



MONITORING YEAR 1 ANNUAL REPORT FINAL

Submittal: January 8, 2024

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: June 2023 – December 2023

PREPARED FOR:



**NC Department of Environmental Quality
Division of Mitigation Services**

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PREPARED BY:



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January 5, 2024
ATTN: Matthew Reid
Western Project Manager
NCDEQ – Division of Mitigation Service

RE: Oak Hill Dairy Draft MY1 Report Review
Catawba River Basin – CU# 03050102 – Gaston County
DMS Project ID No. 100120
Contract # 7867

Dear Matthew Reid,

Wildlands Engineering, Inc. (Wildlands) has reviewed the NC Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 1 (MY1) Report for the Oak Hill Dairy Mitigation Site. The DMS's comments and Wildlands' responses are noted below.

- *Report indicates that Hydrilla was discovered in approximately 450 linear feet of Oak Hill Creek Reach 4 and was mechanically treated. Was heavy equipment used to remove the invasive species or was this completed using handwork? Please provide an update of treatment success in the MY2 report.*

Wildlands Response: Hand tools were used to remove Hydrilla. Wildlands will continue to monitor and treat the Hydrilla. Updates will be included in the MY2 (2024) report.

- *Did the large tree that was removed from Oak Hill Creek Reach 1 result in any bank damage and does WEI think this blockage may be responsible for the aggradation upstream?*

Wildlands Response: No bank damage has been observed due to fallen tree. The blockage is unlikely to have caused or contributed to the aggradation upstream. Off-site erosion is likely causing the increased sediment load within the project area. Wildlands expects aggradation to be flushed through the system during larger rainfall events.

- *Only 5 of 11 gauges met success criteria. Recognizing that this is only MY1 and below average rainfall was received, does WEI have concerns with the wetland hydrology success on the site? Are there plans to install additional gauges at this time?*

Wildlands Response: Due to the below average rainfall during the MY1 growing season, Wildlands is not currently concerned about the wetland hydrology success on site and does not have plans to install additional groundwater gages at this time. Wildlands will continue to closely monitor groundwater levels and if any gage's performance trajectory indicates continued failure, Wildlands will consider installing additional gages.

- *Has WEI considered installing a rain gauge onsite since the closest gauge is 15 miles away?*

Wildlands Response: The daily and monthly rainfall data is collected from the CHERRYVILLE 2.2 SSE station which is located 3.5 miles from the Site and is an accurate representation of the rainfall for the Site. This station does not include 20 years of data; therefore, the WETS data is collected from the GASTONIA, NC station which is located 15 miles from the Site.

- *Thank you for providing the 2022 gauge data that was requested by the IRT during the MYO review as well as addressing the Boundary Inspection action items.*

Wildlands Response: Noted.

Digital Deliverable Comments:

- *No comments.*

Wildlands Response: Noted.

As requested, two copies of the report along with Wildland's response letter will be included inside the front cover of the FINAL MY1 (2023) revised report as well as in the digital support files. Please let me know if you have any questions.

Sincerely,



Mimi Caddell

Environmental Scientist

mcaddell@wildlandseng.com

OAK HILL DAIRY MITIGATION SITE
Monitoring Year 1 Annual Report

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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 ^{1,2}	As-Built Footage /Acreage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Credits	Comments
Stream							
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 ^{1,2}	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 ^{1,2}	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.
Total Stream Credits:						4,618.933	
Total Wetland Credits:						7.680	

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						
Totals	4,618.933			7.680		

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.	No evidence of agricultural runoff in streams.
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 in MY1.
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.	In MY1, riffle 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.	Semi-annual visual inspections	All structures are performing as designed in MY1.
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.	For MY1, one bankfull event was recorded on UT1A (CG1) and Oak Hill Creek R4 (CG3) on 4/28/23. No bankfull events were recorded on UT1 R2 (CG2).
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.	In MY1, five of eleven (5/11) groundwater gages met the performance criteria.
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.	In MY1, eighteen (18) of the nineteen (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 in MY1.



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	Letter of Map Revision	
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 ¹	
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	

¹No wetland credit is being sought for Wetland K.

Section 2: Monitoring Year 1 Data Assessment

Annual monitoring and site visits were conducted during monitoring year (MY) 1 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 MY1 assessment was 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.

2.1 Vegetative Assessment

The MY1 vegetative survey was completed in August 2023. Permanent vegetation plots monitoring resulted in a stem density range from 283 to 850 planted stems per acre with an average of 470 planted stems per acre. Mobile vegetation plots ranged from 324 to 486 planted stems per acre with an average of 371 planted stems per acre. Of the 13 permanent vegetation plots, 12 met the interim MY3 success criteria of 320 stems per acre. The one permanent vegetation plot (VP8) not meeting MY3 success criteria is still on track to meet the MY5 success criteria of 260 stems per acre. All 6 mobile vegetation plots met the interim MY3 success criteria. Vegetation plots on site are on track to meet the MY7 success criteria. Herbaceous and riparian buffer vegetation are thriving across the site as well. Refer to Appendix A for the vegetation plot photographs and the vegetation condition assessment and Appendix B for the vegetation plot data.

2.2 Vegetation Areas of Concern and Management Activity

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. Bamboo has effectively been removed within the easement as of MY1. Kudzu (*Pueraria montana*) was removed along UT1B during construction and has not reestablished on Site as of MY1. During MY1, hydrilla (*Hydrilla verticillate*) was discovered in pools over an approximate 450 linear feet of Oak Hill Creek Reach 4. The hydrilla was mechanically treated in September 2023. Wildlands is monitoring the success of the treatment and will examine alternative treatment solutions if needed. Hydrilla is currently limited to the furthest downstream portion of the project and thus not a propagation source. Invasive species will continue to be monitored, mapped, and controlled as necessary throughout the monitoring period. A boundary inspection was conducted by DMS on June 1, 2023. The boundary inspection report identified a few small areas of concern, all of which were resolved during MY1. The inspection report and Wildland's responses are included in Appendix F.

2.3 Stream Assessment

Morphological surveys for MY1 were conducted in June 2023. 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. All stream structures are stable and functioning as designed. No areas of bank erosion were observed during MY1. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table and stream photographs. Refer to Appendix C for stream geomorphology data.

2.4 Stream Areas of Concern and Management Activity

A few isolated areas of concern were identified during MY1. A large tree was removed from Oak Hill Creek Reach 1 near Sta. 104+00 that reduced stream flow. Approximately 175 linear feet of aggradation



is present on Oak Hill Creek Reach 1 between Sta. 100+00 and 101+75. The sediment deposition is not affecting stream function (see photo point 15 in Appendix A) and is expected to flush through the system during periods of high flow. The Site will continue to be monitored and any issues will be mapped and reported throughout the monitoring period.

2.5 Hydrology Assessment

Crest Gages (CG) located on Oak Hill Creek Reach 4 and UT1A each recorded one bankfull event on April 28, 2023. No bankfull events were recorded on UT1 Reach 2. Therefore, the hydrologic success criteria of four bankfull events in separate years has been partially met. Refer to Appendix D for hydrologic stream data.

2.6 Wetland Assessment

Eleven groundwater gages (GWG) 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. During the 2023 growing season, five groundwater gages met or exceeded the performance criteria of free groundwater surface within 12 inches of ground surface for a minimum of 12% (29 consecutive days) of the growing season. Groundwater gages 3, 4, 5, 6, 9, and 10 did not meet performance criteria for MY1. This may be due to periods of low rainfall in March and below normal amounts in September through November 2023.

The percent increase in maximum consecutive days of groundwater within 12-inches of the soil surface was compared between pre- and post-construction monitoring data. Of the six groundwater gages that did not meet the MY1 performance criteria, four (GWG3, GWG5, GWG6, GWG9) were in similar locations to pre-construction monitoring. Maximum consecutive days increases from pre-construction to MY1 for GWG3 increased 400%, 200% for GWG5, 100% for GWG6, and 200% for GWG9. When comparing all the seven pre-construction monitoring wells to post-construction monitoring wells that are located in similar locations, there was a 582% increase in maximum consecutive days of groundwater in MY1.

The increases in consecutive days of groundwater meeting criteria are despite a decrease in precipitation during the growing season (March – November) from 2020 to 2023. The growing season rainfall total recorded at the GASTONIA, NC station during the 2020 pre-construction monitoring was 40.71 inches and 31.61 inches during MY1. Rainfall total during the 2023 - MY1 growing season is 25.65 inches for the Cherryville, 2.2 SSE, NC station which is 3.5 miles away from the Site. The GASTONIA, NC station is located 15 miles from the Site. Unfortunately, rainfall data is not available for the closer and potentially more accurate Cherryville 2.2 station for 2020. Refer to Appendix D for Wetland Gage Summary and Groundwater Gage Plots.

2.7 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 plan is needed at this time.

2.8 Monitoring Year 1 Summary

Overall, the Site is performing as intended, and is on track to meet success criteria. All but one of the vegetation plots exceed the MY3 interim requirement of 320 planted stems per acre, with an overall average planted stem density of 439 stems per acre. All the cross-sections show that streams on Site are stable and functioning as designed. One bankfull event was recorded for both UT1A and Oak Hill Creek Reach 4. Herbaceous and riparian vegetation has established itself across the site. Invasive species have been effectively managed on the Site to date and follow-up activities are planned to ensure this



continues. Wildlands will continue to monitor these areas and adaptive management maintenance measures will be implemented as necessary to benefit the ecological health of the Site.



Section 3: METHODOLOGY

Geomorphic data was collected following the standards outlined in *The Stream Channel Reference Site: An Illustrated Guide to Field Techniques* (Harrelson et al., 1994) and in *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).

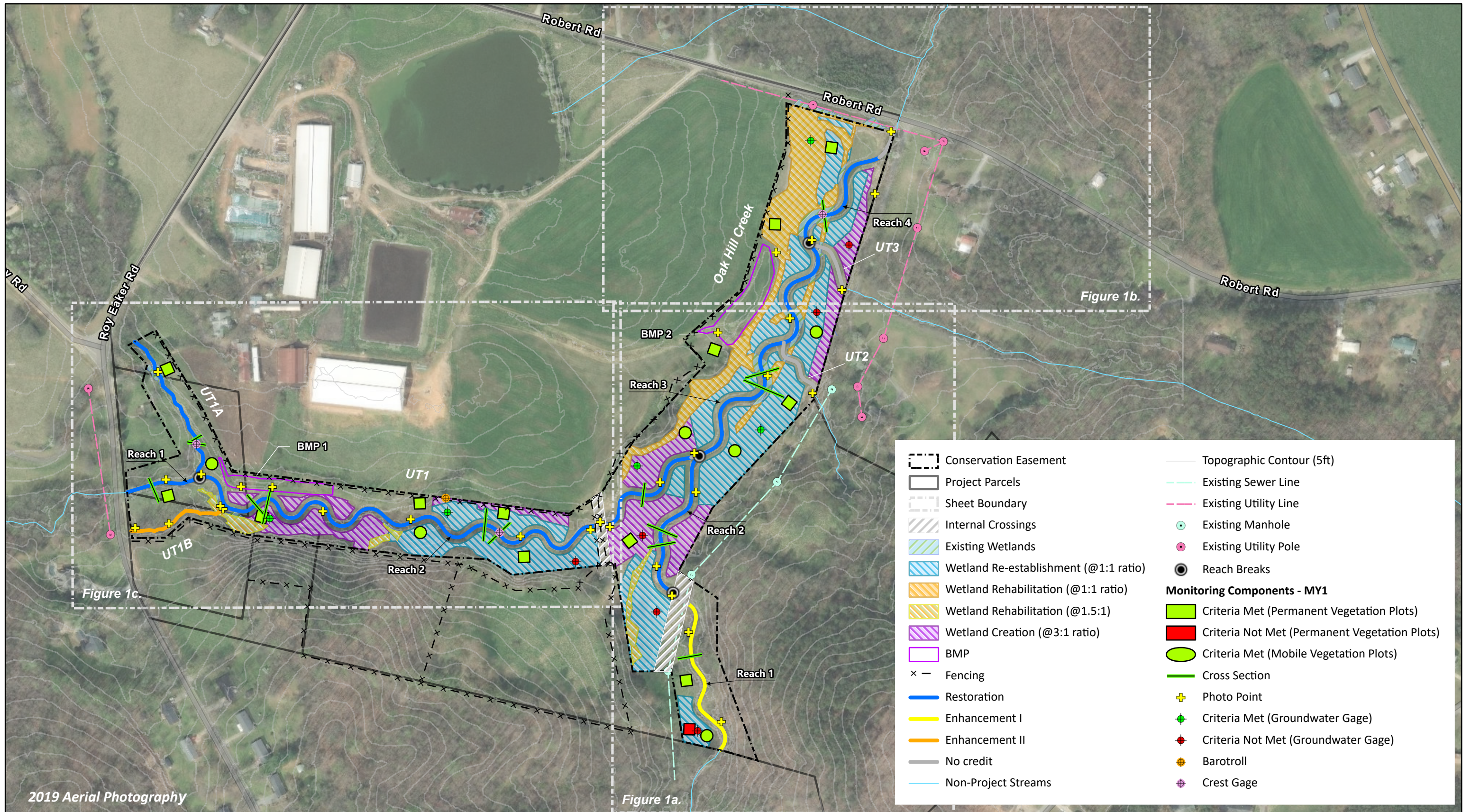


Section 4: REFERENCES

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Figures 1a-c
Current Condition Plan View Maps



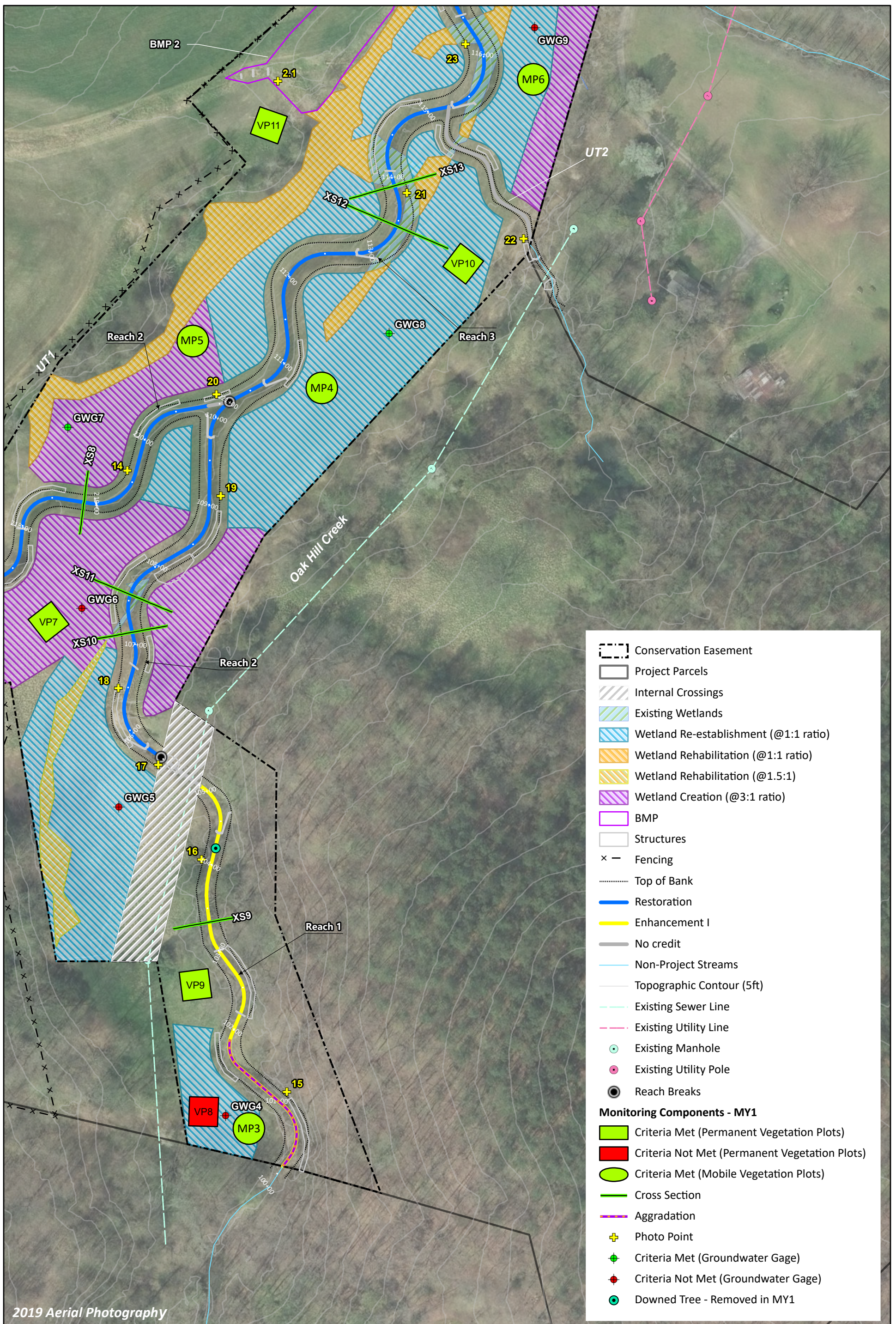
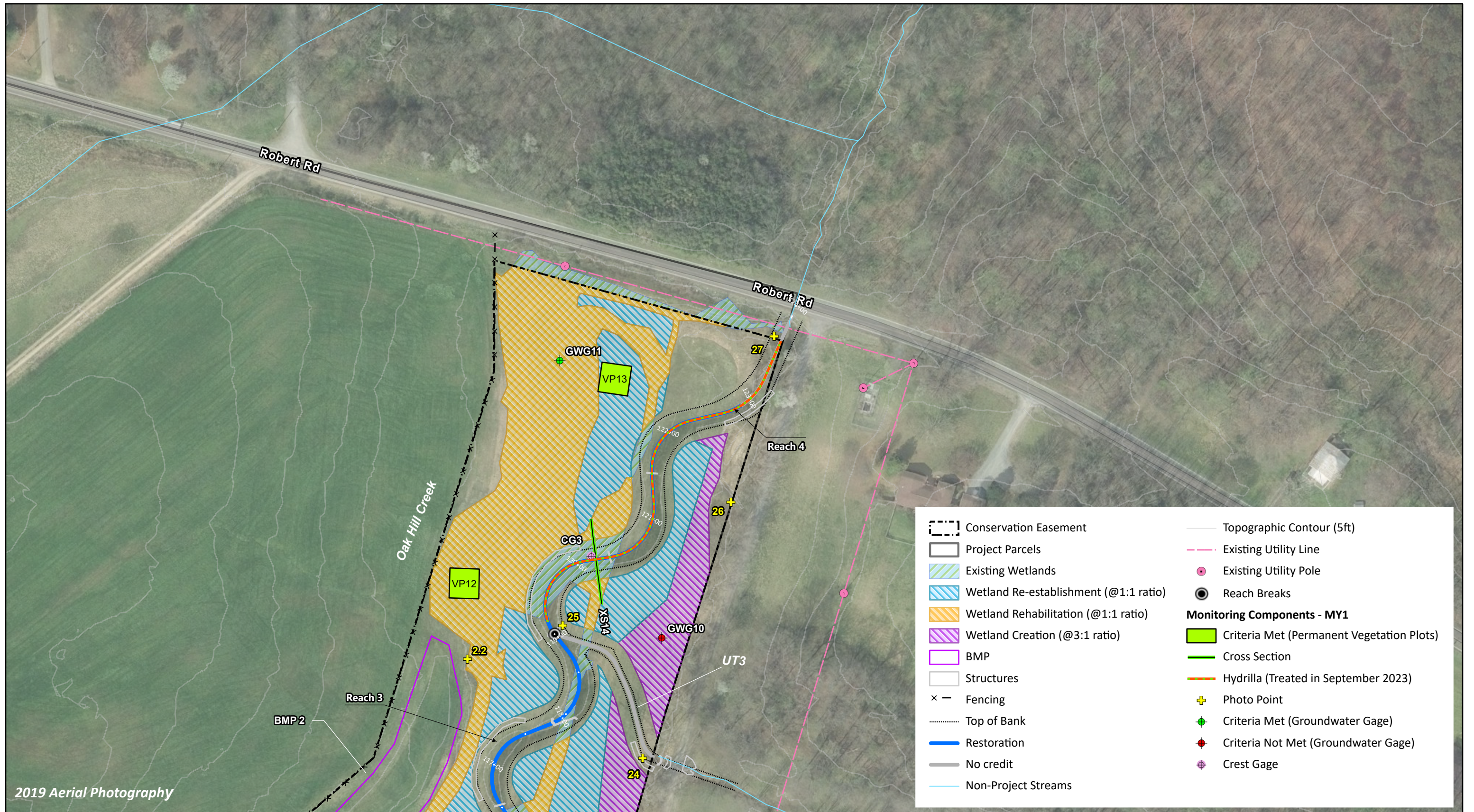
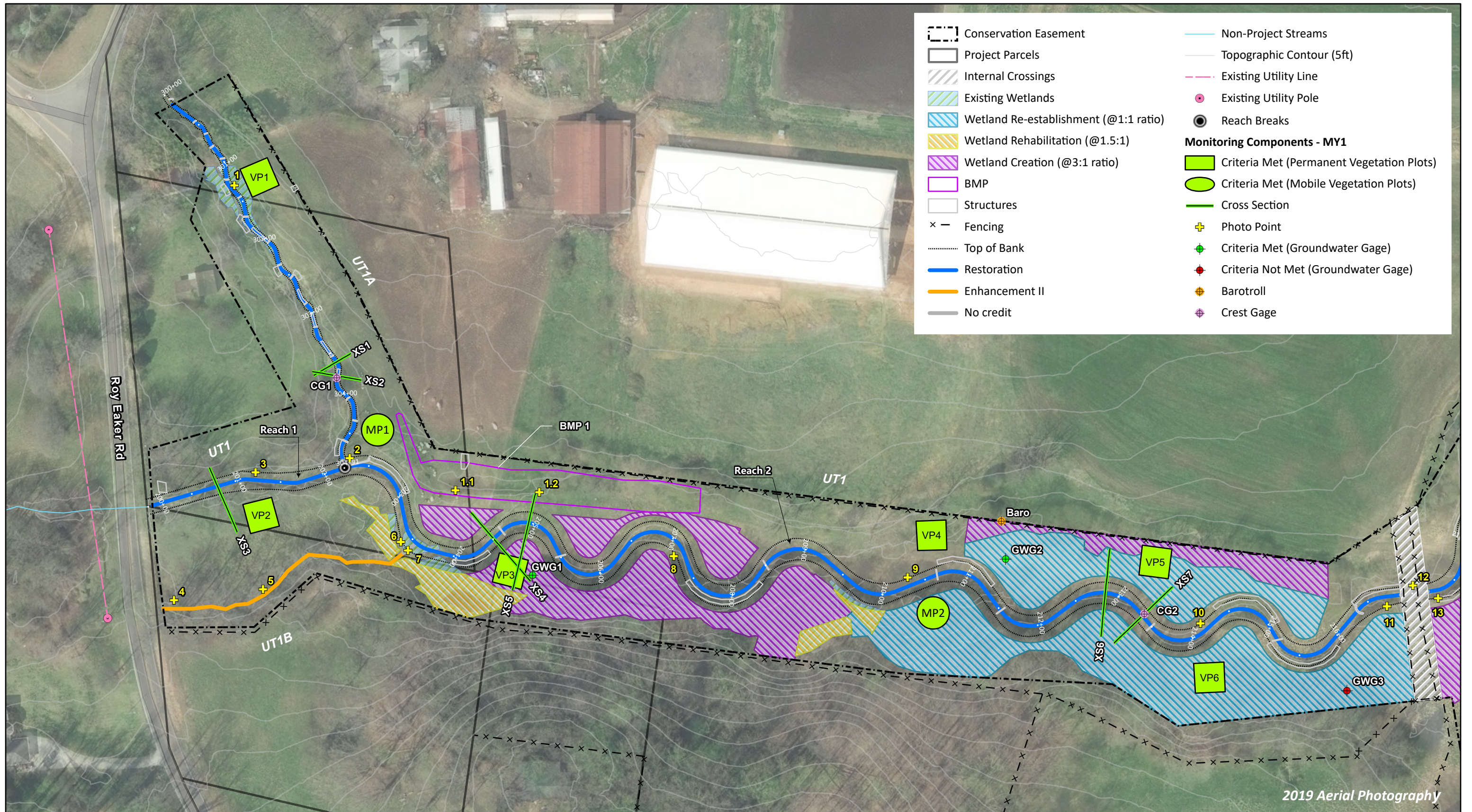


