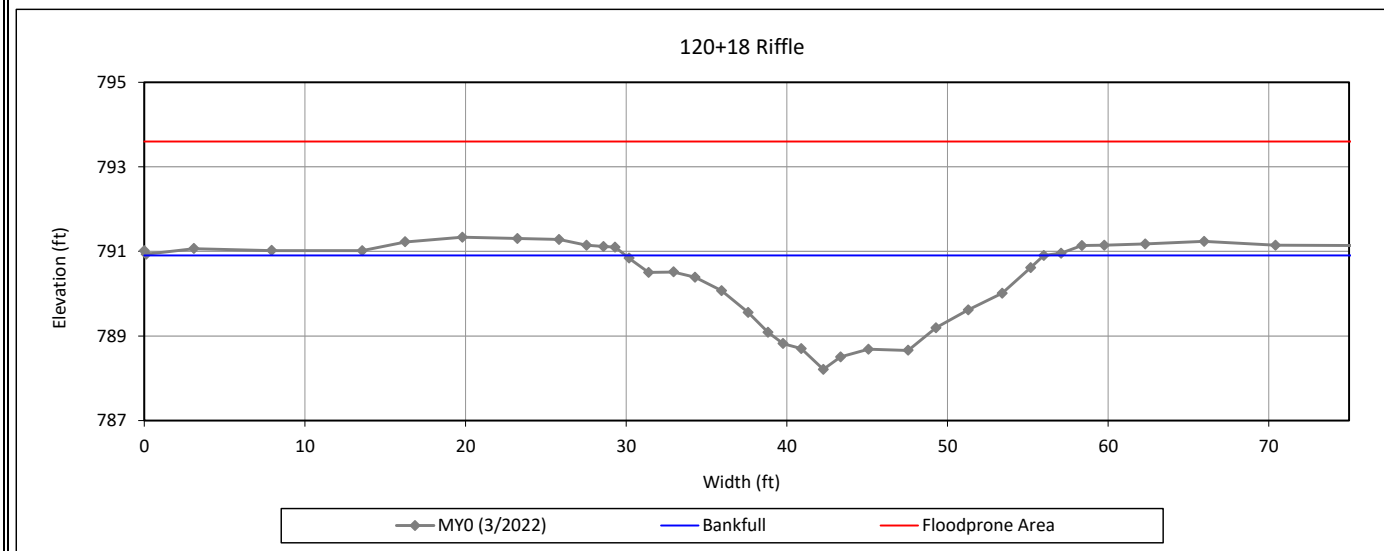
### Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

#### Cross-Section 14-Oak Hill Reach 4



#### Bankfull Dimensions

36.1	x-section area (ft.sq.)
26.0	width (ft)
1.4	mean depth (ft)
2.7	max depth (ft)
26.8	wetted perimeter (ft)
1.3	hydraulic radius (ft)
18.8	width-depth ratio
94.3	W flood prone area (ft)
3.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 3/2022

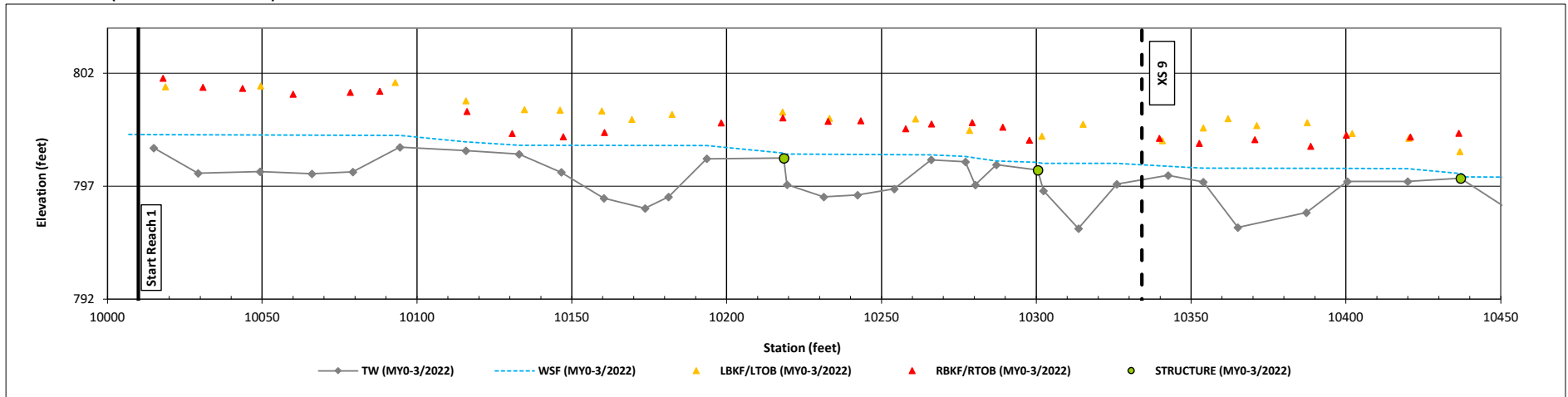
Field Crew: Kee Mapping & Surveying



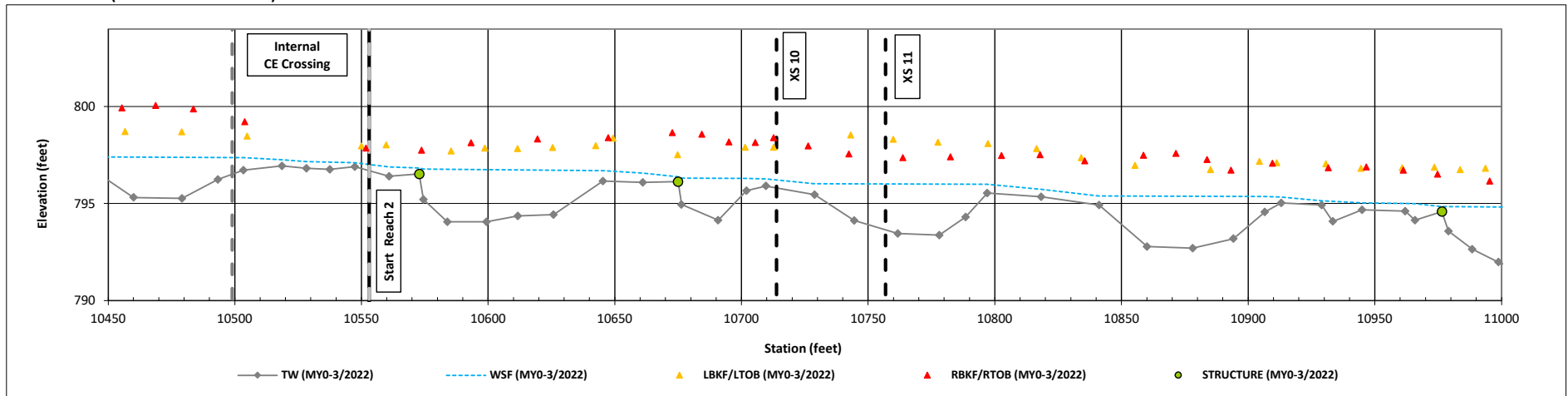
View Downstream

**Longitudinal Profile Plots**  
 Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

**Oak Hill Creek (STA 100+10 to 123+73)**



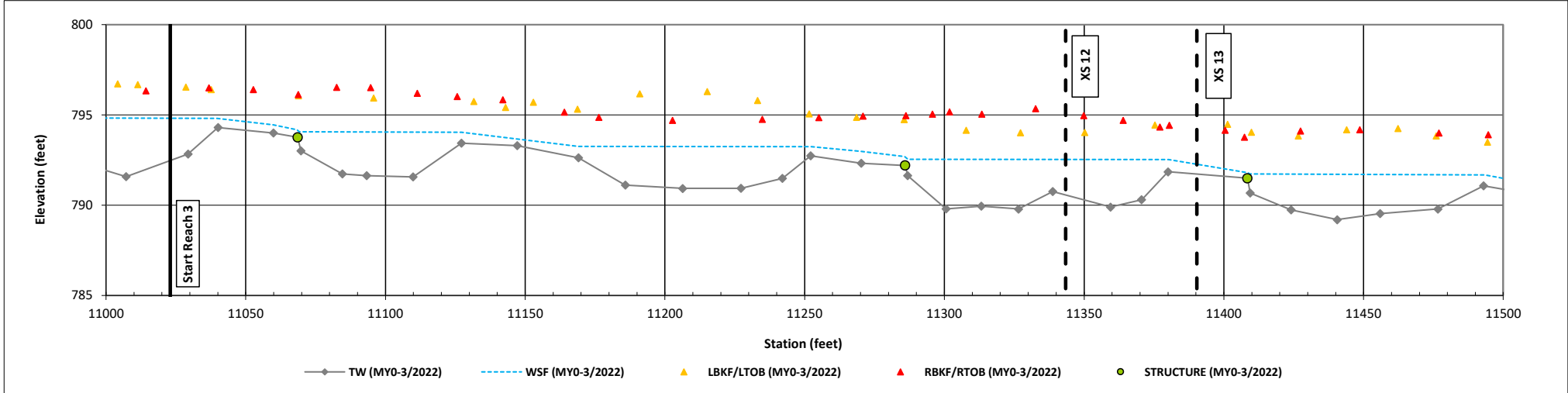
**Oak Hill Creek (STA 100+10 to 123+73)**



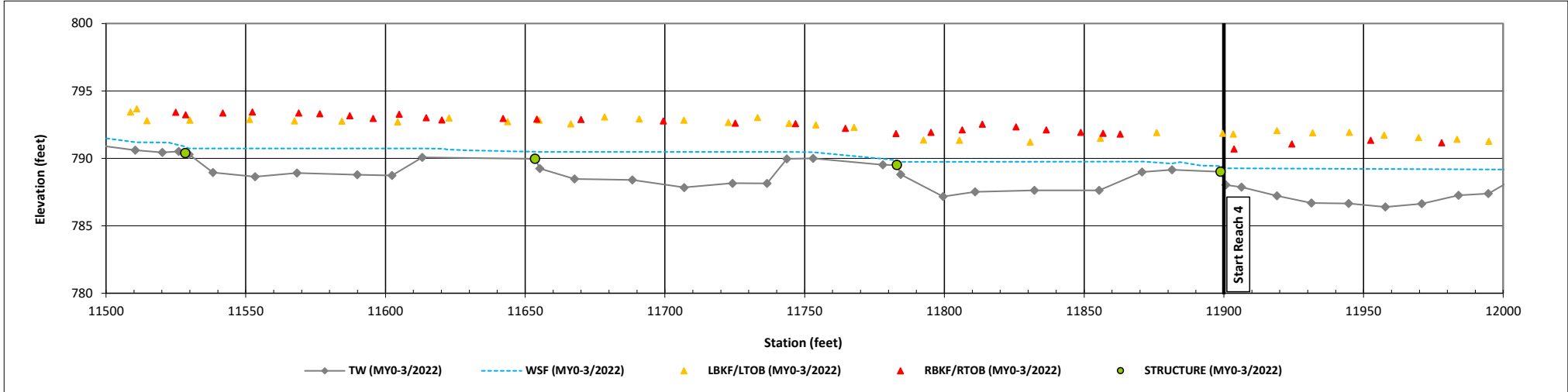
### Longitudinal Profile Plots

Oak Hill Dairy Mitigation Site  
DMS Project No. 100120  
Monitoring Year 0 - 2023

#### Oak Hill Creek (STA 100+10 to 123+73)



#### Oak Hill Creek (STA 100+10 to 123+73)



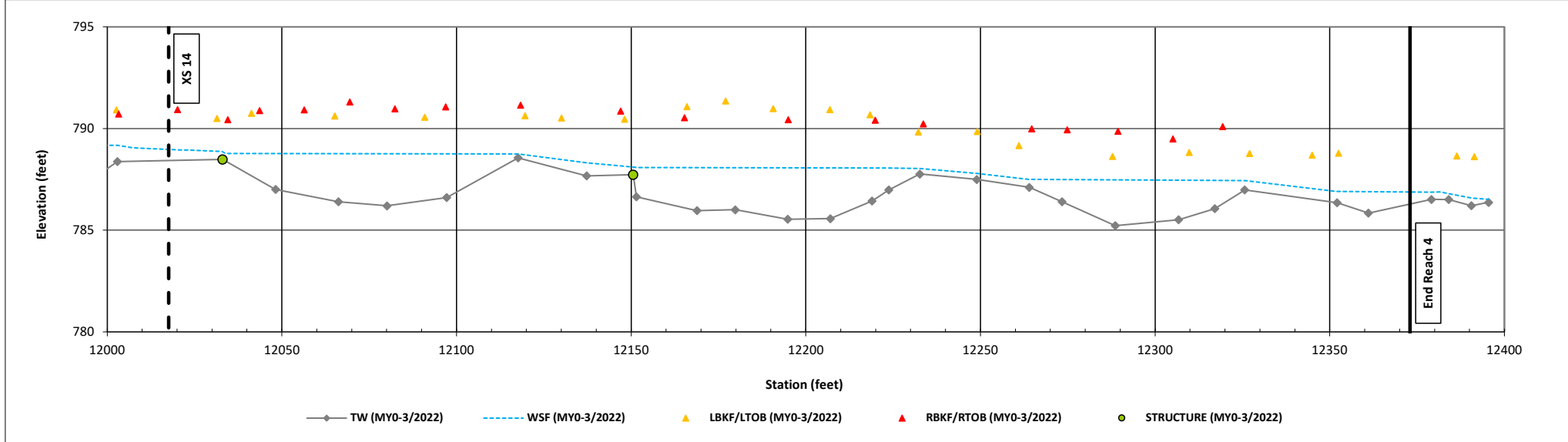
**Longitudinal Profile Plots**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

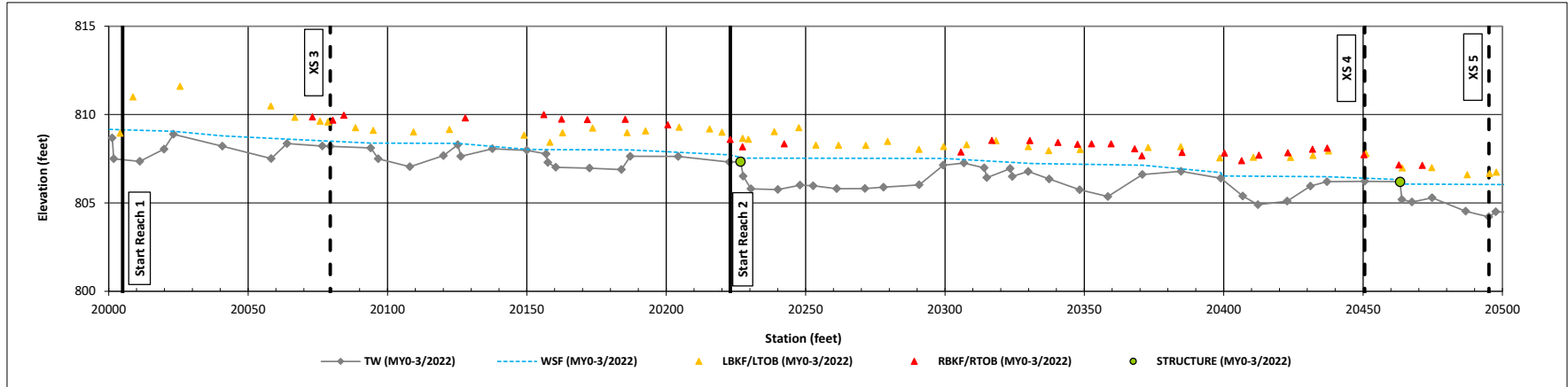
**Monitoring Year 0 - 2023**

**Oak Hill Creek (STA 100+10 to 123+73)**

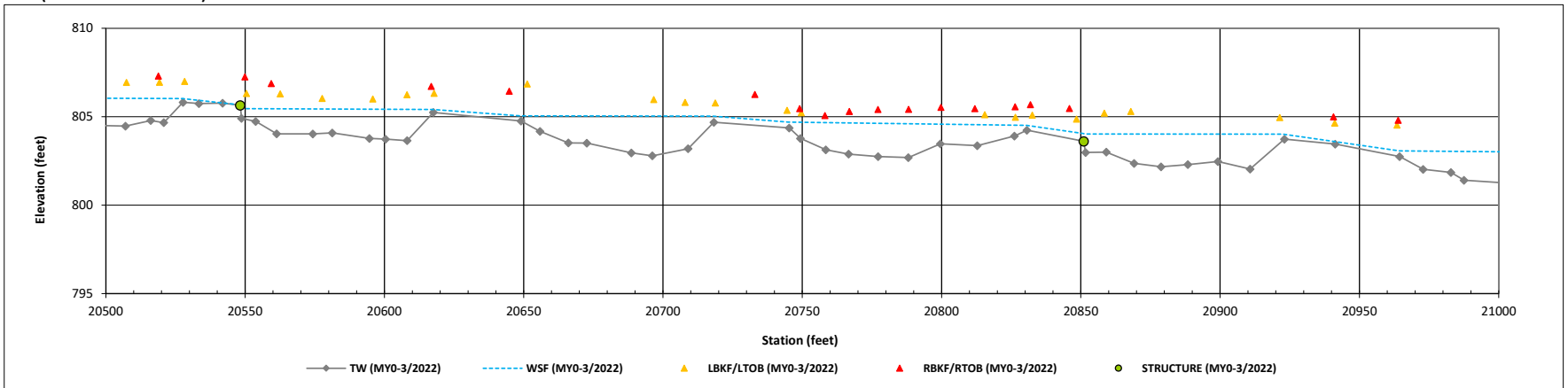


**Longitudinal Profile Plots**  
 Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

**UT1 (STA 200+05 to 221+11)**

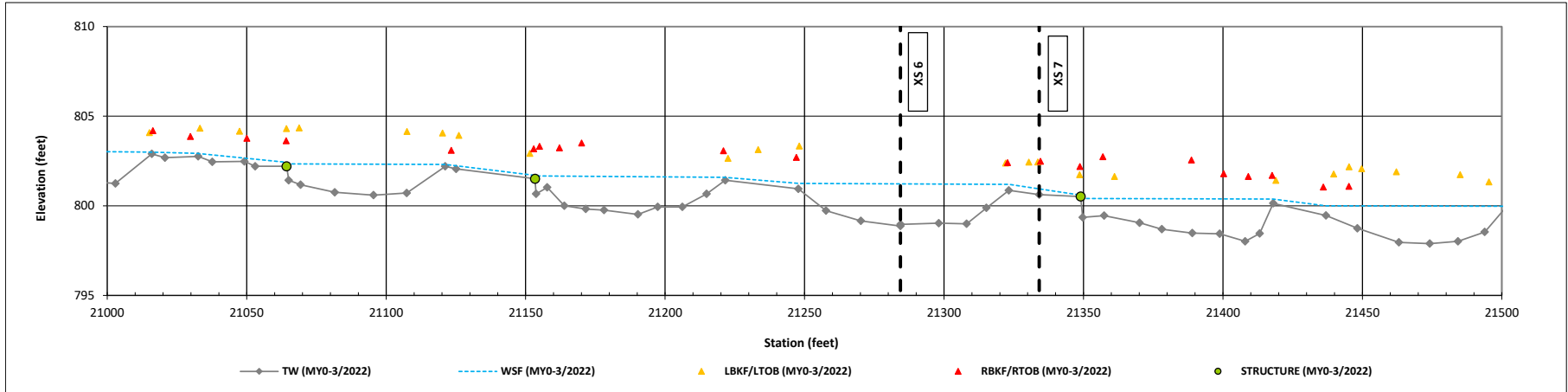


**UT1 (STA 200+05 to 221+11)**

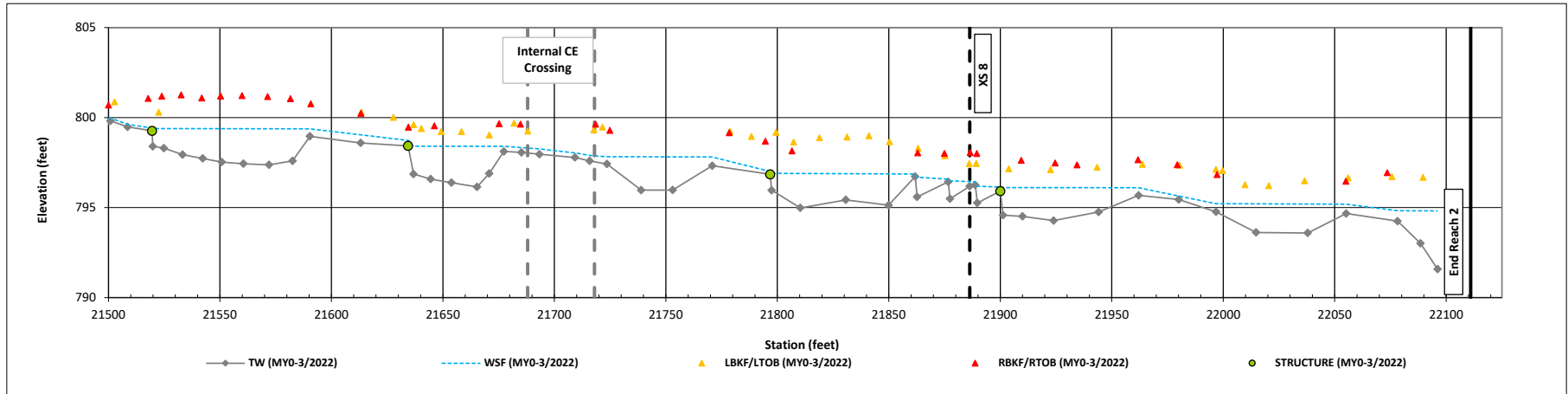


**Longitudinal Profile Plots**  
 Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

**UT1 (STA 200+05 to 221+11)**



**UT1 (STA 200+05 to 221+11)**



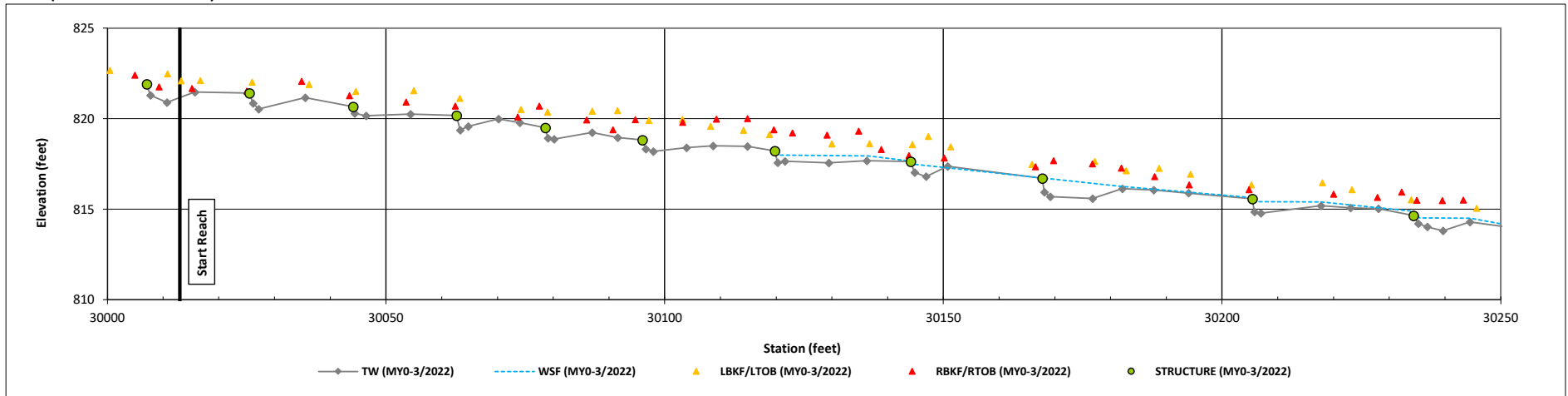
### Longitudinal Profile Plots

Oak Hill Dairy Mitigation Site

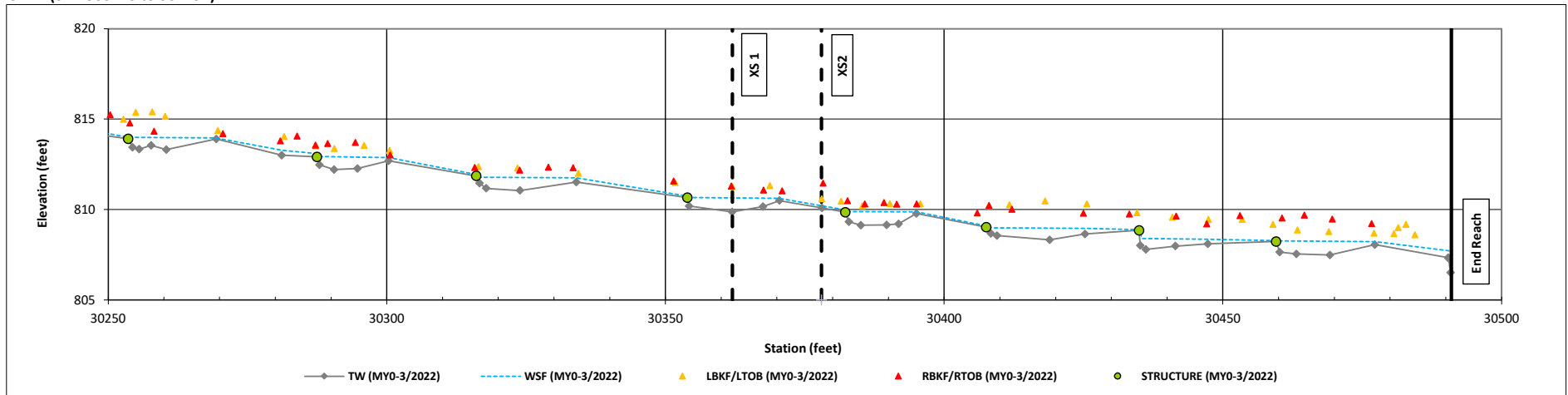
DMS Project No. 100120

Monitoring Year 0 - 2023

#### UT1A (STA 300+13 to 304+91)



#### UT1A (STA 300+13 to 304+91)





**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site

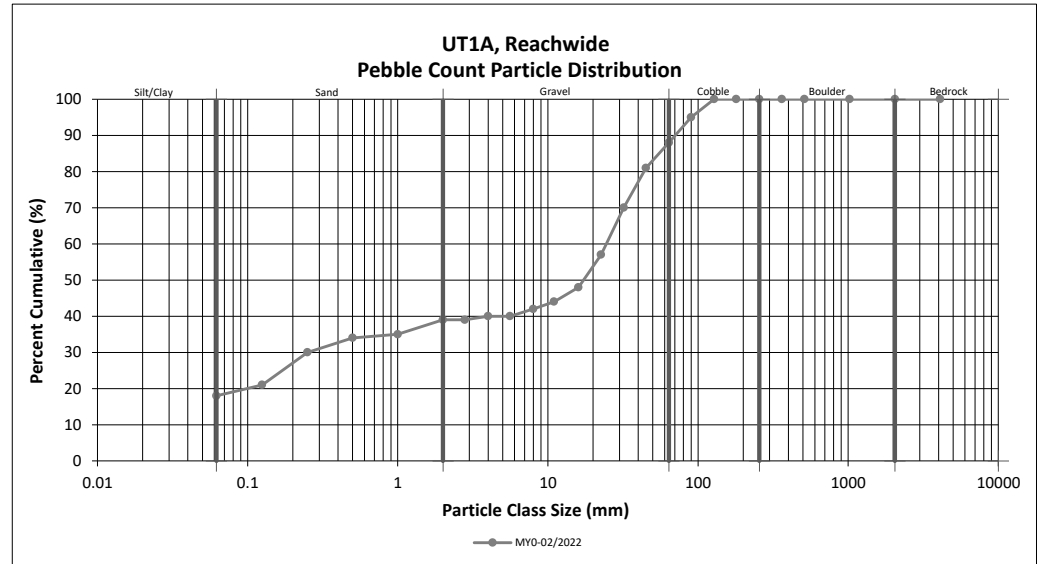
DMS Project No. 100120

Monitoring Year 0 - 2023

UT1A, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062		18	18	18	18
<i>SAND</i>	Very fine	0.062	0.125		3	3	3	21
	Fine	0.125	0.250	2	7	9	9	30
	Medium	0.25	0.50		4	4	4	34
	Coarse	0.5	1.0		1	1	1	35
	Very Coarse	1.0	2.0	2	2	4	4	39
<i>GRAVEL</i>	Very Fine	2.0	2.8					39
	Very Fine	2.8	4.0		1	1	1	40
	Fine	4.0	5.6					40
	Fine	5.6	8.0		2	2	2	42
	Medium	8.0	11.0	1	1	2	2	44
	Medium	11.0	16.0	4		4	4	48
	Coarse	16.0	22.6	8	1	9	9	57
	Coarse	22.6	32	11	2	13	13	70
	Very Coarse	32	45	6	5	11	11	81
Very Coarse	45	64	6	1	7	7	88	
<i>COBBLE</i>	Small	64	90	5	2	7	7	95
	Small	90	128	5		5	5	100
	Large	128	180					100
	Large	180	256					100
<i>BOULDER</i>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<i>BEDROCK</i>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	Silt/Clay
D <sub>35</sub> =	1.0
D <sub>50</sub> =	17.3
D <sub>84</sub> =	52.3
D <sub>95</sub> =	90.0
D <sub>100</sub> =	128.0

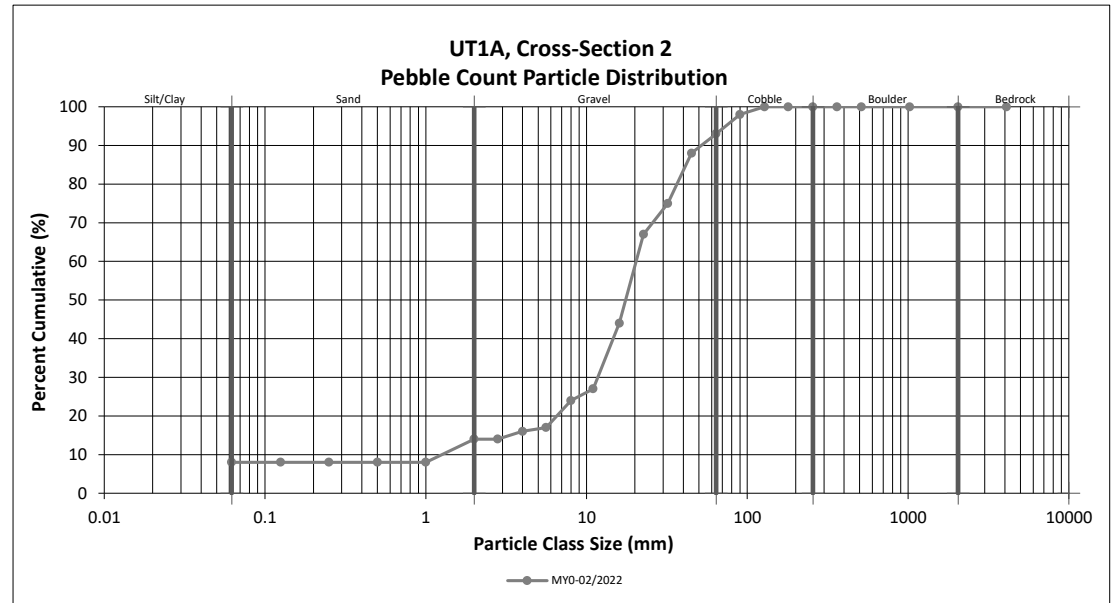


### Reachwide and Cross-Section Pebble Count Plots

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

UT1A, Cross-Section 2

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062	8	8	8
<b>SAND</b>	Very fine	0.062	0.125			8
	Fine	0.125	0.250			8
	Medium	0.25	0.50			8
	Coarse	0.5	1.0			8
	Very Coarse	1.0	2.0	6	6	14
<b>GRAVEL</b>	Very Fine	2.0	2.8			14
	Very Fine	2.8	4.0	2	2	16
	Fine	4.0	5.6	1	1	17
	Fine	5.6	8.0	7	7	24
	Medium	8.0	11.0	3	3	27
	Medium	11.0	16.0	17	17	44
	Coarse	16.0	22.6	23	23	67
	Coarse	22.6	32	8	8	75
	Very Coarse	32	45	13	13	88
Very Coarse	45	64	5	5	93	
<b>COBBLE</b>	Small	64	90	5	5	98
	Small	90	128	2	2	100
	Large	128	180			100
	Large	180	256			100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



Cross-Section 2	
Channel materials (mm)	
D <sub>16</sub> =	4.0
D <sub>35</sub> =	13.1
D <sub>50</sub> =	17.5
D <sub>84</sub> =	40.5
D <sub>95</sub> =	73.4
D <sub>100</sub> =	128.0

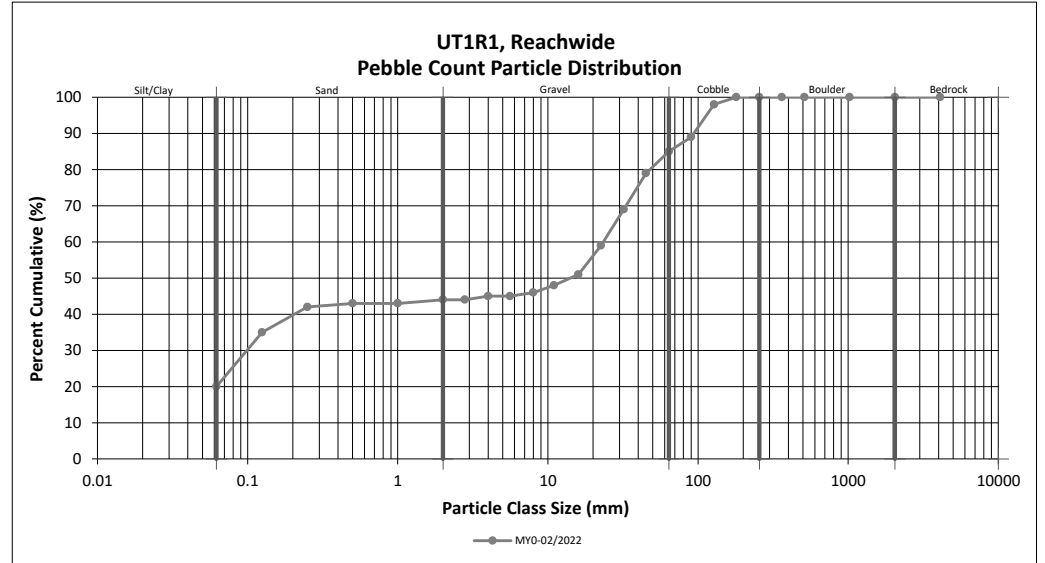
**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

UT1R1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062		20	20	20	20
<b>SAND</b>	Very fine	0.062	0.125		15	15	15	35
	Fine	0.125	0.250		7	7	7	42
	Medium	0.25	0.50	1		1	1	43
	Coarse	0.5	1.0					43
	Very Coarse	1.0	2.0	1		1	1	44
<b>GRAVEL</b>	Very Fine	2.0	2.8					44
	Very Fine	2.8	4.0		1	1	1	45
	Fine	4.0	5.6					45
	Fine	5.6	8.0		1	1	1	46
	Medium	8.0	11.0	2		2	2	48
	Medium	11.0	16.0	1	2	3	3	51
	Coarse	16.0	22.6	5	3	8	8	59
	Coarse	22.6	32	10		10	10	69
	Very Coarse	32	45	9	1	10	10	79
	Very Coarse	45	64	6		6	6	85
<b>COBBLE</b>	Small	64	90	4		4	4	89
	Small	90	128	9		9	9	98
	Large	128	180	2		2	2	100
	Large	180	256					100
<b>BOULDER</b>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	Silt/Clay
D <sub>35</sub> =	0.1
D <sub>50</sub> =	14.1
D <sub>84</sub> =	60.4
D <sub>95</sub> =	113.8
D <sub>100</sub> =	180.0

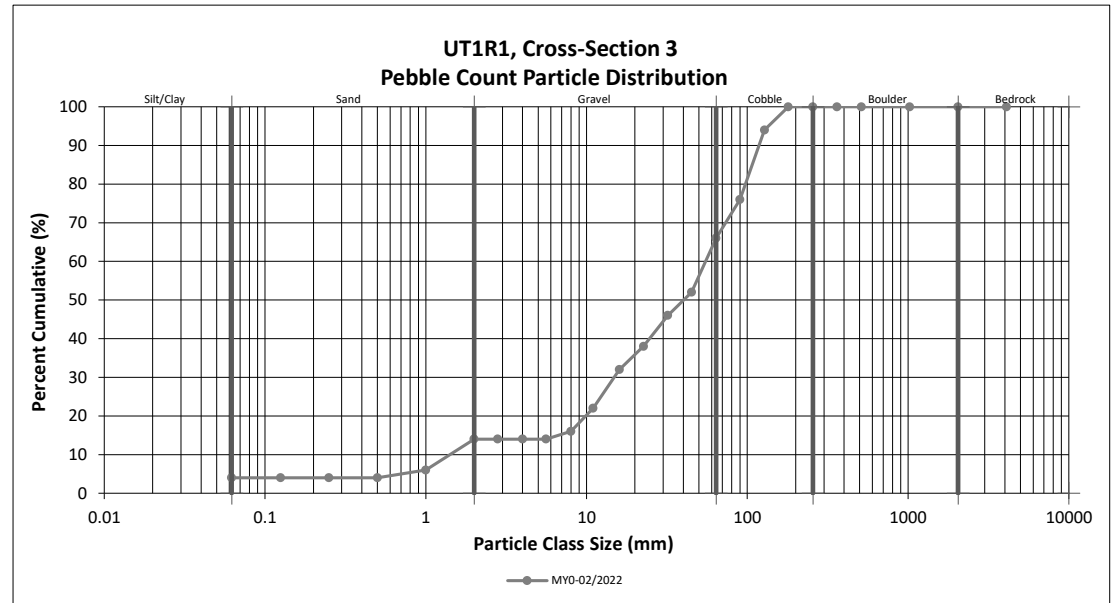


### Reachwide and Cross-Section Pebble Count Plots

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

UT1R1, Cross-Section 3

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062	4	4	4
<b>SAND</b>	Very fine	0.062	0.125			4
	Fine	0.125	0.250			4
	Medium	0.25	0.50			4
	Coarse	0.5	1.0	2	2	6
	Very Coarse	1.0	2.0	8	8	14
<b>GRAVEL</b>	Very Fine	2.0	2.8			14
	Very Fine	2.8	4.0			14
	Fine	4.0	5.6			14
	Fine	5.6	8.0	2	2	16
	Medium	8.0	11.0	6	6	22
	Medium	11.0	16.0	10	10	32
	Coarse	16.0	22.6	6	6	38
	Coarse	22.6	32	8	8	46
	Very Coarse	32	45	6	6	52
	Very Coarse	45	64	14	14	66
<b>COBBLE</b>	Small	64	90	10	10	76
	Small	90	128	18	18	94
	Large	128	180	6	6	100
	Large	180	256			100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



Cross-Section 3	
Channel materials (mm)	
D <sub>16</sub> =	8.0
D <sub>35</sub> =	19.0
D <sub>50</sub> =	40.2
D <sub>84</sub> =	105.3
D <sub>95</sub> =	135.5
D <sub>100</sub> =	180.0

**Reachwide and Cross-Section Pebble Count Plots**

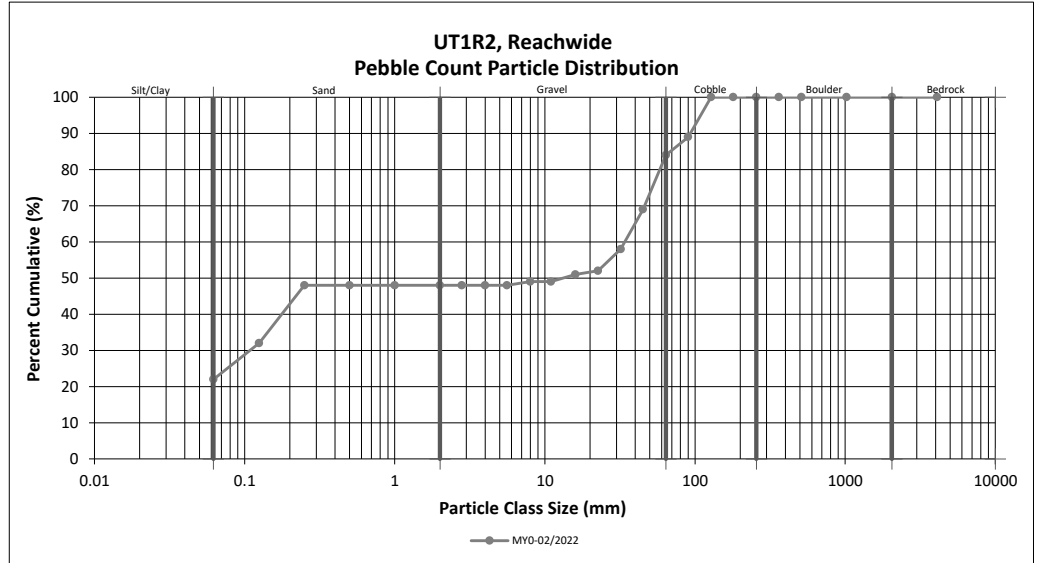
Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

UT1R2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062		22	22	22	22
<b>SAND</b>	Very fine	0.062	0.125		10	10	10	32
	Fine	0.125	0.250		16	16	16	48
	Medium	0.25	0.50					48
	Coarse	0.5	1.0					48
	Very Coarse	1.0	2.0					48
<b>GRAVEL</b>	Very Fine	2.0	2.8					48
	Very Fine	2.8	4.0					48
	Fine	4.0	5.6					48
	Fine	5.6	8.0		1	1	1	49
	Medium	8.0	11.0					49
	Medium	11.0	16.0	2		2	2	51
	Coarse	16.0	22.6	1		1	1	52
	Coarse	22.6	32	5	1	6	6	58
	Very Coarse	32	45	11		11	11	69
	Very Coarse	45	64	15		15	15	84
<b>COBBLE</b>	Small	64	90	5		5	5	89
	Small	90	128	11		11	11	100
	Large	128	180					100
	Large	180	256					100
<b>BOULDER</b>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>



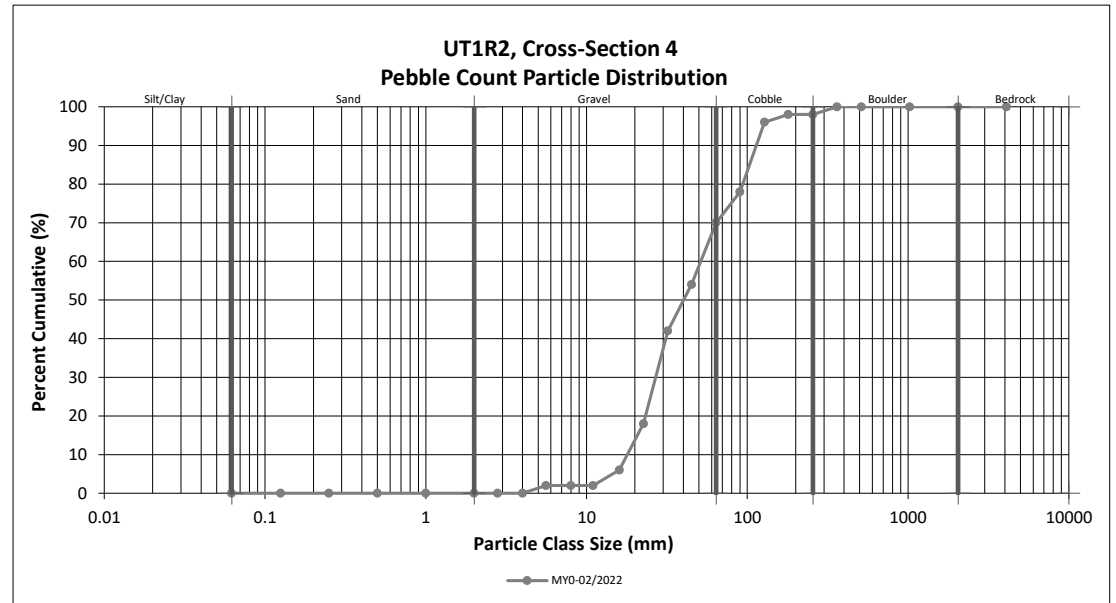
Reachwide	
Channel materials (mm)	
$D_{16}$ =	Silt/Clay
$D_{35}$ =	0.1
$D_{50}$ =	13.3
$D_{64}$ =	64.0
$D_{95}$ =	109.1
$D_{100}$ =	128.0

**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

UT1R2, Cross-Section 4

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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
<b>GRAVEL</b>	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	4	4	6
	Coarse	16.0	22.6	12	12	18
	Coarse	22.6	32	24	24	42
	Very Coarse	32	45	12	12	54
Very Coarse	45	64	16	16	70	
<b>COBBLE</b>	Small	64	90	8	8	78
	Small	90	128	18	18	96
	Large	128	180	2	2	98
	Large	180	256			98
<b>BOULDER</b>	Small	256	362	2	2	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



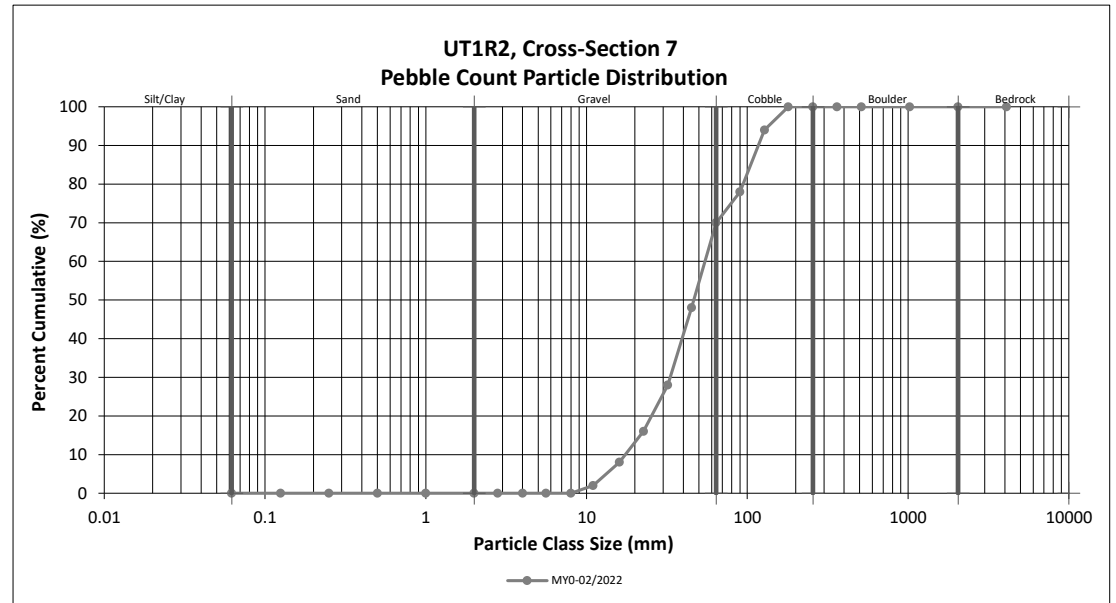
Cross-Section 4	
Channel materials (mm)	
D <sub>16</sub> =	21.3
D <sub>35</sub> =	28.9
D <sub>50</sub> =	40.2
D <sub>84</sub> =	101.2
D <sub>95</sub> =	125.5
D <sub>100</sub> =	362.0

**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

UT1R2, Cross-Section 7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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
<b>GRAVEL</b>	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	2	2	2
	Medium	11.0	16.0	6	6	8
	Coarse	16.0	22.6	8	8	16
	Coarse	22.6	32	12	12	28
	Very Coarse	32	45	20	20	48
Very Coarse	45	64	22	22	70	
<b>COBBLE</b>	Small	64	90	8	8	78
	Small	90	128	16	16	94
	Large	128	180	6	6	100
	Large	180	256			100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



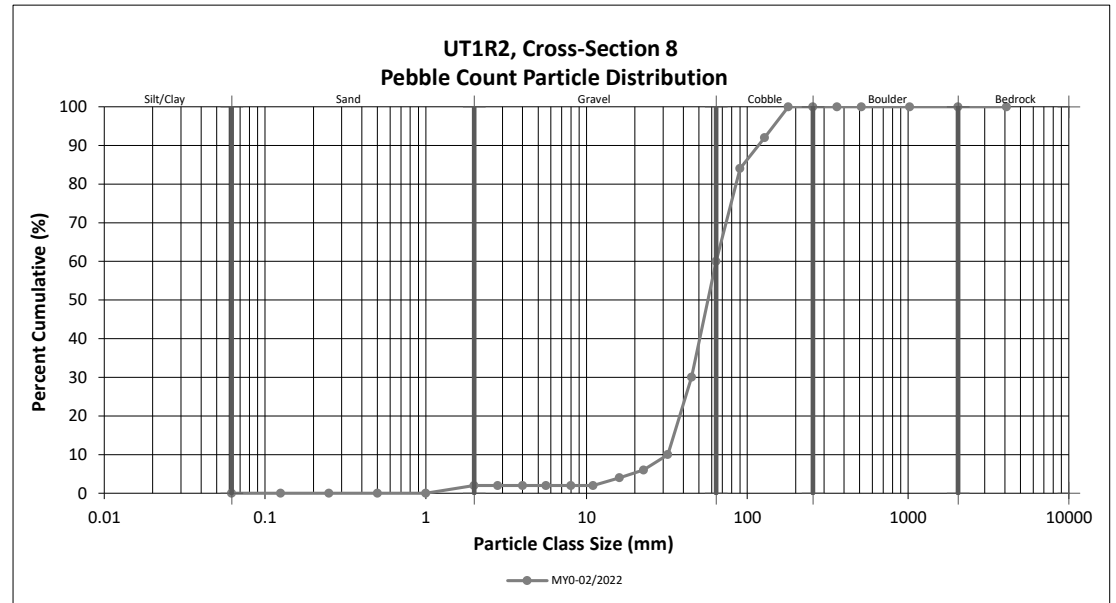
Cross-Section 7	
Channel materials (mm)	
D <sub>16</sub> =	22.6
D <sub>35</sub> =	36.1
D <sub>50</sub> =	46.5
D <sub>84</sub> =	102.7
D <sub>95</sub> =	135.5
D <sub>100</sub> =	180.0

**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

UT1R2, Cross-Section 8

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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	2	2	2
<b>GRAVEL</b>	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			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	2	4
	Coarse	16.0	22.6	2	2	6
	Coarse	22.6	32	4	4	10
	Very Coarse	32	45	20	20	30
Very Coarse	45	64	30	30	60	
<b>COBBLE</b>	Small	64	90	24	24	84
	Small	90	128	8	8	92
	Large	128	180	8	8	100
	Large	180	256			100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



Cross-Section 8	
Channel materials (mm)	
D <sub>16</sub> =	35.4
D <sub>35</sub> =	47.7
D <sub>50</sub> =	56.9
D <sub>84</sub> =	90.0
D <sub>95</sub> =	145.5
D <sub>100</sub> =	180.0



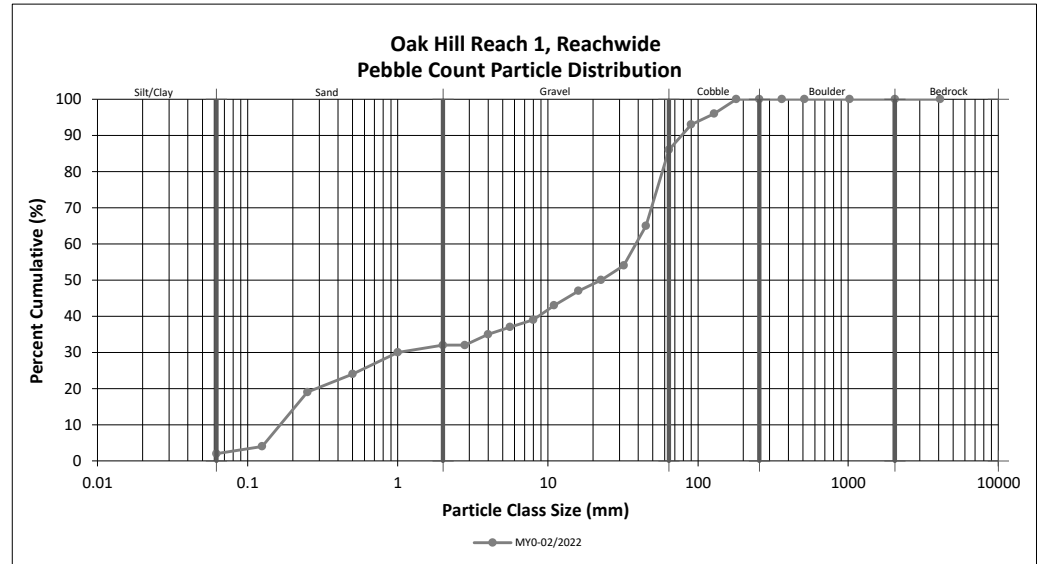
### Reachwide and Cross-Section Pebble Count Plots

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

Oak Hill Reach 1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062		2	2	2	2
<b>SAND</b>	Very fine	0.062	0.125		2	2	2	4
	Fine	0.125	0.250		15	15	15	19
	Medium	0.25	0.50		5	5	5	24
	Coarse	0.5	1.0		6	6	6	30
	Very Coarse	1.0	2.0		2	2	2	32
<b>GRAVEL</b>	Very Fine	2.0	2.8					32
	Very Fine	2.8	4.0		3	3	3	35
	Fine	4.0	5.6		2	2	2	37
	Fine	5.6	8.0		2	2	2	39
	Medium	8.0	11.0		4	4	4	43
	Medium	11.0	16.0	2	2	4	4	47
	Coarse	16.0	22.6	3		3	3	50
	Coarse	22.6	32	2	2	4	4	54
	Very Coarse	32	45	8	3	11	11	65
Very Coarse	45	64	21		21	21	86	
<b>COBBLE</b>	Small	64	90	7		7	7	93
	Small	90	128	3		3	3	96
	Large	128	180	4		4	4	100
	Large	180	256					100
<b>BOULDER</b>	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	0.2
D <sub>35</sub> =	4.0
D <sub>50</sub> =	22.6
D <sub>84</sub> =	61.9
D <sub>95</sub> =	113.8
D <sub>100</sub> =	180.0



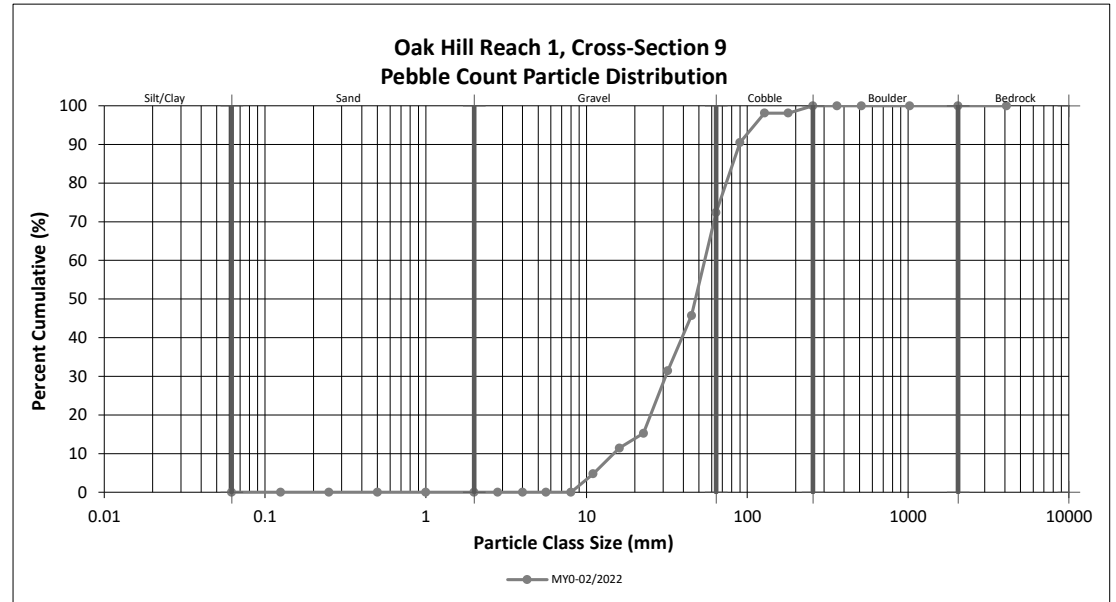
**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Oak Hill Reach 1, Cross-Section 9

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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
<b>GRAVEL</b>	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	5	5	5
	Medium	11.0	16.0	7	7	11
	Coarse	16.0	22.6	4	4	15
	Coarse	22.6	32	17	16	31
	Very Coarse	32	45	15	14	46
Very Coarse	45	64	28	27	72	
<b>COBBLE</b>	Small	64	90	19	18	90
	Small	90	128	8	8	98
	Large	128	180			98
	Large	180	256	2	2	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>105</b>	<b>100</b>	<b>100</b>

Cross-Section 9	
Channel materials (mm)	
D <sub>16</sub> =	23.0
D <sub>35</sub> =	34.8
D <sub>50</sub> =	47.6
D <sub>84</sub> =	79.7
D <sub>95</sub> =	110.9
D <sub>100</sub> =	256.0



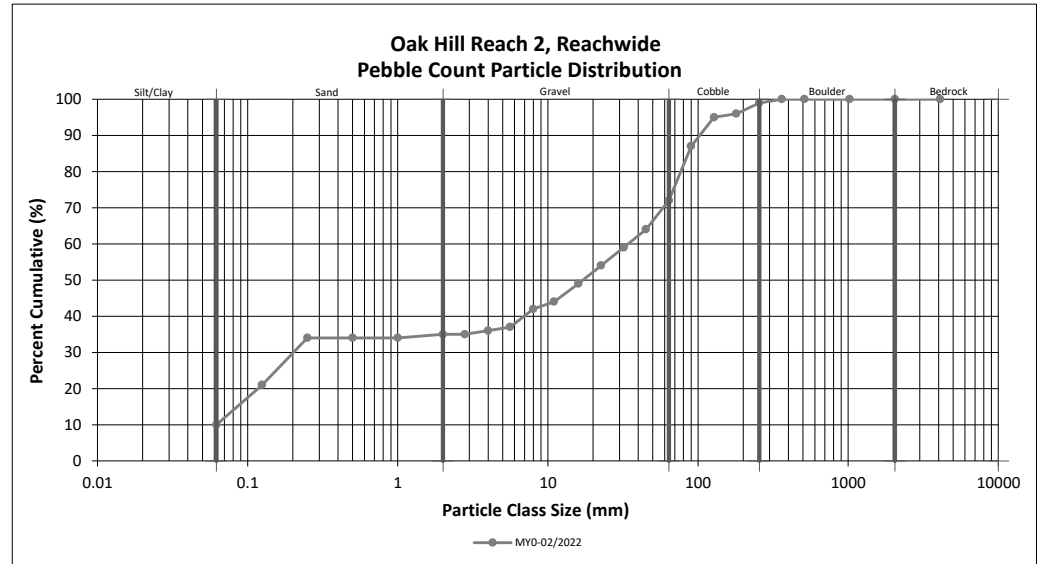
### Reachwide and Cross-Section Pebble Count Plots

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

Oak Hill Reach 2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062		10	10	10	10
<b>SAND</b>	Very fine	0.062	0.125		11	11	11	21
	Fine	0.125	0.250		13	13	13	34
	Medium	0.25	0.50					34
	Coarse	0.5	1.0					34
	Very Coarse	1.0	2.0		1	1	1	35
<b>GRAVEL</b>	Very Fine	2.0	2.8					35
	Very Fine	2.8	4.0		1	1	1	36
	Fine	4.0	5.6	1		1	1	37
	Fine	5.6	8.0		5	5	5	42
	Medium	8.0	11.0		2	2	2	44
	Medium	11.0	16.0	3	2	5	5	49
	Coarse	16.0	22.6	3	2	5	5	54
	Coarse	22.6	32	3	2	5	5	59
	Very Coarse	32	45	4	1	5	5	64
	Very Coarse	45	64	8		8	8	72
<b>COBBLE</b>	Small	64	90	15		15	15	87
	Small	90	128	8		8	8	95
	Large	128	180	1		1	1	96
	Large	180	256	3		3	3	99
<b>BOULDER</b>	Small	256	362	1		1	1	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	0.1
D <sub>35</sub> =	2.0
D <sub>50</sub> =	17.1
D <sub>84</sub> =	84.1
D <sub>95</sub> =	128.0
D <sub>100</sub> =	362.0



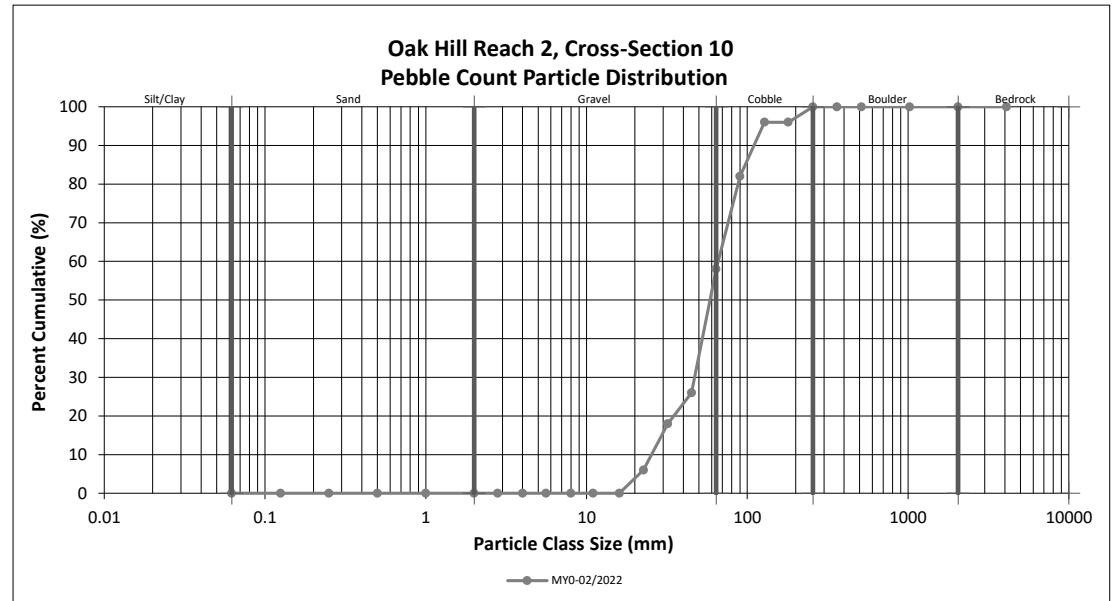
### Reachwide and Cross-Section Pebble Count Plots

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Oak Hill Reach 2, Cross-Section 10

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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
<b>GRAVEL</b>	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	6	6	6
	Coarse	22.6	32	12	12	18
	Very Coarse	32	45	8	8	26
Very Coarse	45	64	32	32	58	
<b>COBBLE</b>	Small	64	90	24	24	82
	Small	90	128	14	14	96
	Large	128	180			96
	Large	180	256	4	4	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>

Cross-Section 10	
Channel materials (mm)	
D <sub>16</sub> =	30.2
D <sub>35</sub> =	49.7
D <sub>50</sub> =	58.6
D <sub>84</sub> =	94.6
D <sub>95</sub> =	124.8
D <sub>100</sub> =	256.0

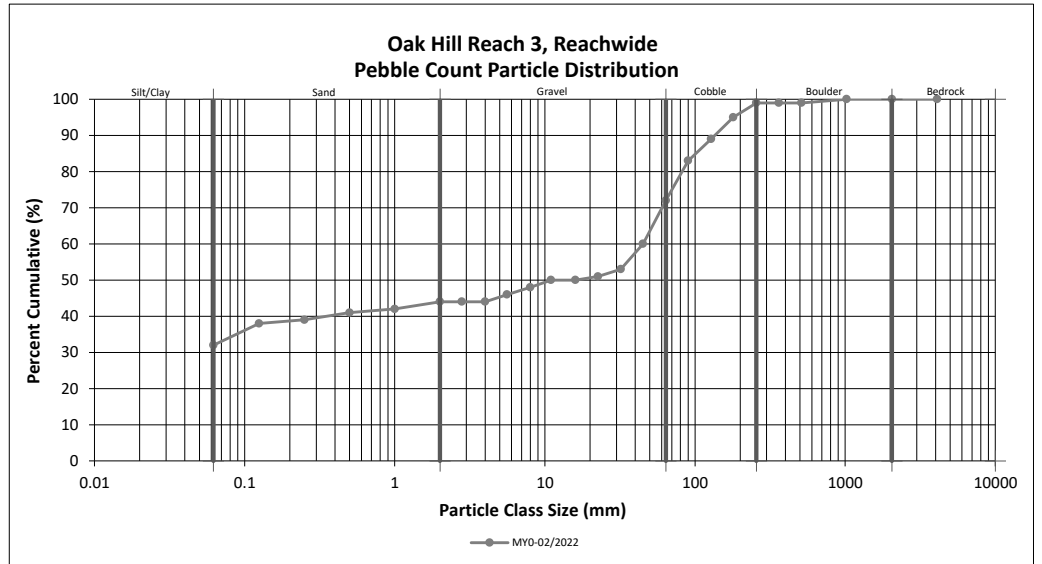


**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Oak Hill Reach 3, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<i>SILT/CLAY</i>	Silt/Clay	0.000	0.062		32	32	32	32
<i>SAND</i>	Very fine	0.062	0.125		6	6	6	38
	Fine	0.125	0.250		1	1	1	39
	Medium	0.25	0.50		2	2	2	41
	Coarse	0.5	1.0		1	1	1	42
<i>GRAVEL</i>	Very Coarse	1.0	2.0		2	2	2	44
	Very Fine	2.0	2.8					44
	Very Fine	2.8	4.0					44
	Fine	4.0	5.6		2	2	2	46
	Fine	5.6	8.0		2	2	2	48
	Medium	8.0	11.0		2	2	2	50
	Medium	11.0	16.0					50
	Coarse	16.0	22.6	1		1	1	51
	Coarse	22.6	32	2		2	2	53
	Very Coarse	32	45	7		7	7	60
<i>COBBLE</i>	Very Coarse	45	64	12		12	12	72
	Small	64	90	11		11	11	83
	Small	90	128	6		6	6	89
	Large	128	180	6		6	6	95
<i>BOULDER</i>	Large	180	256	4		4	4	99
	Small	256	362					99
	Small	362	512					99
	Medium	512	1024	1		1	1	100
<i>BEDROCK</i>	Large/Very Large	1024	2048					100
	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>



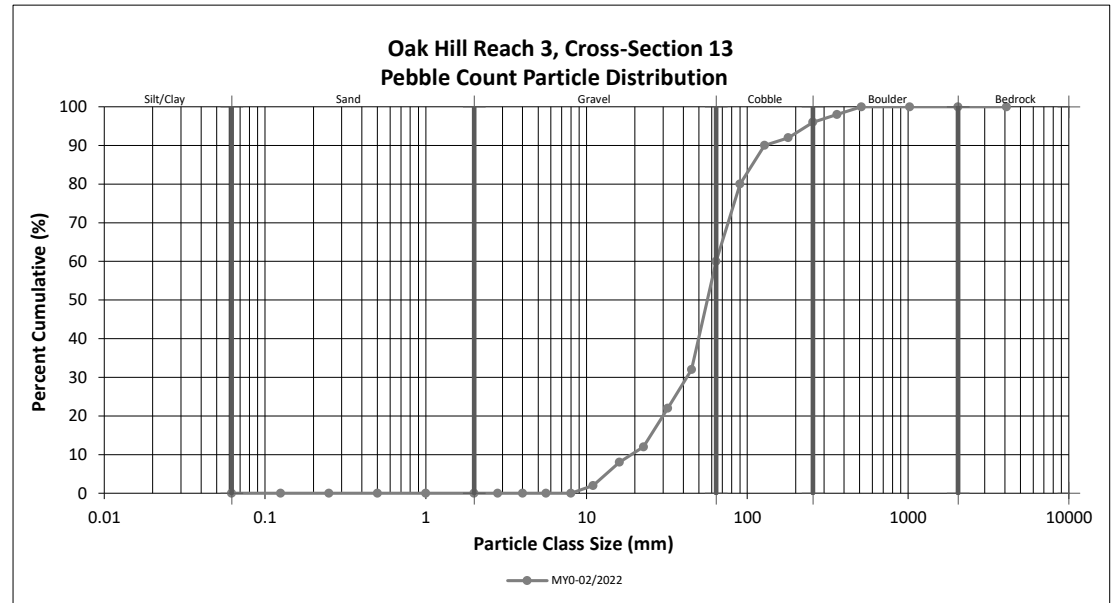
Reachwide Channel materials (mm)	
D <sub>16</sub> =	Silt/Clay
D <sub>35</sub> =	0.1
D <sub>50</sub> =	11.0
D <sub>84</sub> =	95.4
D <sub>95</sub> =	180.0
D <sub>100</sub> =	1024.0

### Reachwide and Cross-Section Pebble Count Plots

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
 Monitoring Year 0 - 2023

Oak Hill Reach 3, Cross-Section 13

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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
<b>GRAVEL</b>	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	2	2	2
	Medium	11.0	16.0	6	6	8
	Coarse	16.0	22.6	4	4	12
	Coarse	22.6	32	10	10	22
	Very Coarse	32	45	10	10	32
Very Coarse	45	64	28	28	60	
<b>COBBLE</b>	Small	64	90	20	20	80
	Small	90	128	10	10	90
	Large	128	180	2	2	92
	Large	180	256	4	4	96
<b>BOULDER</b>	Small	256	362	2	2	98
	Small	362	512	2	2	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