Figure 1a. Current Condition Plan View
 Oak Hill Dairy Mitigation Site
 DMS Project No. 100120
 Monitoring Year 1 - 2023





2019 Aerial Photography



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

APPENDICES

Appendix A
Visual Assessment Data

Table 4a. Visual Stream Morphology Stability Assessment Table

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Assessment Date: 9/18/2023

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
					Assessed Stream Length	489
					Assessed Bank Length	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%
					Totals:	0
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
					Assessed Stream Length	470
					Assessed Bank Length	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%
					Totals:	0
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 4b. Visual Stream Morphology Stability Assessment Table

Oak Hill Dairy Mitigation Site
 DMS Project No. 100120
 Monitoring Year 1 - 2023
 Assessment Date: 9/18/2023

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
					Assessed Stream Length	877
					Assessed Bank Length	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 <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%
Totals:					0	100%
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
					Assessed Stream Length	389
					Assessed Bank Length	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 <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%
Totals:					0	100%
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%
	Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%.	2	2		100%

Table 4c. Visual Stream Morphology Stability Assessment Table

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Assessment Date: 9/18/2023

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
					Assessed Stream Length	218
					Assessed Bank Length	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 NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
					Totals:	0
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 not 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
					Assessed Stream Length	1,834
					Assessed Bank Length	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 NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
					Totals:	0
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 not exceed 15%.	10	10		100%

Table 4d. Visual Stream Morphology Stability Assessment Table

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Assessment Date: 9/18/2023

UT1A

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	470
					Assessed Bank Length	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%
					Totals:	0
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 1 - 2023
Assessment Date: 9/18/2023

Planted Acreage 19.9

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

Easement Acreage 20.4

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

Stream Photographs
Monitoring Year 1



PP1 – UT1A looking upstream (04/24/2023)



PP1 – UT1A looking downstream (04/24/2023)



PP2 – UT1A looking upstream (04/24/2023)



PP2 – UT1 R1 looking upstream (04/24/2023)



PP2 – UT1 R2 looking downstream (04/24/2023)



PP3 – UT1 R1 looking upstream (04/24/2023)



PP3 – UT1 R1 looking downstream (04/24/2023)



PP4 – UT1B looking upstream (04/24/2023)



PP4 – UT1B looking downstream (04/24/2023)



PP5 – UT1B looking upstream (04/24/2023)



PP5 – UT1B looking downstream (04/24/2023)



PP6 – UT1 R2 looking upstream (04/24/2023)



PP6 – UT1 R2 looking downstream (04/24/2023)



PP7 – UT1B looking upstream (04/24/2023)



PP7 – UT1B – UT1 R2 Confluence (04/24/2023)



PP8 – UT1 R2 looking upstream (04/24/2023)



PP8 – UT1 R2 looking downstream (04/24/2023)



PP9 – UT1 R2 looking upstream (04/24/2023)



PP9 – UT1 R2 looking downstream (04/24/2023)



PP10 – UT1 R2 looking upstream (04/24/2023)



PP10 – UT1 R2 looking downstream (04/24/2023)



PP11 –UT1 R2 looking upstream (04/24/2023)



PP11 – UT1 R2 looking downstream (04/24/2023)



PP12 – UT1 R2 looking upstream (04/24/2023)



PP12 – UT1 R2 looking downstream (04/24/2023)



PP13 – UT1 R2 looking upstream (04/24/2023)



PP13 – UT1 R2 looking downstream (04/24/2023)



PP14 – UT1 R2 looking upstream (04/24/2023)



PP14 – UT1 R2 looking downstream (04/24/2023)



PP15 – Oak Hill R1 looking upstream (04/24/2023)



PP15 – Oak Hill R1 looking downstream (04/24/2023)



PP16 – Oak Hill R1 looking upstream (04/24/2023)



PP16 – Oak Hill R1 looking downstream (04/24/2023)



PP17 – Oak Hill R2 looking upstream (04/24/2023)



PP17 – Oak Hill R2 looking downstream (04/24/2023)



PP18 – Oak Hill R2 looking upstream (04/24/2023)



PP18 – Oak Hill R2 looking downstream (04/24/2023)



PP19 – Oak Hill R2 looking upstream (04/24/2023)



PP19 – Oak Hill R2 looking downstream (04/24/2023)



PP20 – UT1 R2 looking upstream (04/24/2023)



PP20 – Oak Hill R3 looking downstream (04/24/2023)



PP20 –Oak Hill R2 upstream (04/24/2023)



PP21 – Oak Hill R3 looking upstream (04/24/2023)



PP21 – Oak Hill R3 looking downstream (04/24/2023)



PP22 – UT2 looking upstream (04/24/2023)



PP22 – UT2 looking downstream (04/24/2023)



PP23 – Oak Hill R3 looking upstream (04/24/2023)



PP23 – Oak Hill R3 looking downstream (04/24/2023)



PP24 – UT3 looking upstream (04/24/2023)



PP24 – UT3 looking downstream (04/24/2023)



PP25 – Oak Hill R4 looking upstream (04/24/2023)



PP25 – Oak Hill R4 looking downstream (04/24/2023)



PP25 –UT3 looking upstream (04/24/2023)



PP26 – Right floodplain ditch looking upstream (04/24/2023)



PP26 – Right floodplain ditch looking downstream (04/24/2023)



PP27 – Oak Hill R4 upstream (04/24/2023)



PP27 – Oak Hill R4 downstream (04/24/2023)



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



PP1.1 – BMP 1 looking north (04/24/2023)



PP1.1 – BMP 1 looking northwest (04/24/2023)



PP1.2 – BMP 1 looking west (04/24/2023)



PP1.2 – BMP 1 looking east (04/24/2023)



PP2.1 – BMP 2 looking northwest (04/24/2023)



PP2.1 – BMP 2 looking northeast after large rain event (04/24/2023)



PP2.2 – BMP 2 looking northwest after large rain event (04/24/2023)



PP2.2 – BMP 2 looking west after large rain event (04/24/2023)

Vegetation Plot Photographs
Monitoring Year 1



PERMANENT VEGETATION PLOT 1 (08/22/2023)



PERMANENT VEGETATION PLOT 2 (08/22/2023)



PERMANENT VEGETATION PLOT 3 (08/22/2023)



PERMANENT VEGETATION PLOT 4 (08/22/2023)



PERMANENT VEGETATION PLOT 5 (08/22/2023)



PERMANENT VEGETATION PLOT 6 (08/22/2023)



PERMANENT VEGETATION PLOT 7 (08/22/2023)



PERMANENT VEGETATION PLOT 8 (08/22/2023)



PERMANENT VEGETATION PLOT 9 (08/22/2023)



PERMANENT VEGETATION PLOT 10 (08/22/2023)



PERMANENT VEGETATION PLOT 11 (08/22/2023)



PERMANENT VEGETATION PLOT 12 (08/22/2023)



PERMANENT VEGETATION PLOT 13 (08/22/2023)



MOBILE VEGETATION PLOT 1 (08/22/2023)



MOBILE VEGETATION PLOT 2 (08/22/2023)



MOBILE VEGETATION PLOT 3 (08/22/2023)



MOBILE VEGETATION PLOT 4 (08/22/2023)



MOBILE VEGETATION PLOT 5 (08/22/2023)



MOBILE VEGETATION PLOT 6 (08/22/2023)

Groundwater Gage Photographs
Monitoring Year 1



Groundwater Gage 1 - (09/18/2023)



Groundwater Gage 2 - (09/18/2023)



Groundwater Gage 3 - (09/18/2023)



Groundwater Gage 4 - (09/18/2023)



Groundwater Gage 5 - (09/18/2023)



Groundwater Gage 6 - (09/18/2023)



Groundwater Gage 7 - (09/18/2023)



Groundwater Gage 8 - (09/18/2023)



Groundwater Gage 9 - (09/18/2023)



Groundwater Gage 10 - (09/18/2023)



Groundwater Gage 11 - (09/18/2023)

Areas of Concern Photographs



Oak Hill Creek R4 – Hydrilla STA 119+00 – 123+50 (8/2/2023)



Oak Hill Creek R1 – Aggradation STA: 100+00 – 101+75 (9/18/2023)



Oak Hill Creek R1 – Downed Tree STA: 104+50 (9/18/2023)

Appendix B
Vegetation Plot Data

Table 6a. Vegetation Plot Data

Oak Hill Dairy Mitigation Site DMS

Project No. 100120

Monitoring Year 1 - 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	2023-08-22
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			2	2			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			2	2	3	3	1	1	2	2	2	2
	<i>Calycanthus floridus</i>	eastern sweetshrub	Shrub	FACU	1	1										
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW					1	1			1	1		
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL											3	3
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW					1	1						
	<i>Cornus florida</i>	flowering dogwood	Tree	FACU												
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC	1	1	3	3								
	<i>Hamamelis virginiana</i>	American witchhazel	Tree	FACU			1	1								
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC												
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU						2						
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC					3	3			1	1		
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	3	3	3	3	1	1	1	1	4	4
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC	1	1										
	<i>Quercus alba</i>	white oak	Tree	FACU							2	2				
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW					1	1			2	2		
	<i>Quercus nigra</i>	water oak	Tree	FAC					1	1			1	1	5	5
	<i>Quercus phellos</i>	willow oak	Tree	FAC					1	1			1	1		
<i>Quercus rubra</i>	northern red oak	Tree	FACU	1	1											
<i>Salix nigra</i>	black willow	Tree	OBL						2							
<i>Salix sericea</i>	silky willow	Shrub	OBL													
<i>Sambucus canadensis</i>	American black elderberry	Tree		1	1			1	1	2	2					
<i>Ulmus americana</i>	American elm	Tree	FACW					2	2	2	2	3	3	1	1	
<i>Ulmus rubra</i>	slippery elm	Tree	FAC			2	2									
Sum	Performance Standard				8	8	14	14	17	21	10	10	12	12	17	17
Mitigation Plan Performance Standard	Current Year Stem Count					8		14		21		10		12		17
	Stems/Acre					324		567		850		405		486		688
	Species Count					6		7		12		6		8		7
	Dominant Species Composition (%)					38		21		14		20		25		29
	Average Plot Height (ft.)					5		5		3		4		3		3
	% Invasives					0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					8		14		21		10		12		17
	Stems/Acre					324		567		850		405		486		688
	Species Count					6		7		12		6		8		7
	Dominant Species Composition (%)					38		21		14		20		25		29
	Average Plot Height (ft.)					5		5		3		4		3		3
	% Invasives					0		0		0		0		0		0

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

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

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

Table 6b. Vegetation Plot Data

Oak Hill Dairy Mitigation Site DMS

Project No. 100120

Monitoring Year 1 - 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	2023-08-22
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	1	1	2	2	1	1	1	1	1	1					
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL															
	<i>Amelanchier arborea</i>	common serviceberry	Tree	FAC					1	1									
	<i>Betula nigra</i>	river birch	Tree	FACW			1	1	2	2	1	1	3	3	1	1	3	3	
	<i>Calycanthus floridus</i>	eastern sweetshrub	Shrub	FACU															
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW	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					
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC					1	1	1	1			1	1			
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU															
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC														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					1	1			2	2					
	<i>Quercus alba</i>	white oak	Tree	FACU					1	1			1	1					
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW	1	1					1	1						1	1
	<i>Quercus nigra</i>	water oak	Tree	FAC	1	1					2	2						2	2
	<i>Quercus phellos</i>	willow oak	Tree	FAC	2	2									1	1	2	2	
<i>Quercus rubra</i>	northern red oak	Tree	FACU					1	1										
<i>Salix nigra</i>	black willow	Tree	OBL																
<i>Salix sericea</i>	silky willow	Shrub	OBL							1	1								
<i>Sambucus canadensis</i>	American black elderberry	Tree																	
<i>Ulmus americana</i>	American elm	Tree	FACW							1	1			2	2				
<i>Ulmus rubra</i>	slippery elm	Tree	FAC					1	1										
Sum	Performance Standard				11	11	8	8	12	12	11	11	8	8	8	8	12	12	
Mitigation Plan Performance Standard	Current Year Stem Count					11		8		12		11		8		8		12	
	Stems/Acre					445		283		486		445		324		324		486	
	Species Count					8		3		10		10		5		6		8	
	Dominant Species Composition (%)					27		62		17		18		38		25		25	
	Average Plot Height (ft.)					3		7		4		3		2		3		2	
	% Invasives					0		0		0		0		0		0		0	
Post Mitigation Plan Performance Standard	Current Year Stem Count					11		8		12		11		8		8		12	
	Stems/Acre					445		283		486		445		324		324		486	
	Species Count					8		3		10		10		5		6		8	
	Dominant Species Composition (%)					27		62		17		18		38		25		25	
	Average Plot Height (ft.)					3		7		4		3		2		3		2	
	% Invasives					0		0		0		0		0		0		0	

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

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

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

Table 6c. Vegetation Plot Data

Oak Hill Dairy Mitigation Site DMS

Project No. 100120

Monitoring Year 1 - 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	2023-08-22
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	2	1	3	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	1			1	1	
	<i>Calycanthus floridus</i>	eastern sweetshrub	Shrub	FACU						
	<i>Celtis laevigata</i>	sugarberry	Tree	FACW						
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL						
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW			1	2	1	
	<i>Cornus florida</i>	flowering dogwood	Tree	FACU						1
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC	2					
	<i>Hamamelis virginiana</i>	American witchhazel	Tree	FACU						
	<i>Lindera benzoin</i>	northern spicebush	Tree	FAC			1			
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU		1				
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC						
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	2	5	2	4	1	3
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC	1	1				
	<i>Quercus alba</i>	white oak	Tree	FACU						1
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW		1				
	<i>Quercus nigra</i>	water oak	Tree	FAC						
	<i>Quercus phellos</i>	willow oak	Tree	FAC	2	1				
<i>Quercus rubra</i>	northern red oak	Tree	FACU							
<i>Salix nigra</i>	black willow	Tree	OBL		2					
<i>Salix sericea</i>	silky willow	Shrub	OBL					2	1	
<i>Sambucus canadensis</i>	American black elderberry	Tree						1		
<i>Ulmus americana</i>	American elm	Tree	FACW							
<i>Ulmus rubra</i>	slippery elm	Tree	FAC			1		1	2	
Sum	Performance Standard				10	12	8	8	9	8
Mitigation Plan Performance Standard	Current Year Stem Count				10	12	8	8	9	8
	Stems/Acre				405	486	324	324	364	324
	Species Count				6	7	5	4	8	5
	Dominant Species Composition (%)				20	42	38	50	22	38
	Average Plot Height (ft.)				4	3	4	3	2	2
	% Invasives				0	0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count				10	12	8	8	9	8
	Stems/Acre				405	486	324	324	364	324
	Species Count				6	7	5	4	8	5
	Dominant Species Composition (%)				20	42	38	50	22	38
	Average Plot Height (ft.)				4	3	4	3	2	2
	% Invasives				0	0	0	0	0	0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
 2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded), species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
 3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Appendix C
Stream Geomorphology Data