Cross-Section 13 Channel materials (mm)	
D <sub>16</sub> =	26.0
D <sub>35</sub> =	46.7
D <sub>50</sub> =	56.4
D <sub>84</sub> =	103.6
D <sub>95</sub> =	234.4
D <sub>100</sub> =	512.0

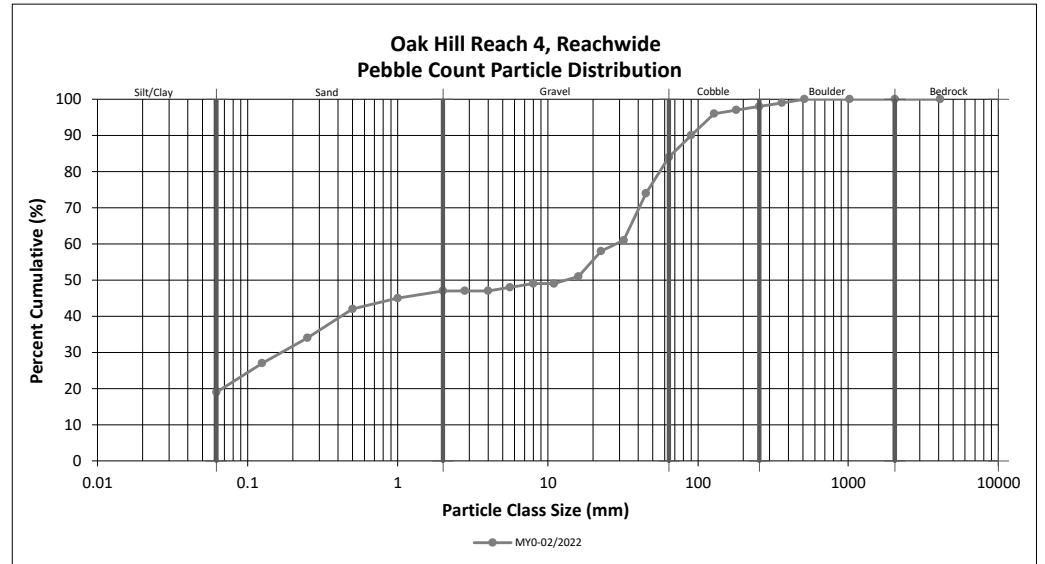
**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Oak Hill Reach 4, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062		19	19	19	19
<b>SAND</b>	Very fine	0.062	0.125		8	8	8	27
	Fine	0.125	0.250		7	7	7	34
	Medium	0.25	0.50		8	8	8	42
	Coarse	0.5	1.0		3	3	3	45
	Very Coarse	1.0	2.0		2	2	2	47
<b>GRAVEL</b>	Very Fine	2.0	2.8					47
	Very Fine	2.8	4.0					47
	Fine	4.0	5.6		1	1	1	48
	Fine	5.6	8.0		1	1	1	49
	Medium	8.0	11.0					49
	Medium	11.0	16.0	2		2	2	51
	Coarse	16.0	22.6	7		7	7	58
	Coarse	22.6	32	3		3	3	61
	Very Coarse	32	45	12	1	13	13	74
	Very Coarse	45	64	10		10	10	84
<b>COBBLE</b>	Small	64	90	6		6	6	90
	Small	90	128	6		6	6	96
	Large	128	180	1		1	1	97
	Large	180	256	1		1	1	98
<b>BOULDER</b>	Small	256	362	1		1	1	99
	Small	362	512	1		1	1	100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
<b>BEDROCK</b>	Bedrock	2048	>2048					100
<b>Total</b>				<b>50</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>100</b>

Reachwide	
Channel materials (mm)	
D <sub>16</sub> =	Silt/Clay
D <sub>35</sub> =	0.3
D <sub>50</sub> =	13.3
D <sub>84</sub> =	64.0
D <sub>95</sub> =	120.7
D <sub>100</sub> =	512.0

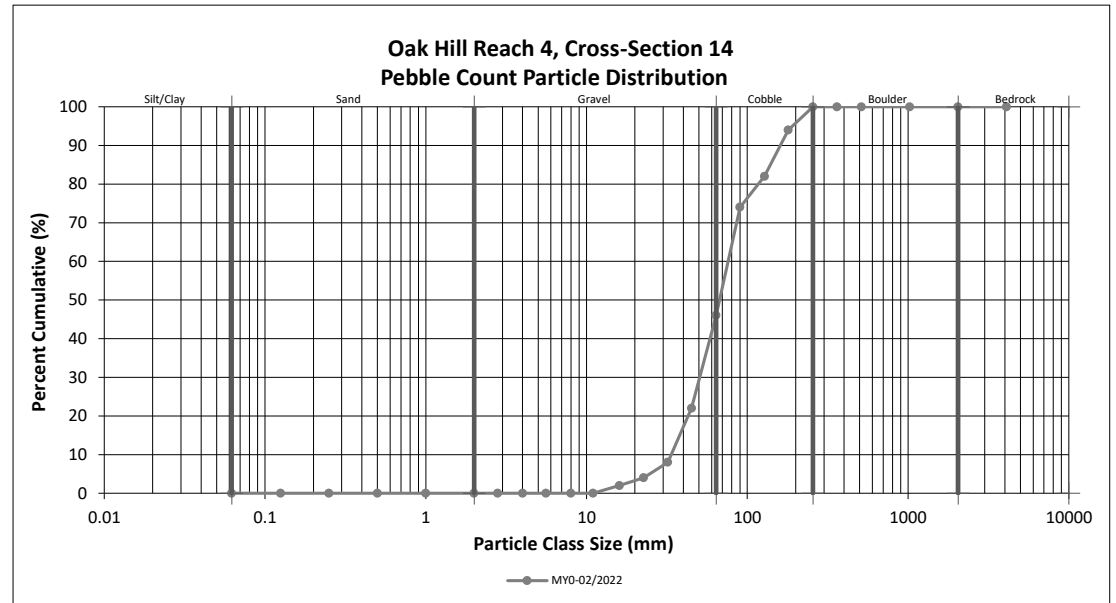


**Reachwide and Cross-Section Pebble Count Plots**

Oak Hill Dairy Mitigation Site  
 DMS Project No. 100120  
**Monitoring Year 0 - 2023**

Oak Hill Reach 4, Cross-Section 14

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
<b>SILT/CLAY</b>	Silt/Clay	0.000	0.062			0
<b>SAND</b>	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
<b>GRAVEL</b>	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	2	2	2
	Coarse	16.0	22.6	2	2	4
	Coarse	22.6	32	4	4	8
	Very Coarse	32	45	14	14	22
Very Coarse	45	64	24	24	46	
<b>COBBLE</b>	Small	64	90	28	28	74
	Small	90	128	8	8	82
	Large	128	180	12	12	94
	Large	180	256	6	6	100
<b>BOULDER</b>	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
<b>BEDROCK</b>	Bedrock	2048	>2048			100
<b>Total</b>				<b>100</b>	<b>100</b>	<b>100</b>



Cross-Section 14 Channel materials (mm)	
D <sub>16</sub> =	38.9
D <sub>35</sub> =	54.5
D <sub>50</sub> =	67.2
D <sub>84</sub> =	135.5
D <sub>95</sub> =	190.9
D <sub>100</sub> =	256.0



**Table 8a. Baseline Stream Data Summary**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)			
	UT1A								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n	
Bankfull Width (ft)	9.9		1	5.5		4.3		1	
Floodprone Width (ft)	12.2		1	8.0	12.0	9.3		1	
Bankfull Mean Depth	0.2		1	0.5		0.3		1	
Bankfull Max Depth	0.4		1	0.6	0.8	0.5		1	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	1.9		1	2.6		1.2		1	
Width/Depth Ratio	51.0		1	12.0		15.0		1	
Entrenchment Ratio	1.2		1	1.4	2.2	2.2		1	
Bank Height Ratio	9.6		1	1.0	1.1	1.0		1	
Max part size (mm) mobilized at bankfull	Silt			---		17.5		1	
Rosgen Classification	F6b			E4b		E4b			
Bankfull Discharge (cfs)	3			7		---			
Sinuosity	1.07			1.10		1.10			
Water Surface Slope (ft/ft) <sup>2</sup>	0.0250			0.0320		0.0274			
Other									
Parameter	UT1 Reach 1								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n	
Bankfull Width (ft)	15.9		1	17.0		18.7		1	
Floodprone Width (ft)	24.5		1	37.0	85.0	54.8		1	
Bankfull Mean Depth	0.7		1	1.1		1.2		1	
Bankfull Max Depth	1.6		1	1.3	1.6	1.8		1	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	10.7		1	18.4		22.0		1	
Width/Depth Ratio	23.4		1	16.0		15.9		1	
Entrenchment Ratio	1.5		1	2.2	5.0	2.9		1	
Bank Height Ratio	2.4		1	1.0	1.1	1.0		1	
Max part size (mm) mobilized at bankfull	3.2			---		40.2		1	
Rosgen Classification	F4			C4		C4			
Bankfull Discharge (cfs)	31			42		---			
Sinuosity	1.03			1.20		1.20			
Water Surface Slope (ft/ft) <sup>2</sup>	0.0077			0.0060		0.0064			
Other									

**Table 8b. Baseline Stream Data Summary**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
	Min	Max	n	Min	Max	Min	Max	n
<b>UT1 Reach 2</b>								
<b>Riffle Only</b>	<b>Min</b>	<b>Max</b>	<b>n</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>n</b>
Bankfull Width (ft)	9.1		1	17.0		14.8	16.4	3
Floodprone Width (ft)	16.2		1	37.0	85.0	72.6	100.0	3
Bankfull Mean Depth	1.5		1	1.1		0.8	1.0	3
Bankfull Max Depth	2.2		1	1.3	1.6	1.5	1.8	3
Bankfull Cross Sectional Area (ft <sup>2</sup> )	14.1		1	18.4		12.0	15.2	3
Width/Depth Ratio	5.9		1	16.0		14.3	21.0	3
Entrenchment Ratio	1.8		1	2.2	5.0	4.7	6.1	3
Bank Height Ratio	2.4		1	1.0	1.1	1.0		3
Max part size (mm) mobilized at bankfull	3.3			---		40.2	56.9	3
Rosgen Classification	G4			C4		C4		
Bankfull Discharge (cfs)	52			51		---		
Sinuosity	1.15			1.20		1.20		
Water Surface Slope (ft/ft) <sup>2</sup>	0.0070			0.0070		0.0070		
Other								
<b>Oak Hill Reach 1</b>								
<b>Riffle Only</b>	<b>Min</b>	<b>Max</b>	<b>n</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>n</b>
Bankfull Width (ft)	19.9		1	20.0		21.5		1
Floodprone Width (ft)	40.0		1	44.0	100.0	72.4		1
Bankfull Mean Depth	1.4		1	1.4		1.2		1
Bankfull Max Depth	1.7		1	1.7	2.1	2.2		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	27.5		1	28.4		25.3		1
Width/Depth Ratio	14.4		1	14.0		18.2		1
Entrenchment Ratio	2.0		1	2.2	5.0	3.4		1
Bank Height Ratio	2.4		1	1.0	1.1	1.0		1
Max part size (mm) mobilized at bankfull	22.6			---		47.6		1
Rosgen Classification	B4c			C4		C4		
Bankfull Discharge (cfs)	98			90		---		
Sinuosity	1.30			1.20		1.20		
Water Surface Slope (ft/ft) <sup>2</sup>	0.0070			0.0040		0.0046		
Other								

**Table 8c. Baseline Stream Data Summary**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
	Min	Max	n	Min	Max	Min	Max	n
<b>Oak Hill Reach 2</b>								
<b>Riffle Only</b>	<b>Min</b>	<b>Max</b>	<b>n</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>n</b>
Bankfull Width (ft)	14.6		1	23.0		21.2		1
Floodprone Width (ft)	79		1	51	115	83.8		1
Bankfull Mean Depth	1.9		1	1.5		1.2		1
Bankfull Max Depth	3		1	1.7	2.3	2.1		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	28.1		1	33.4		25.5		1
Width/Depth Ratio	7.6		1	16.0		17.7		1
Entrenchment Ratio	5.4		1	2.2	5.0	4.0		1
Bank Height Ratio	2.0		1	1.0	1.1	1.0		1
Max part size (mm) mobilized at bankfull	2.5			---		58.6		1
Rosgen Classification	G4c			C4		C4		
Bankfull Discharge (cfs)	94			88		---		
Sinuosity	1.65			1.20		1.20		
Water Surface Slope (ft/ft) <sup>2</sup>	0.0057			0.0055		0.0051		
Other								
<b>Oak Hill Reach 3</b>								
<b>Riffle Only</b>	<b>Min</b>	<b>Max</b>	<b>n</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>n</b>
Bankfull Width (ft)	19.3		1	25.0		22.3		1
Floodprone Width (ft)	49.8		1	55	125	102.5		1
Bankfull Mean Depth	1.5		1	1.8		1.4		1
Bankfull Max Depth	2.2		1	2.1	2.6	2.6		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	29.1		1	43.9		31.5		1
Width/Depth Ratio	12.9		1	14.0		15.8		1
Entrenchment Ratio	2.6		1	2.2	5.0	4.6		1
Bank Height Ratio	2.6		1	1.0	1.1	1.0		1
Max part size (mm) mobilized at bankfull	8.0			---		56.4		1
Rosgen Classification	C4			C4		C4		
Bankfull Discharge (cfs)	95			149		---		
Sinuosity	1.15			1.20		1.20		
Water Surface Slope (ft/ft) <sup>2</sup>	0.0052			0.0055		0.0060		
Other								

**Table 8d. Baseline Stream Data Summary**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
	Oak Hill Reach 4							
Riffle Only	Min	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	19.8		1	25.0		26.0		1
Floodprone Width (ft)	90.7		1	55	125	94.3		1
Bankfull Mean Depth	1.8		1	1.8		1.4		1
Bankfull Max Depth	2.3		1	2.1	2.6	2.7		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	35.1		1	43.9		36.1		1
Width/Depth Ratio	11.2		1	14.0		18.8		1
Entrenchment Ratio	4.6		1	2.2	5.0	3.6		1
Bank Height Ratio	2.3		1	1.0	1.1	1.0		1
Max part size (mm) mobilized at bankfull	1.7			---		67.2		1
Rosgen Classification	E5			C4		C4		
Bankfull Discharge (cfs)	122			156		---		
Sinuosity	1.16			1.20		1.20		
Water Surface Slope (ft/ft) <sup>2</sup>	0.0050			0.0070		0.0054		
Other								

**Table 9. Cross-Section Morphology Monitoring Summary**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 0 - 2023

	UT1A												UT1 Reach 1						UT1 Reach 2					
	Cross-Section 1 (Pool)						Cross-Section 2 (Riffle)						Cross-Section 3 (Riffle)						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 <sup>1</sup> Area	811.26						810.59						810.05						807.79					
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.0						1.0						1.0						1.0					
Thalweg Elevation	809.87						810.08						808.20						806.22					
LTOB <sup>2</sup> Elevation	811.26						810.59						810.05						807.79					
LTOB <sup>2</sup> Max Depth (ft)	1.4						0.5						1.8						1.6					
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	4.0						1.2						22.0						12.8					
UT1 Reach 2																								
	Cross-Section 5 (Pool)						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 <sup>1</sup> Area	807.22						802.40						802.44						797.65				
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.0						1.0						1.0						1.0					
Thalweg Elevation	804.21						798.88						800.62						796.18					
LTOB <sup>2</sup> Elevation	807.22						802.40						802.44						797.65					
LTOB <sup>2</sup> Max Depth (ft)	3.0						3.5						1.8						1.5					
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	26.1						43.0						15.2						12.0					
Oak Hill Reach 1												Oak Hill Reach 2						Oak Hill Reach 3						
	Cross-Section 9 (Riffle)						Cross-Section 10 (Riffle)						Cross-Section 11 (Pool)						Cross-Section 12 (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 <sup>1</sup> Area	799.74						798.06						797.76						794.01				
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.0						1.0						1.0						1.0					
Thalweg Elevation	797.55						795.97						793.40						789.76					
LTOB <sup>2</sup> Elevation	799.74						798.06						797.76						794.01					
LTOB <sup>2</sup> Max Depth (ft)	2.2						2.1						4.4						4.2					
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	25.3						25.5						64.9						73.1					
Oak Hill Reach 3												Oak Hill Reach 4												
	Cross-Section 13 (Riffle)						Cross-Section 14 (Riffle)																	
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7												
	Bankfull Elevation (ft) - Based on AB-Bankfull <sup>1</sup> Area	794.36						790.90																
Bank Height Ratio - Based on AB Bankfull <sup>1</sup> Area	1.0						1.0																	
Thalweg Elevation	791.77						788.21																	
LTOB <sup>2</sup> Elevation	794.36						790.90																	
LTOB <sup>2</sup> Max Depth (ft)	2.6						2.7																	
LTOB <sup>2</sup> Cross Sectional Area (ft <sup>2</sup> )	31.5						36.1																	

<sup>1</sup>Bank Height Ratio (BHR) takes the As-built bankfull area as the basis for adjusting each subsequent years bankfull elevation.

<sup>2</sup>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 recoded and tracked above as LTOB max depth.

## **Appendix D**

### **Project Timeline and Contact Information**

**Table 10. Project Activity and Reporting History**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

**Monitoring Year 0 - 2023**

Activity or Deliverable		Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted		N/A	April 2019
Mitigation Plan Approved		July 2019 - March 2021	March 2021
Construction (Grading) Completed		September 2021-January 2022	January 2022
Wetland Regrading Completed		October 2022	October 2022
Planting Completed		February 2022	February 2022
Regrading Planting Completed		February 2023	February 2023
As-Built Survey Completed		January - March 2022	April 2022
As-Built Survey Completed - Regrading		October 2022	November 2022
Baseline Monitoring Document (Year 0)	Stream Survey	February - March 2022	April 2023
	Vegetation Survey	February 2022	
	Regrading Vegetation Survey	February 2023	
Year 1 Monitoring	Stream Survey	2023	December 2023
	Vegetation Survey	2023	
Year 2 Monitoring	Stream Survey	2024	December 2024
	Vegetation Survey	2024	
Year 3 Monitoring	Stream Survey	2025	December 2025
	Vegetation Survey	2025	
Year 4 Monitoring			December 2026
Year 5 Monitoring	Stream Survey	2027	December 2027
	Vegetation Survey	2027	
Year 6 Monitoring			December 2028
Year 7 Monitoring	Stream Survey	2029	December 2029
	Vegetation Survey	2029	

**Table 11. Project Contact Table**

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

**Monitoring Year 0 - 2023**

<b>Designer</b> Jake McLean, PE, CFM	<b>Wildlands Engineering, Inc.</b> 167-B Haywood Rd Asheville, NC 28806 828.774.5547
<b>Construction Contractor</b>	<b>Wildlands Construction, Inc.</b> 1430 S. Mint St., Suite 140 Charlotte, NC 28203
<b>Planting Contractor</b>	<b>Bruton Natural Systems, Inc.</b> P.O. Box 1197 Fremont, NC 27830
<b>Monitoring Performers</b> Monitoring, POC	<b>Wildlands Engineering, Inc.</b> Kristi Suggs 704.332.7754

**Appendix E**

**Record Drawings and Sealed As-Built Survey**

**(see attached in Portfolio)**



**Appendix F**  
**Correspondence**



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](mailto:matthew.reid@ncdenr.gov)

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



*Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.*

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**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

**CAUTION:** External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

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

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**From:** Jason Lorch <[jlorch@wildlandseng.com](mailto:jlorch@wildlandseng.com)>  
**Sent:** Monday, October 25, 2021 9:05 AM  
**To:** Kristi Suggs <[ksuggs@wildlandseng.com](mailto: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

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

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919 208 1426 mobile  
[periann.russell@ncdenr.gov](mailto:periann.russell@ncdenr.gov)

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## MEMO

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SUBJECT: Post Construction Grading Revisions  
**Oak Hill Dairy Mitigation Site**  
Cataloging Units 03050101, 03050102 and 03050103 (Catawba ESA); Gaston County, NC  
DEQ Contract No. 7867  
DMS Project No. 100120  
Wildlands Project No. 005-02182

DATE: 8/8/22

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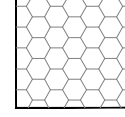
During post construction data review and FEMA modeling for Letter of Map Revision it was noted that multiple areas on the floodplain were higher than the proposed design grade per the mitigation plan and construction drawings. Wildlands is unsure of what caused the grading issues during construction but the as-built demonstrates that channel, bankfull and immediately adjacent grading were consistently built to design grades, but that certain areas on the floodplain in the middle and lower portions of the project were built high, or showed high on the as-built survey due to fluffing of the soil from ripping and discing or from survey bias.

As a result, areas with wetland crediting were between 3" and 12" above the design grades per the as-built topographic survey. More recent spot checks suggest that the site may have subsequently settled and is closer to design grade than the survey suggests. We plan to have the surveyor complete an evaluation of existing grade prior to finalizing proposed re-grading plans. Subject to this effort, Wildlands proposes to remobilize to the site and re-grade some or all of the areas identified on the attached figure. The figure provides a summary of grading acreage and average depth of additional grading to achieve design grades based on as-built data. Without this effort to attain the design grades, Wildlands is concerned that the desired stream-wetland interaction and wetland hydrology will not be met.

A 10-foot wide buffer will be left intact off of the bankfull top of bank. Based on the as-built, approximately 3-acres, or 15%, of the site is proposed to be re-graded to address this issue. Wildlands has coordinated these activities with the landowner and will use the previously employed waste areas on upland fields within the LOD. Upon completion of grading, the site will be ripped with trackhoe teeth and reseeded with native riparian and wetland seed. Where possible, existing vegetation will be harvested and transplanted and overseeded; woody stems will also be replanted whenever possible.

All disturbed monitoring devices and plots will be reinstalled in the same location.

Area #	Grading (Acres)	Average Grading Depth (Inches)
Area 1	1.14	5
Area 2	0.34	5
Area 3	0.49	3
Area 4	0.46	9
Area 5	0.48	6
Area 6	0.28	5
TOTAL:	3.19	



POTENTIAL WETLAND RESTORATION AREAS TO BE LOWERED TO DESIGN GRADE



Oak Hill Dairy Mitigation Site  
Gaston County, North Carolina

Proposed Regrading Areas

Revisions:


Date: August 8, 2022  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: JM  
Checked By: SW

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PRELIMINARY  
DO NOT  
USE FOR  
CONSTRUCTION

# Oak Hill Dairy Mitigation Site Record Drawing

Gaston County, North Carolina

for

NCDEQ

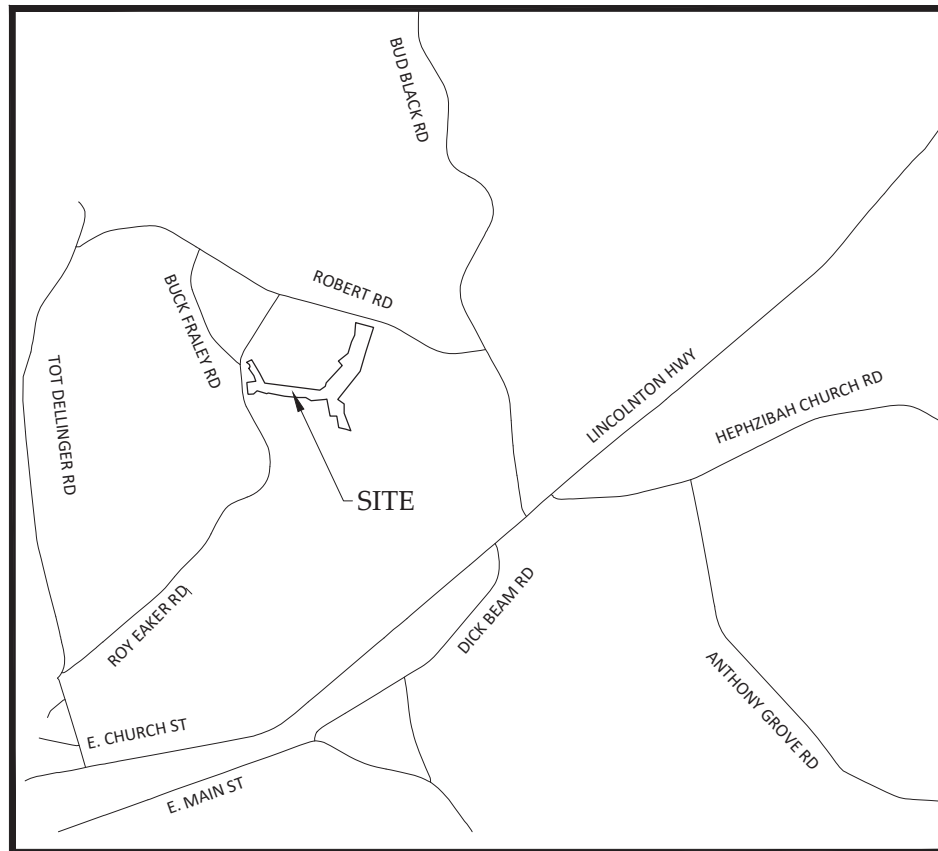
Division of Mitigation Services

Jacob P. McLean

Digitally signed by Jacob P. McLean  
Date: 2023.04.18 11:55:27 -04'00'



*Jacob P. McLean*



Vicinity Map  
Not to Scale



**RECORD DRAWINGS  
ISSUED APRIL 18, 2023**

STREAM ORIGINS		
NAME	NORTHING	EASTING
OAK HILL CREEK	609299	1299430
UT1	610055	1297694
UT1A	610499	1297711
UT1B	609941	1297705
UT2	610266	1299747
UT3	610616	1299891

### Sheet Index

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Stream Plan and Profile	
Oak Hill Creek	1.1-1.6
UT1	1.7-1.11
UT1A	1.12
UT1B	1.13
UT2	1.14
UT3	1.15
Wetland Grading	2.1-2.4
Planting Sheets	3.1-3.5
Fencing and Gate Plan	4.1

### Project Directory

**Engineering:**  
Wildlands Engineering, Inc  
License No. F-0831  
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Asheville, NC 28806  
Jake Mclean, PE, CFM  
828-774-5547

**Owner:**  
NCDEQ - NC DMS  
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Mathew Reid  
828-231-7912

**Surveying:**  
Kee Mapping and Surveying, PA  
P.O. Box 2566  
Asheville, NC 28802  
Phillip B. Kee, PLS  
828-575-9021

NCDEQ Contract No. 7867  
DMS ID No. 100120  
NC DWR#20190863  
Catawba River Basin 03050102

Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

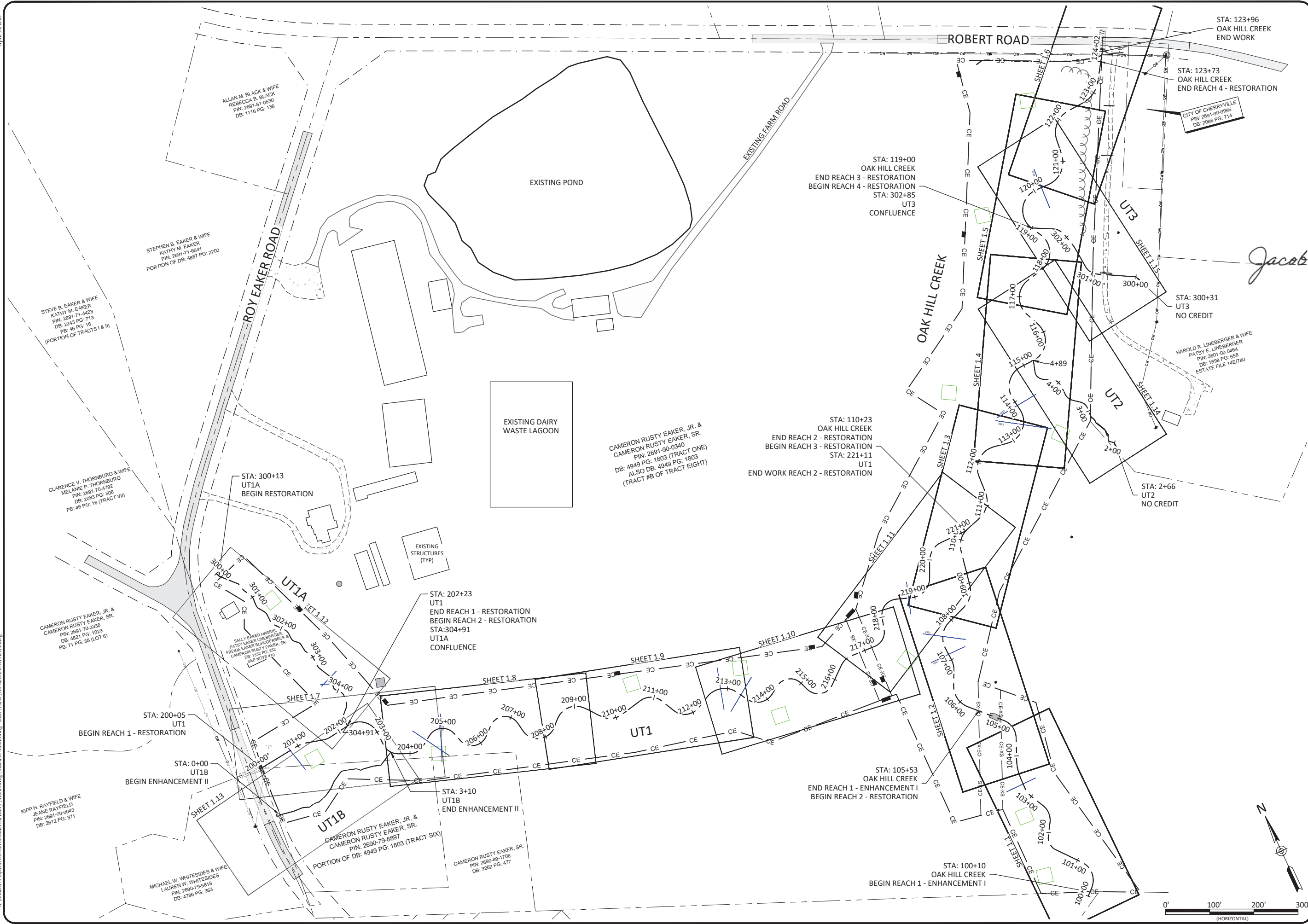
Title Sheet

Date	Job Number	Project Engineer	Drawn By	Checked By

Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

0.1





*Jacob P. McLean*

STA: 123+96  
OAK HILL CREEK  
END WORK

STA: 123+73  
OAK HILL CREEK  
END REACH 4 - RESTORATION

CITY OF CHERRYVILLE  
PIN: 2691-90-9995  
DB: 2095 PG: 714

STA: 119+00  
OAK HILL CREEK  
END REACH 3 - RESTORATION  
BEGIN REACH 4 - RESTORATION  
STA: 302+85  
UT3  
CONFLUENCE

STA: 300+31  
UT3  
NO CREDIT

HAROLD R. LINEBERGER & WIFE  
PATSY E. LINEBERGER  
PIN: 3601-00-0464  
DB: 1898 PG: 659  
ESTATE FILE 14E780

STA: 110+23  
OAK HILL CREEK  
END REACH 2 - RESTORATION  
BEGIN REACH 3 - RESTORATION  
STA: 221+11  
UT1  
END WORK REACH 2 - RESTORATION

STA: 2+66  
UT2  
NO CREDIT

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2691-90-0340  
DB: 4949 PG: 1803 (TRACT ONE)  
ALSO DB: 4949 PG: 1803  
(TRACT #B OF TRACT EIGHT)

STA: 202+23  
UT1  
END REACH 1 - RESTORATION  
BEGIN REACH 2 - RESTORATION  
STA: 304+91  
UT1A  
CONFLUENCE

STA: 105+53  
OAK HILL CREEK  
END REACH 1 - ENHANCEMENT I  
BEGIN REACH 2 - RESTORATION

STA: 200+05  
UT1  
BEGIN REACH 1 - RESTORATION

STA: 0+00  
UT1B  
BEGIN ENHANCEMENT II

STA: 3+10  
UT1B  
END ENHANCEMENT II

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2690-79-8897  
PORTION OF DB: 4949 PG: 1803 (TRACT SIX)

CAMERON RUSTY EAKER, SR.  
PIN: 2690-89-1706  
DB: 3262 PG: 477

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2691-70-3339  
DB: 4821 PG: 1023  
PB: 71 PG: 58 (LOT 6)

KIPP H. RAYFIELD & WIFE  
JEANE RAYFIELD  
PIN: 2691-70-0043  
DB: 2612 PG: 371

MICHAEL W. WHITESIDES & WIFE  
LAUREN W. WHITESIDES  
PIN: 2690-75-9818  
DB: 4786 PG: 363

CLARENCE V. THORNBERG & WIFE  
MELANIE P. THORNBERG  
PIN: 2691-70-4792  
DB: 2093 PG: 506  
PB: 46 PG: 16 (TRACT VIII)

STEVE B. EAKER & WIFE  
KATHY M. EAKER  
PIN: 2691-71-4423  
DB: 2243 PG: 713  
PB: 46 PG: 16  
(PORTION OF TRACTS I & II)

STEPHEN B. EAKER & WIFE  
KATHY M. EAKER  
PIN: 2691-71-6541  
PORTION OF DB: 4887 PG: 2200

ALLAN M. BLACK & WIFE  
REBECCA B. BLACK  
PIN: 2691-81-0530  
DB: 1116 PG: 136



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**Oak Hill Dairy Mitigation Site Record Drawings**  
Gaston County, North Carolina

Project Overview

Date:	April 18, 2023
Job Number:	005-02182
Project Engineer:	JM
Drawn By:	AMR/JCK
Checked By:	JCK

0.2

### Pre-Construction Features

- Pre-Construction Property Line
- Pre-Construction NCDOT Right-of-Way
- Pre-Construction Top of Bank
- Pre-Construction Overhead Utility Line
- Pre-Construction Overhead Utility Easement
- Pre-Construction Fence
- Pre-Construction Overhead Utility
- Pre-Construction Sanitary Sewer
- Pre-Construction Sanitary Sewer Right of Way
- Pre-Construction Tree Line
- Pre-Construction Storm Pipe
- Pre-Construction Wetland
- Pre-Construction Road
- Pre-Construction Rip Rap
- Pre-Construction Building
- Pre-Construction Utility Pole

### Design Features

- Design Alignment
- Design Bankfull
- Design Major Contour (5' Interval)
- Design Minor Contour
- Design Permanent Culvert
- Design Woven Wire Fence
- Design Barbed Wire Fence
- Design 8' Double Gate
- Design 12' Single Gate

### Design Structures

- Design Various Constructed Riffles
- Design Cascading Riffle/Rock Cascade
- Design Brush Toe
- Design Vegetated Soil Lift
- Design Bank Roughening
- Design Floodplain Roughening
- Design BMP
- Design Log Sill
- Design Cover Log
- Design Log J-hook
- Design Log Vane
- Design Rock Sill
- Design Boulder J-hook with Sill

### Asbuilt Features

- Asbuilt Alignment
- Asbuilt Bankfull
- Recorded CE
- Recorded Internal Crossing
- Asbuilt LOD
- Asbuilt Major Contour (5' Interval)
- Asbuilt Minor Contour
- Asbuilt Permanent Culvert
- Asbuilt Fence
- Asbuilt 8' Double Gate
- Asbuilt 12' Single Gate
- Asbuilt Permanent Ford Crossing
- Asbuilt Stream Crossing - Culvert

### Asbuilt Structures

- Asbuilt Various Constructed Riffles
- Asbuilt Cascading Riffle/Rock Cascade
- Asbuilt Brush Toe
- Asbuilt Vegetated Soil Lift
- Asbuilt BMP
- Asbuilt Gravel Farm Road
- Asbuilt Soil Farm Road
- Asbuilt Bank Roughening
- Asbuilt Boulder Toe
- Asbuilt Riprap
- Asbuilt Bridge Crossing
- Asbuilt Log Sill
- Asbuilt Cover Log
- Asbuilt Log J-hook
- Asbuilt Rock Sill
- Asbuilt Rock J-hook with Sill
- Asbuilt Log J-hook with Sill
- Photo Point
- Permanent Vegetation Plot
- Barotroll
- Ground Water Gage
- Crest Gage
- Monitoring Cross Section

**PROJECT NOTES:**  
 As-built survey was completed March 2022.  
 Updated As-built survey was completed November 2022.

Topographic survey was completed by Kee Mapping and Surveying, PA in July 2019.  
 Parcel boundary survey completed by Kee Mapping and Surveying, PA in October 2019.  
 Conservation easement survey completed by Kee Mapping and Surveying, PA in October 2020.