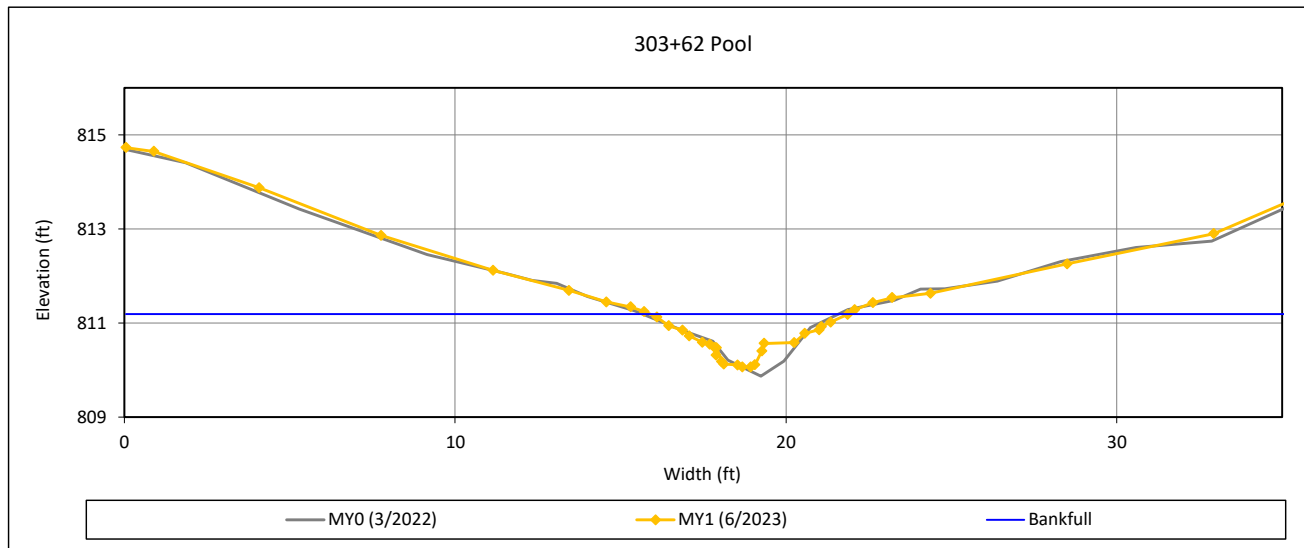
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 1-UT1A



Bankfull Dimensions

3.2	x-section area (ft.sq.)
6.0	width (ft)
0.5	mean depth (ft)
1.1	max depth (ft)
7.0	wetted perimeter (ft)
0.5	hydraulic radius (ft)
11.0	width-depth ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

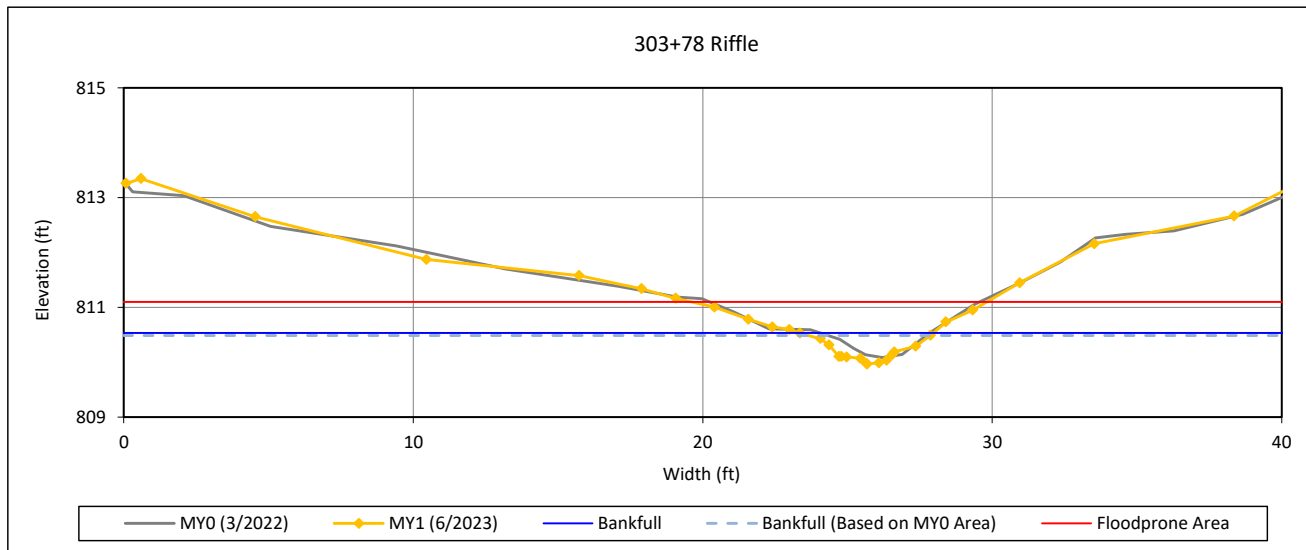
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 2-UT1A



Bankfull Dimensions

1.4	x-section area (ft.sq.)
4.6	width (ft)
0.3	mean depth (ft)
0.6	max depth (ft)
4.8	wetted perimeter (ft)
0.3	hydraulic radius (ft)
15.1	width-depth ratio
10.2	W flood prone area (ft)
2.2	entrenchment ratio
1.1	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

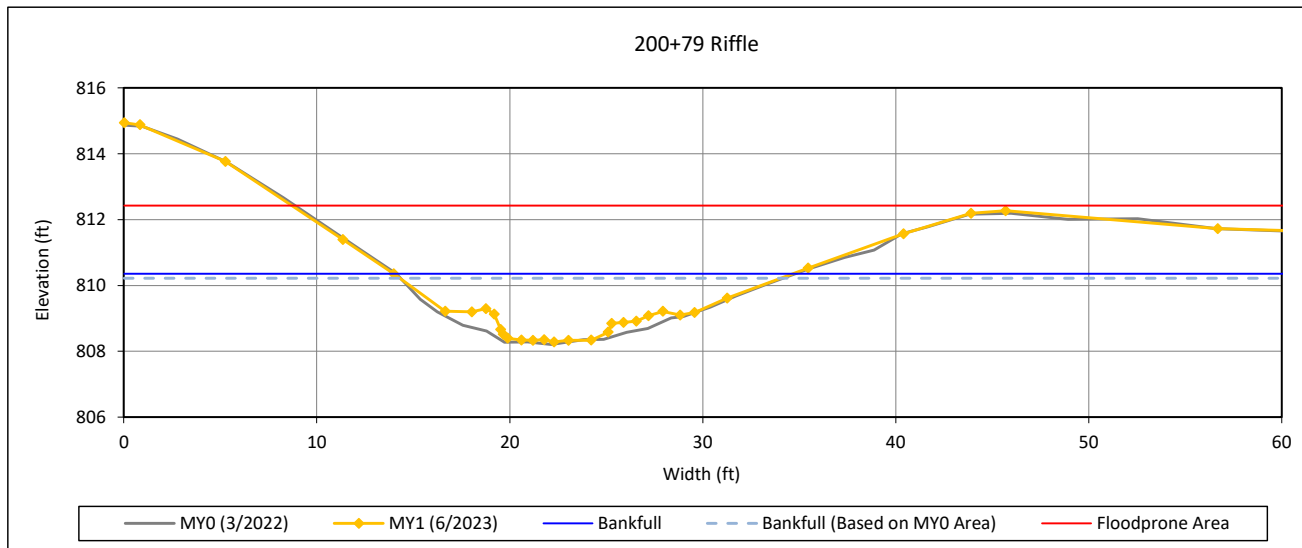
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 3-UT1 Reach 1



Bankfull Dimensions

24.8	x-section area (ft.sq.)
20.7	width (ft)
1.2	mean depth (ft)
2.1	max depth (ft)
21.6	wetted perimeter (ft)
1.1	hydraulic radius (ft)
17.2	width-depth ratio
68.4	W flood prone area (ft)
3.3	entrenchment ratio
1.1	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

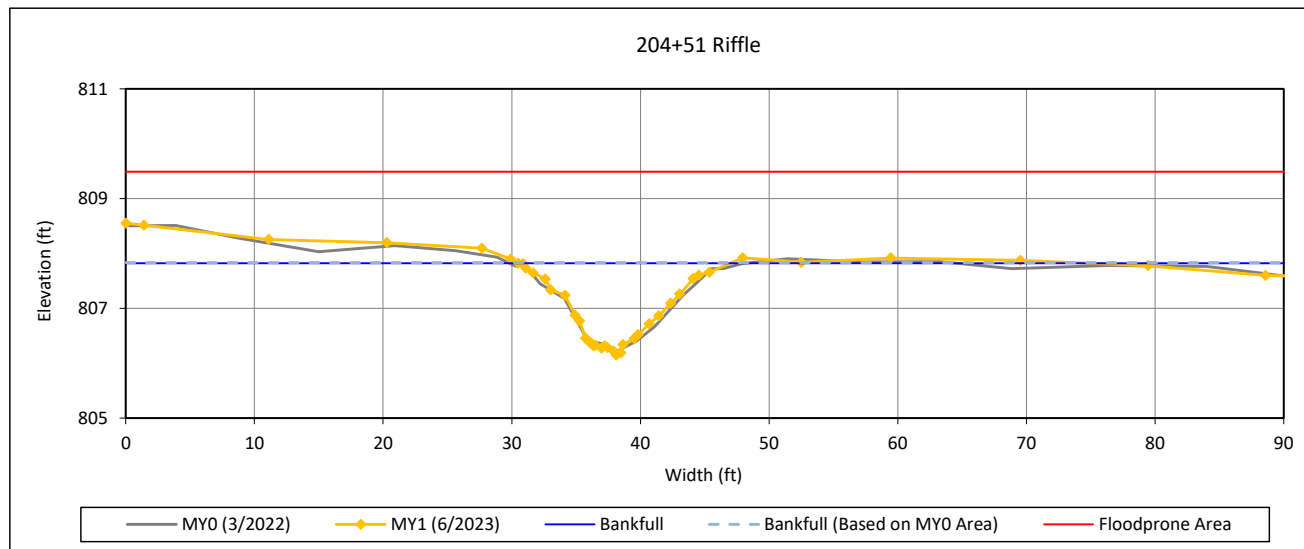
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 4-UT1 Reach 2



Bankfull Dimensions

12.5	x-section area (ft.sq.)
16.5	width (ft)
0.8	mean depth (ft)
1.7	max depth (ft)
17.0	wetted perimeter (ft)
0.7	hydraulic radius (ft)
21.6	width-depth ratio
99.9	W flood prone area (ft)
6.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering

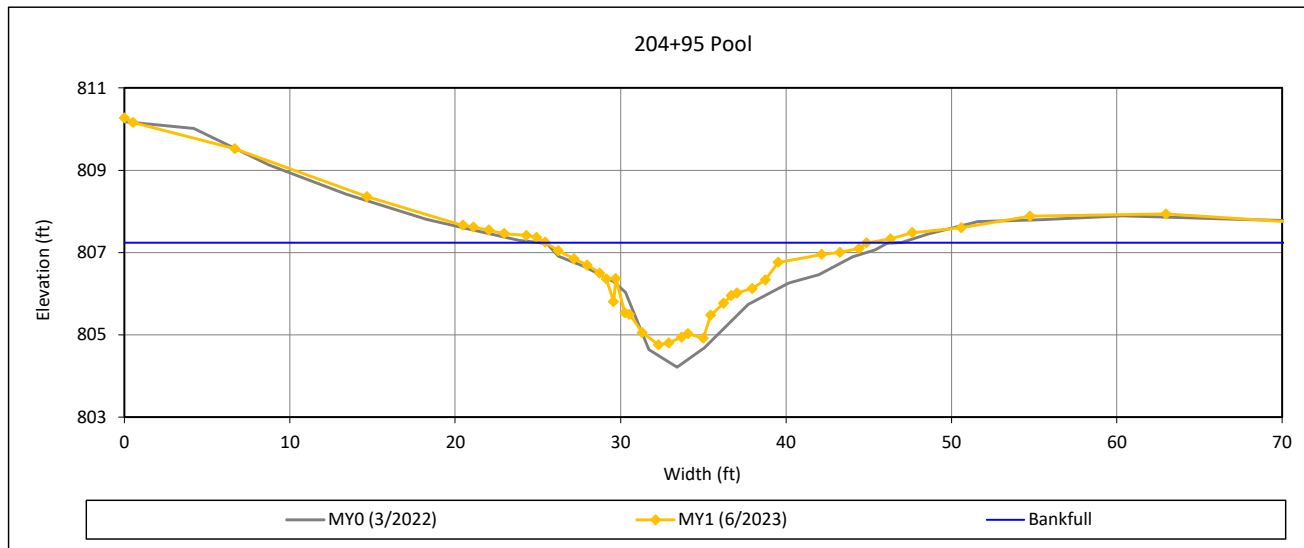


View Downstream

Cross-Section Plots

Oak Hill Dairy Mitigation Site
DMS Project No. 100120
Monitoring Year 1 - 2023

Cross-Section 5-UT1 Reach 2



Bankfull Dimensions

20.6	x-section area (ft.sq.)
19.4	width (ft)
1.1	mean depth (ft)
2.5	max depth (ft)
21.4	wetted perimeter (ft)
1.0	hydraulic radius (ft)
18.2	width-depth ratio

Survey Date: 6/2023
Field Crew: Wildlands Engineering



View Downstream

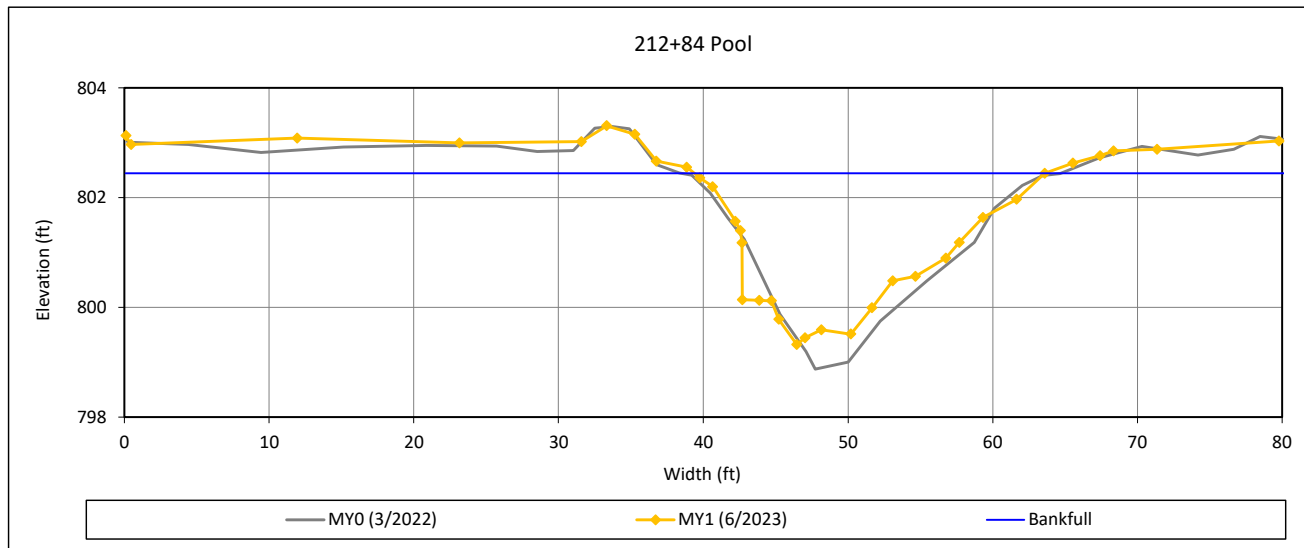
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 6-UT1 Reach 2



Bankfull Dimensions

40.7	x-section area (ft.sq.)
24.2	width (ft)
1.7	mean depth (ft)
3.1	max depth (ft)
26.2	wetted perimeter (ft)
1.6	hydraulic radius (ft)
14.4	width-depth ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

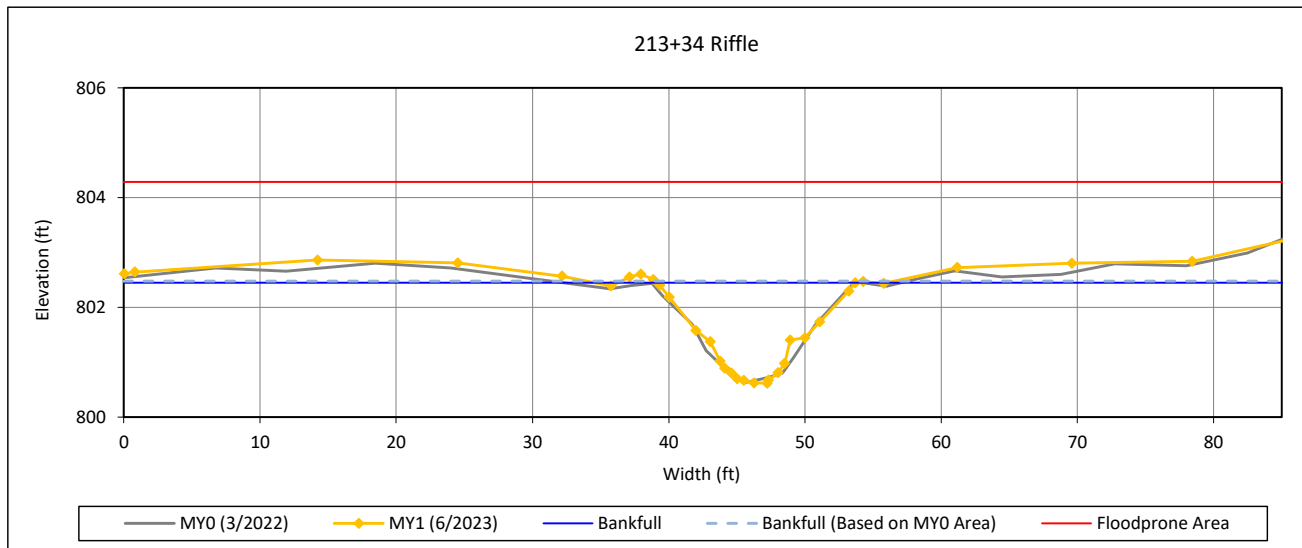
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 7-UT1 Reach 2



Bankfull Dimensions

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

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

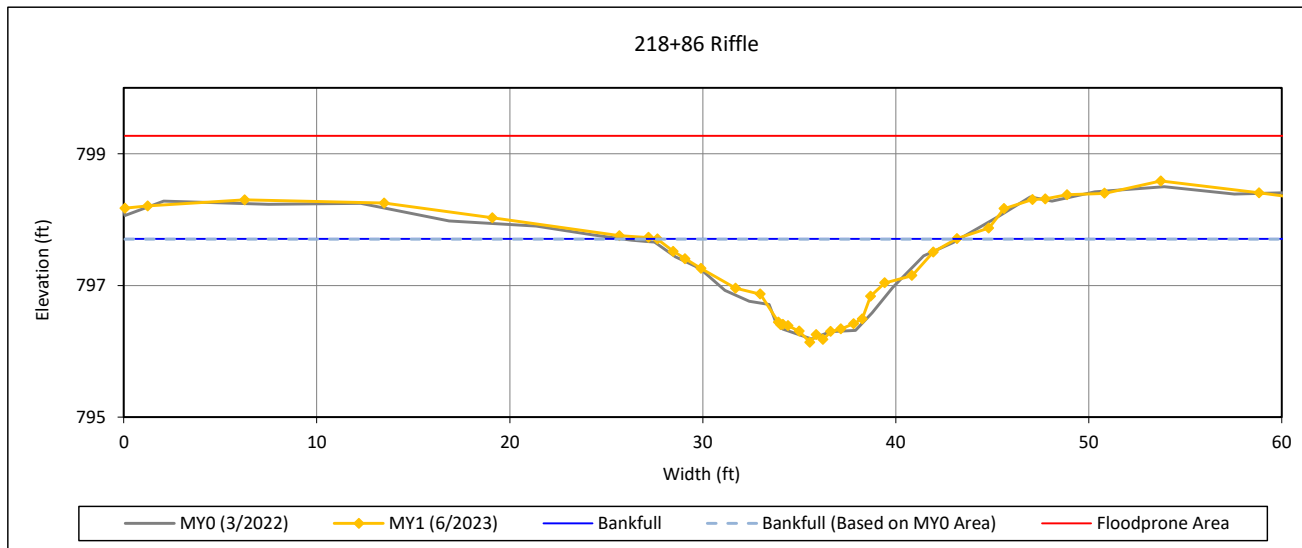
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 8-UT1 Reach 2