Topographic data supplemented with Lidar data from Feb - April 2017.

Riffle selection varied based on available materials at the Engineers' discretion. Field coordination will be required.

**Project Notes:**  
 1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.



*Jacob P. McLean*

Oak Hill Dairy Mitigation Site Record Drawings  
 Gaston County, North Carolina

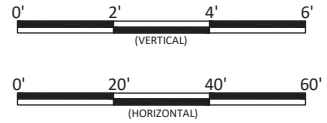
General Notes and Symbols

Revisions:


Date: April 18, 2023  
 Job Number: 005-02182  
 Project Engineer: JM  
 Drawn By: AMR/JCK  
 Checked By: JCK

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April 18, 2023

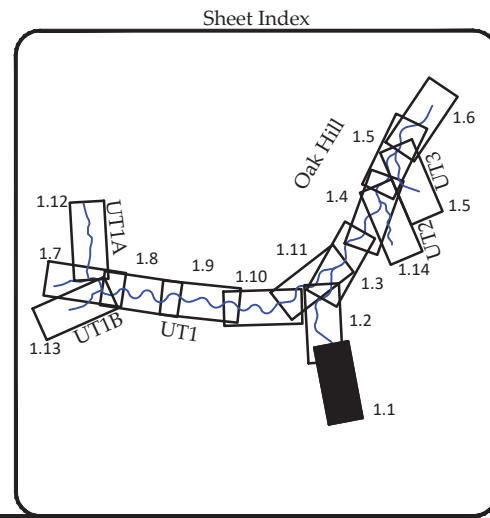
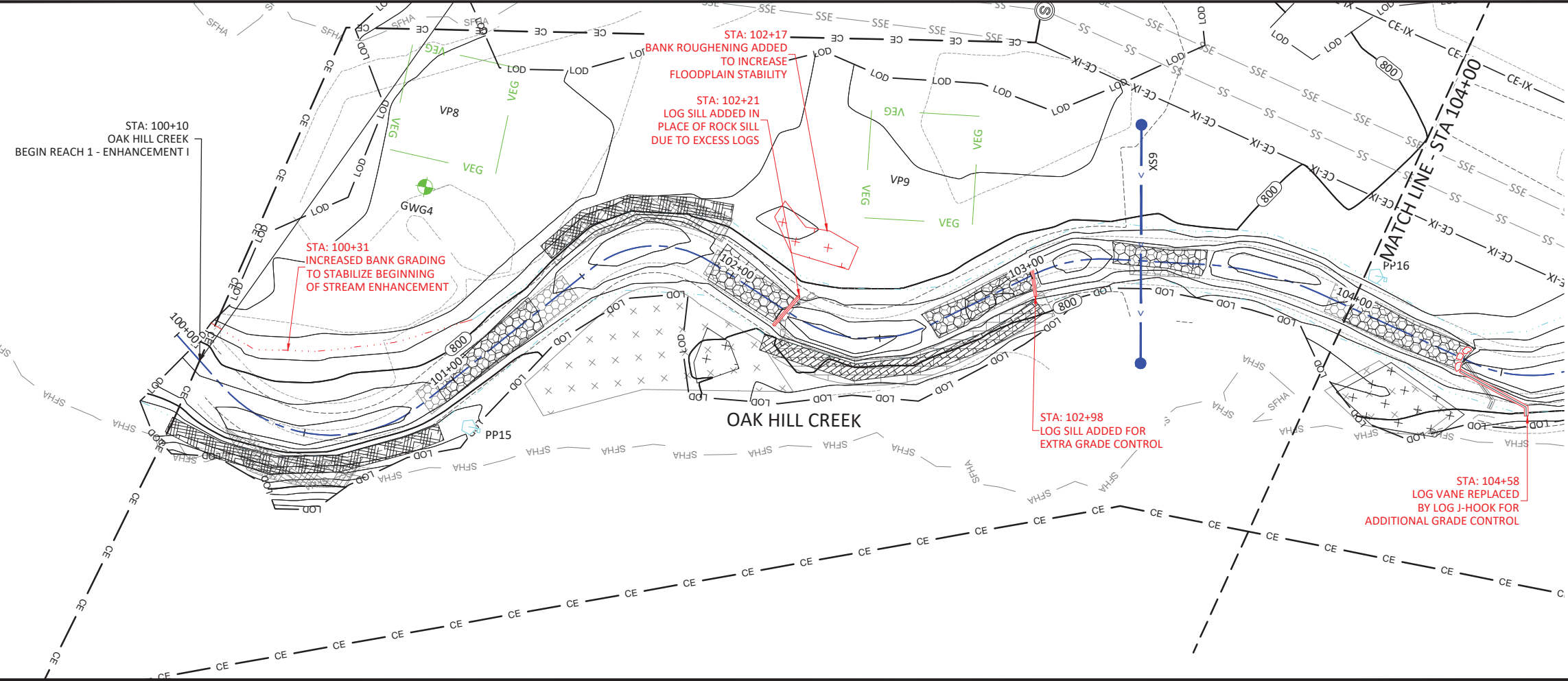


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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina  
Oak Hill Creek  
Stream Plan and Profiles

Revisions:

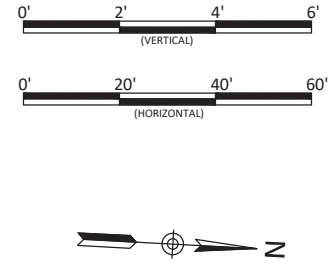
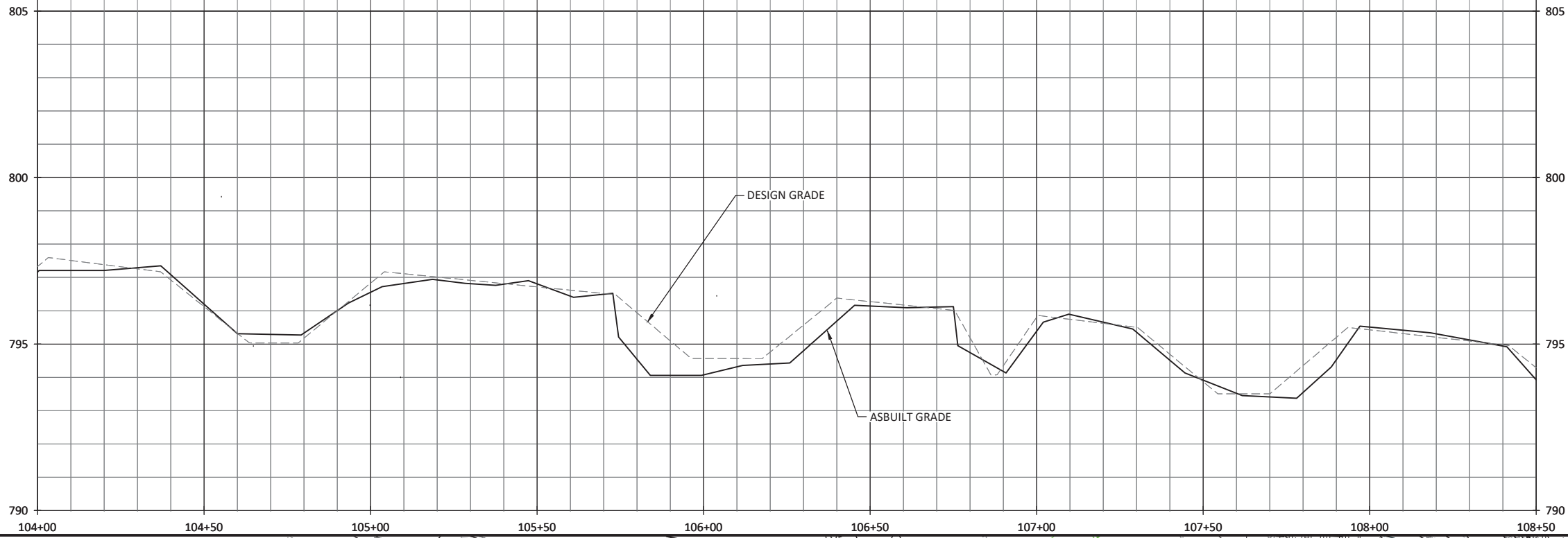

Date: April 18, 2023  
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Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

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April 18, 2023

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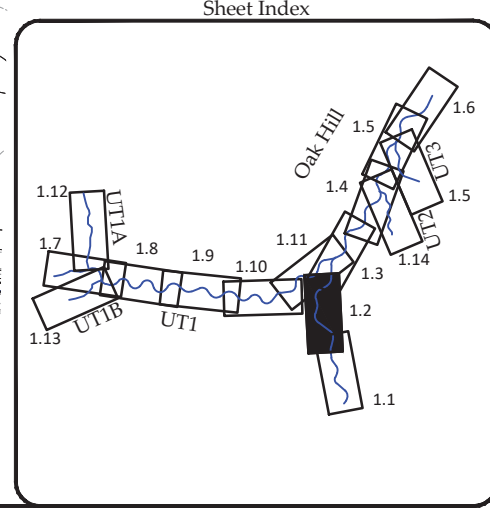
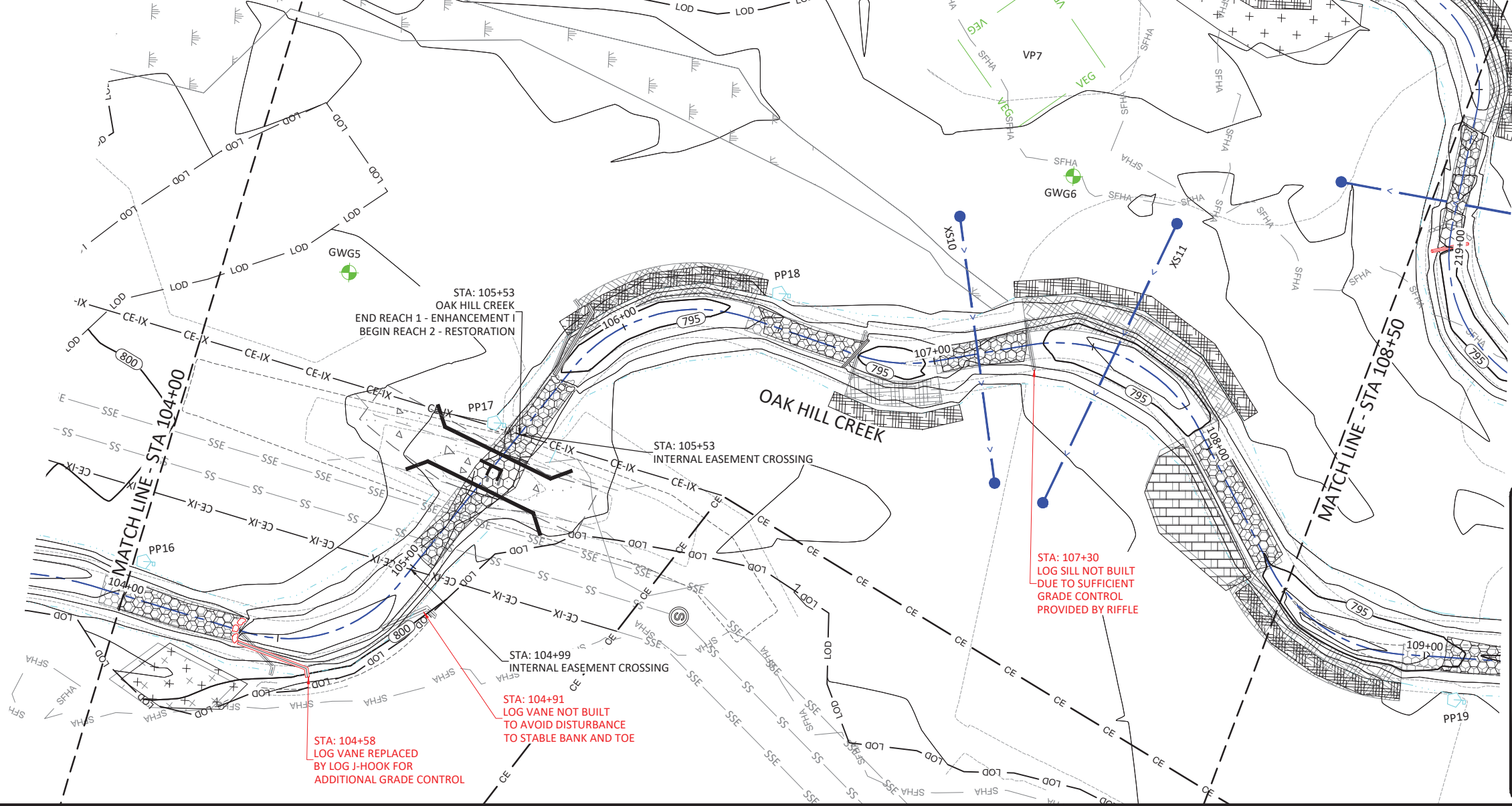


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Oak Hill Dairy Mitigation Site Record Drawings  
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Oak Hill Creek  
Stream Plan and Profiles



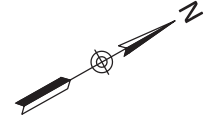
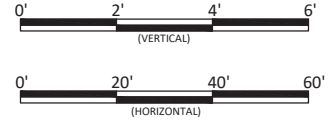
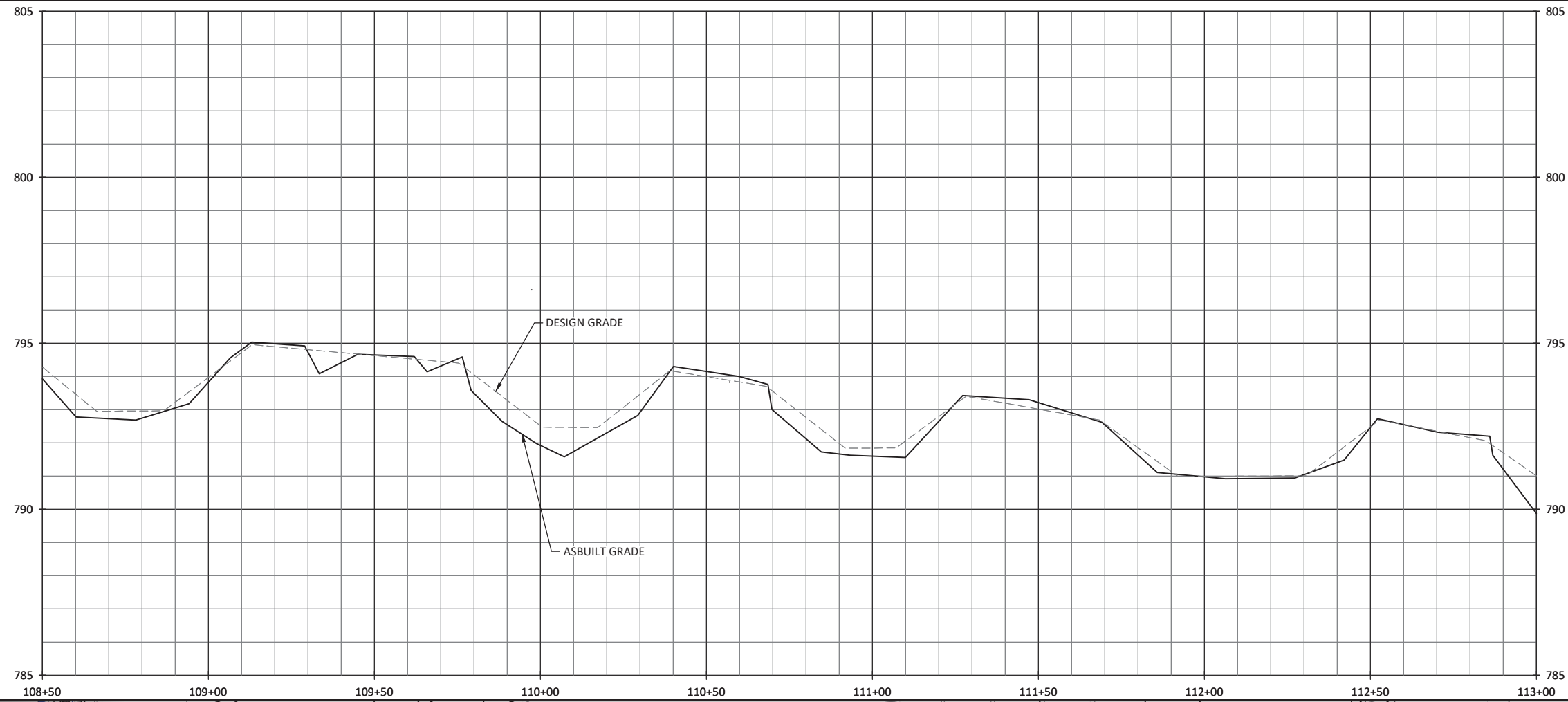
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Project Engineer: JM  
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April 18, 2023



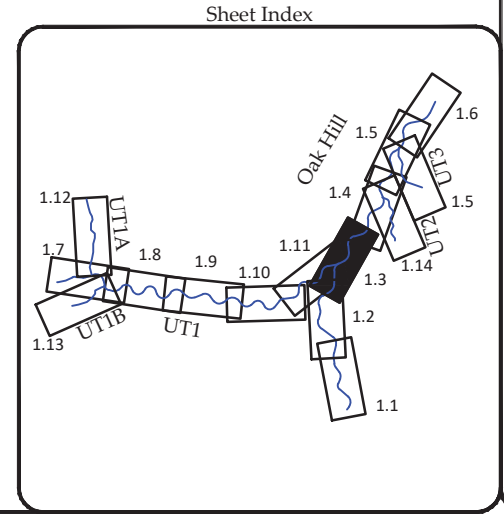
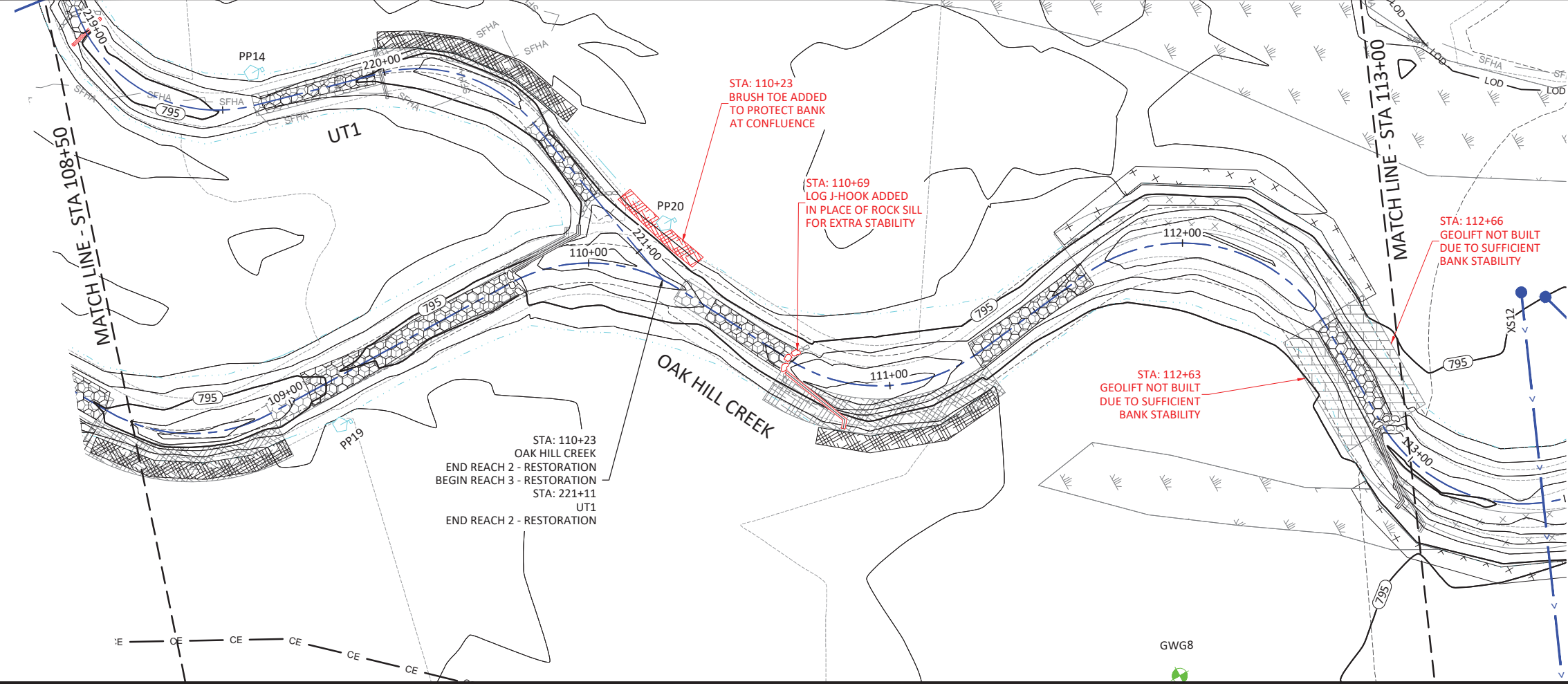
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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

Oak Hill Creek  
Stream Plan and Profiles



Revisions:

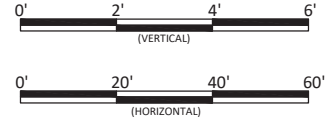
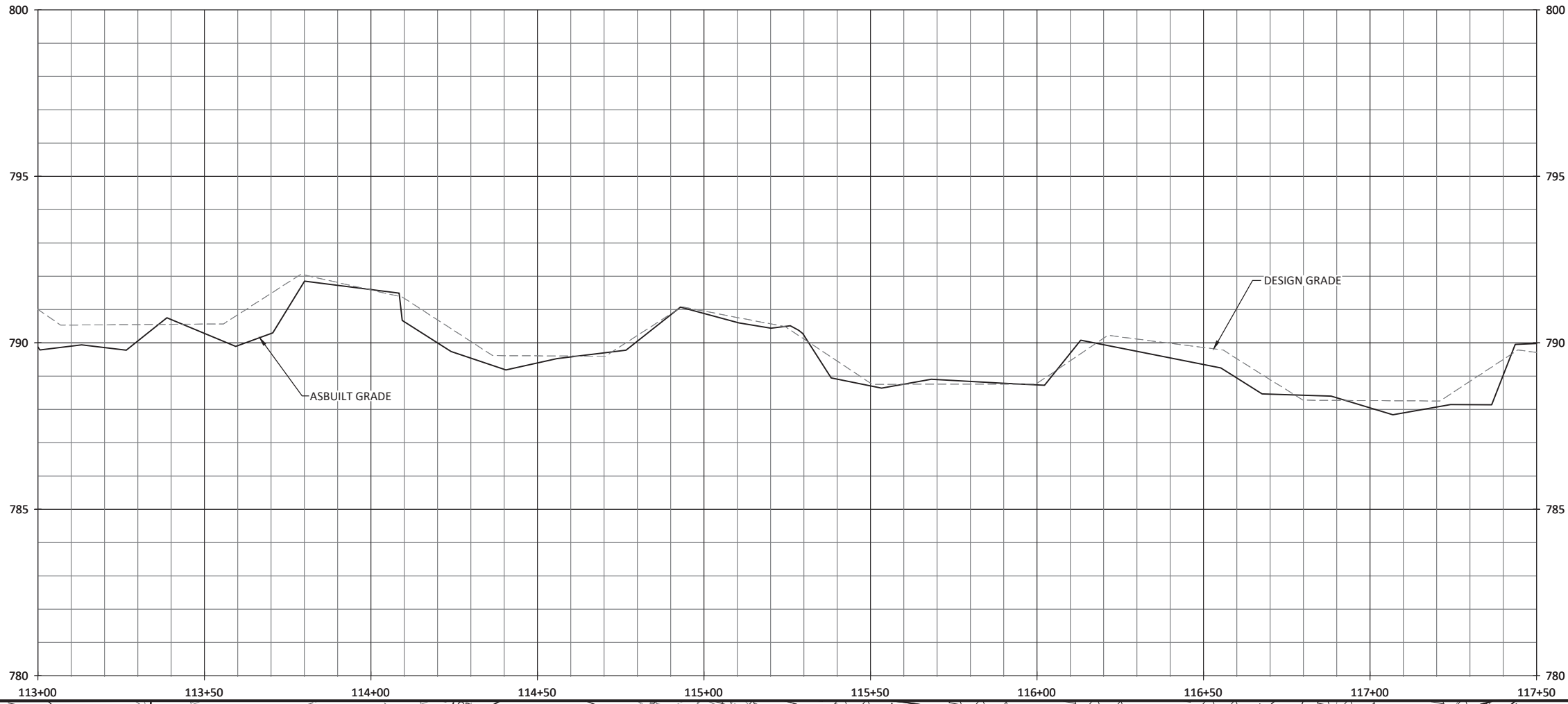
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Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

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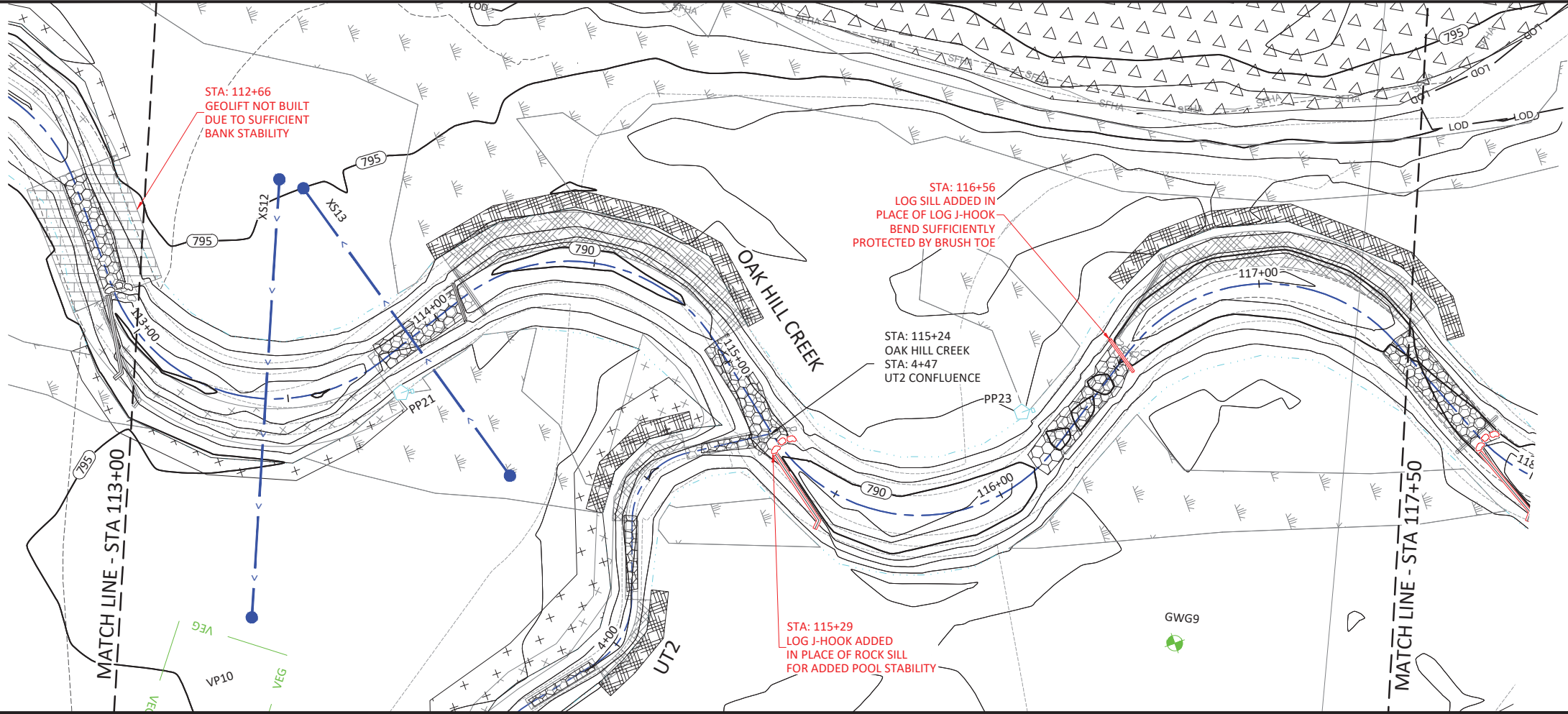
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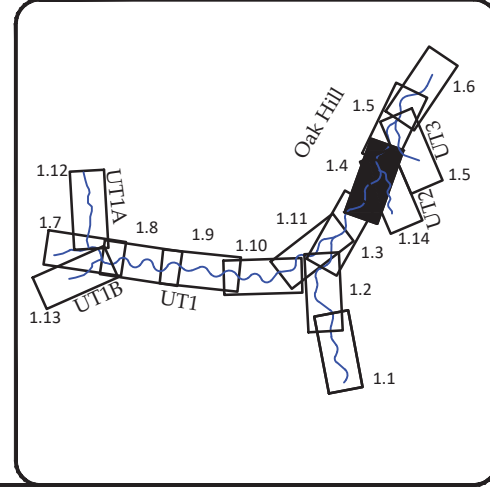
*Jacob P. McLean*

Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

Oak Hill Creek  
Stream Plan and Profiles



Sheet Index

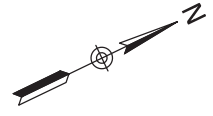
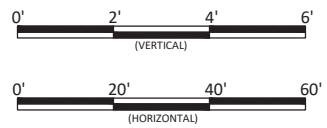
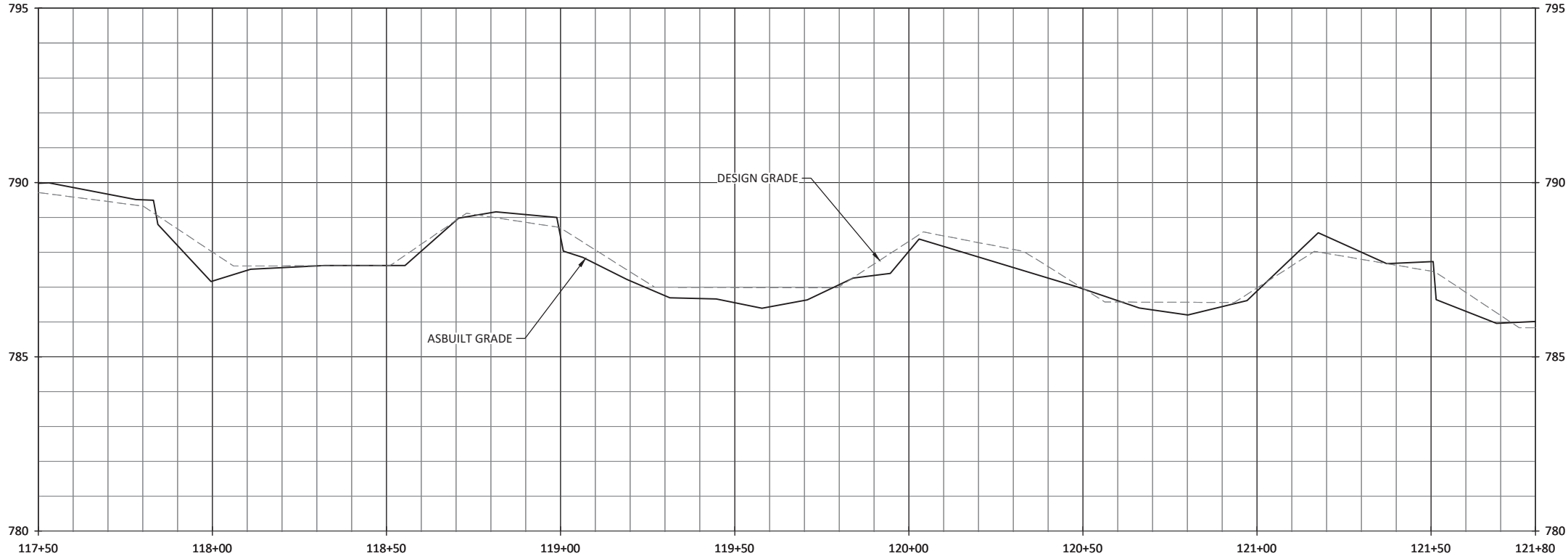