Bankfull Dimensions

12.0	x-section area (ft.sq.)
15.5	width (ft)
0.8	mean depth (ft)
1.6	max depth (ft)
16.0	wetted perimeter (ft)
0.8	hydraulic radius (ft)
19.9	width-depth ratio
72.4	W flood prone area (ft)
4.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

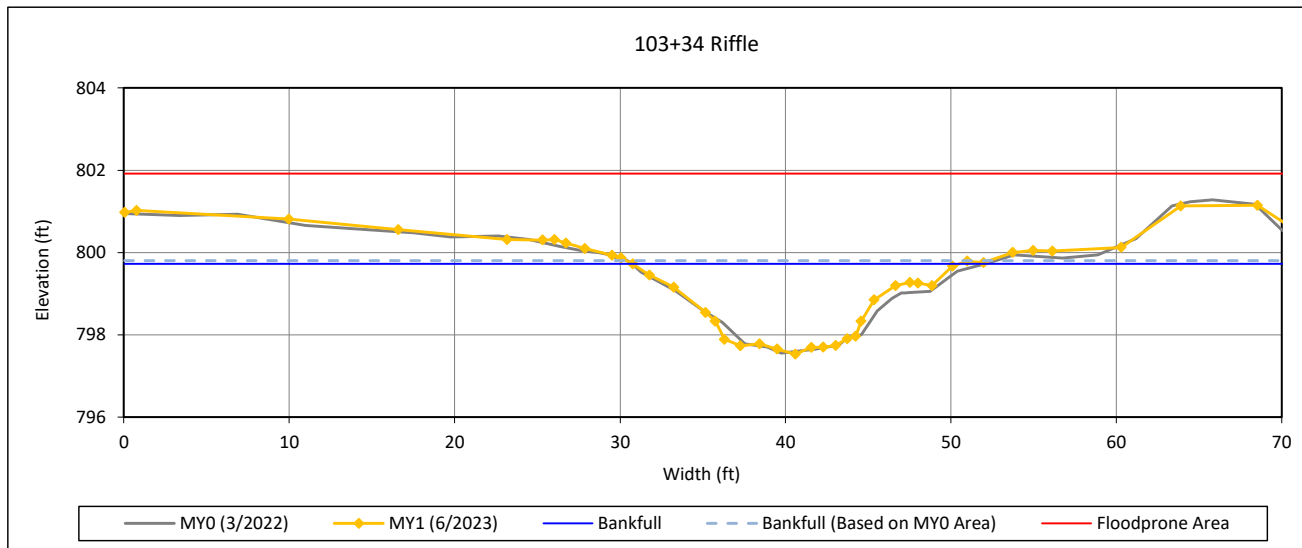
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 9-Oak Hill Reach 1



Bankfull Dimensions

23.6	x-section area (ft.sq.)
19.7	width (ft)
1.2	mean depth (ft)
2.2	max depth (ft)
20.6	wetted perimeter (ft)
1.1	hydraulic radius (ft)
16.4	width-depth ratio
72.4	W flood prone area (ft)
3.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

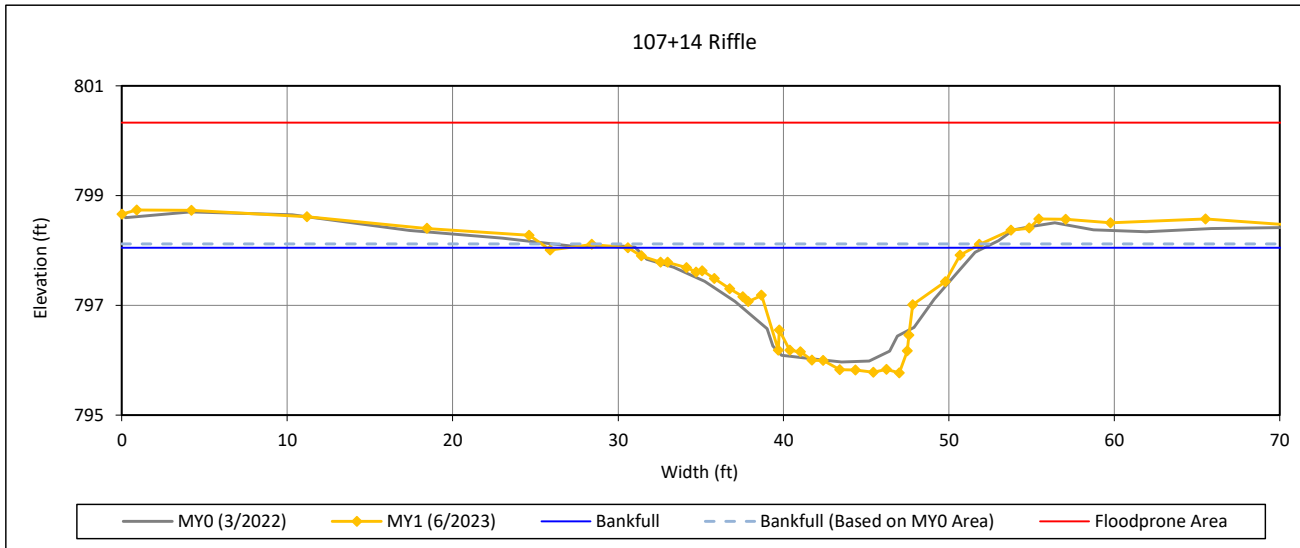
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 10-Oak Hill Reach 2



Bankfull Dimensions

24.1	x-section area (ft.sq.)
20.9	width (ft)
1.2	mean depth (ft)
2.3	max depth (ft)
22.7	wetted perimeter (ft)
1.1	hydraulic radius (ft)
18.1	width-depth ratio
83.7	W flood prone area (ft)
4.0	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

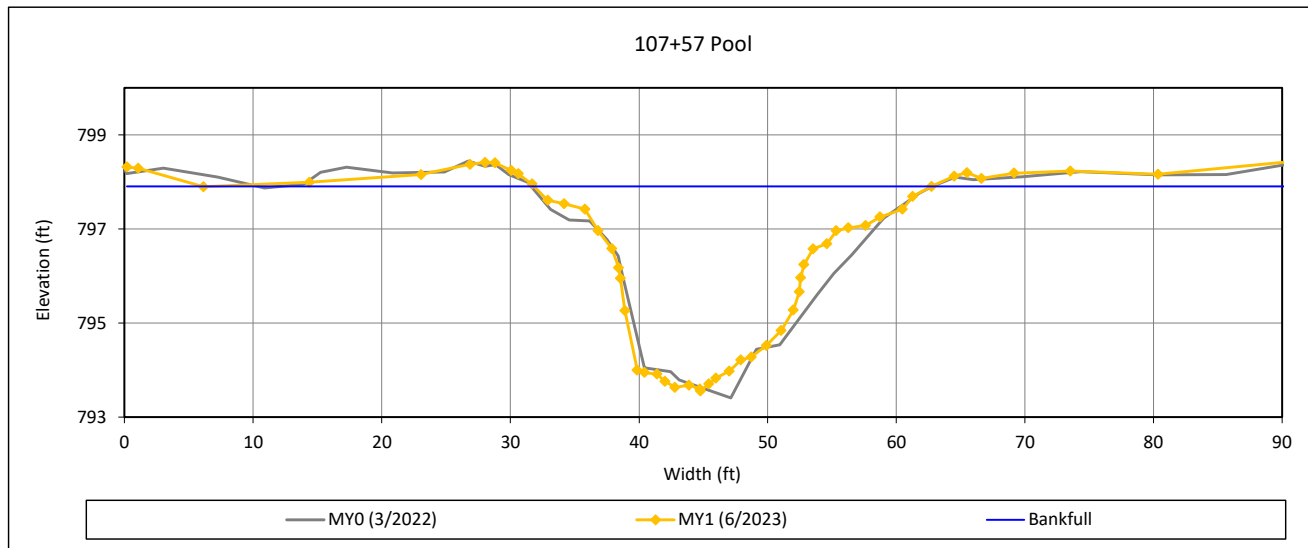
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 11-Oak Hill Reach 2



Bankfull Dimensions

63.9	x-section area (ft.sq.)
30.9	width (ft)
2.1	mean depth (ft)
4.4	max depth (ft)
33.4	wetted perimeter (ft)
1.9	hydraulic radius (ft)
14.9	width-depth ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

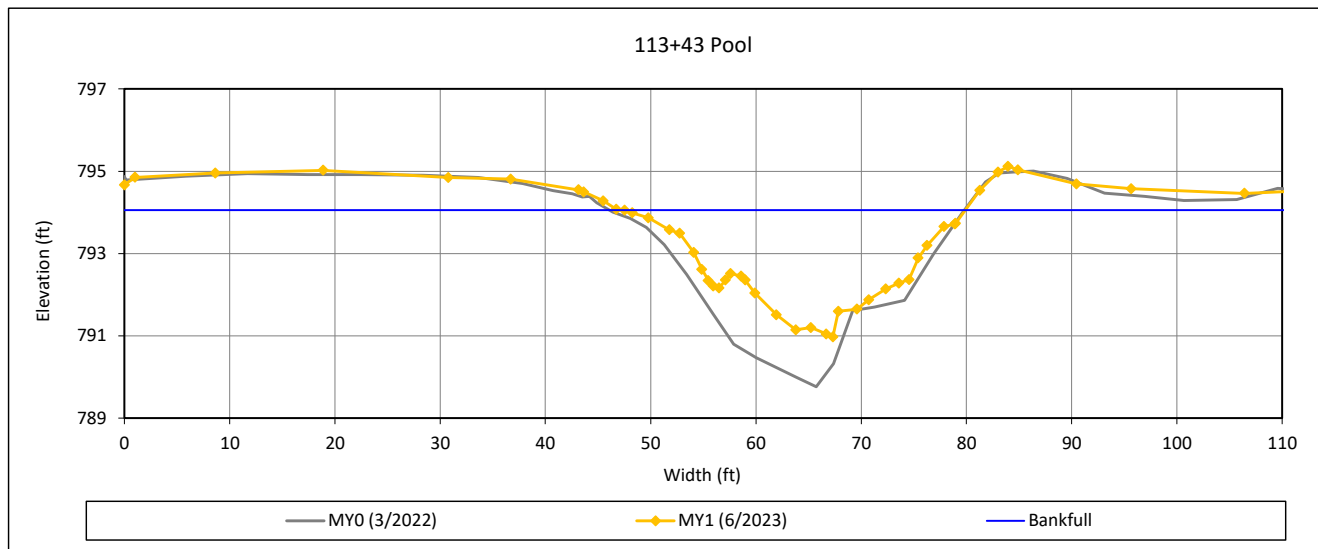
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 12-Oak Hill Reach 3



Bankfull Dimensions

51.4	x-section area (ft.sq.)
32.4	width (ft)
1.6	mean depth (ft)
3.1	max depth (ft)
33.6	wetted perimeter (ft)
1.5	hydraulic radius (ft)
20.4	width-depth ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

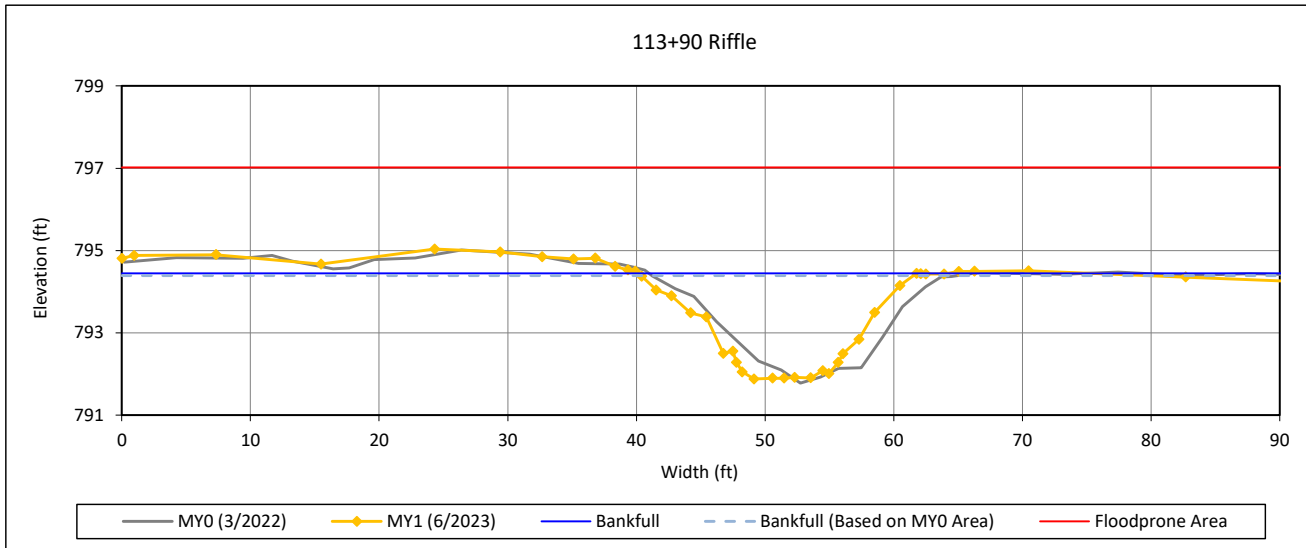
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 13-Oak Hill Reach 3



Bankfull Dimensions

32.7	x-section area (ft.sq.)
21.7	width (ft)
1.5	mean depth (ft)
2.6	max depth (ft)
22.7	wetted perimeter (ft)
1.4	hydraulic radius (ft)
14.3	width-depth ratio
100.8	W flood prone area (ft)
4.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

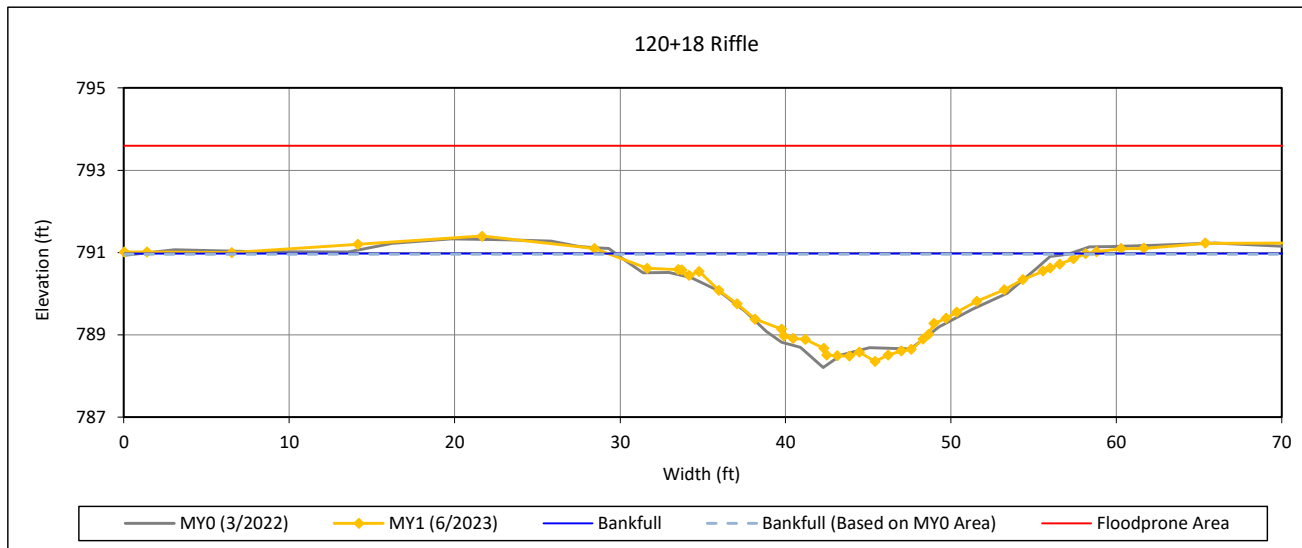
Cross-Section Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Cross-Section 14-Oak Hill Reach 4

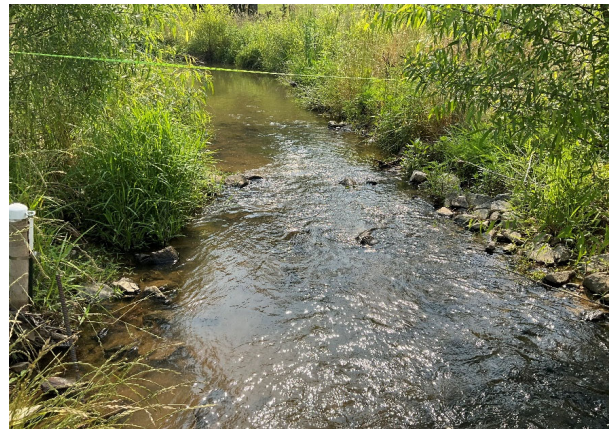


Bankfull Dimensions

36.6	x-section area (ft.sq.)
28.9	width (ft)
1.3	mean depth (ft)
2.6	max depth (ft)
29.7	wetted perimeter (ft)
1.2	hydraulic radius (ft)
22.8	width-depth ratio
94.4	W flood prone area (ft)
3.3	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023

Field Crew: Wildlands Engineering



View Downstream

Table 8a. Baseline Stream Data Summary

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 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 ²)	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) ²	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 ²)	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) ²	0.0077			0.0060		0.0064			
Other									

Table 8b. Baseline Stream Data Summary

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
	Min	Max	n	Min	Max	Min	Max	n
UT1 Reach 2								
Riffle Only								
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 ²)	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) ²	0.0070			0.0070		0.0070		
Other								
Oak Hill Reach 1								
Riffle Only								
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 ²)	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) ²	0.0070			0.0040		0.0046		
Other								

Table 8c. Baseline Stream Data Summary

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Parameter	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
	Min	Max	n	Min	Max	Min	Max	n
Oak Hill Reach 2								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n
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 ²)	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) ²	0.0057			0.0055		0.0051		
Other								
Oak Hill Reach 3								
Riffle Only	Min	Max	n	Min	Max	Min	Max	n
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 ²)	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) ²	0.0052			0.0055		0.0060		
Other								

Table 8d. Baseline Stream Data Summary

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 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 ²)	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) ²	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 1 - 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 ¹ Area	N/A	N/A					810.59	810.49					810.05	810.22					807.79	807.84				
Bank Height Ratio - Based on AB Bankfull ¹ Area	N/A	N/A					1.0	1.1					1.0	1.1					1.0	1.0				
Thalweg Elevation	809.87	810.07					810.08	809.96					808.20	808.29					806.22	806.15				
LTOB ² Elevation	811.26	811.19					810.59	810.53					810.05	810.36					807.79	807.82				
LTOB ² Max Depth (ft)	1.4	1.1					0.5	0.6					1.8	2.1					1.6	1.7				
LTOB ² Cross Sectional Area (ft ²)	4.0	3.2					1.2	1.4					22.0	24.8					12.8	12.5				
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 ¹ Area	N/A	N/A					N/A	N/A					802.44	802.48					797.65	797.70				
Bank Height Ratio - Based on AB Bankfull ¹ Area	N/A	N/A					N/A	N/A					1.0	1.0					1.0	1.0				
Thalweg Elevation	804.21	804.75					798.88	799.32					800.62	800.62					796.18	796.14				
LTOB ² Elevation	807.22	807.23					802.40	802.45					802.44	802.45					797.65	797.71				
LTOB ² Max Depth (ft)	3.0	2.5					3.5	3.1					1.8	1.8					1.5	1.6				
LTOB ² Cross Sectional Area (ft ²)	26.1	20.6					43.0	40.7					15.2	14.8					12.0	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 ¹ Area	799.74	799.80					798.06	798.12					N/A	N/A					N/A	N/A				
Bank Height Ratio - Based on AB Bankfull ¹ Area	1.0	1.0					1.0	1.0					N/A	N/A					N/A	N/A				
Thalweg Elevation	797.55	797.53					795.97	795.77					793.40	793.56					789.76	790.97				
LTOB ² Elevation	799.74	799.72					798.06	798.05					797.76	797.91					794.01	794.06				
LTOB ² Max Depth (ft)	2.2	2.2					2.1	2.3					4.4	4.4					4.2	3.1				
LTOB ² Cross Sectional Area (ft ²)	25.3	23.6					25.5	24.1					64.9	63.9					73.1	51.4				
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 ¹ Area	794.36	794.39					790.90	790.95																
Bank Height Ratio - Based on AB Bankfull ¹ Area	1.0	1.0					1.0	1.0																
Thalweg Elevation	791.77	791.87					788.21	788.35																
LTOB ² Elevation	794.36	794.44					790.90	790.97																
LTOB ² Max Depth (ft)	2.6	2.6					2.7	2.6																
LTOB ² Cross Sectional Area (ft ²)	31.5	32.7					36.1	36.6																

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

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

Appendix D
Hydrology Data

Table 10. Bankfull Events

Oak Hill Dairy Mitigation Site
DMS Project No. 100120
Monitoring Year 1 - 2023

Reach	MY1 (2023)	MY2 (2024)	MY3 (2025)	MY4 (2026)	MY5 (2027)	MY6 (2028)	MY7 (2029)
UT1A	4/28						
UT1 Reach 2	N/A						
Oak Hil Creek Reach 4	4/28						

* Data collected from Jan. 1 - Dec. 31

Table 11. Rainfall Summary

Wyant Lands Mitigation Site
DMS Project No. 100067
Monitoring Year 1 - 2023

	MY1 (2023)	MY2 (2024)	MY3 (2025)	MY4 (2026)	MY5 (2027)	MY6 (2028)	MY7 (2029)
Annual Precipitation Total (in)	38.95						
WETS 30th Percentile (in)	39.13						
WETS 70th Percentile (in)	49.00						
Normal	Below Normal						

*30th and 70th percentile rainfall data collected from WETS Station GASTONIA, NC for 20 years prior to previous year. 35.2671, -81.1436

** Rainfall data for Jan. 1 - Dec. 31. CHERRYVILLE 2.2 SSE 35.3535, -81.3584 (3.5 miles from Site).

Table 12. Wetland Gage Summary

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Gage	Max. Consecutive Hydroperiod (Percentage)							
	2022	MY1 (2023)	MY2 (2024)	MY3 (2025)	MY4 (2026)	MY5 (2027)	MY6 (2028)	MY7 (2029)
1	50%	66%						
2	3%	13%						
3	1%	2%						
4	0%	0%						
5	2%	3%						
6	1%	2%						
7	12%	13%						
8	16%	13%						
9	2%	5%						
10	3%	5%						
11	11%	21%						

Performance Standard: 12.0% or 29 consecutive days.