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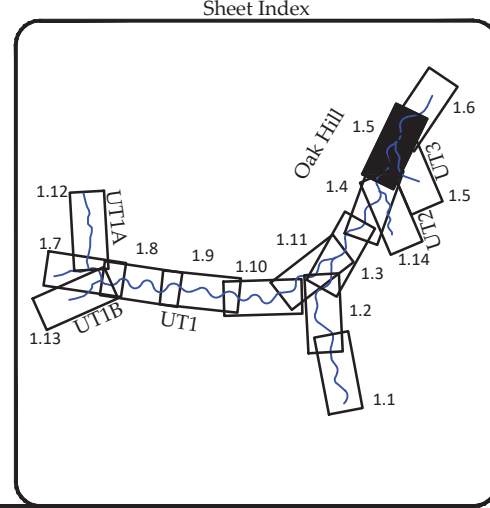
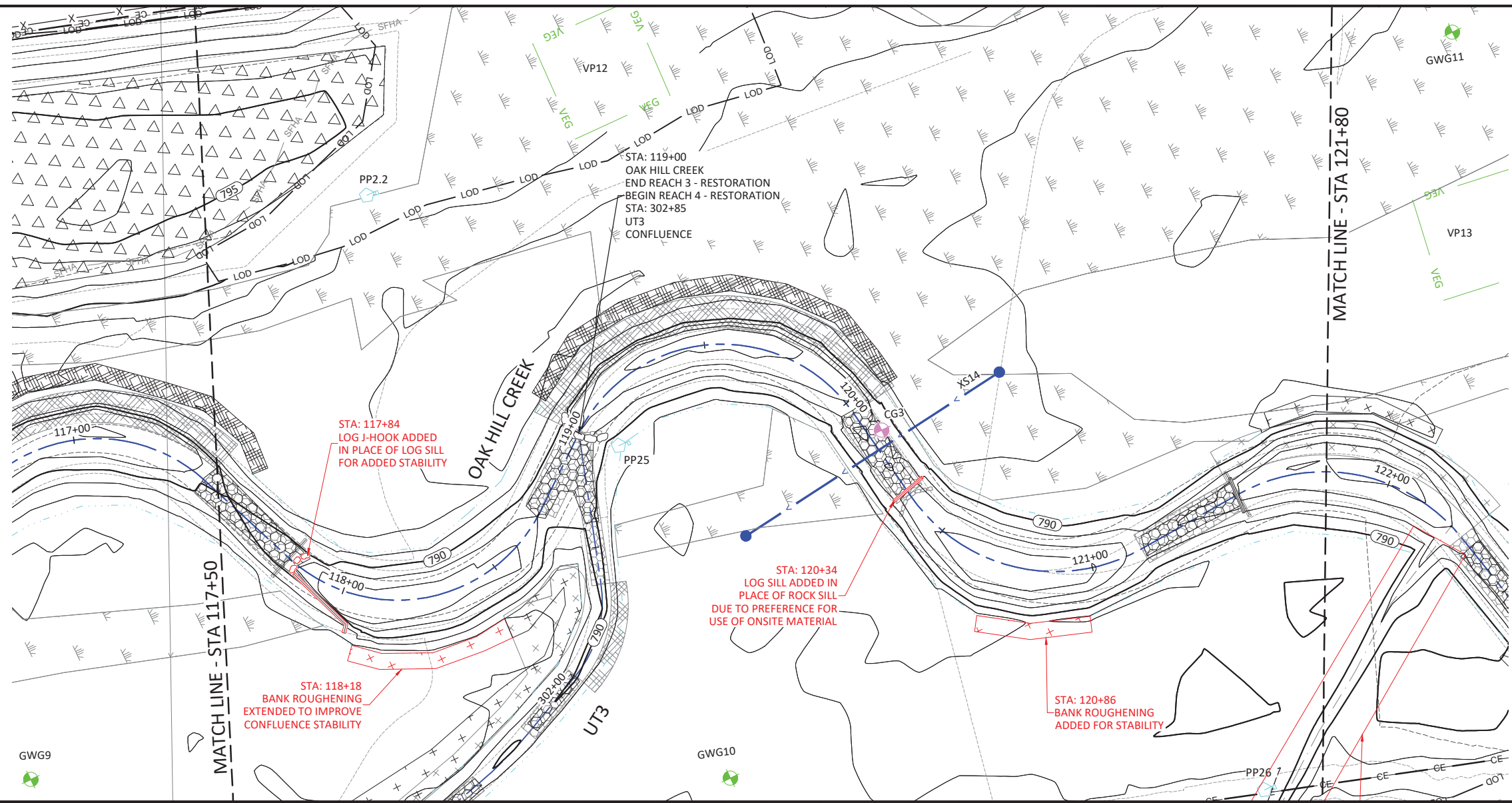
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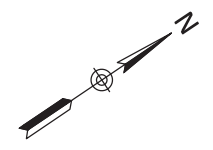
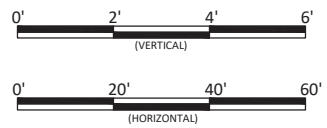
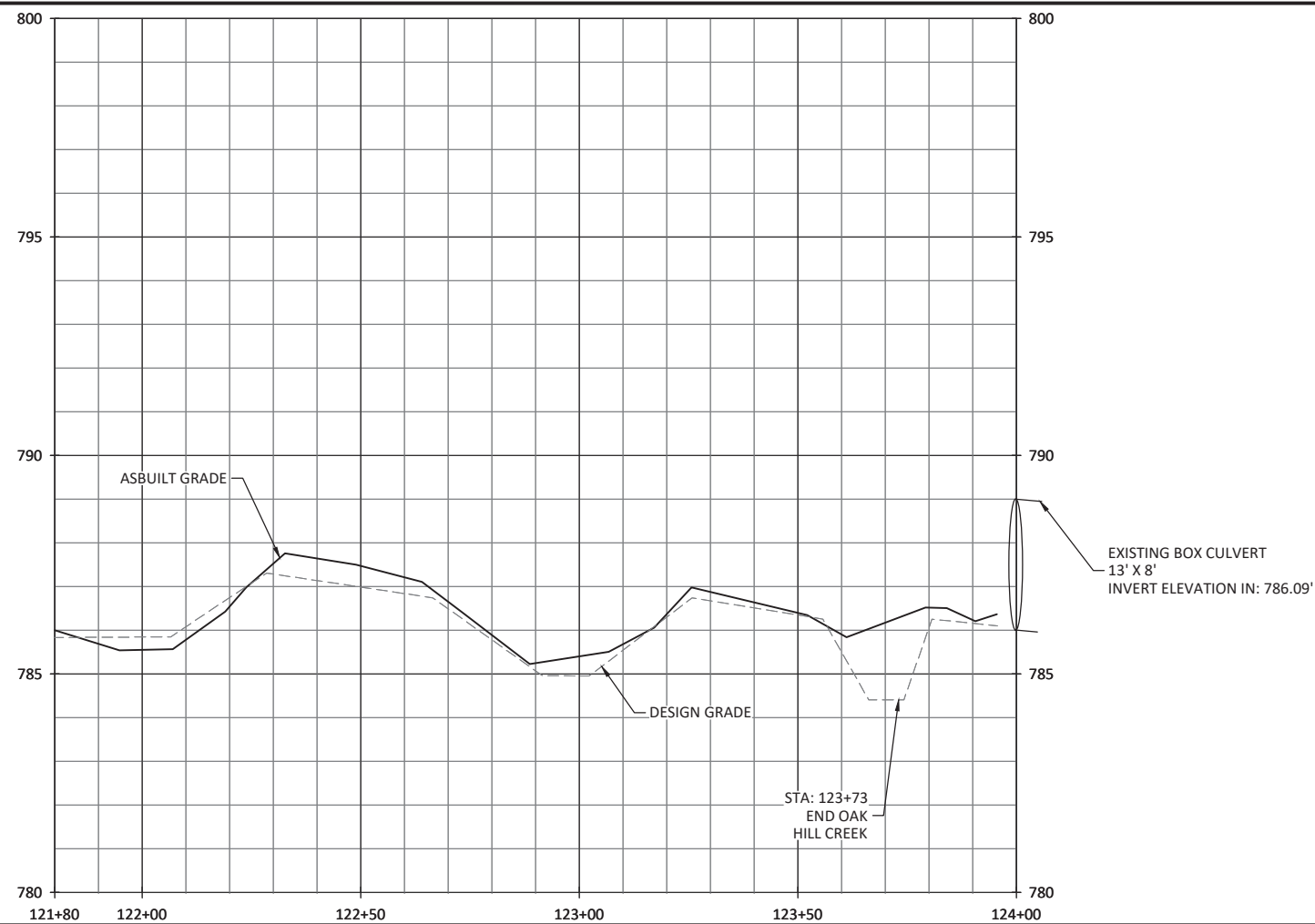
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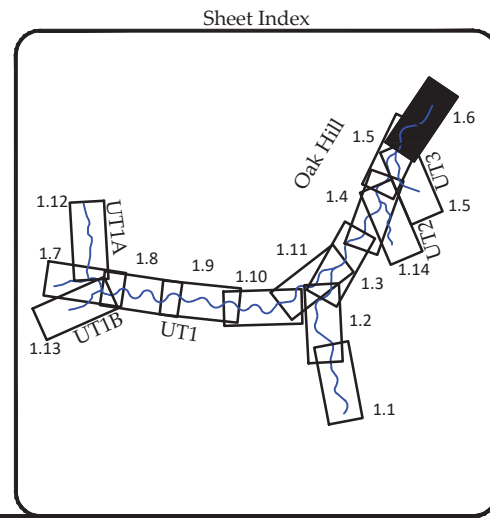
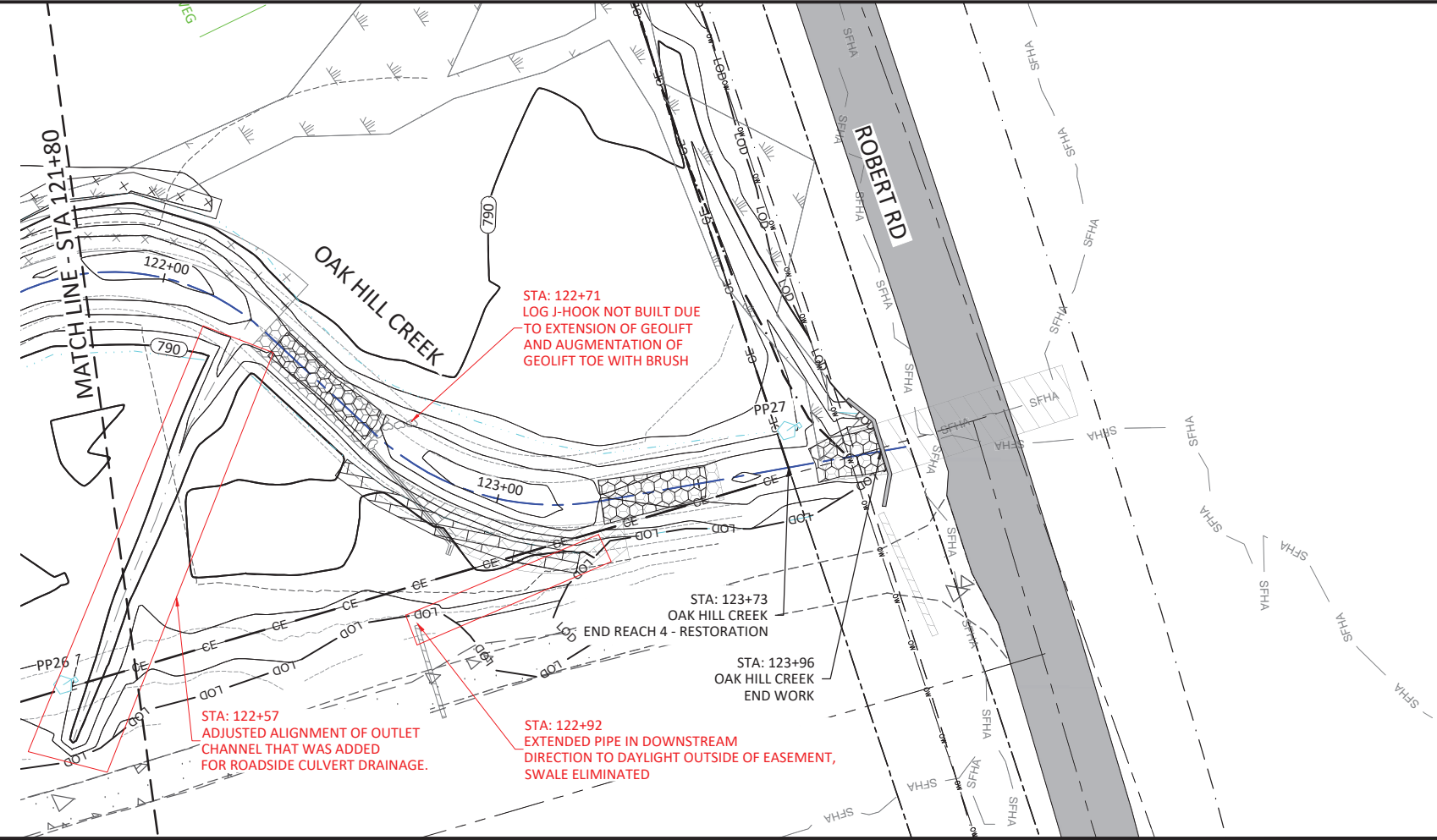


Date	Job Number	Project Engineer	Drawn By	Checked By
April 18, 2023	005-02182	JM	AMR/JCK	JCK



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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

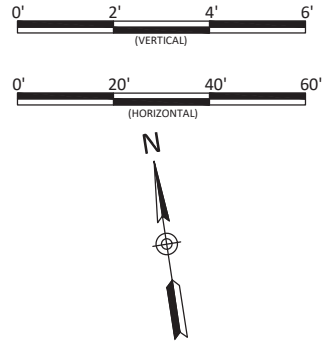
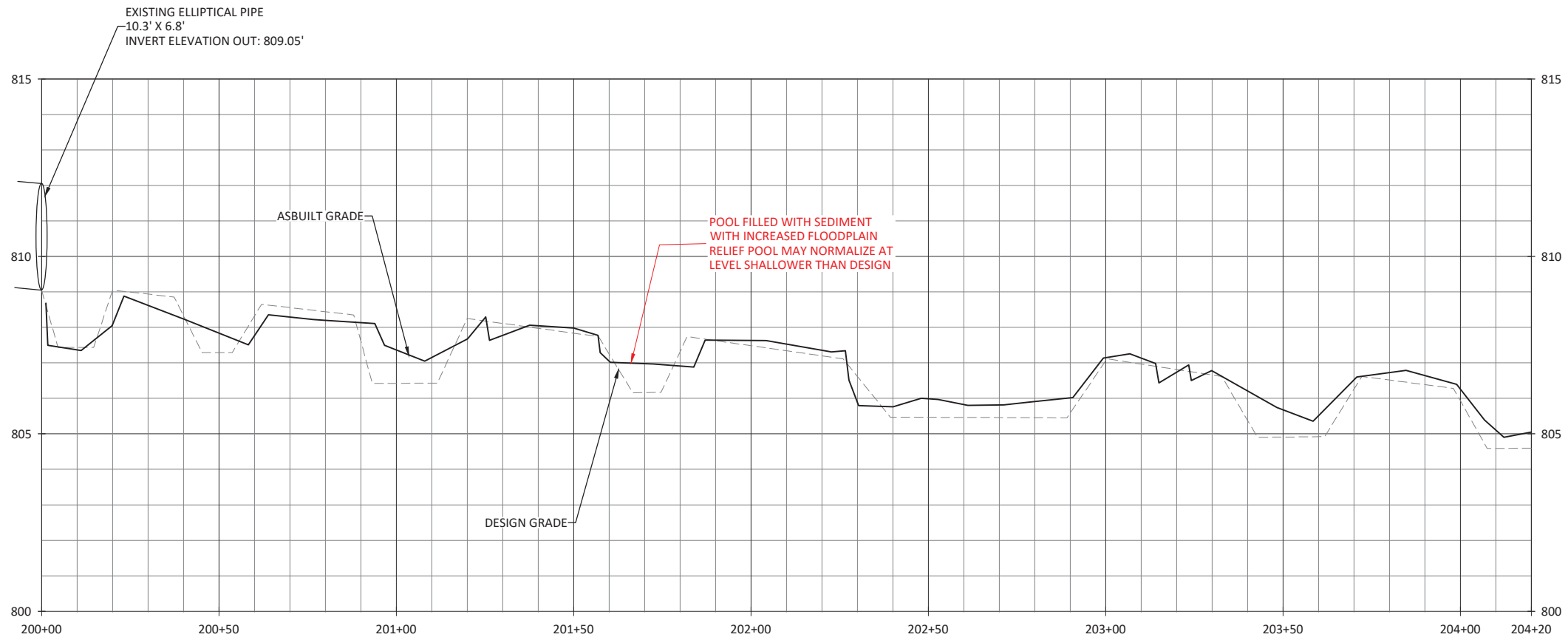
Oak Hill Creek  
Stream Plan and Profiles

Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

1.6

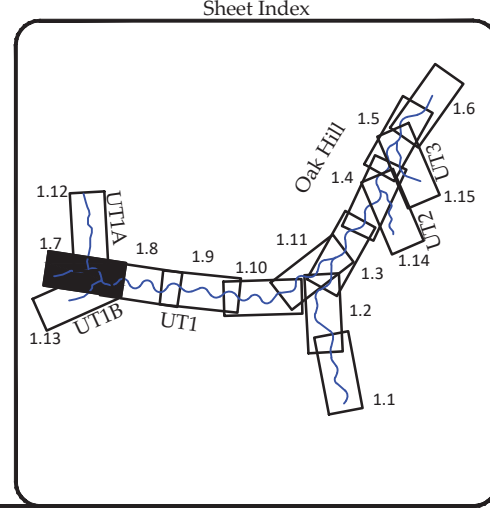
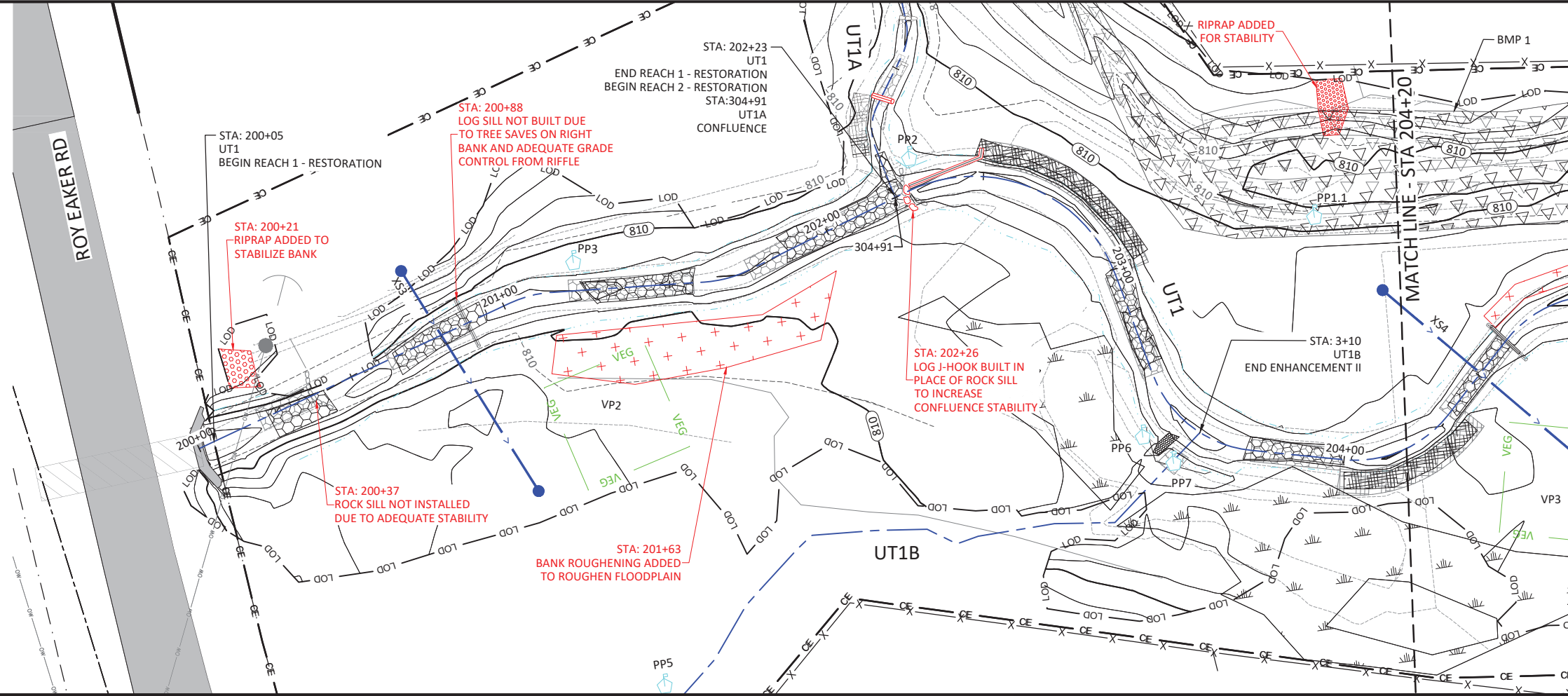




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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

UT1  
Stream Plan and Profiles

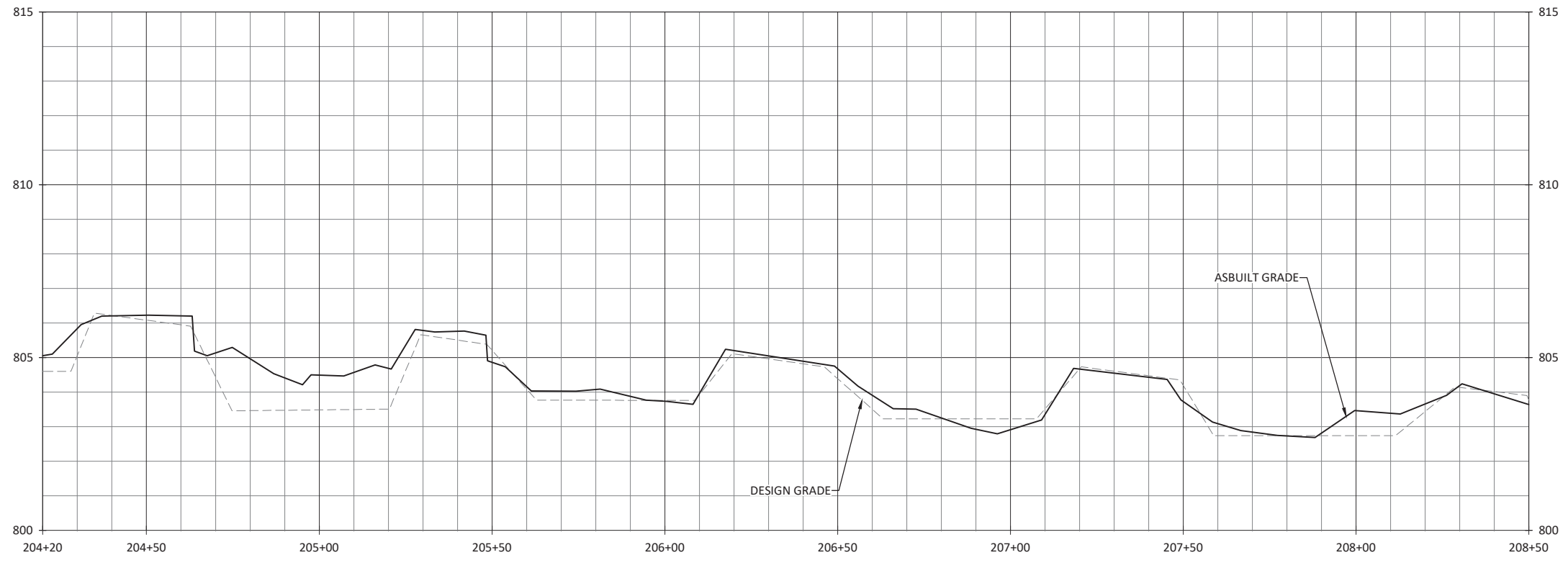
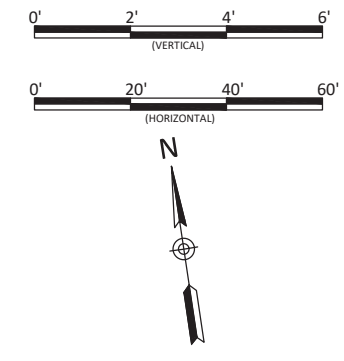


Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**1.7**

April 18, 2023



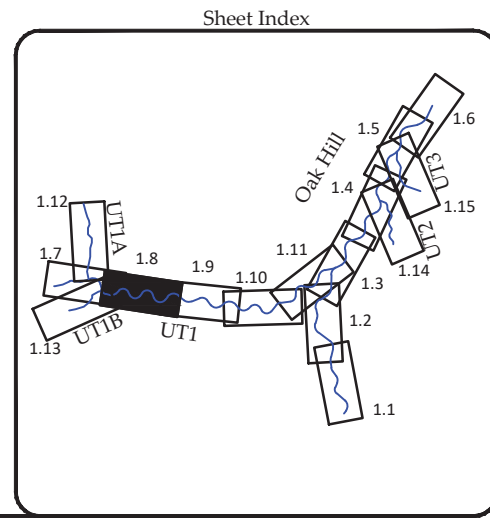
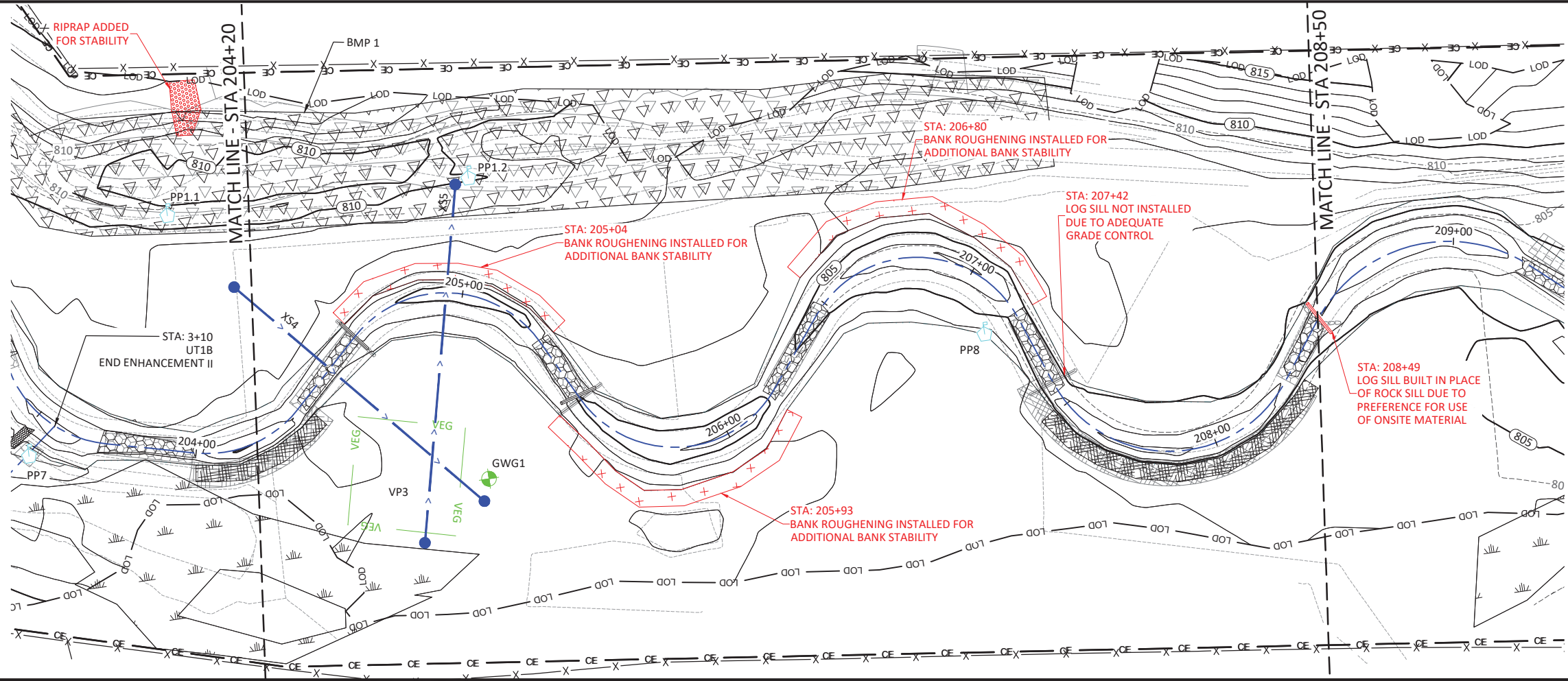
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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

UT1  
Stream Plan and Profiles



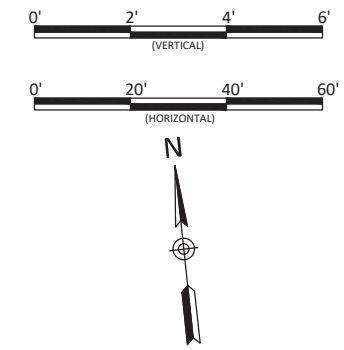
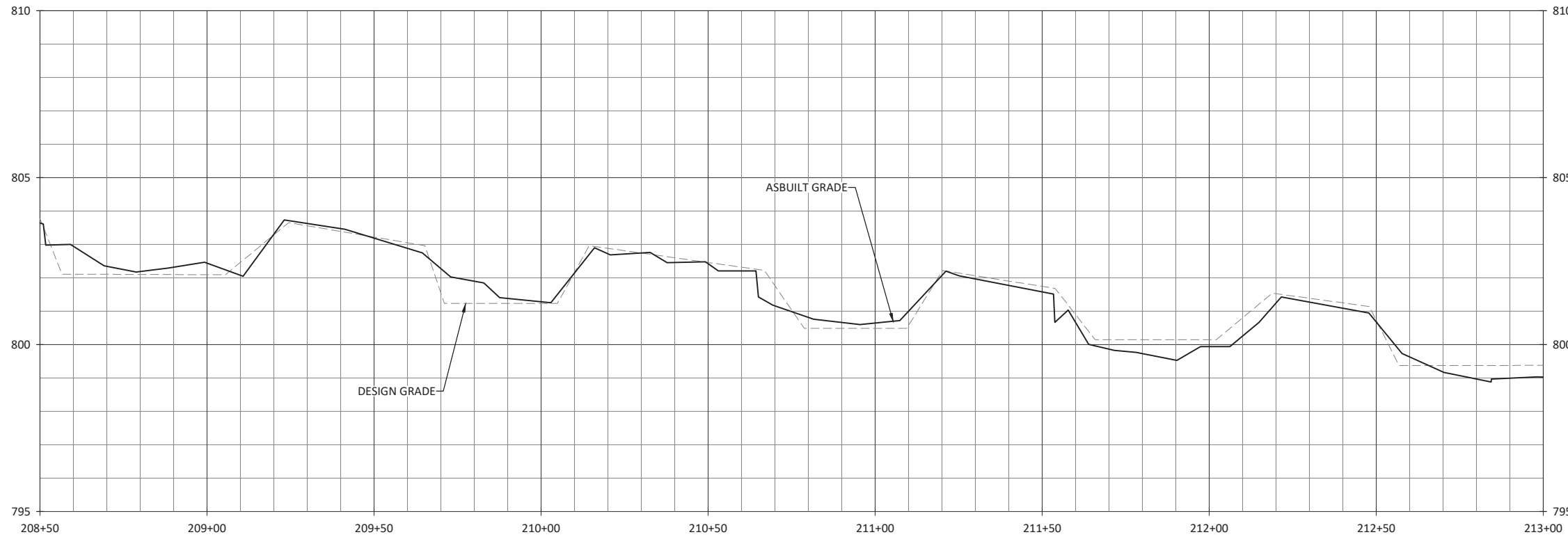
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Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**1.8**

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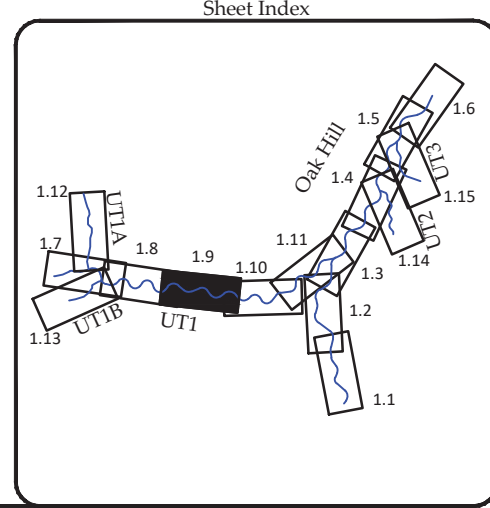
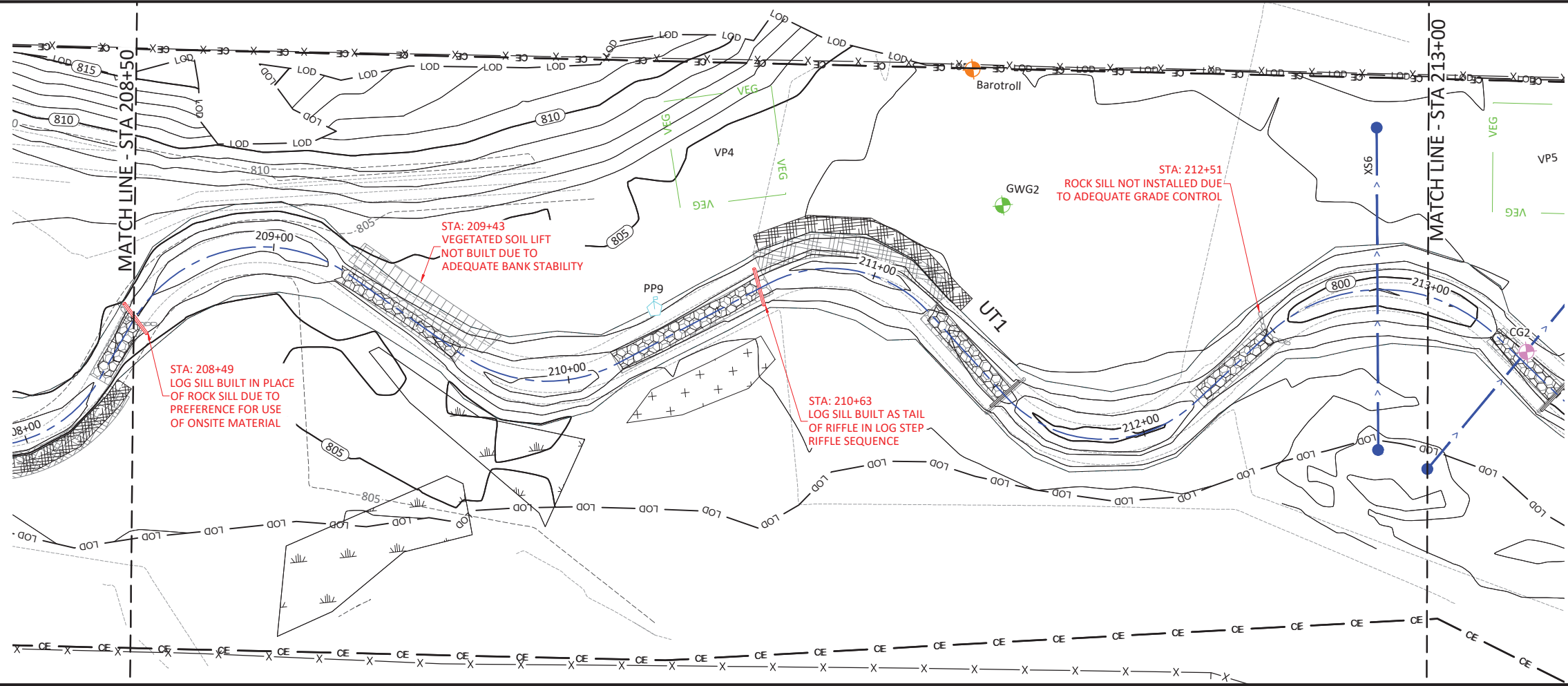
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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