WETS Station: GASTONIA, NC

Growing Season: 3/20/2023 to 11/14/2023 (239 Days)

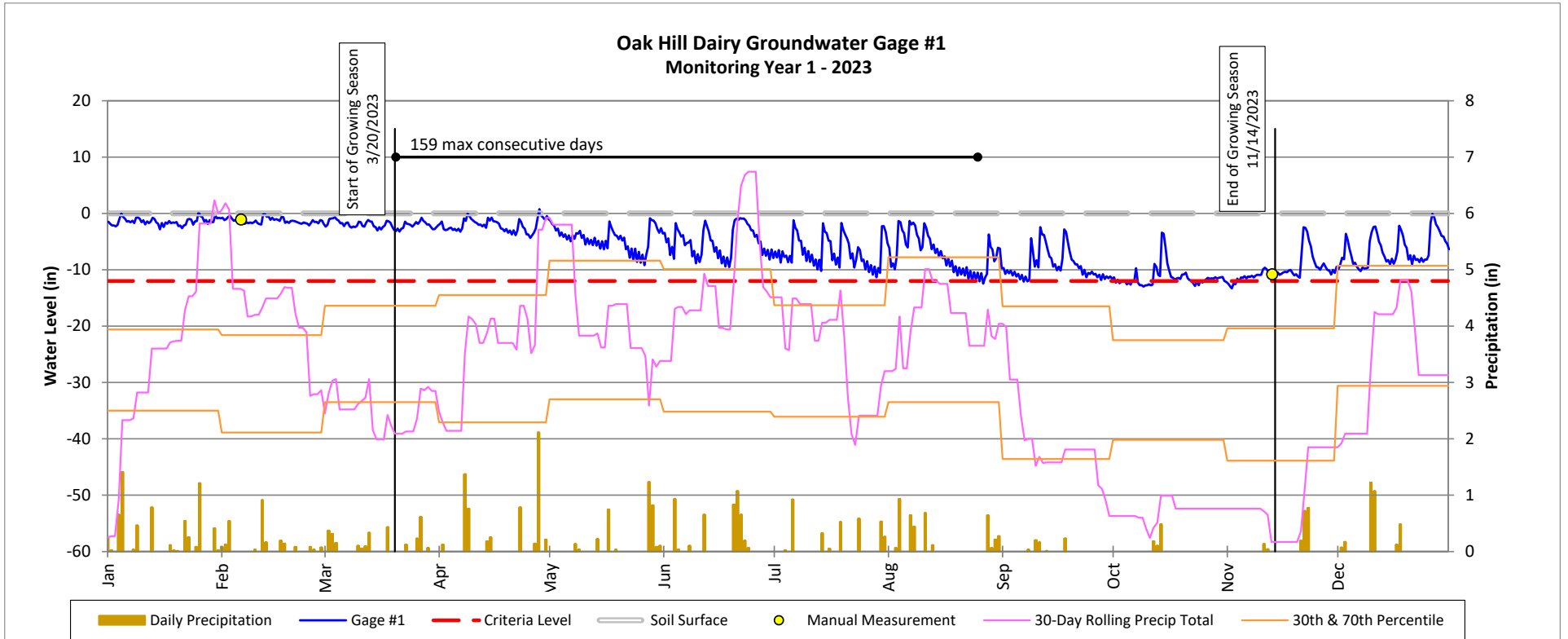
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Creation



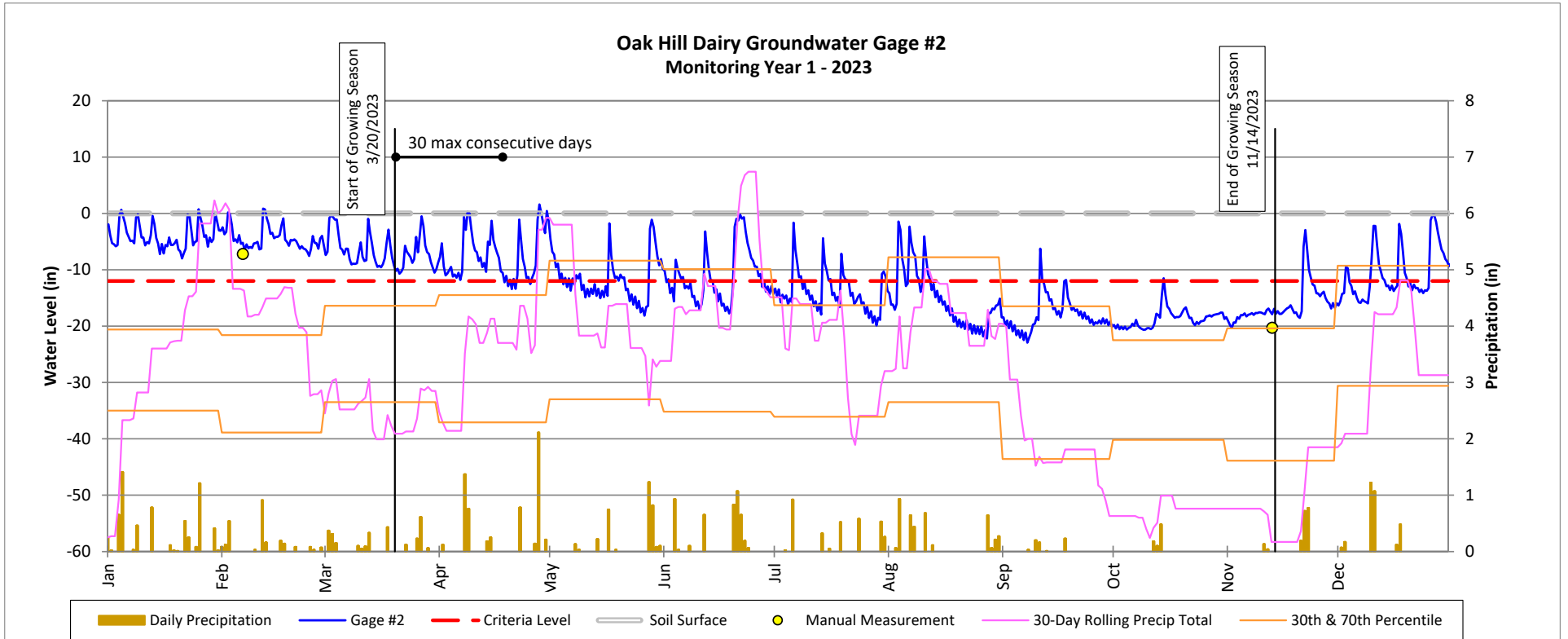
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Re-establishment



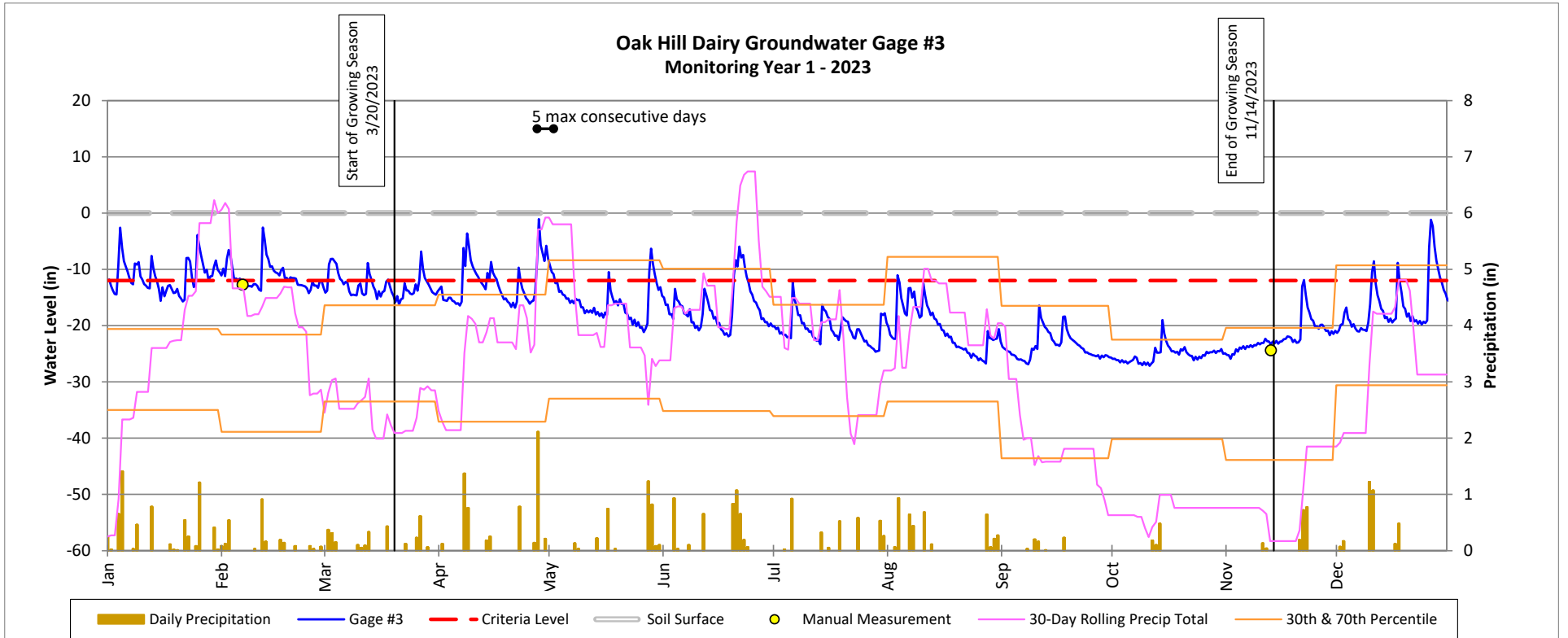
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Re-establishment



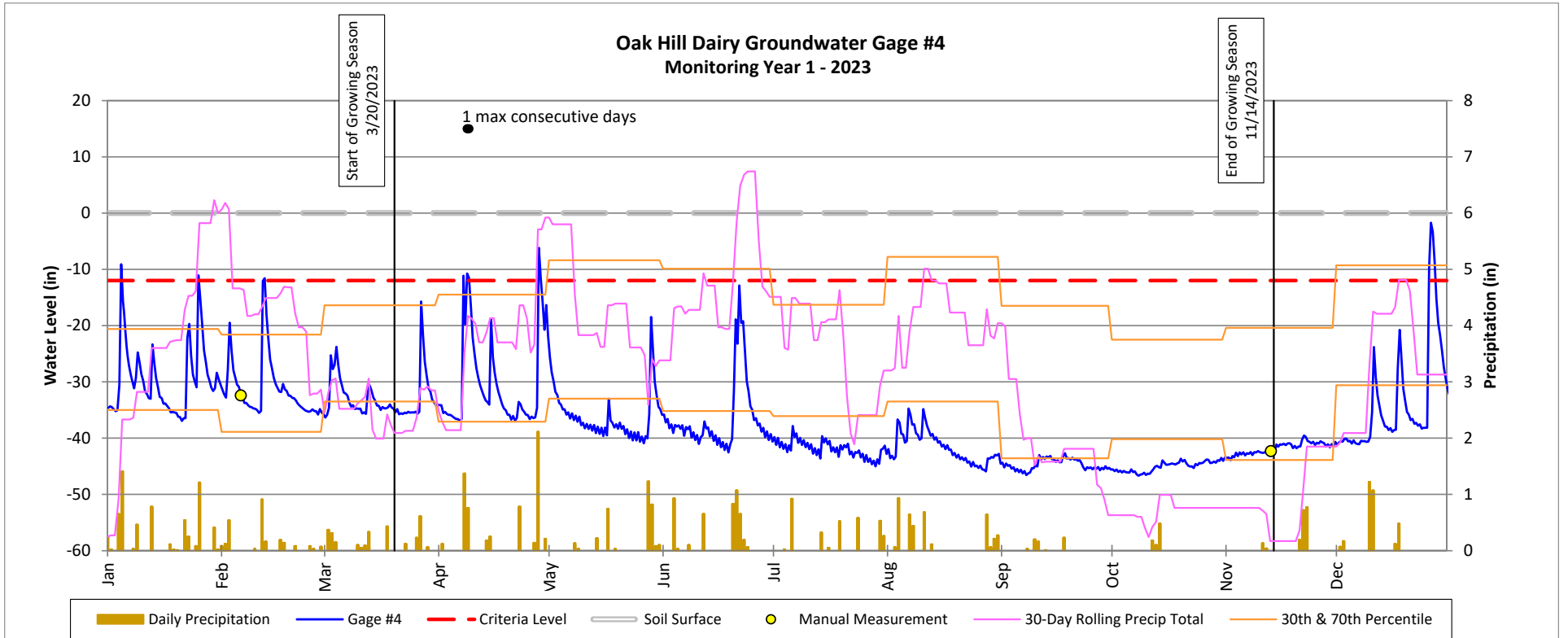
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Re-establishment



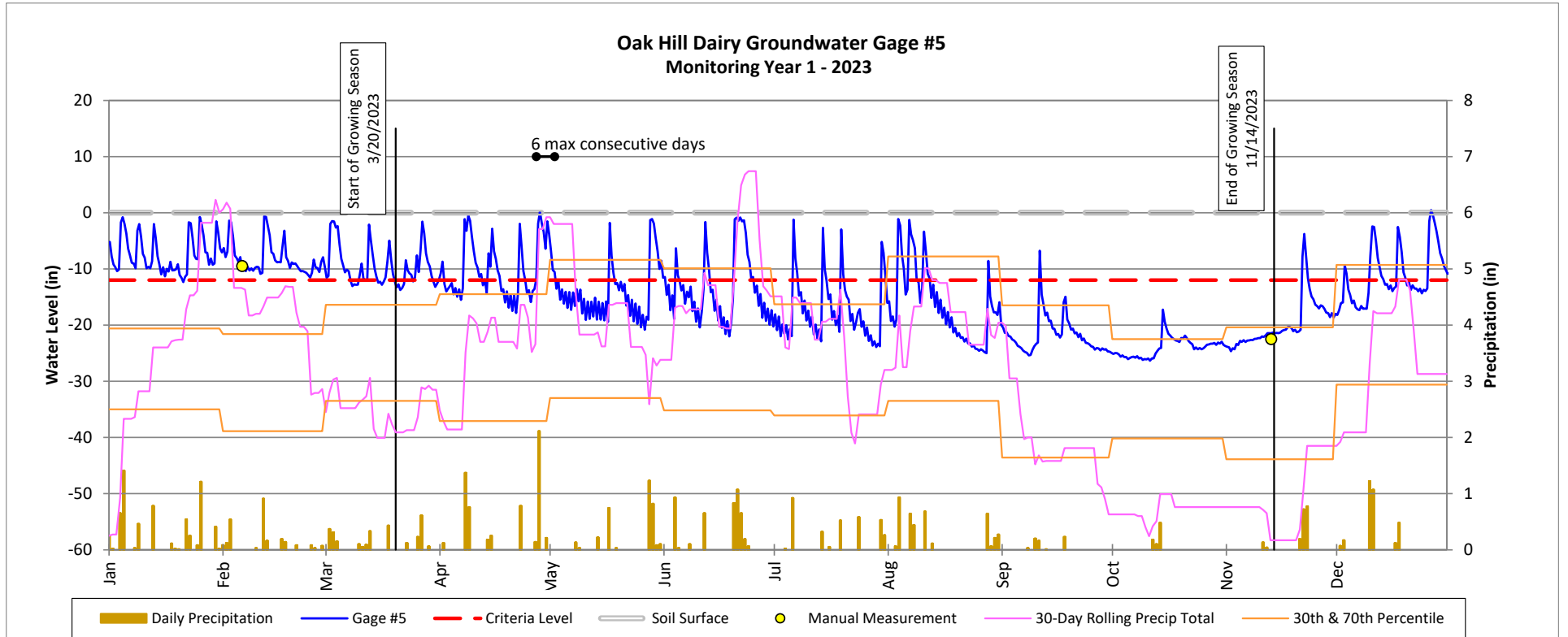
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Re-establishment



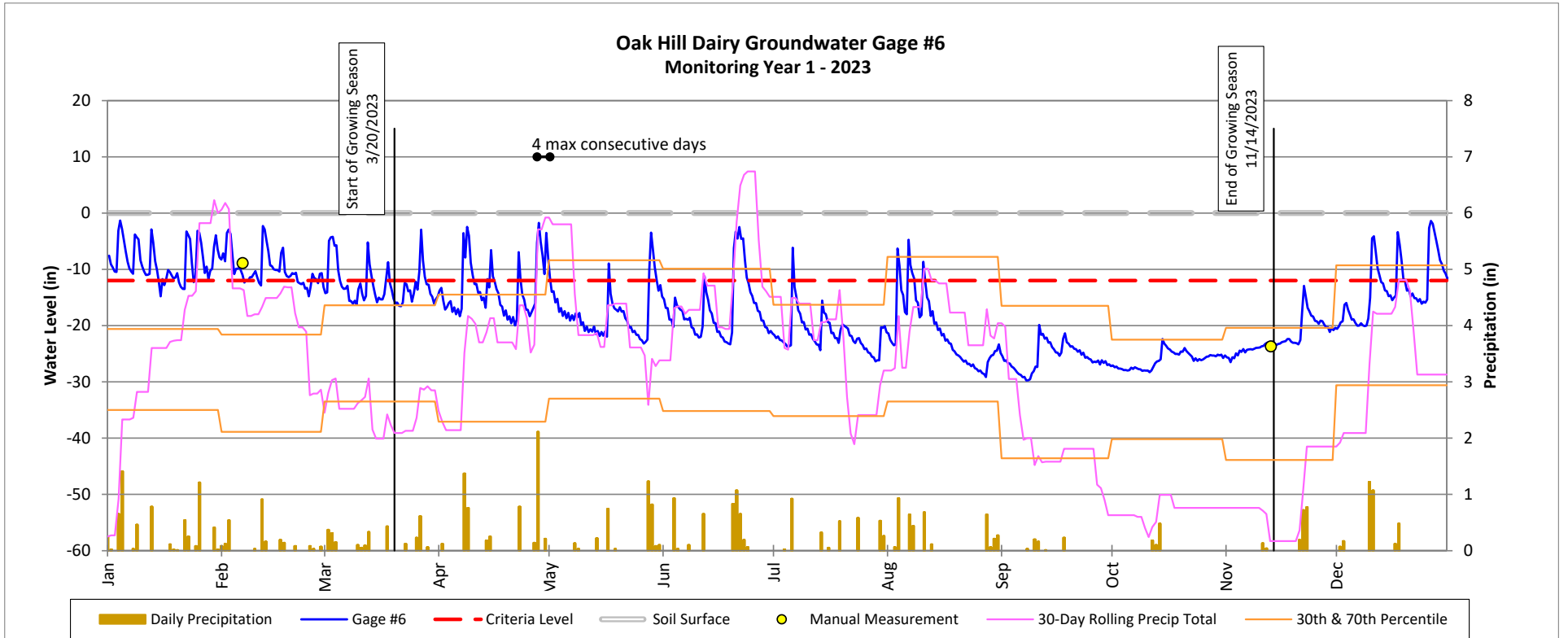
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Creation



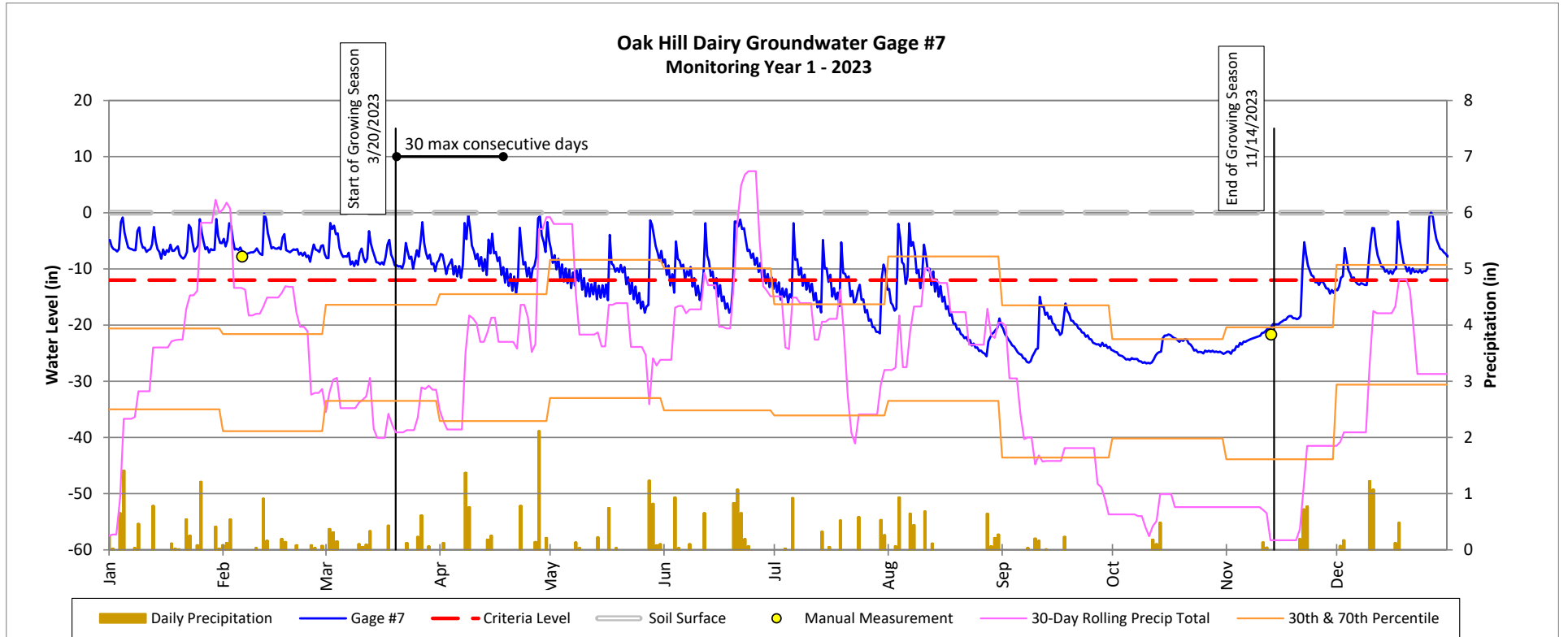
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Creation



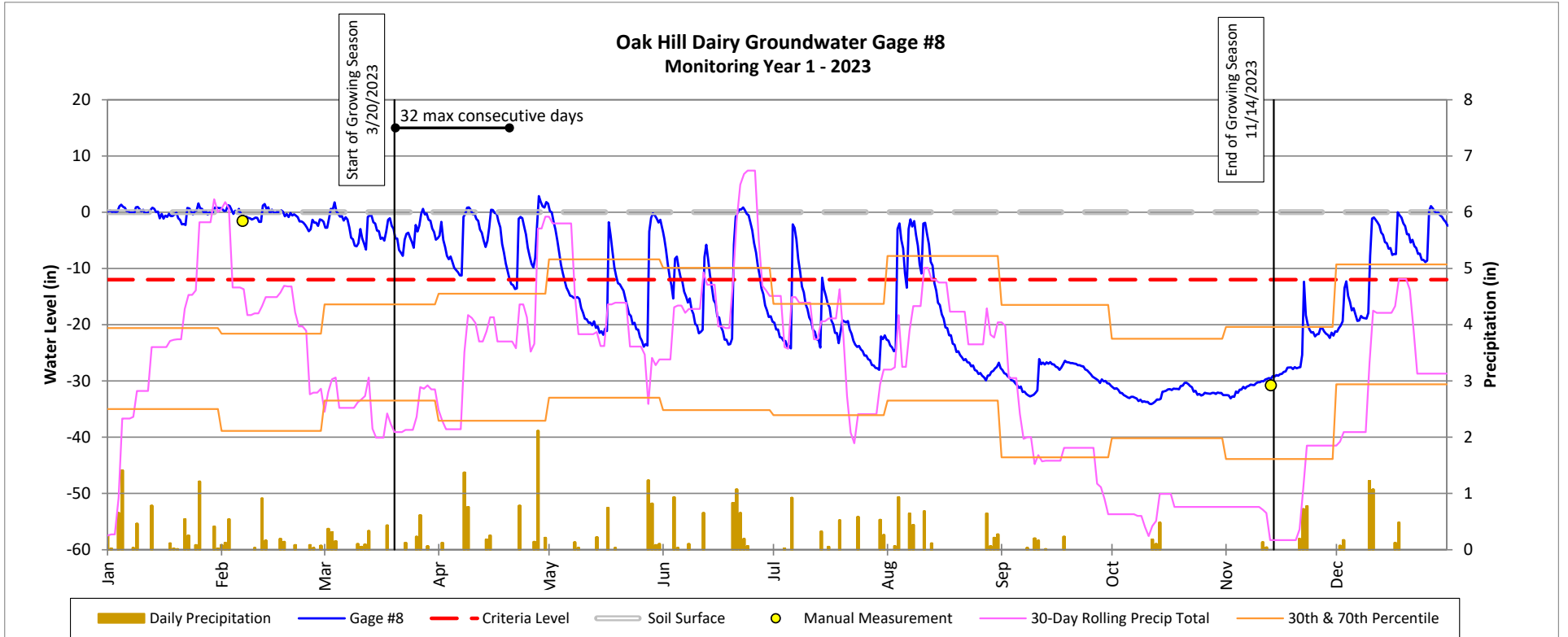
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Re-establishment



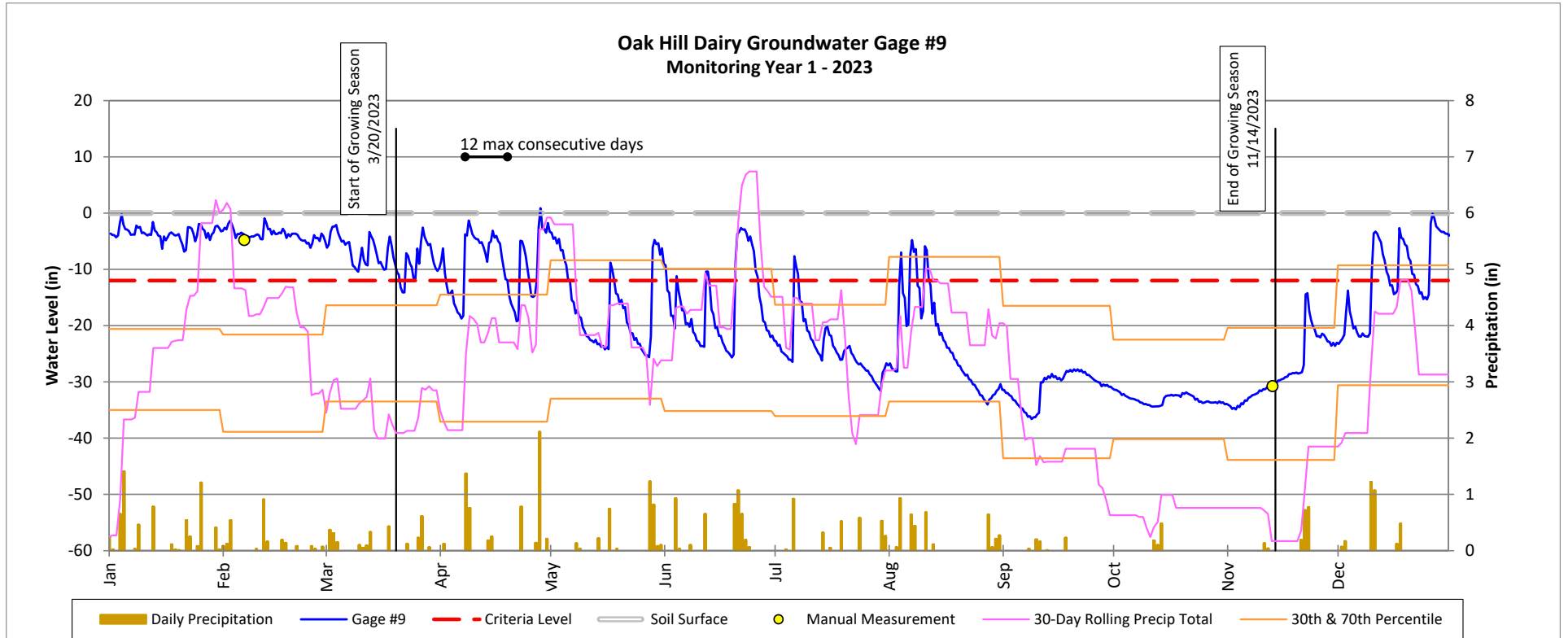
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Re-establishment



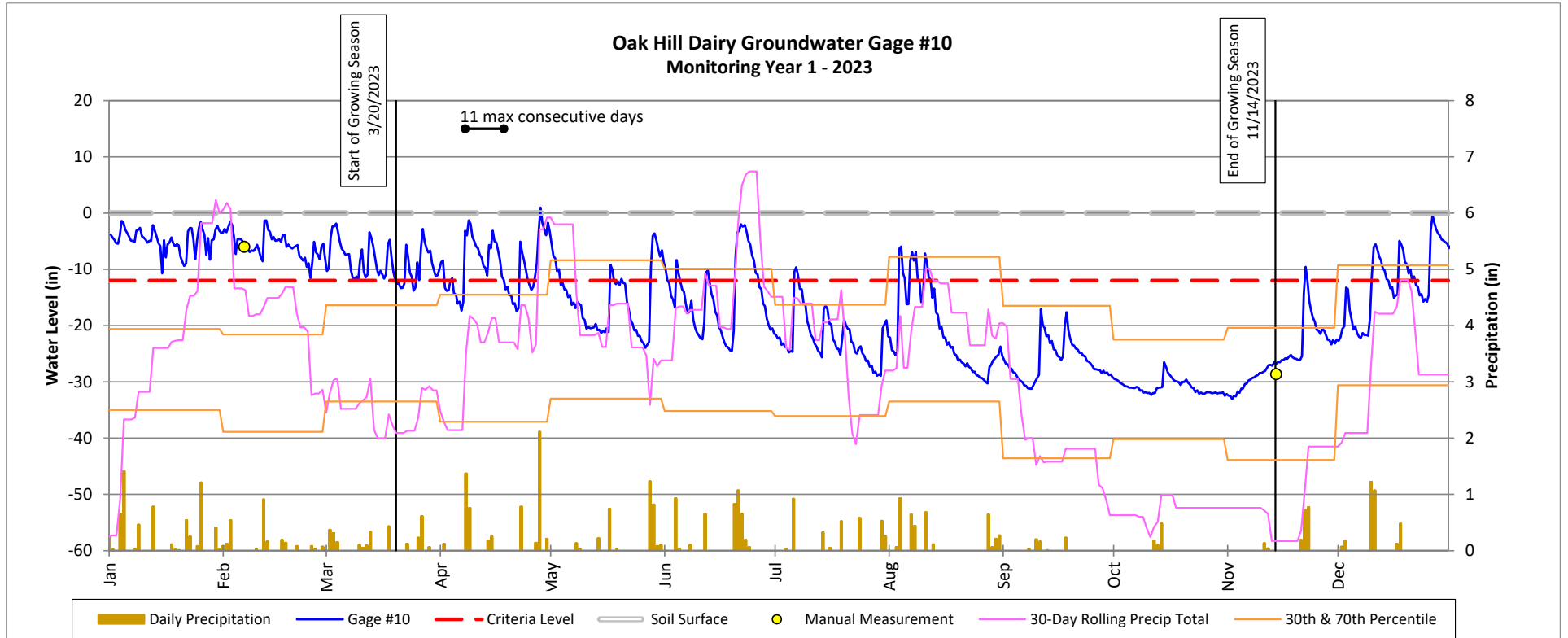
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Creation



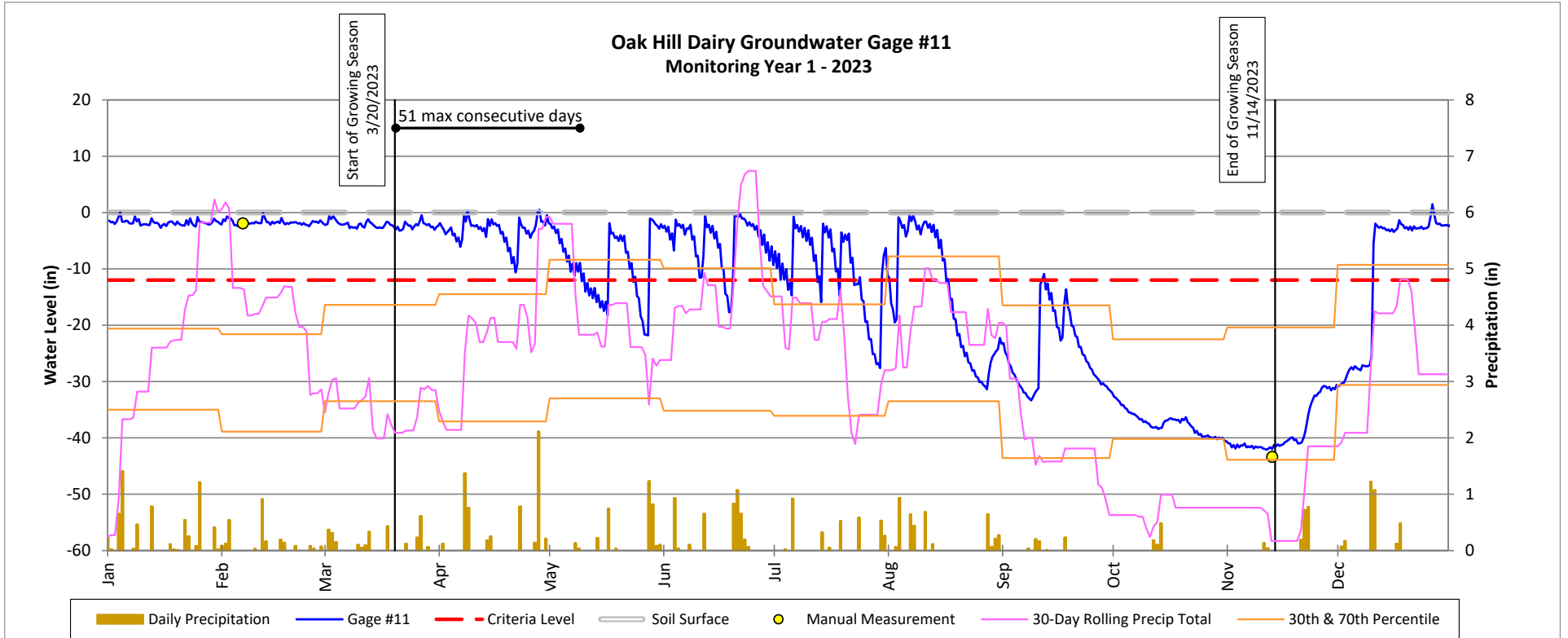
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Wetland Rehabilitation



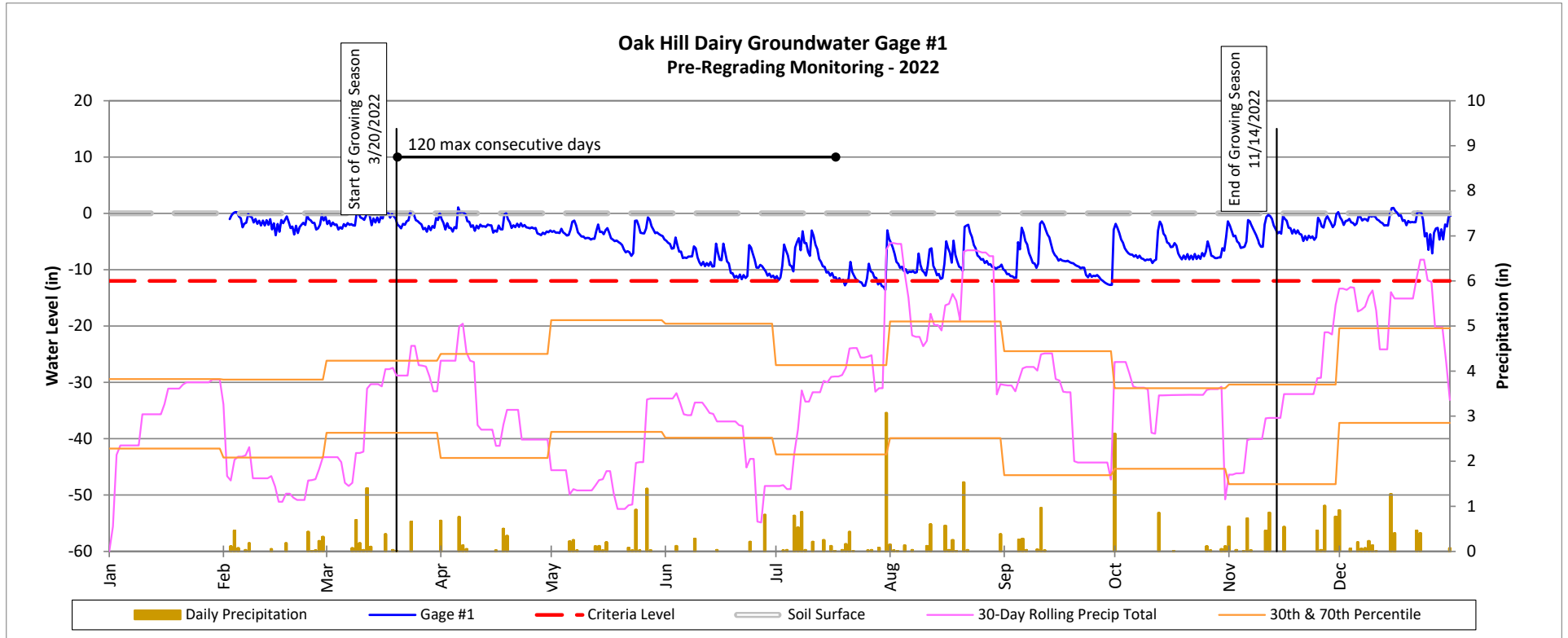
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Creation