UT1  
Stream Plan and Profiles



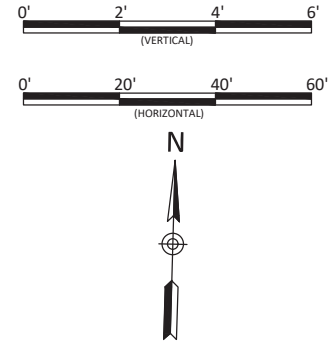
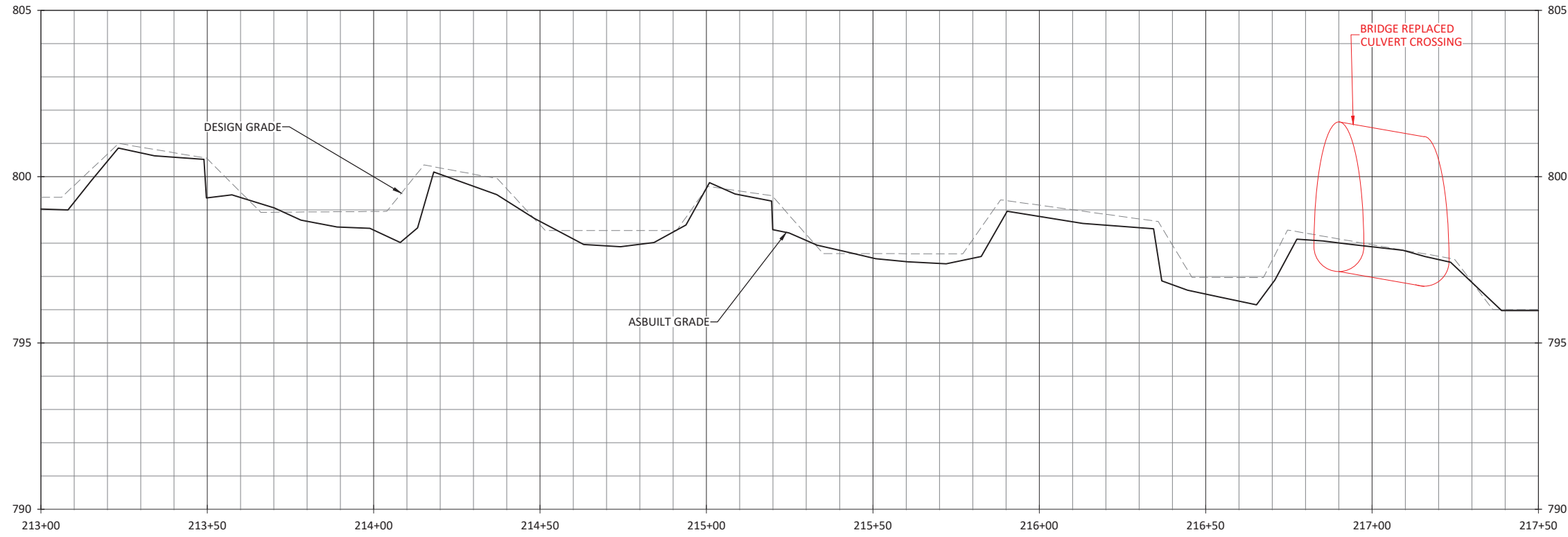
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Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

1.9

April 18, 2023

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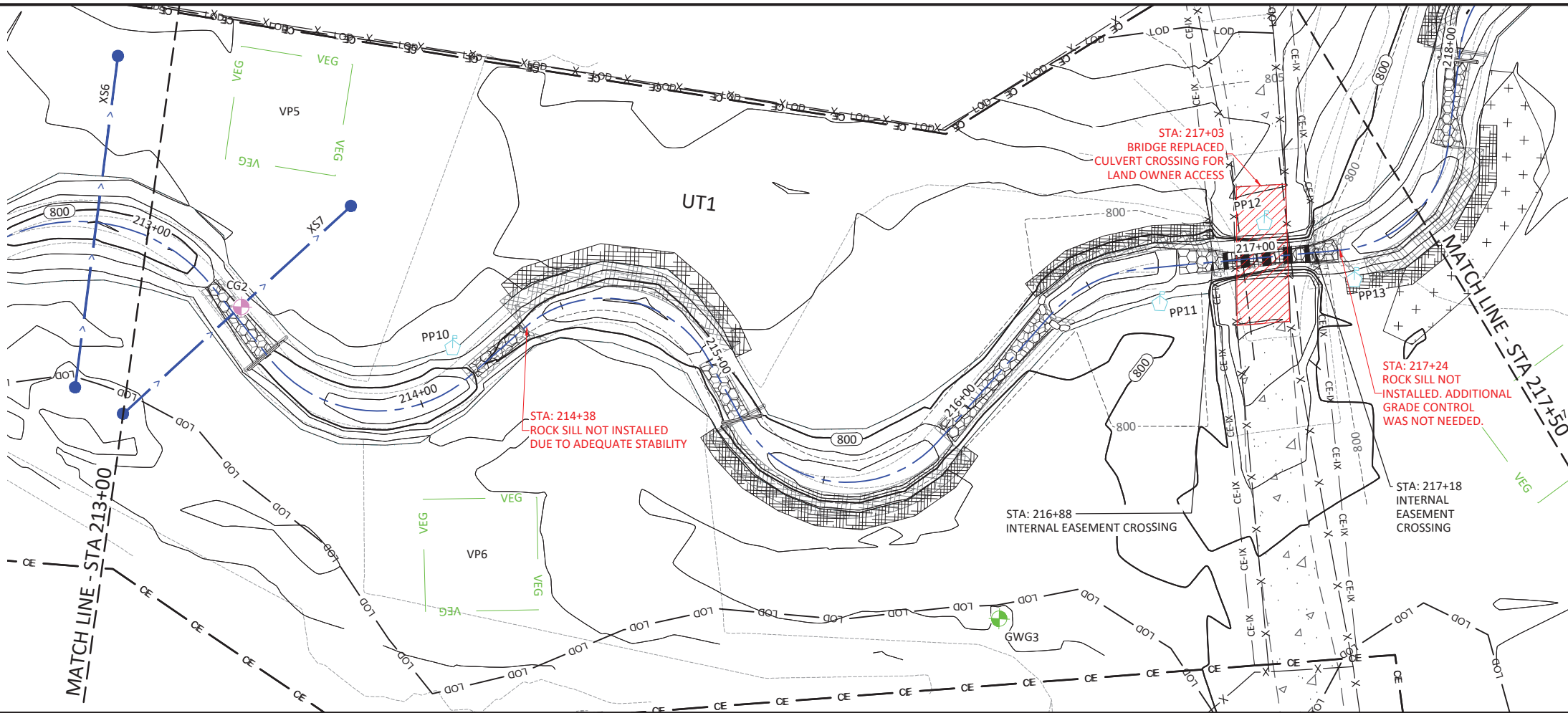
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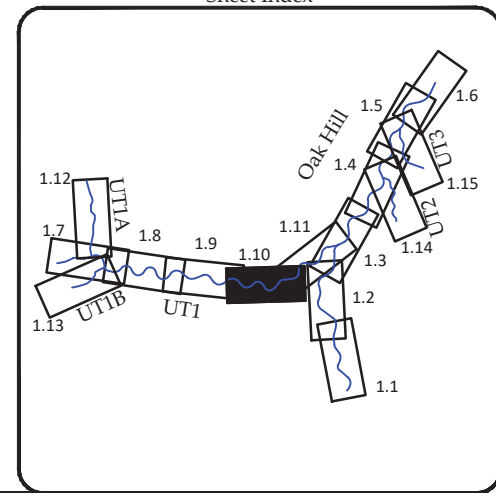


Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

UT1  
Stream Plan and Profiles



NOTE:  
FLOODPLAIN GRADING MODIFIED  
DURING CONSTRUCTION ON RIGHT  
FLOODPLAIN NEAR 213+00 TO SAVE  
LARGE TREES.



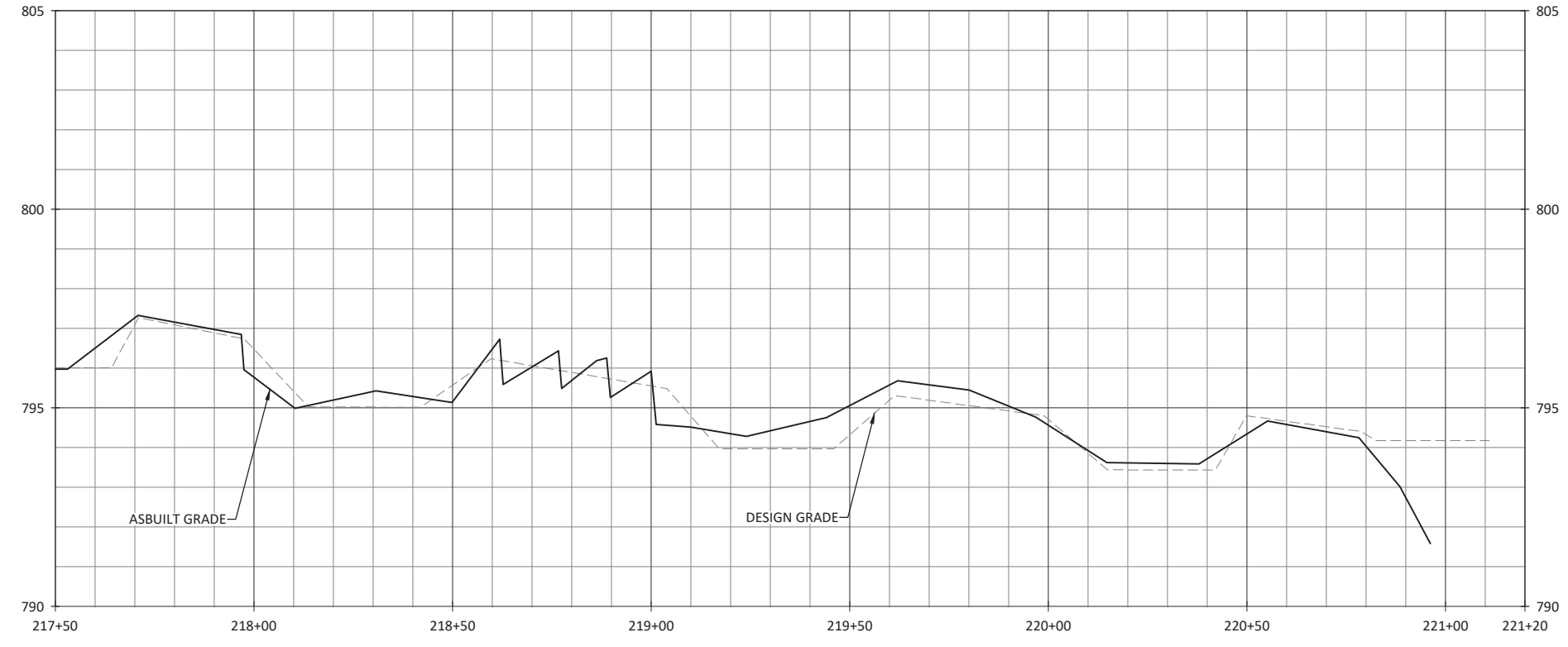
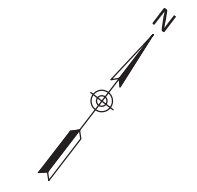
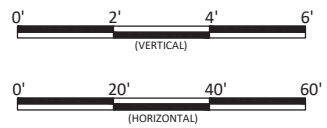
Revisions

Date:	April 18, 2023
Job Number:	005-02182
Project Engineer:	JM
Drawn By:	AMR/JCK
Checked By:	JCK

1.10

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April 18, 2023



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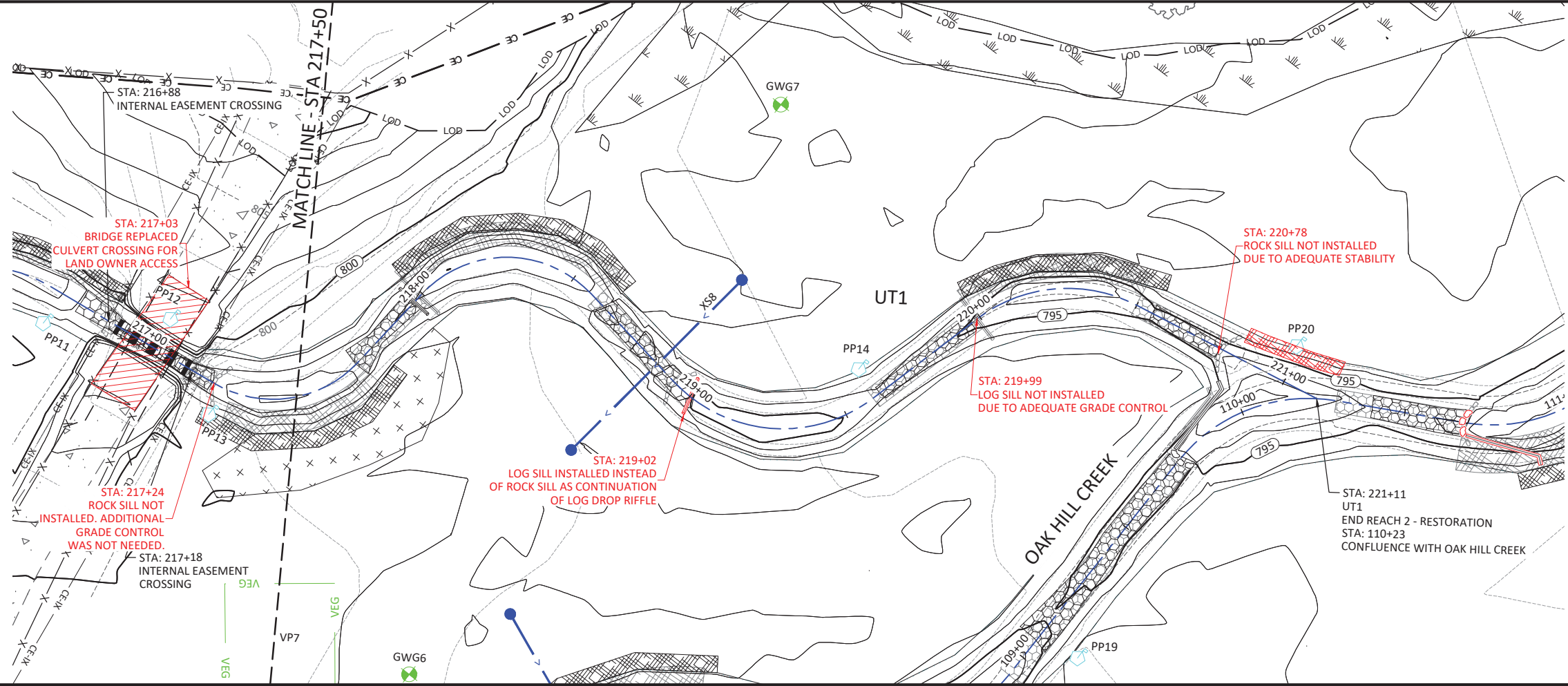


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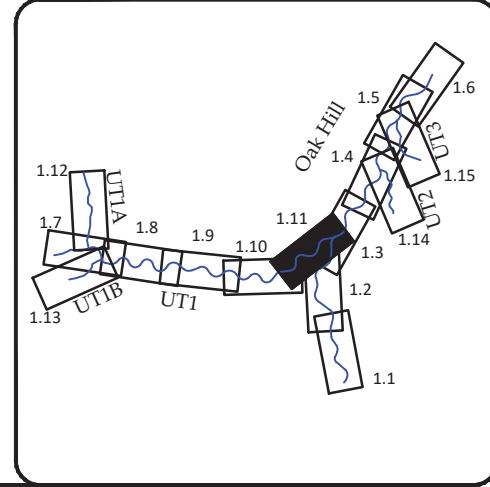
Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

UT1  
Stream Plan and Profiles

X:\Shared\Projects\005-02182 Oak Hill Dairy Monitoring - Baseline Monitoring - 2023\Plans\AP-02182-Profile-T113.dwg



Sheet Index

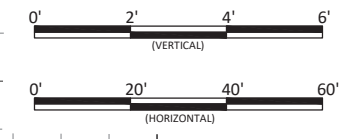
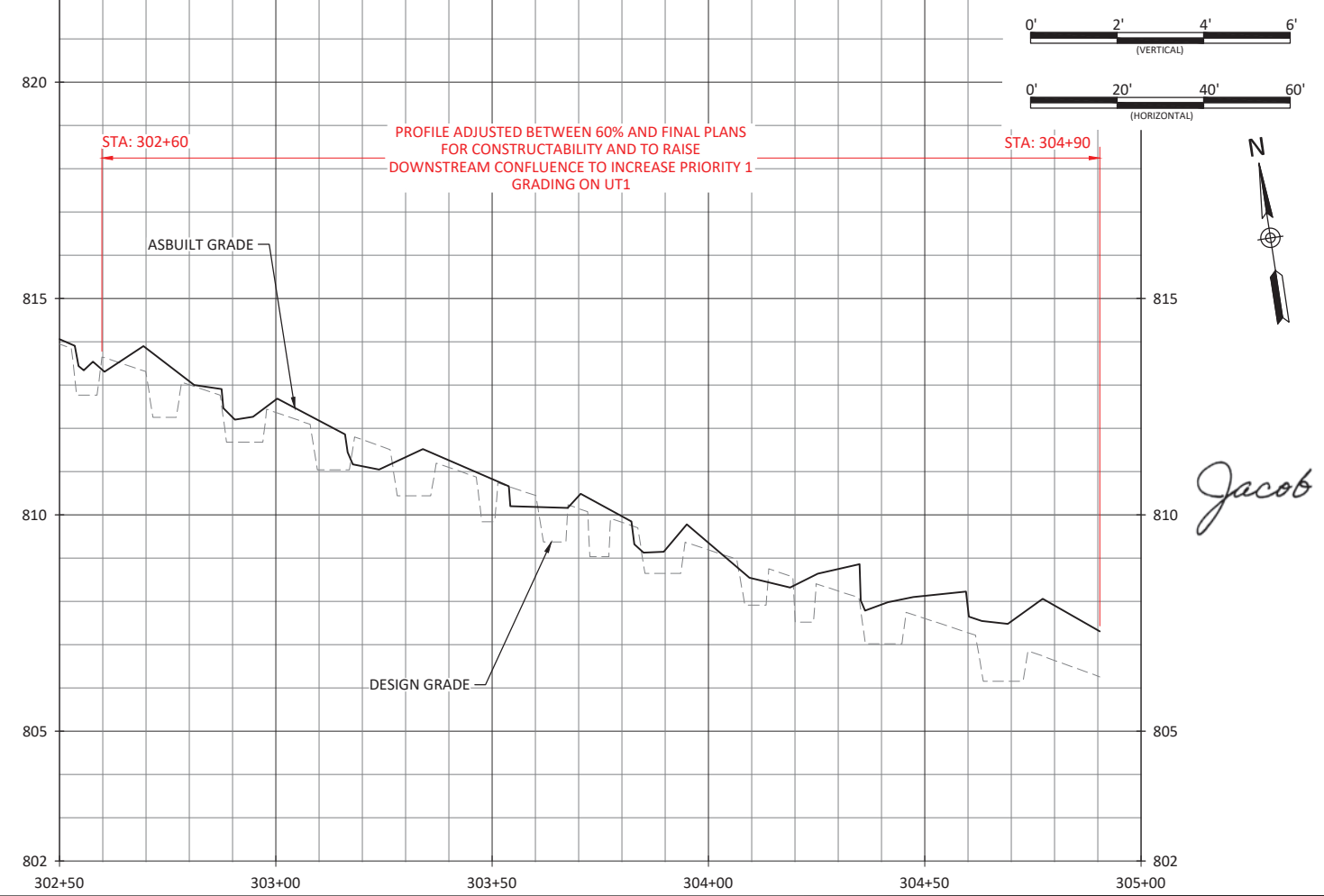
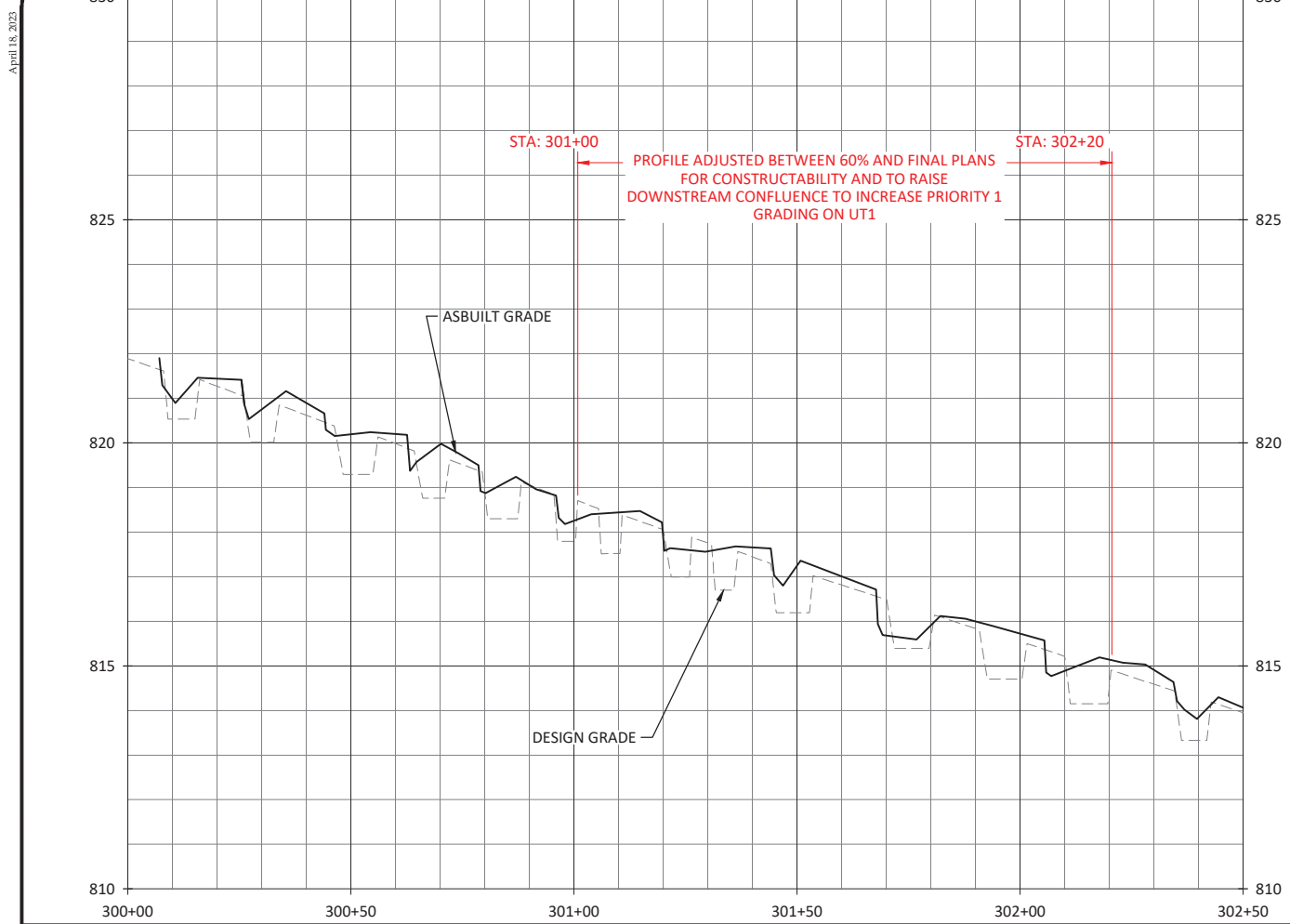


Revisions:

Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**1.11**

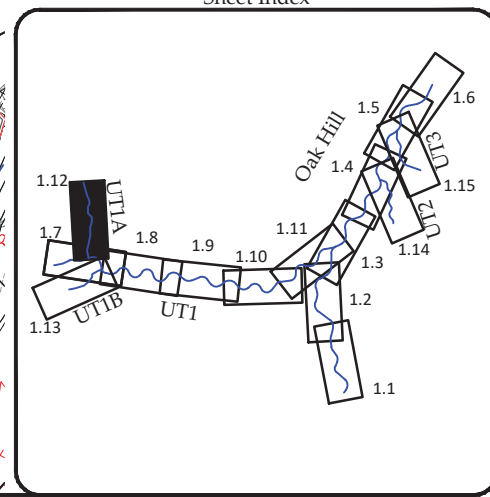
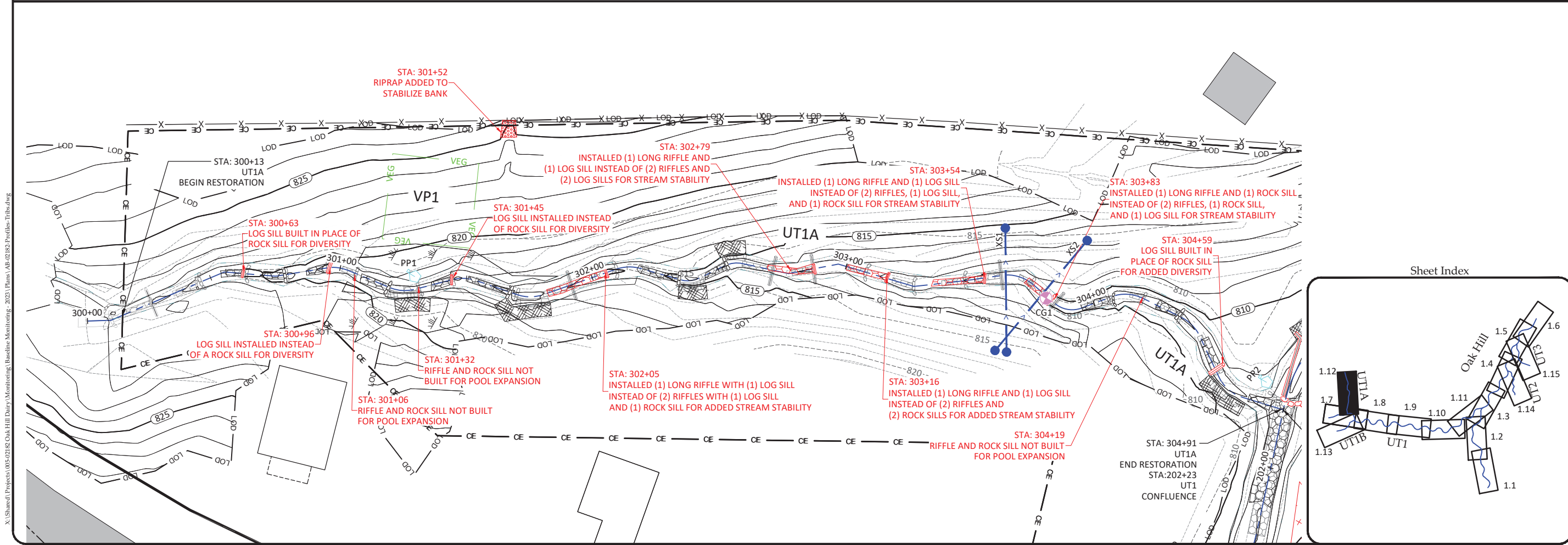
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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

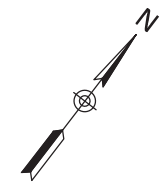
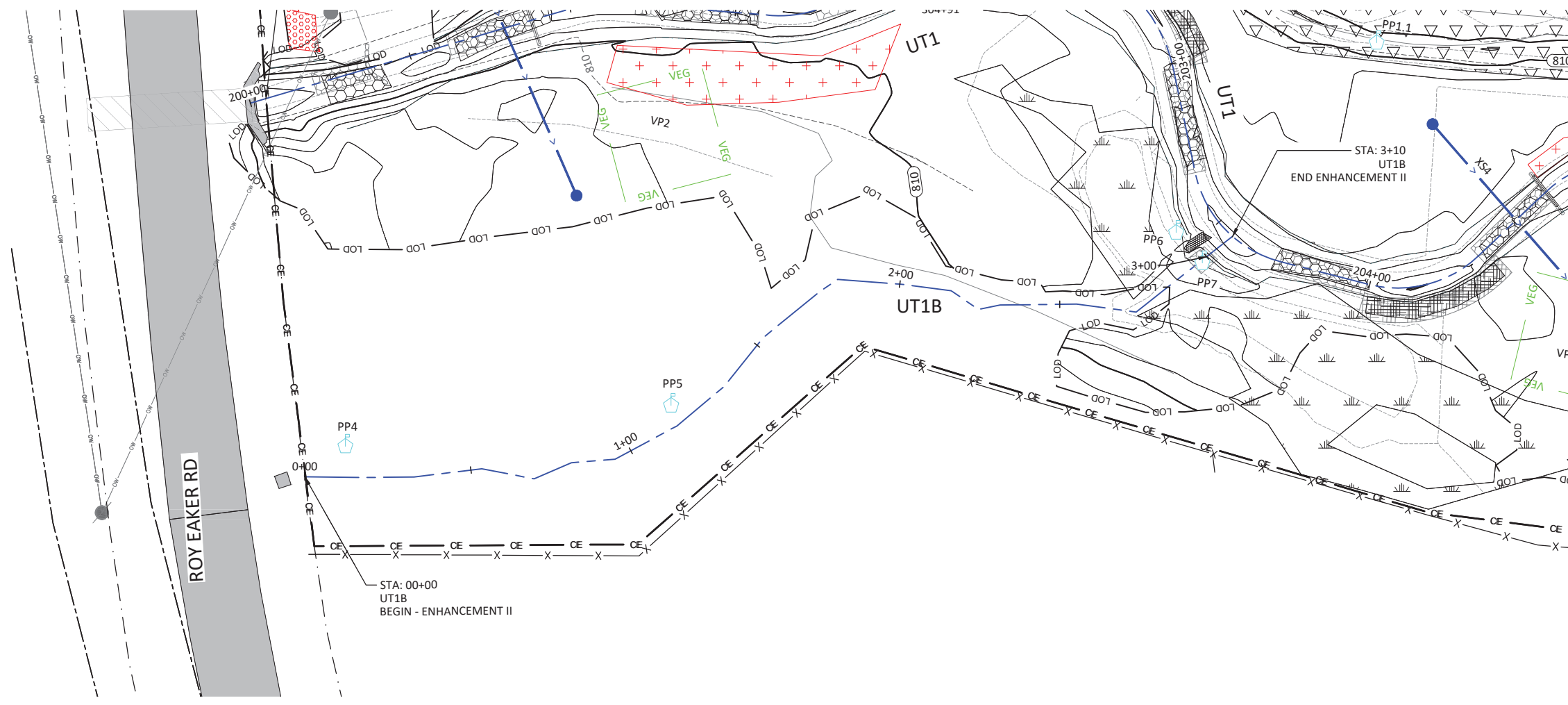
UT1A  
Stream Plan and Profiles

Date:	April 18, 2023
Job Number:	005-02182
Project Engineer:	JM
Drawn By:	AMR/JCK
Checked By:	JCK

1.12

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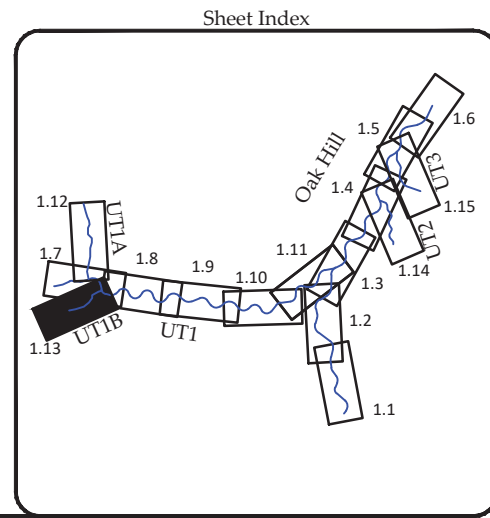
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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

UT1B  
Stream Plan and Profiles

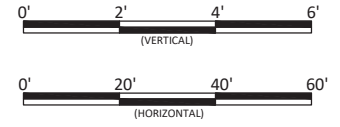
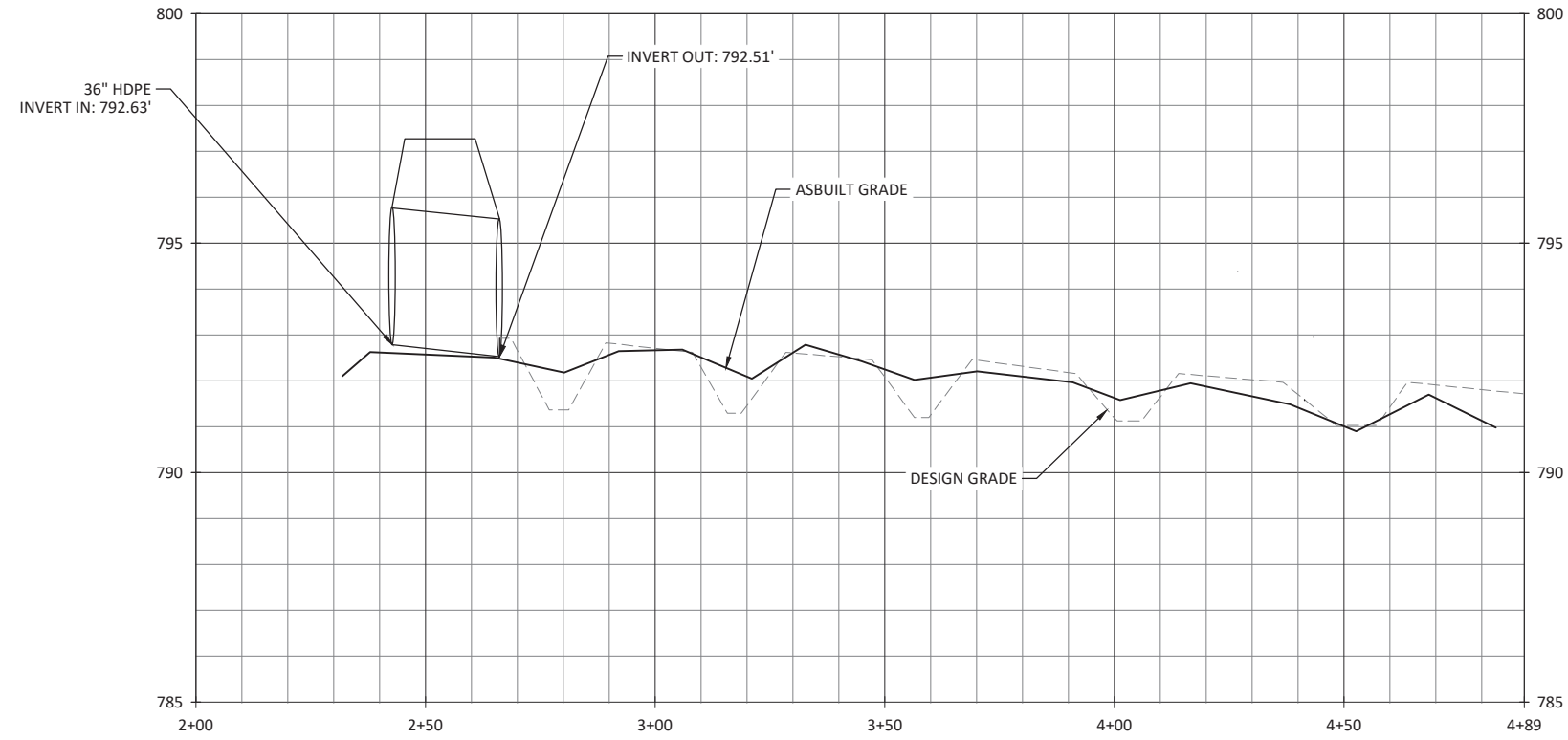


Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**1.13**

April 18, 2023

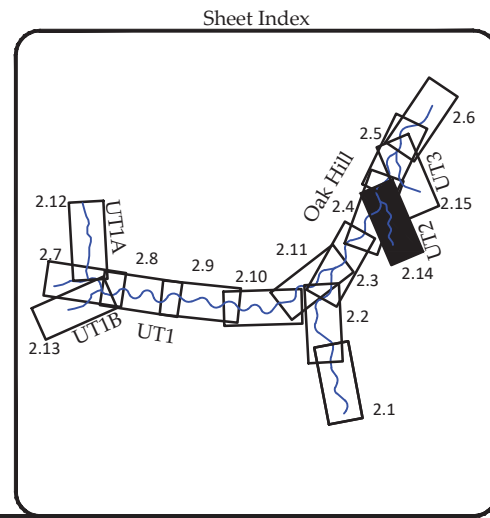
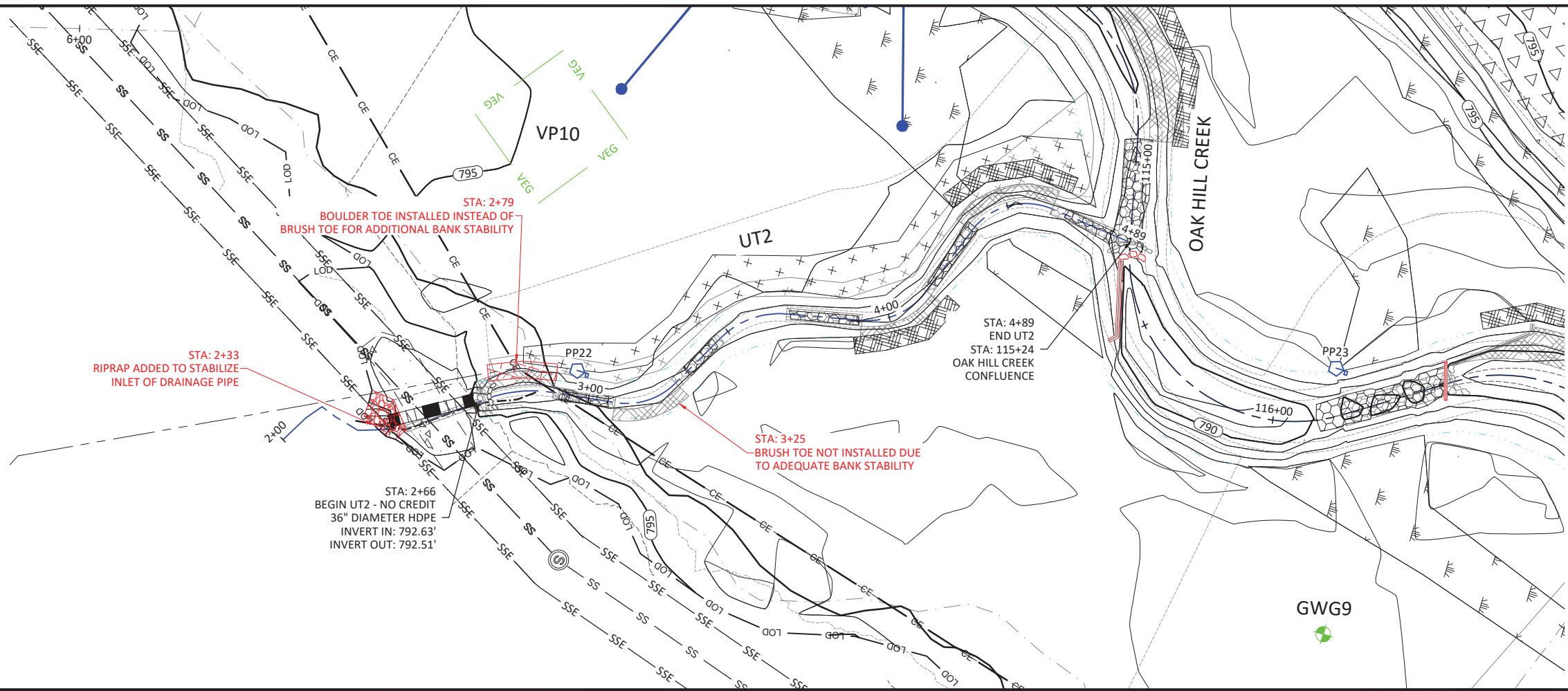


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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina  
Uncredited-Tribs - UT2  
Stream Plan and Profiles



Revisions:

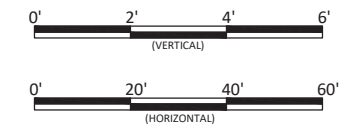
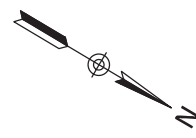
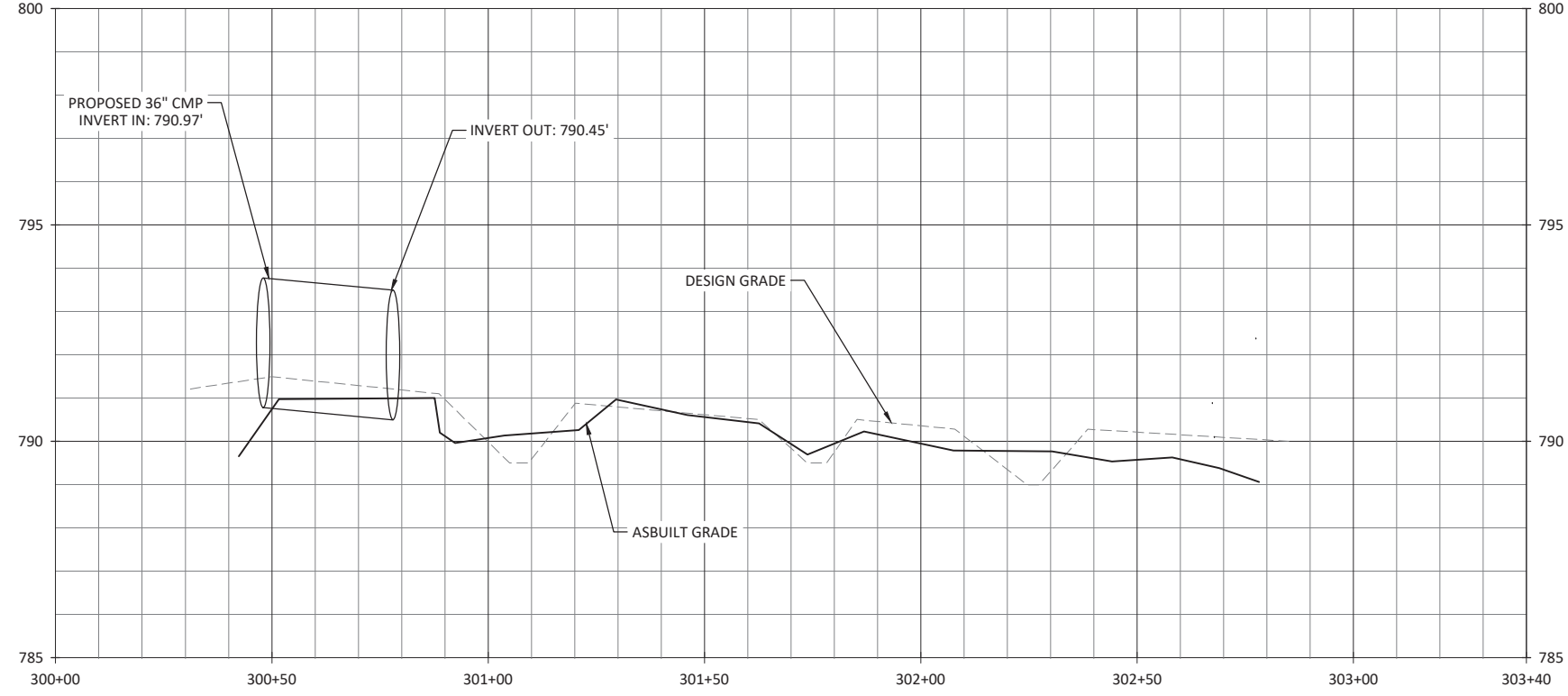

Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**1.14**

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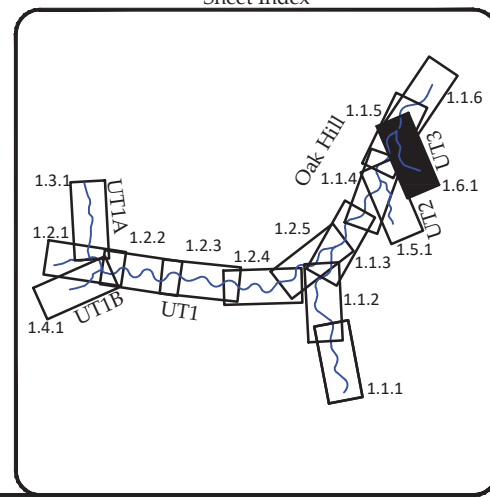
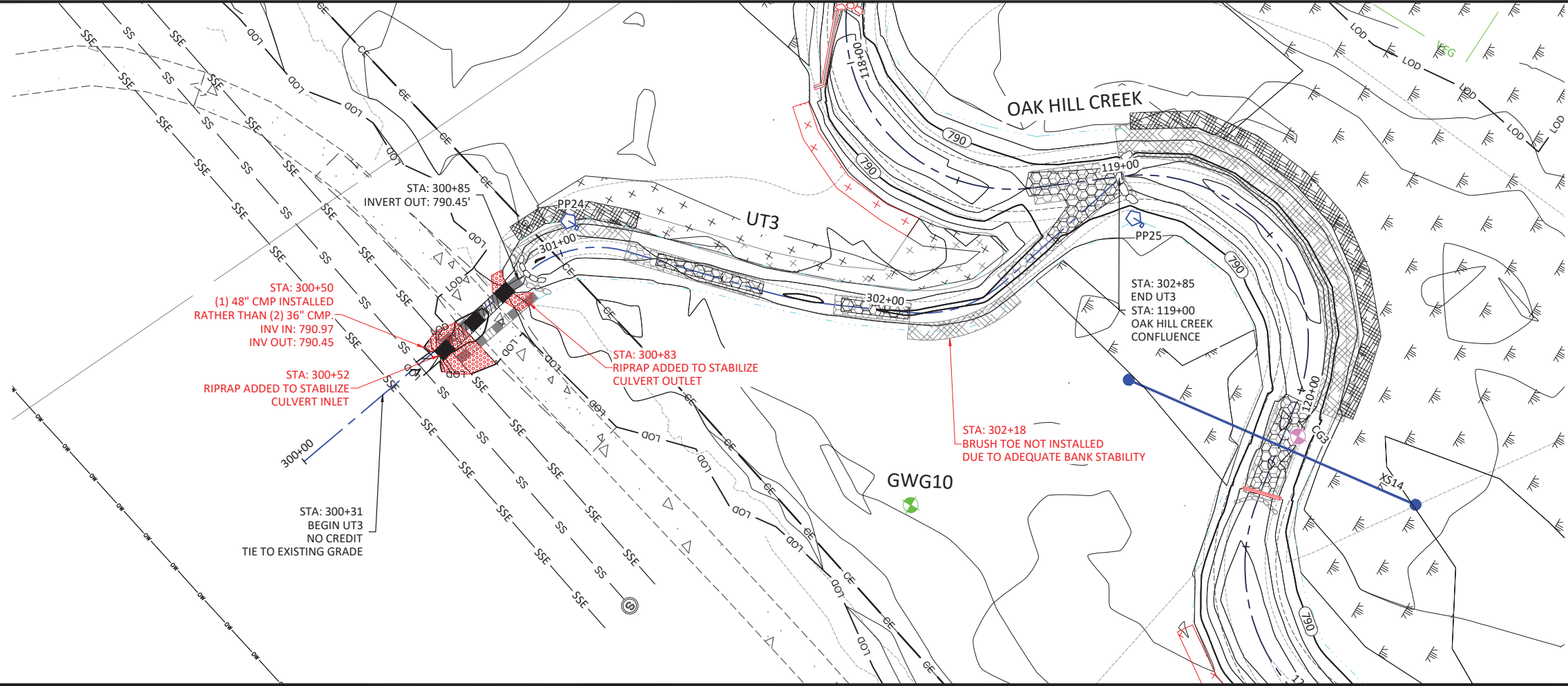
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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

Uncredited-Tribs - UT3  
Stream Plan and Profiles






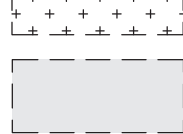
Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**1.15**

Sheet

April 18, 2023  
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-  WETLAND RE-ESTABLISHMENT PROPOSED AT A 1:1 CREDIT RATIO
-  WETLAND REHABILITATION PROPOSED AT A 1:1 CREDIT RATIO
-  WETLAND REHABILITATION PROPOSED AT A 1.5:1 CREDIT RATIO
-  WETLAND CREATION PROPOSED AT A 3:1 CREDIT RATIO

EAKER  
71-6541  
4887 PG: 2200

EXISTING POND

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2691-90-0340  
DB: 4949 PG: 1803 (TRACT ONE)  
ALSO DB: 4949 PG: 1803  
(TRACT #8 OF TRACT EIGHT)

I RUSTY EAKER, JR.  
N RUSTY EAKER, SR.  
PIN: 2691-70-3338  
DB: 4821 PG: 1023  
11 PG: 58 (LOT 6)

SALLY EAKER HARRIS  
PATSY EAKER LINEBERGER  
FREDIA EAKER WOODRIDGE  
CAMERON RUSTY EAKER, SR.  
DB: 1332 PG: 282  
SEE NOTE #10

MICHAEL W. WHITESIDES & WIFE  
LAUREN W. WHITESIDES  
PIN: 2690-79-5818  
DB: 4786 PG: 363

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2690-79-8897  
PORTION OF DB: 4949 PG: 1803 (TRACT SIX)

CAMERON RUSTY EAKER, SR.  
PIN: 2690-89-1706  
DB: 3262 PG: 477

GABRIEL L. LAIL  
PIN: 2690-79-6528  
DB: 4601 PG: 1438

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2690-79-8664  
DB: 4949 PG: 1803 (TRACT FIVE)

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2690-79-9620  
DB: 4949 PG: 1803 (TRACT FOUR)

CAMERON RUSTY EAKER, JR. &  
CAMERON RUSTY EAKER, SR.  
PIN: 2690-79-9577  
DB: 4949 PG: 1803 (TRACT THREE)

NICOLE L. MASSEY  
PIN: 2690-89-0562  
DB: 4782 PG: 590

CAROLYN B. TURNER (LIFE ESTATE)  
ROBERT F. TURNER &  
CHARLES B. TURNER  
PIN: 2690-89-1434  
DB: 4999 PG: 501

TERRY A. RIDDLLEY & WIFE  
LORIE B. RIDDLLEY  
PIN: 2690-89-8022  
DB: 4483 PG: 1040



Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

2.1

Sheet

Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina  
Wetland Grading - Overview  
Wetland Grading



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CITY OF CHERYVILLE  
PIN: 2691-90-9995  
DB: 2086 PG: 714

HAROLD R. LINEBERGER & WIFE  
PATSY E. LINEBERGER  
PIN: 3601-00-0464  
DB: 1898 PG: 658  
ESTATE FILE 14E/780

WETLAND 1  
(SEE SHEET 2.2)

WETLAND 2  
(SEE SHEET 2.3)

WETLAND 3 AND 4  
(SEE SHEET 2.4)

ROY EAKER ROAD

ROBERT ROAD

OAK HILL CREEK

OAK HILL CREEK

UT1A

UT1B

UT1

UT3

UT2

0+00

1+00

2+00

3+00

4+00

0+00

1+00

2+00

3+00

4+00

0+00

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1+00

2+00

3+00

4+00

0+00

1+00

2+00



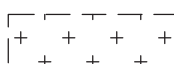

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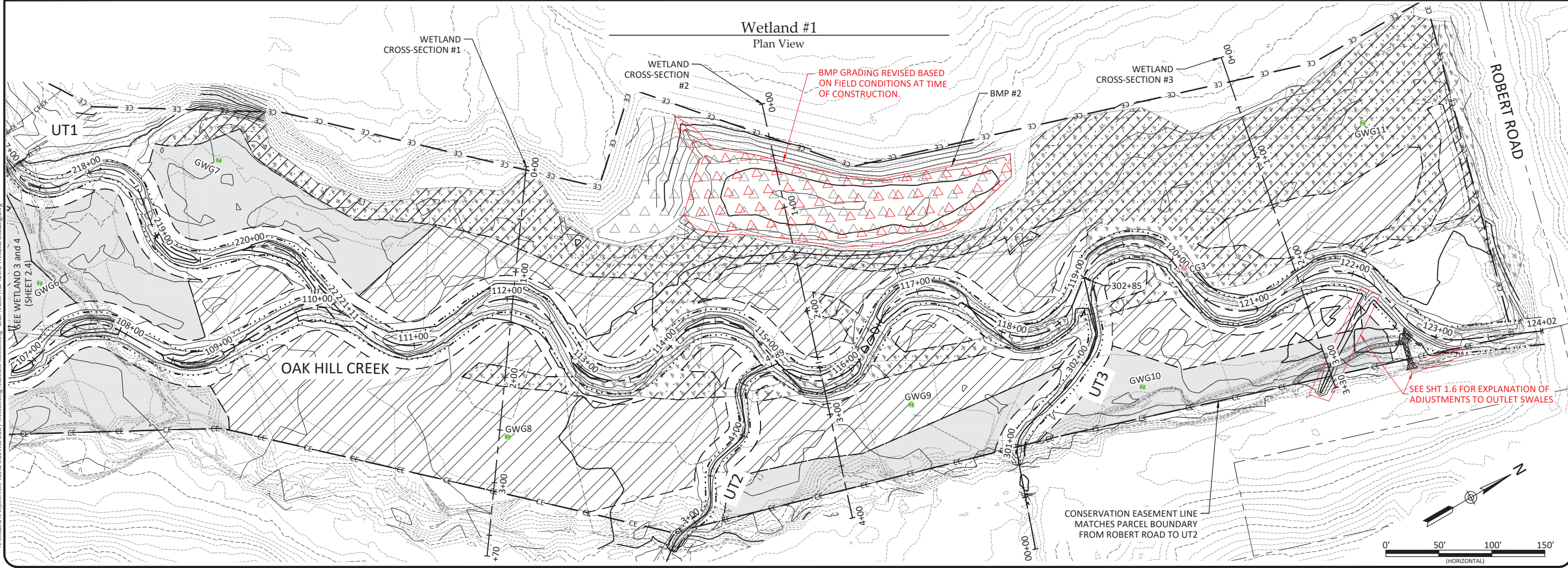
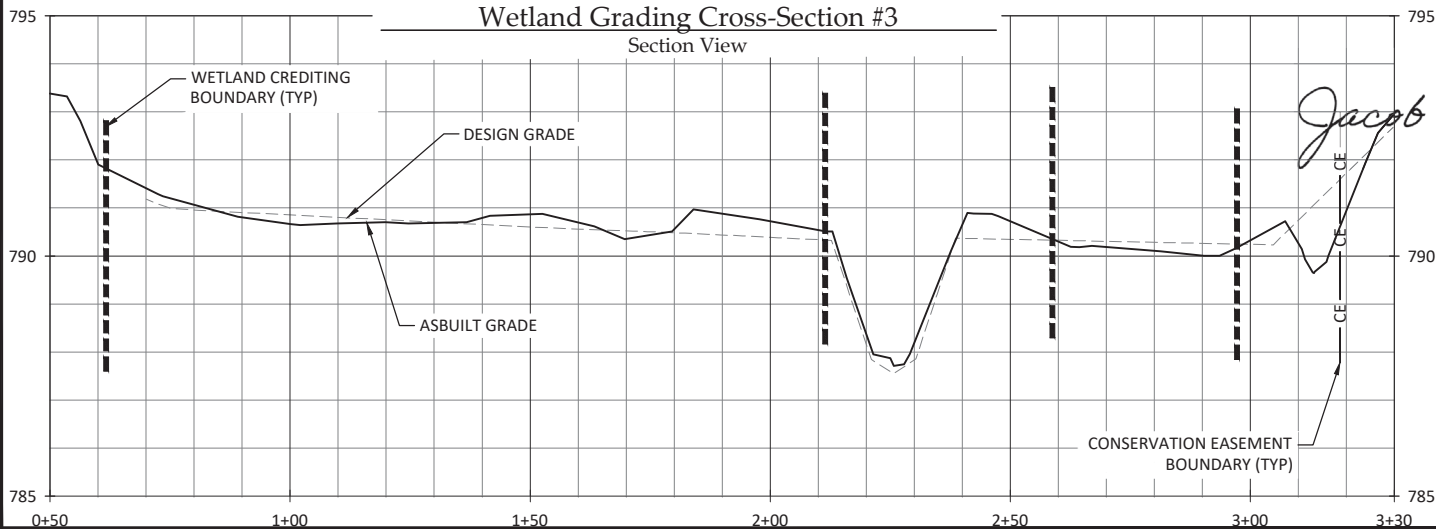
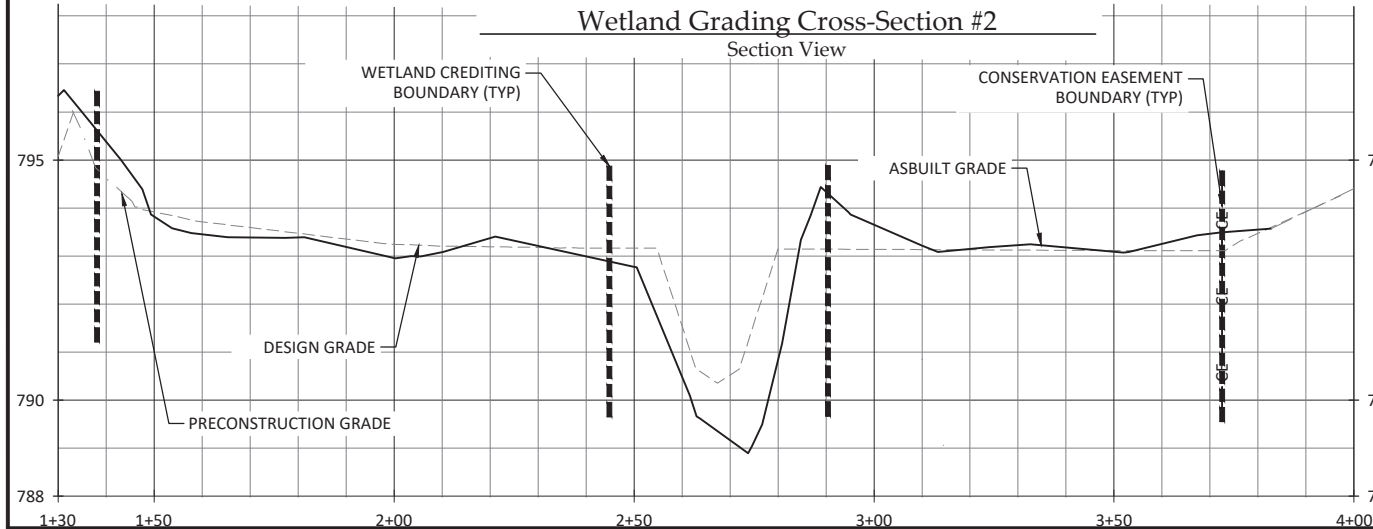
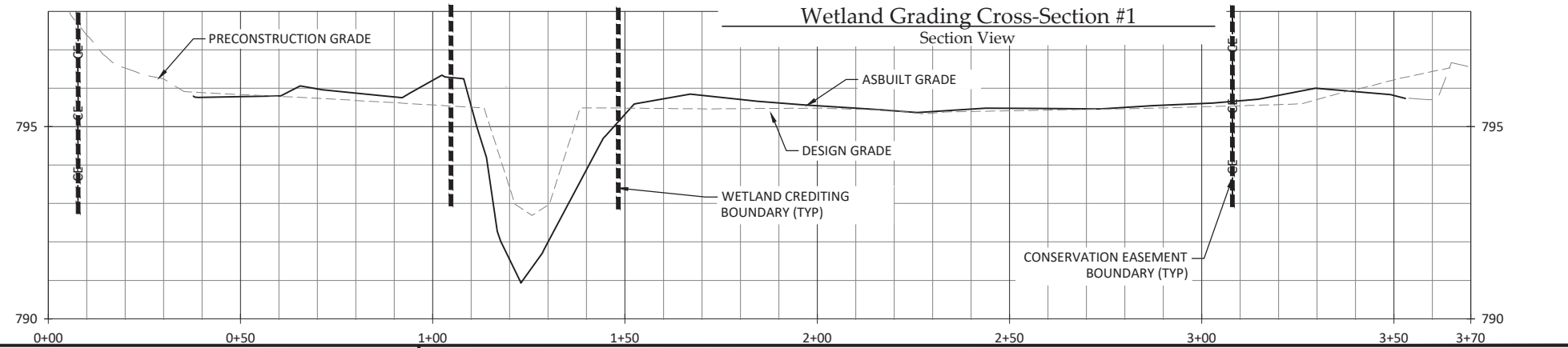
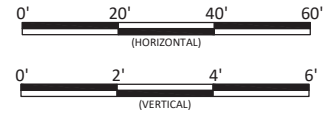
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1+00

1+88

April 18, 2023

-  WETLAND RE-ESTABLISHMENT PROPOSED AT A 1:1 CREDIT RATIO
-  WETLAND REHABILITATION PROPOSED AT A 1:1 CREDIT RATIO
-  WETLAND REHABILITATION PROPOSED AT A 1.5:1 CREDIT RATIO
-  WETLAND CREATION PROPOSED AT A 3:1 CREDIT RATIO



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Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina  
Wetland Grading - Wetland 1  
Wetland Grading

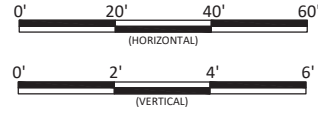
Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JPM  
Drawn By: AMR/JCK  
Checked By: JCK

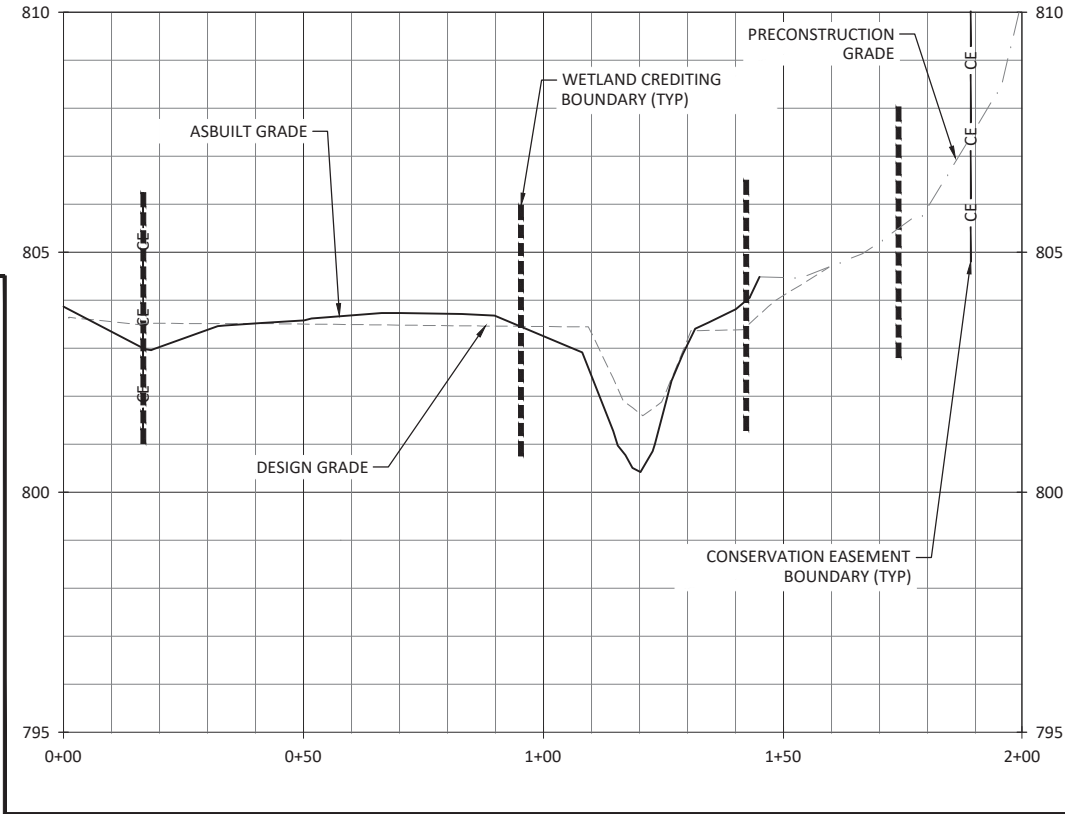
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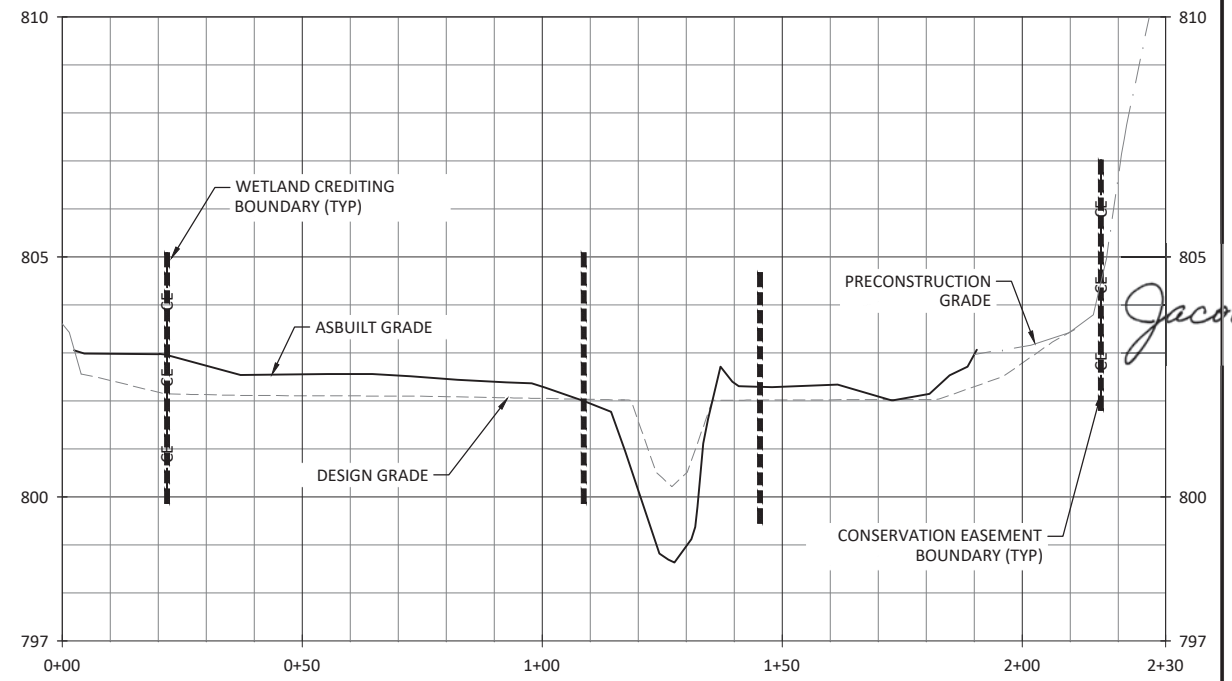


Wetland Grading Cross-Section #4  
Section View



- WETLAND RE-ESTABLISHMENT PROPOSED AT A 1:1 CREDIT RATIO
- WETLAND REHABILITATION PROPOSED AT A 1:1 CREDIT RATIO
- WETLAND REHABILITATION PROPOSED AT A 1.5:1 CREDIT RATIO
- WETLAND CREATION PROPOSED AT A 3:1 CREDIT RATIO

Wetland Grading Cross-Section #5  
Section View

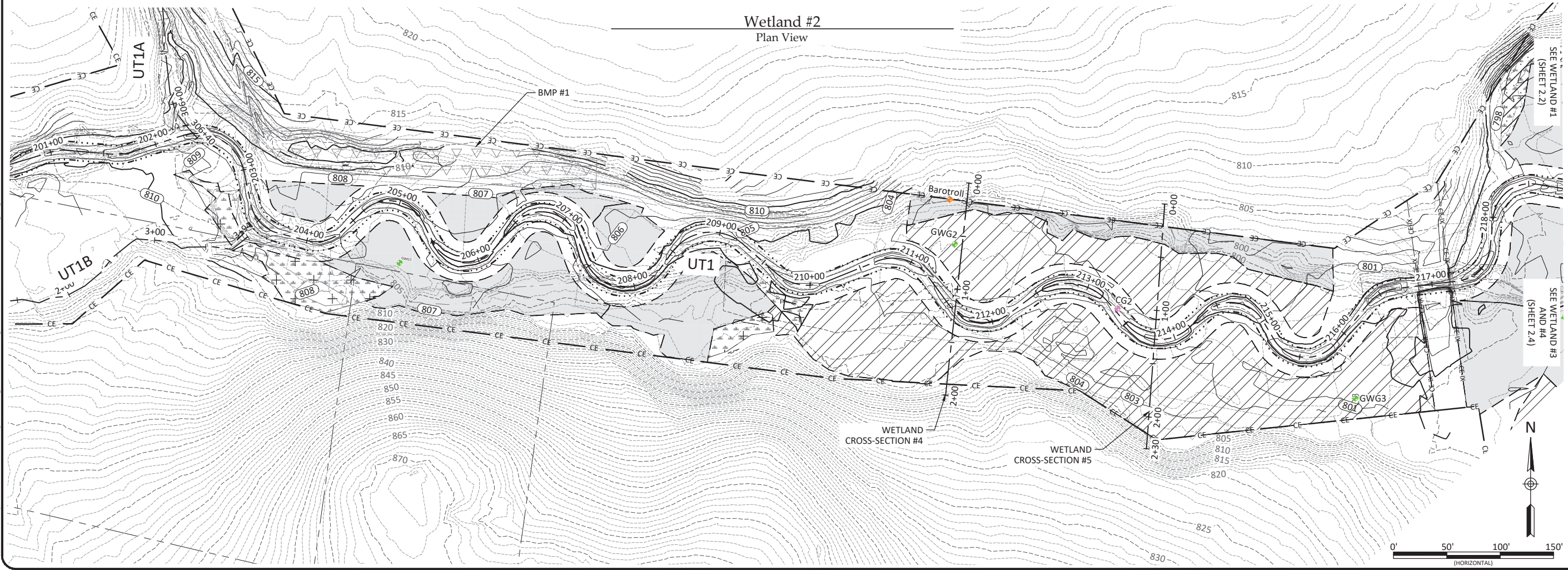


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Wetland #2  
Plan View



Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina  
Wetland Grading - Wetland 2  
Wetland Grading

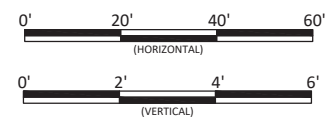
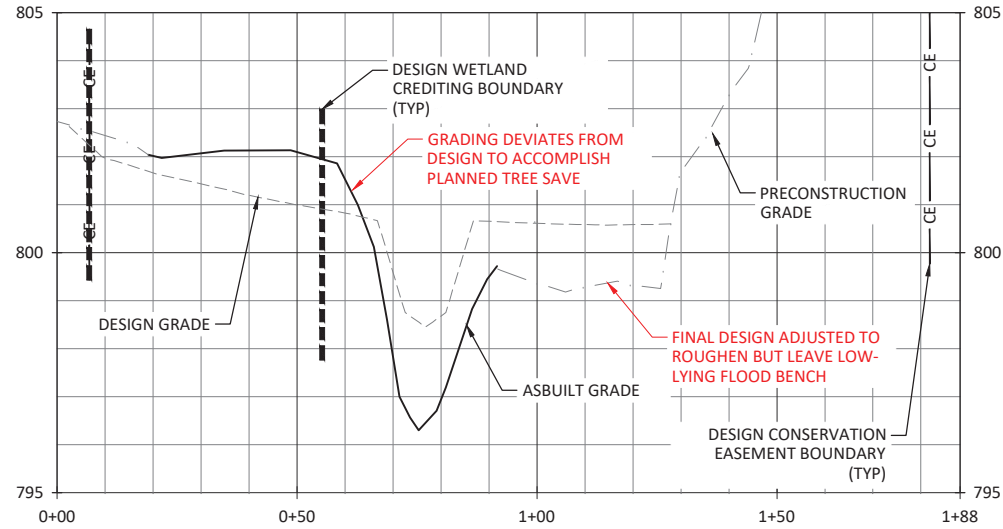
Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

2.3

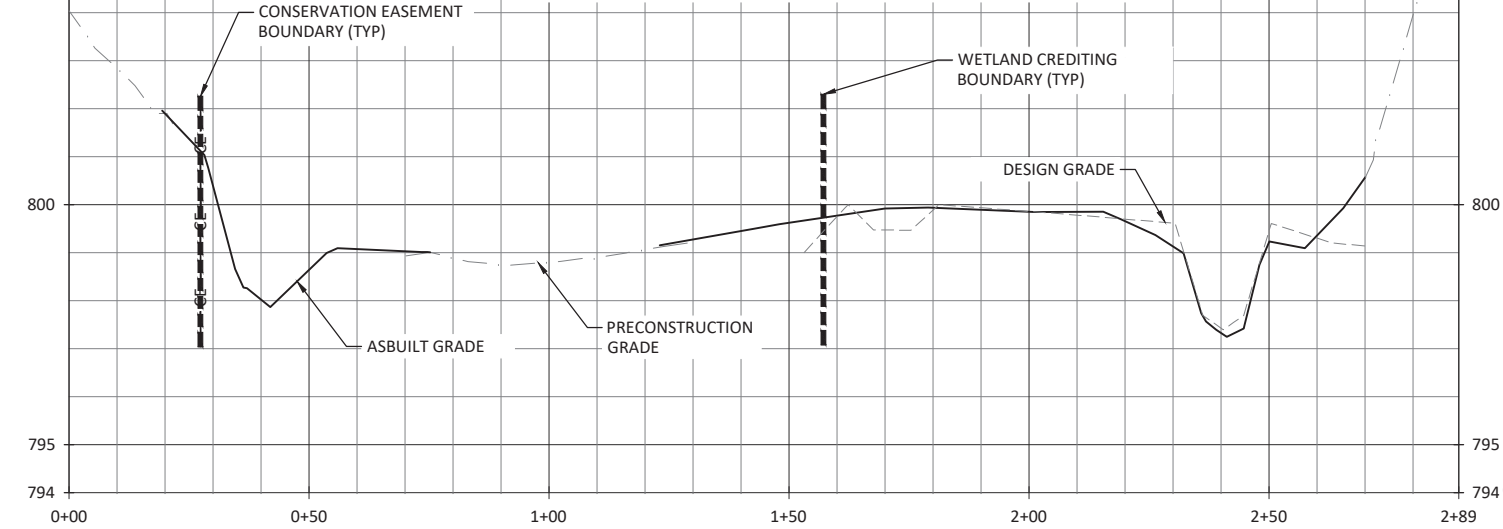
### Wetland Grading Cross-Section #6

Section View



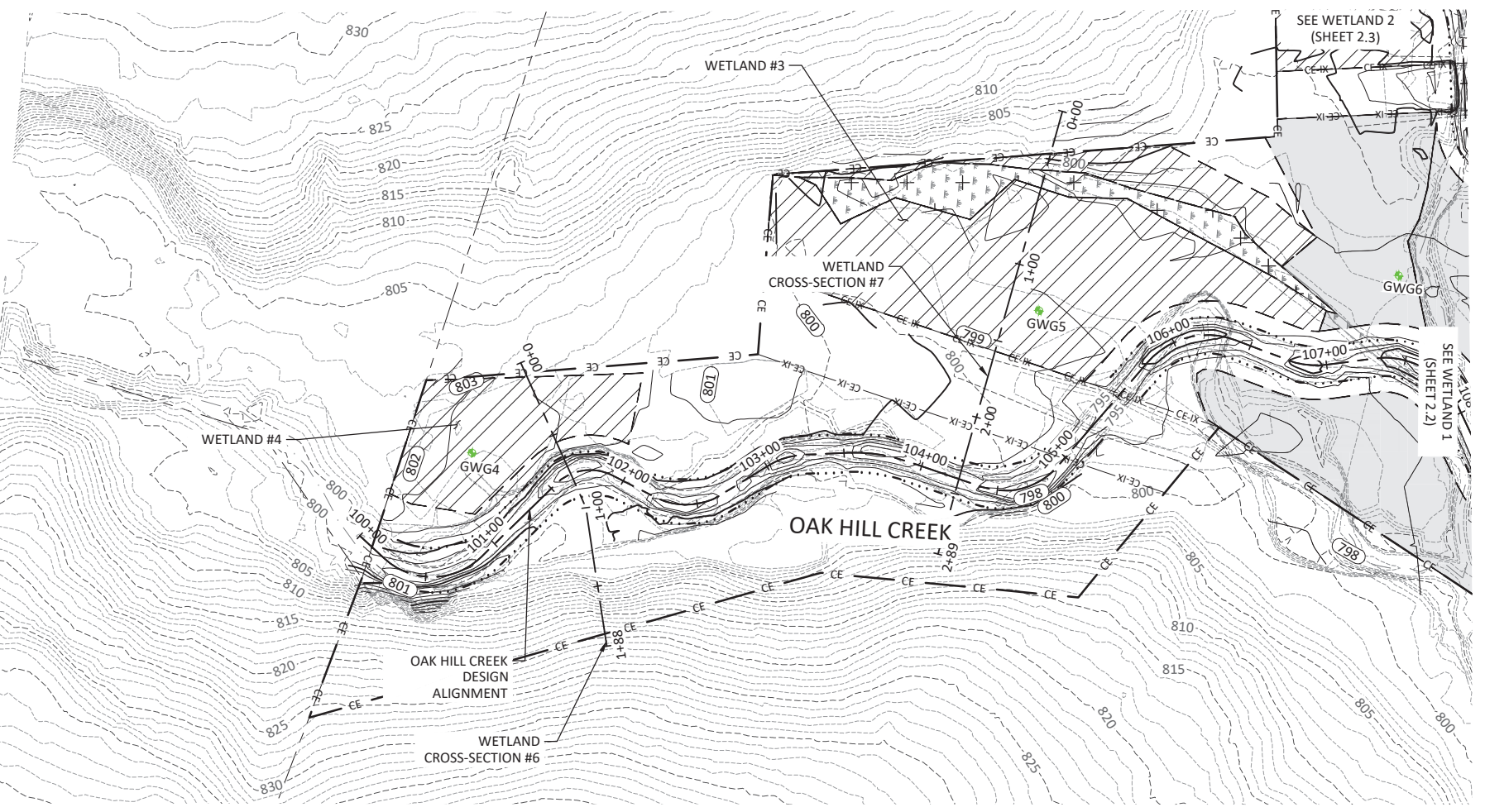
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Section View

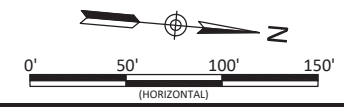


### Wetland #3 and #4

Plan View



- WETLAND RE-ESTABLISHMENT PROPOSED AT A 1:1 CREDIT RATIO
- WETLAND REHABILITATION PROPOSED AT A 1:1 CREDIT RATIO
- WETLAND REHABILITATION PROPOSED AT A 1.5:1 CREDIT RATIO
- WETLAND CREATION PROPOSED AT A 3:1 CREDIT RATIO



Oak Hill Dairy Mitigation Site Record Drawings  
 Gaston County, North Carolina  
 Wetland Grading - Wetland 3-4  
 Wetland Grading

Date: April 18, 2023  
 Job Number: 005-02182  
 Project Engineer: JM  
 Drawn By: AMR/JCK  
 Checked By: JCK

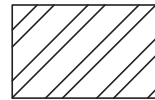
# 2.4



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### Open Area Buffer Planting



Open Buffer Planting Zone Trees table with columns: Species, Common Name, Max Spacing, Indiv. Spacing, Min. Caliper Size, Stratum, Wetland Indicator, # of Stems. Lists various tree species like Acer negundo, Platanus occidentalis, etc.

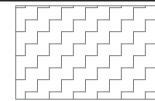
Open Buffer Planting Zone Small Trees / Shrubs table with columns: Species, Common Name, Max Spacing, Indiv. Spacing, Min. Caliper Size, Stratum, Wetland Indicator, # of Stems. Lists species like Alnus serrulata, Hamamelis virginiana, etc.

- Notes: (1) Substitute species: Sweetshrub, northern red oak, slippery elm. (2) Transplants from on-site to be used at Designer's discretion for streambank and floodplain planting.

TEMPORARY SEEDING table with columns: APPROVED DATE, TYPE, PLANTING RATE (lbs/acre). Details seeding rates for Rye Grain, Ladino clover, etc.

Note: Rates of fertilizer and lime if necessary can be found in the site preparation plan included in the specification documents.

### Wetland Planting

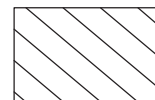


Wetland Planting Zone Trees table with columns: Species, Common Name, Max Spacing, Indiv. Spacing, Min. Caliper Size, Stratum, Wetland Indicator, # of Stems. Lists species like Platanus occidentalis, Betula nigra, etc.

Wetland Planting Zone Small Trees/Shrubs table with columns: Species, Common Name, Max Spacing, Indiv. Spacing, Min. Caliper Size, Stratum, Wetland Indicator, # of Stems. Lists species like Alnus serrulata, Liriodendron benzoin, etc.

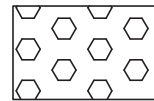
- Notes: (1) Substitute species: Silky willow, silky dogwood. (2) Tag Alder shall be limited to Wetland 1 or other wetter areas of the site as designated by Designer.

### Partially Vegetated Buffer Area Planting



Open Buffer Planting Zone Trees table with columns: Species, Common Name, Max Spacing, Indiv. Spacing, Min. Caliper Size, Stratum, Wetland Indicator, # of Stems. Lists species like Carpinus caroliniana, Euonymus americana, etc.

### Riparian Corridor and Inundated Wetland Planting



Streambank Planting Zone table with columns: Species, Common Name, Max Spacing, Indiv. Spacing, Min. Size, Stratum, Wetland Indicator, % of Stems. Includes Live Stakes and Herbaceous Plugs sections.

Note: See live staking and herbaceous plugs detail.

### Permanent Seeding

Riparian Seeding - Open Canopy table with columns: Approved Date, Species Name, Common Name, Stratum, Wetland Indicator, Density (lbs/acre). Lists various grass and seed species.

Wetland Seeding - Open Canopy table with columns: Approved Date, Species Name, Common Name, Stratum, Wetland Indicator, Density (lbs/acre). Lists various grass and seed species.

- Notes: (1) Apply Permanent Riparian seeding in all disturbed areas within Conservation Easement. (2) Apply Permanent seeding in all other disturbed areas outside of Easement per specification.

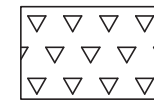
### Stabilization Seeding

Stabilization Seeding table with columns: Species Name, Common Name, lbs/acre. Lists Fescue and Orchard Grass.

- Notes: (1) Apply Pasture Seeding for grading outside Conservation Easement, utility easements, and stream crossings. (2) Install temporary seed and mulch with all permanent seed.

### Best Management Practice (BMP) Planting

- Notes: (1) Apply "Wetland Seeding - Open Canopy" seed mix to all disturbed areas of BMP including bottom of basin. (2) Apply "Riparian Corridor Planting - Herbaceous Plugs and Livestakes" species in areas shown in detail.



Oak Hill Dairy Mitigation Site Record Drawings

Gaston County, North Carolina

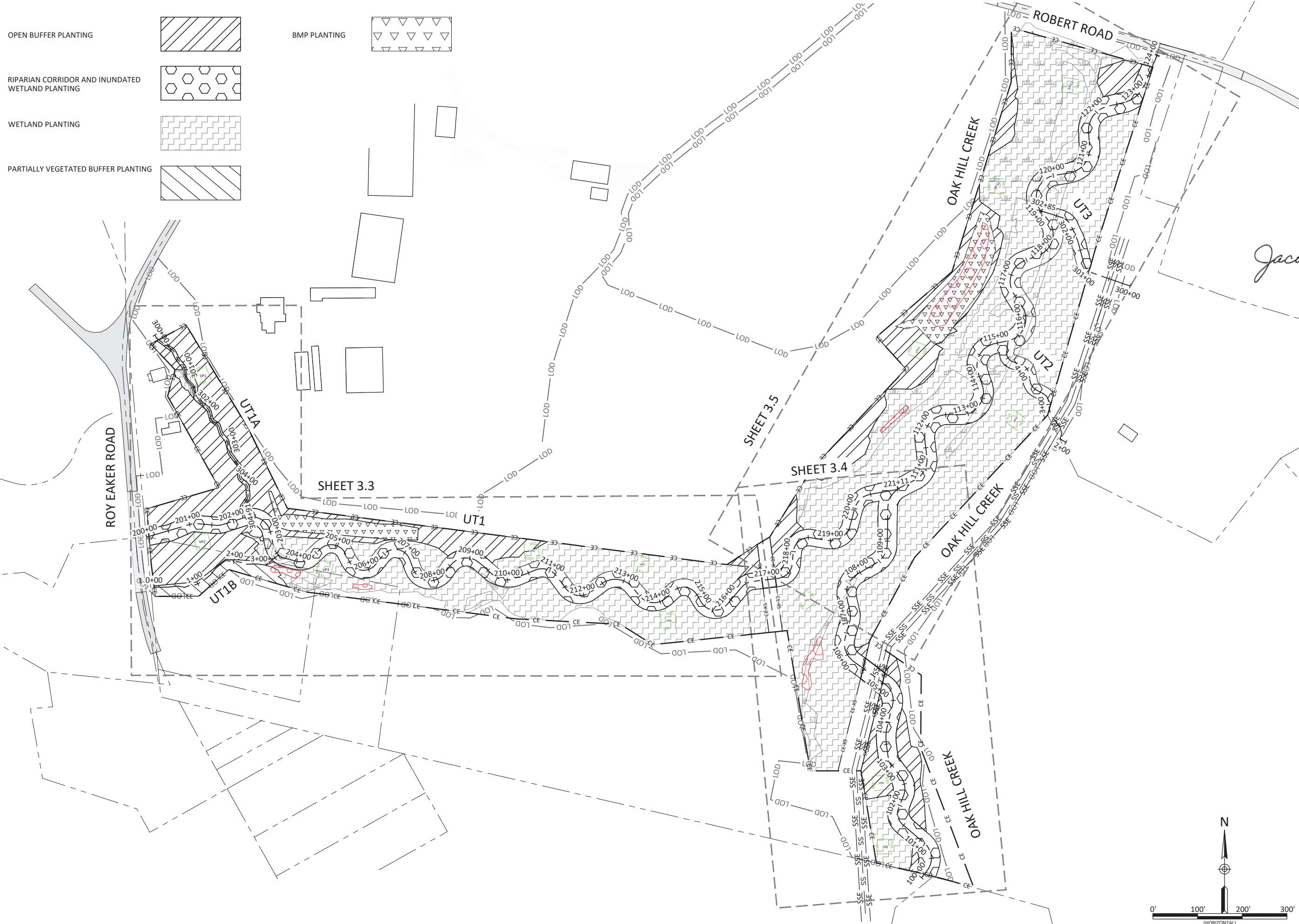
Planting List





Date: April 18, 2023 Job Number: 005-02182 Project Engineer: AMR/JCK Drawn By: AMR/JCK Checked By: JCK


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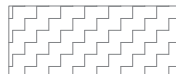
April 18, 2023




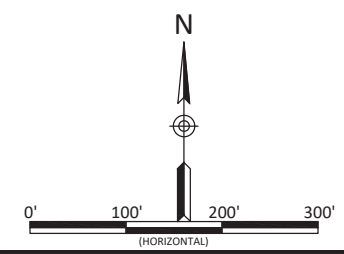
**OPEN BUFFER PLANTING** 

**BMP PLANTING** 

**RIPARIAN CORRIDOR AND INUNDATED WETLAND PLANTING** 


**WETLAND PLANTING** 

**PARTIALLY VEGETATED BUFFER PLANTING** 



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**Oak Hill Dairy Mitigation Site Record Drawings**  
Gaston County, North Carolina

Planting Overview

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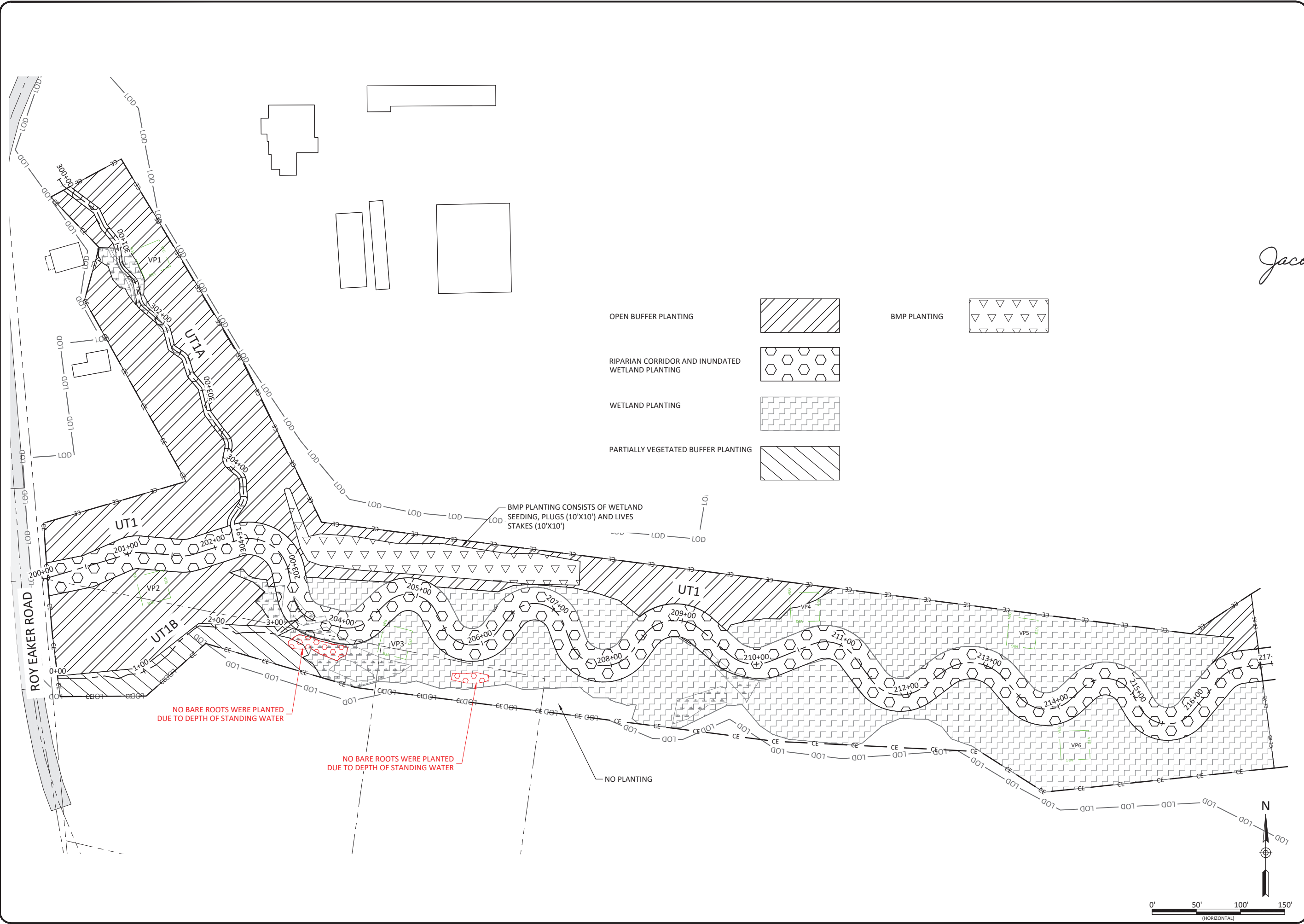
Revisions:

No.	Description

Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

3.2

Sheet



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Oak Hill Dairy Mitigation Site Record Drawings  
 Gaston County, North Carolina

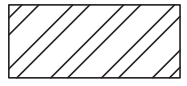
Planting Plan

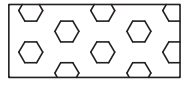
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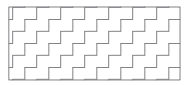

Date: April 18, 2023  
 Job Number: 005-02182  
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 Drawn By: AMR/JCK  
 Checked By: JCK

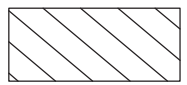
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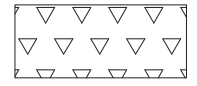


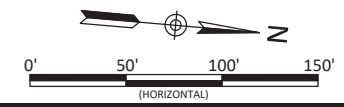
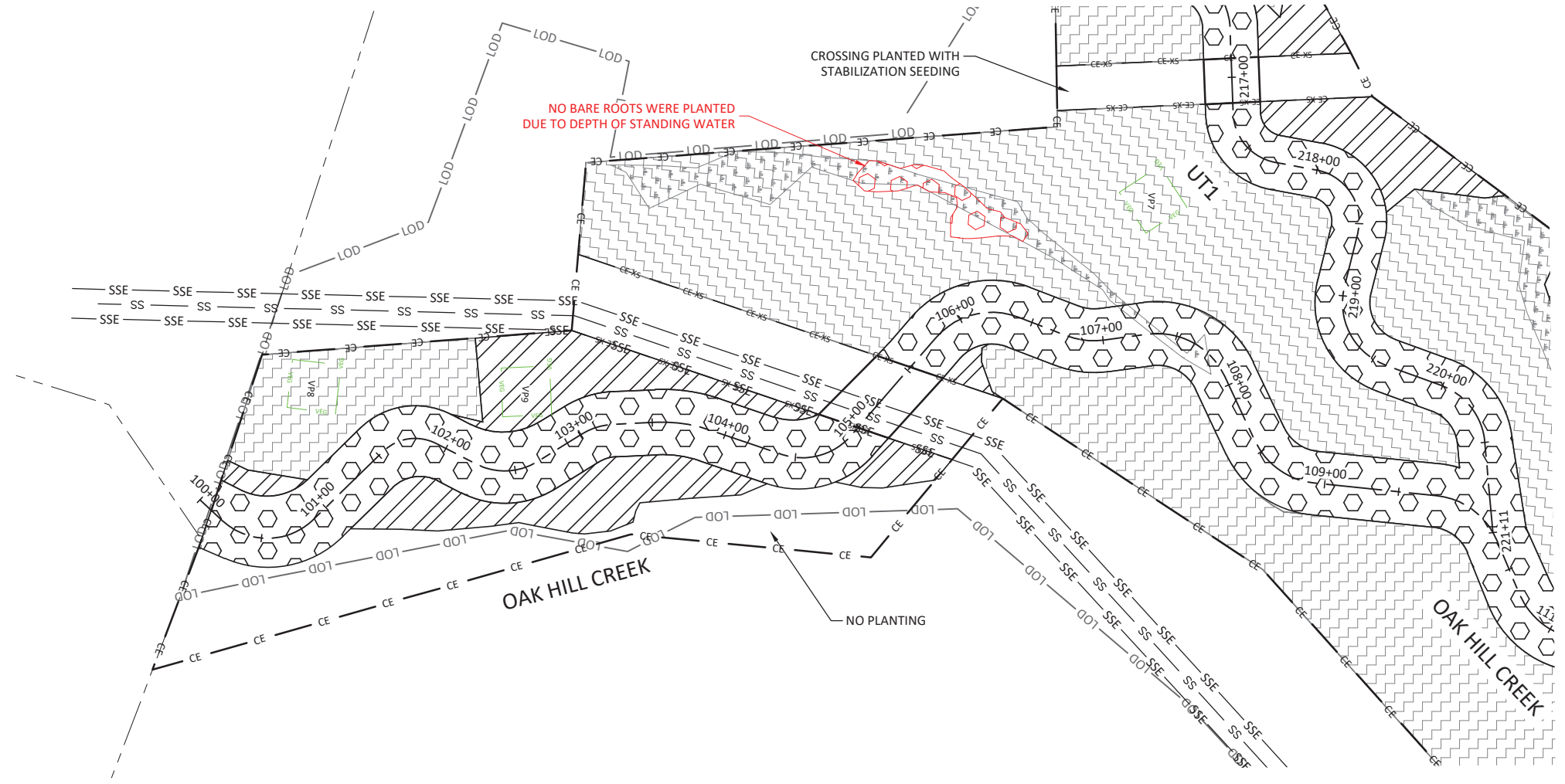
OPEN BUFFER PLANTING 

RIPARIAN CORRIDOR AND INUNDATED WETLAND PLANTING 

WETLAND PLANTING 

PARTIALLY VEGETATED BUFFER PLANTING 

BMP PLANTING 



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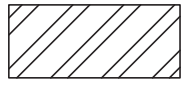
Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

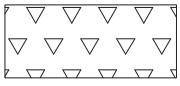
Planting Plan

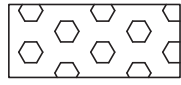
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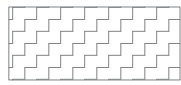
Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

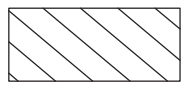
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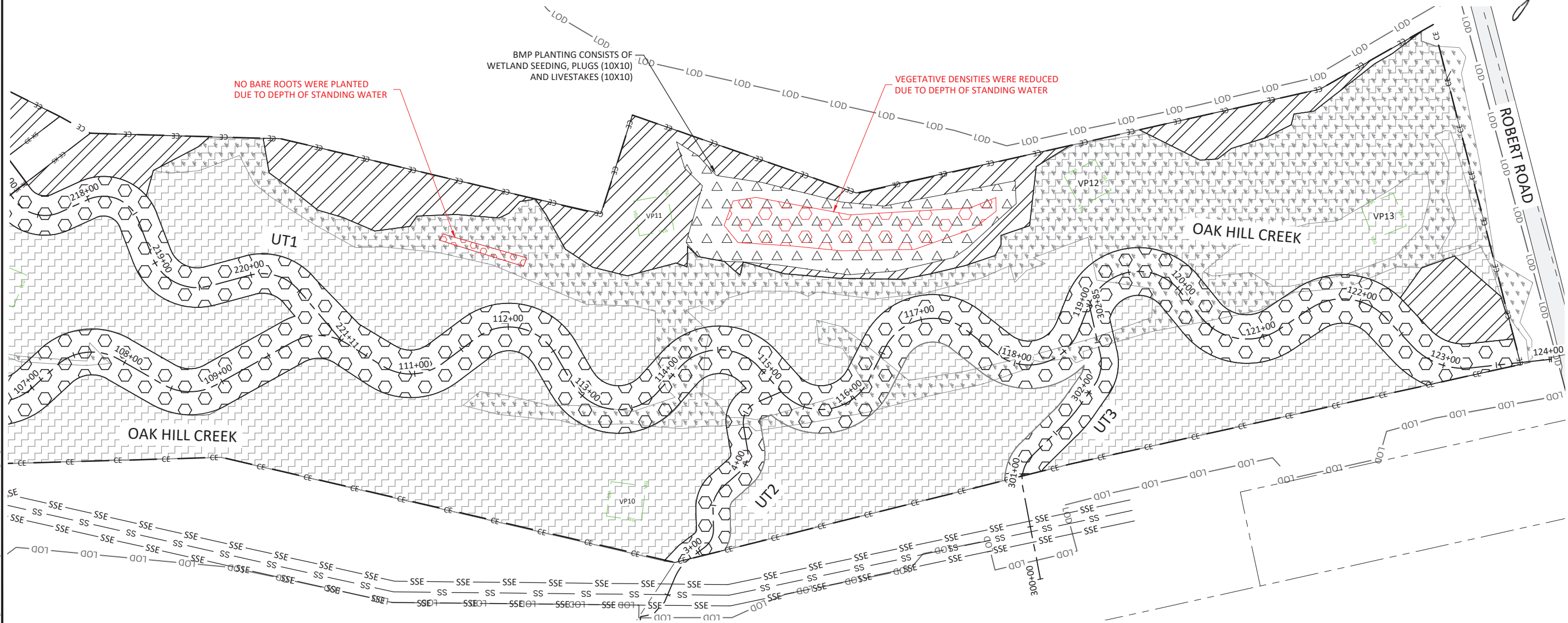
OPEN BUFFER PLANTING 

BMP PLANTING 

RIPARIAN CORRIDOR AND INUNDATED WETLAND PLANTING 

WETLAND PLANTING 

PARTIALLY VEGETATED BUFFER PLANTING 



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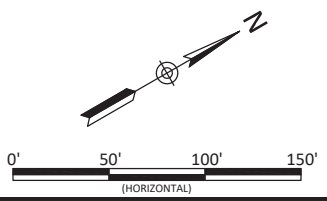
Oak Hill Dairy Mitigation Site Record Drawings  
Gaston County, North Carolina

Planting Plan

Revisions:

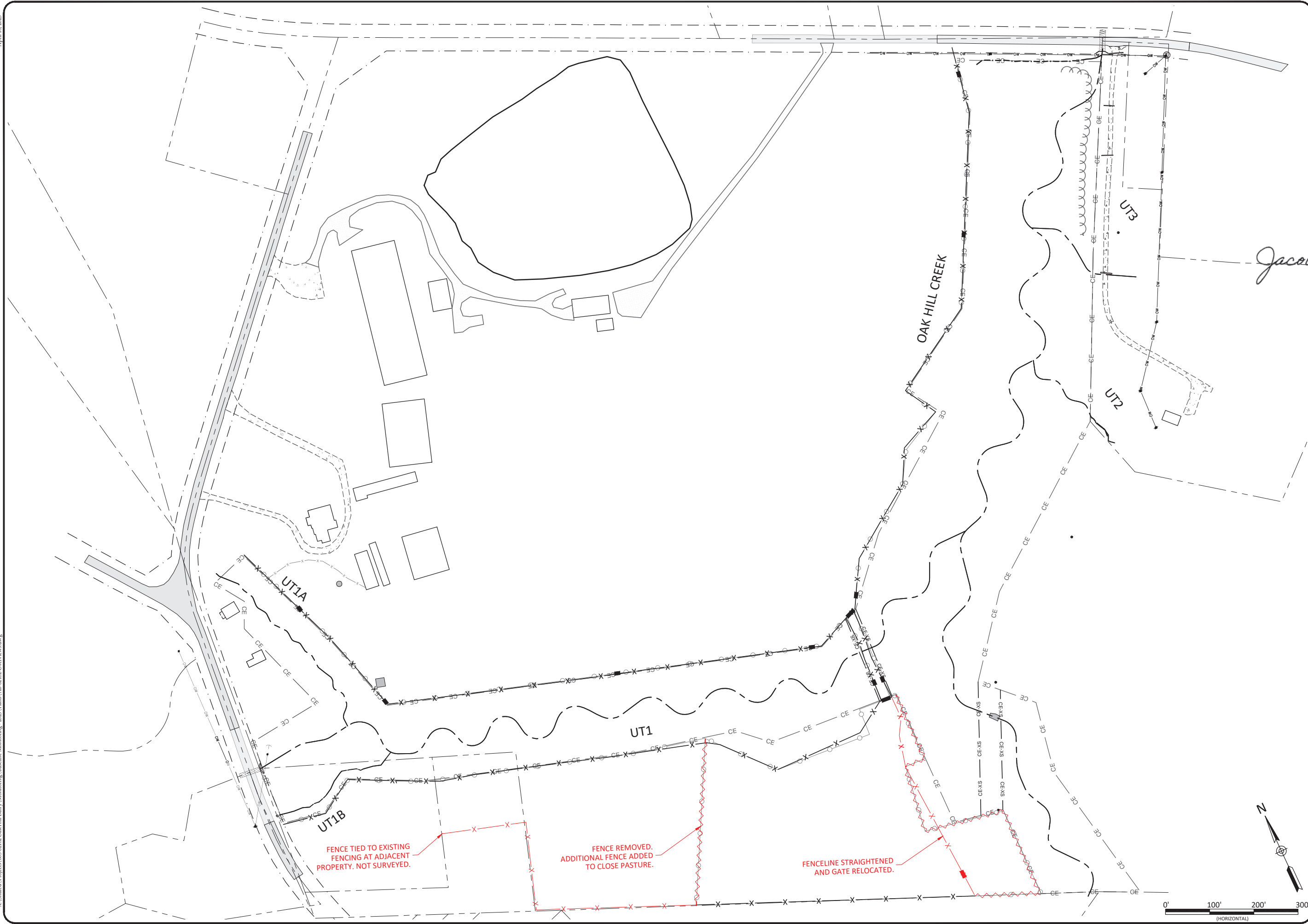

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Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

3.5



April 18, 2023

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**Oak Hill Dairy Mitigation Site Record Drawings**  
Gaston County, North Carolina

Farm Plan

Revisions:


Date: April 18, 2023  
Job Number: 005-02182  
Project Engineer: JM  
Drawn By: AMR/JCK  
Checked By: JCK

**4.1**

Sheet