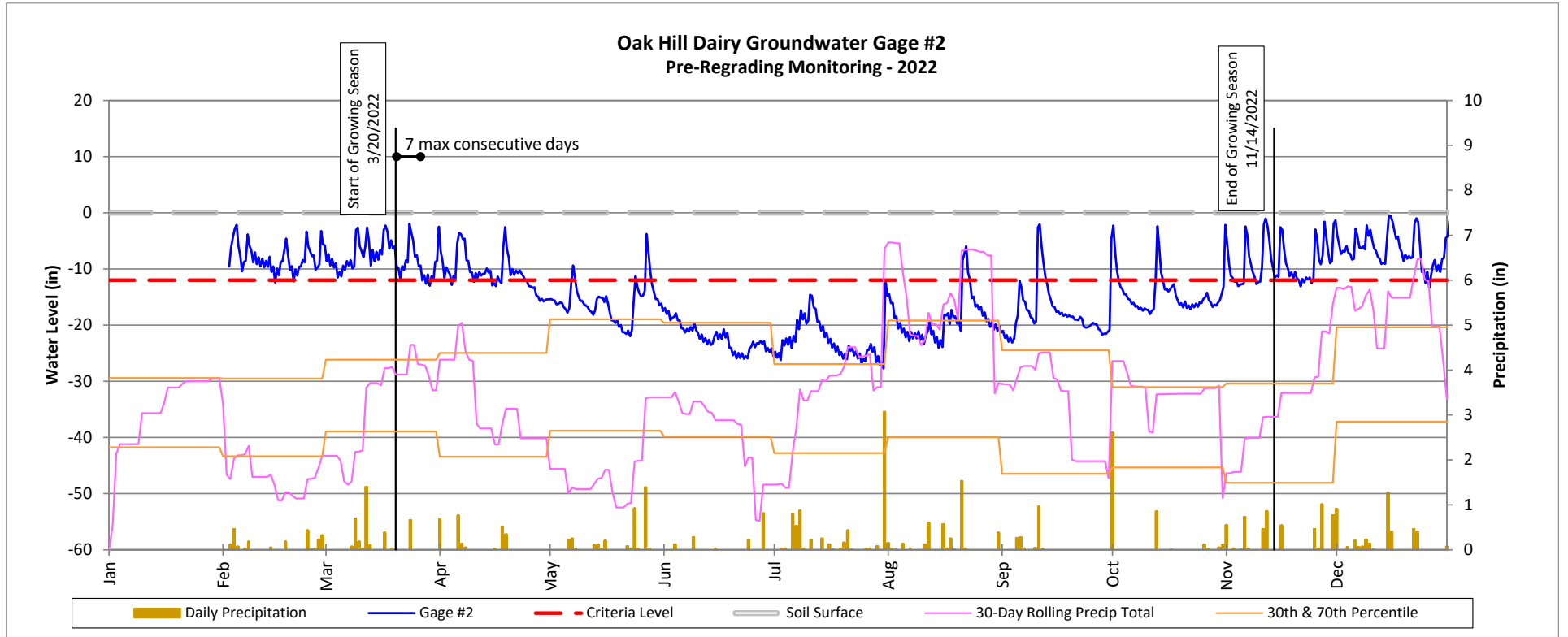
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Re-establishment



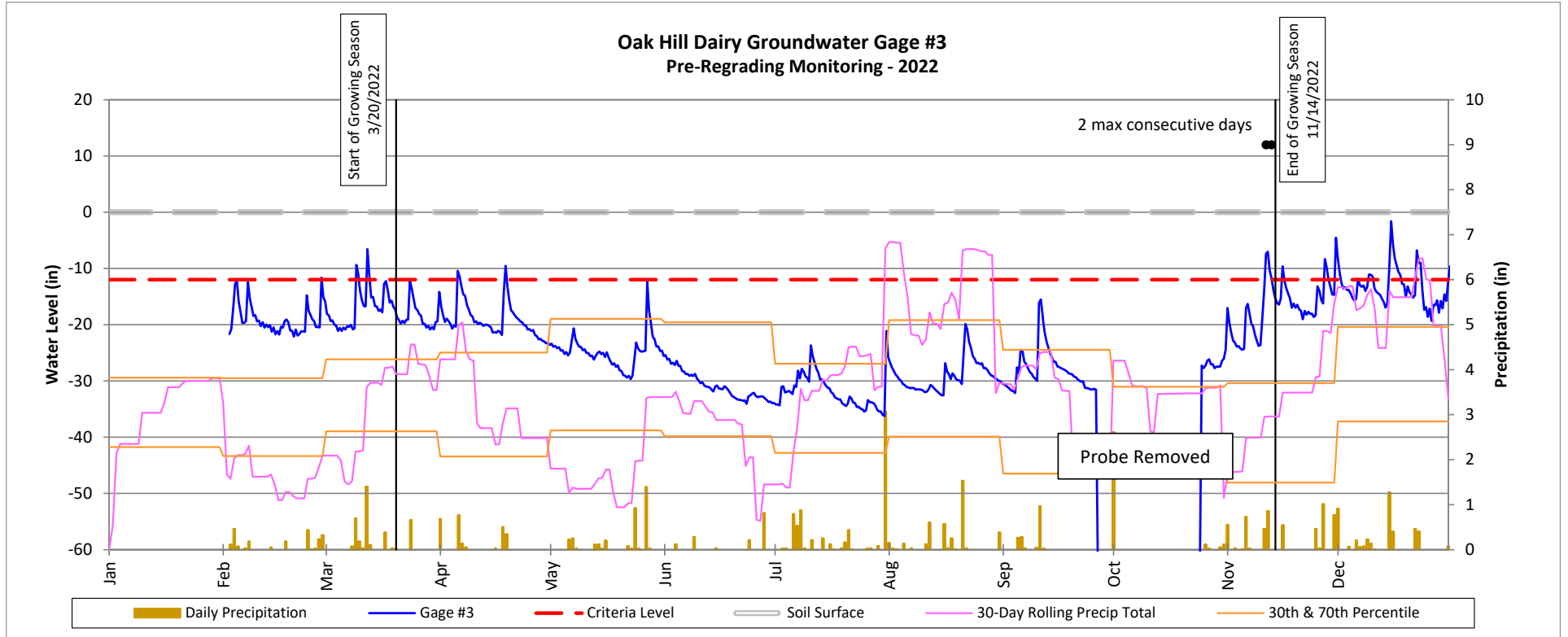
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Re-establishment



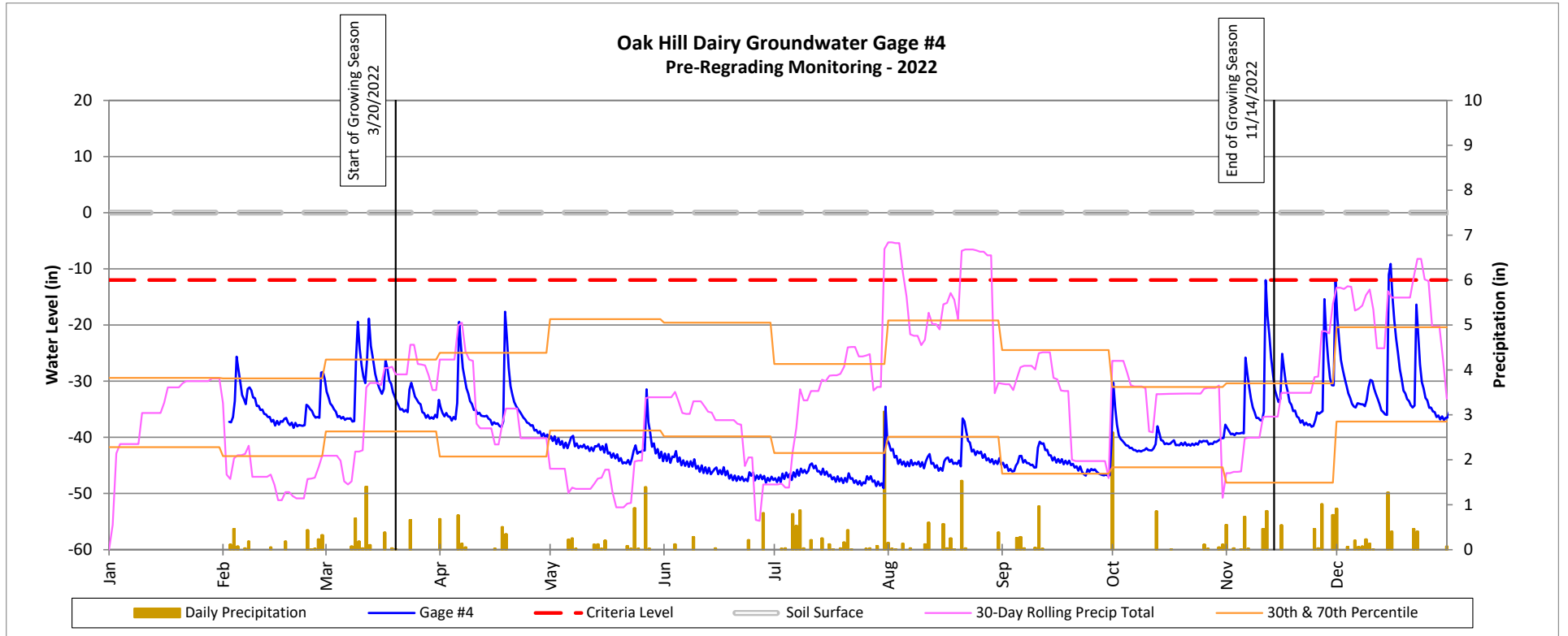
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Re-establishment



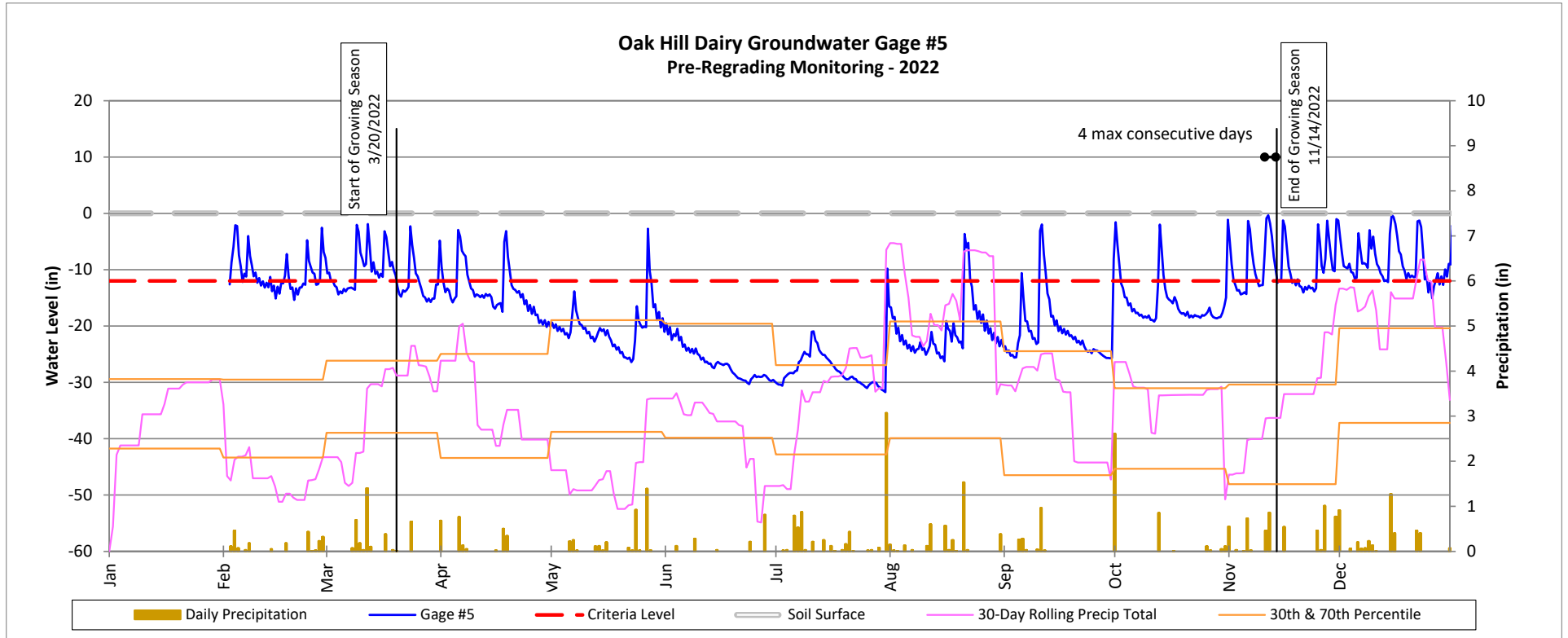
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Re-establishment



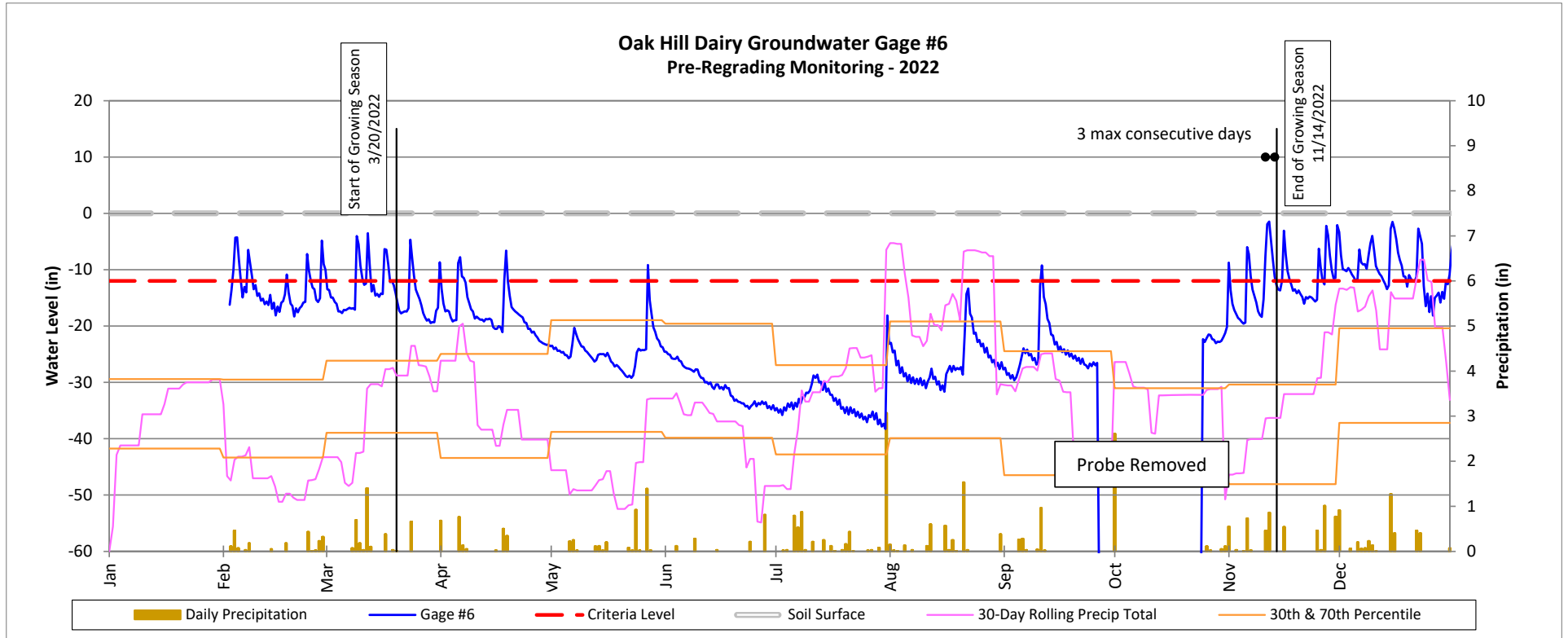
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Creation



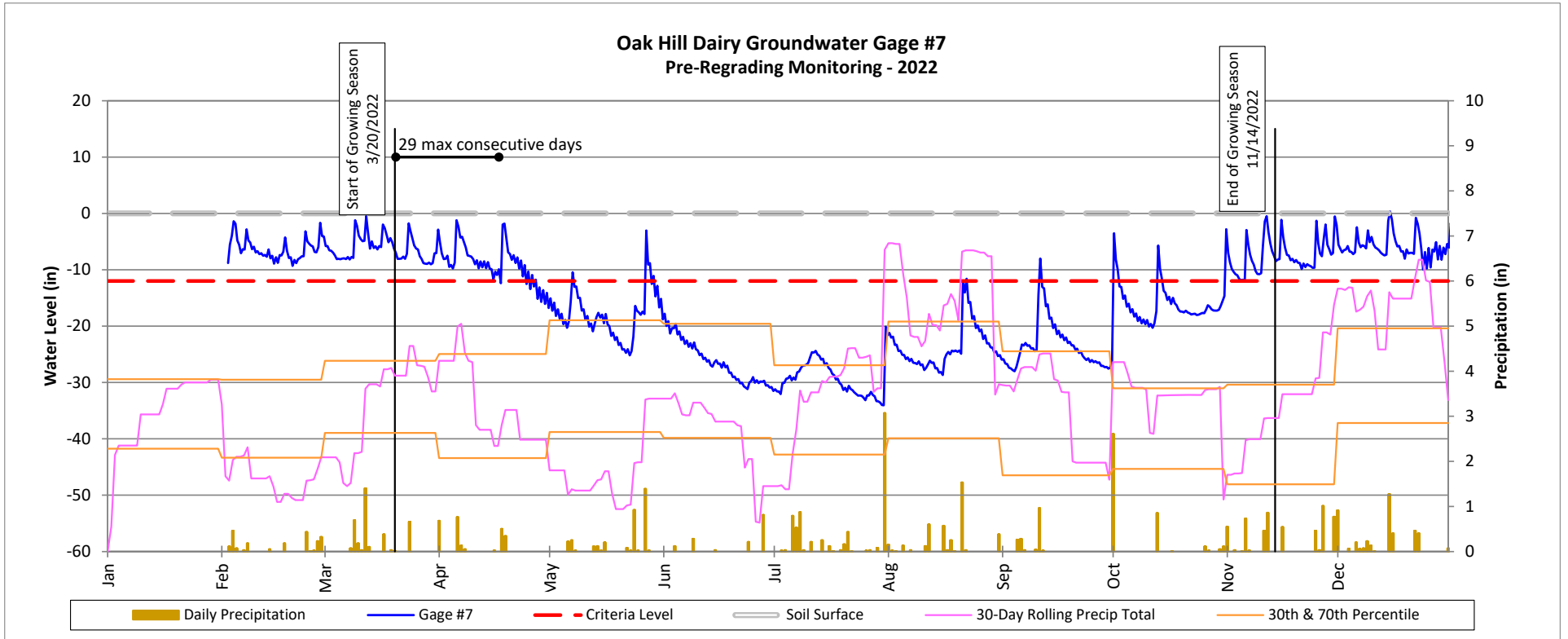
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Creation



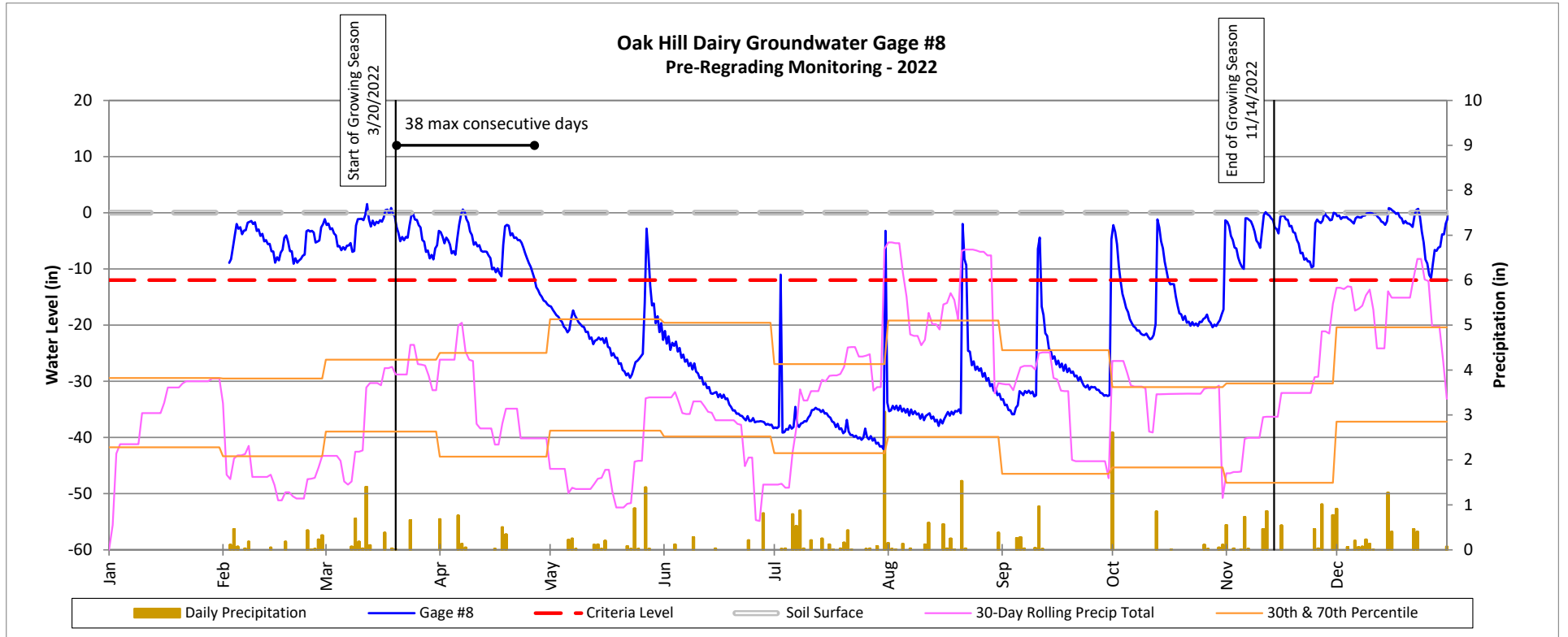
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Re-establishment



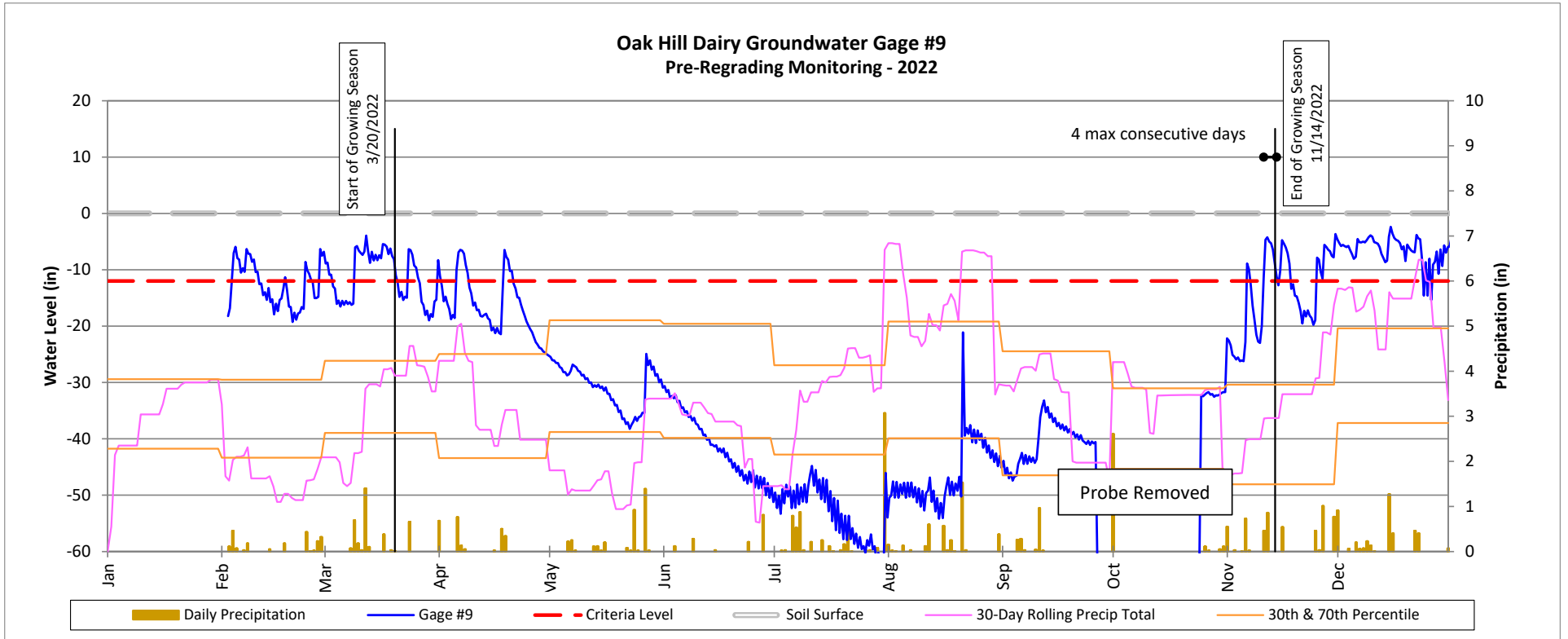
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Re-establishment



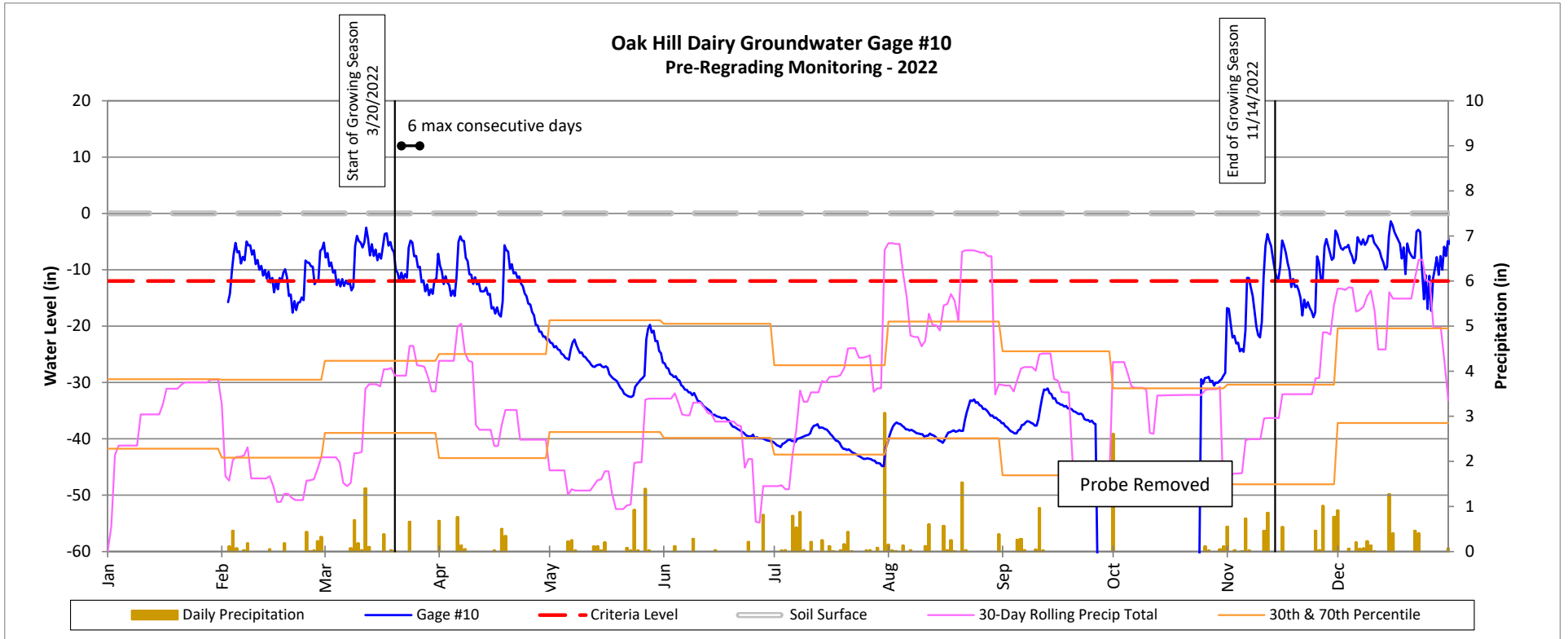
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland Creation



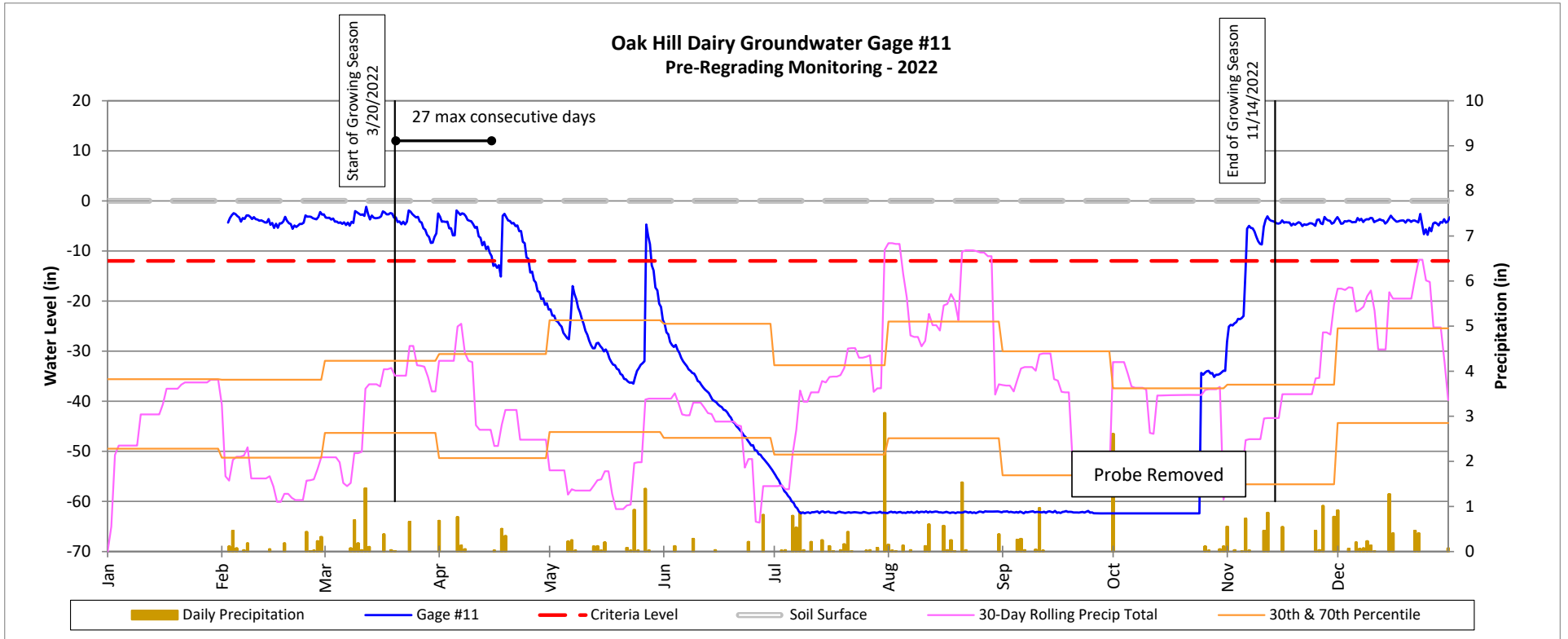
Groundwater Gage Plots

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Pre-Regrading Monitoring - 2022

Wetland GWG11

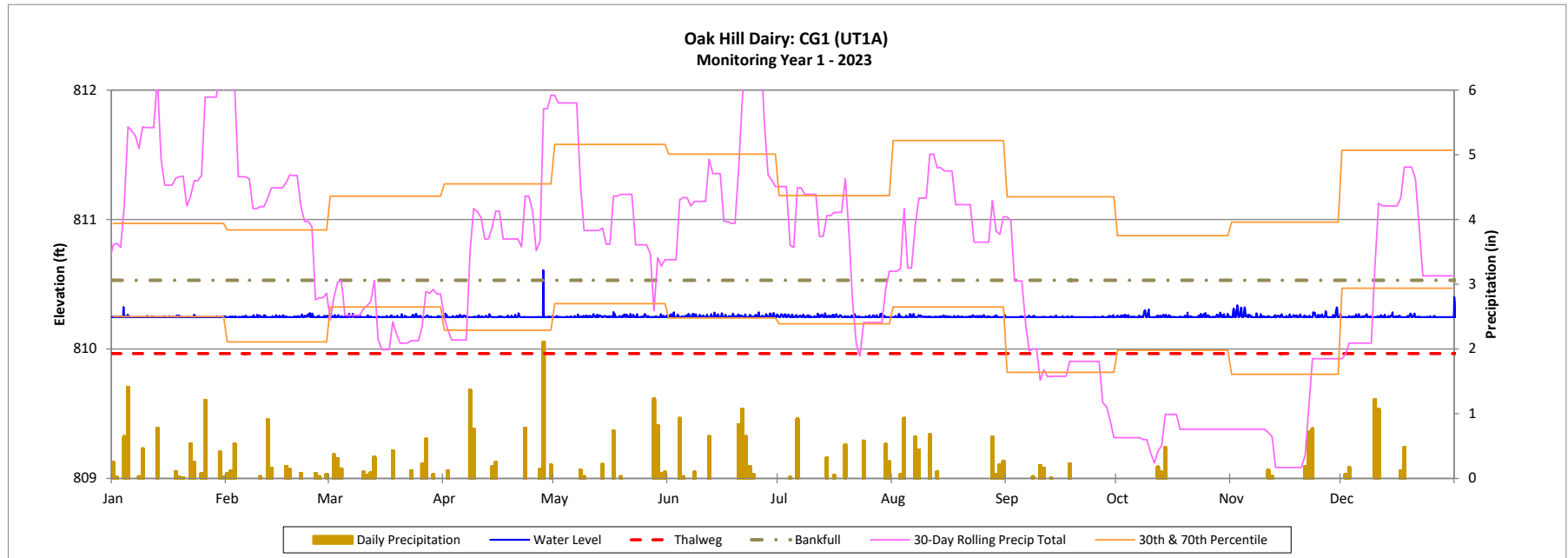


Recorded In-Stream Flow Events Plot

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

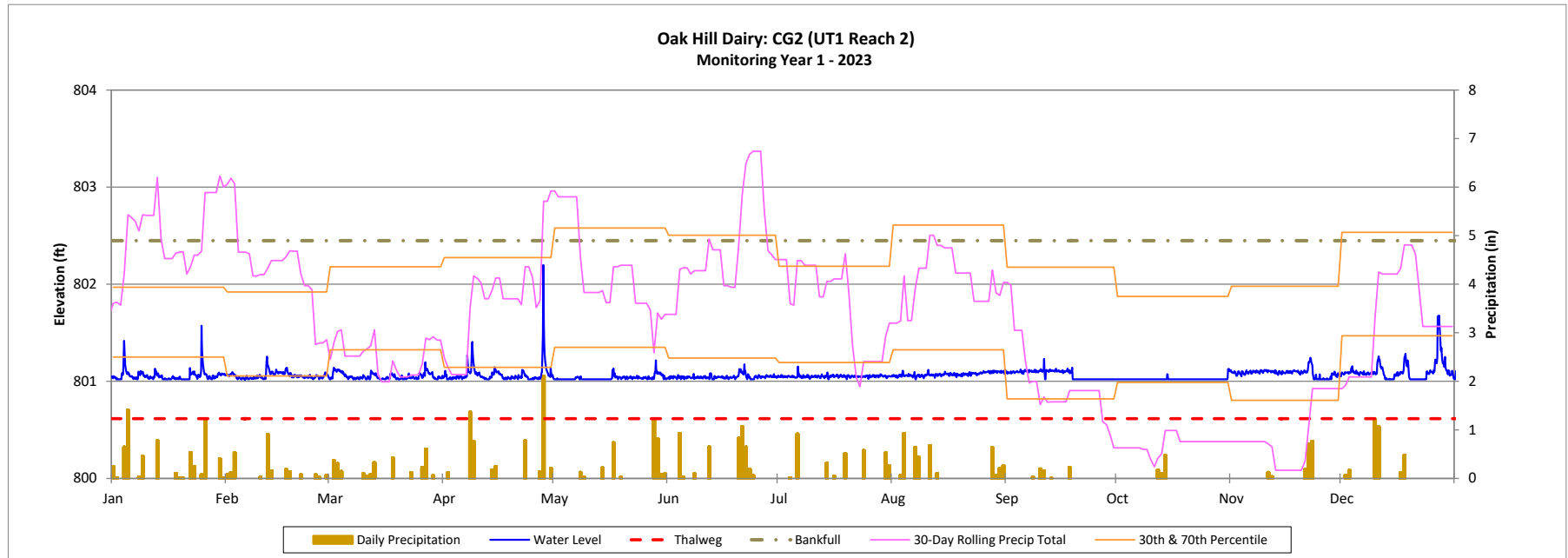


Recorded In-Stream Flow Events Plot

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

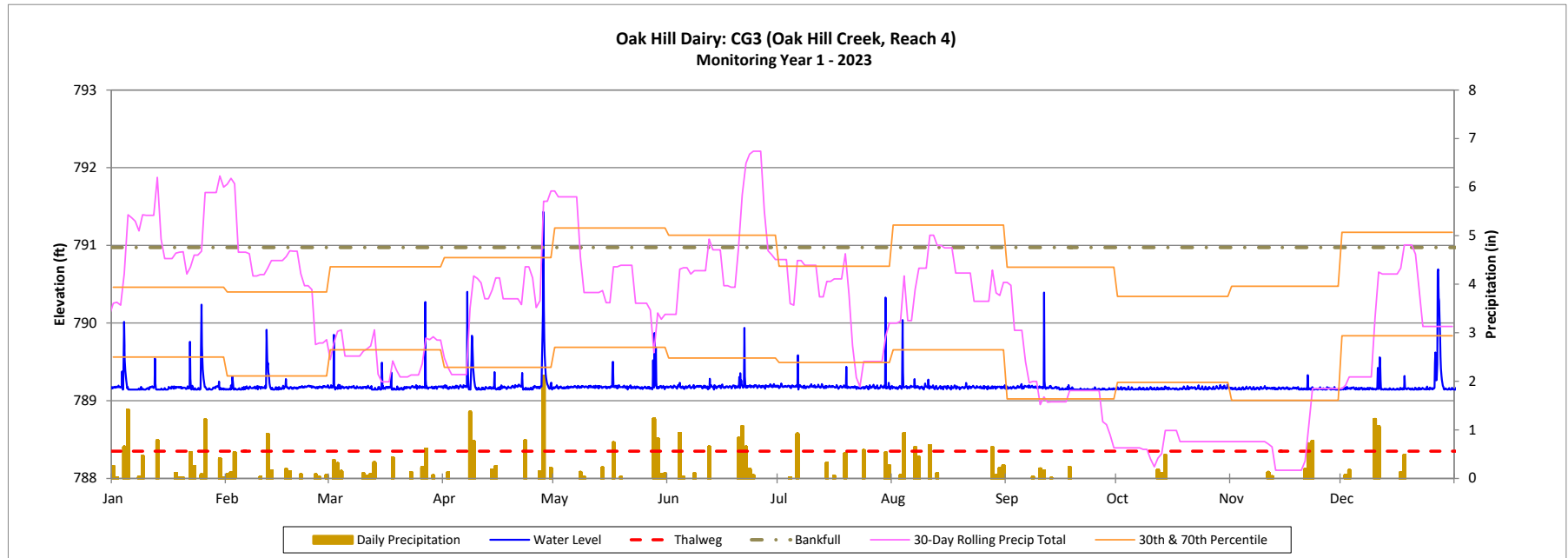


Recorded In-Stream Flow Events Plot

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

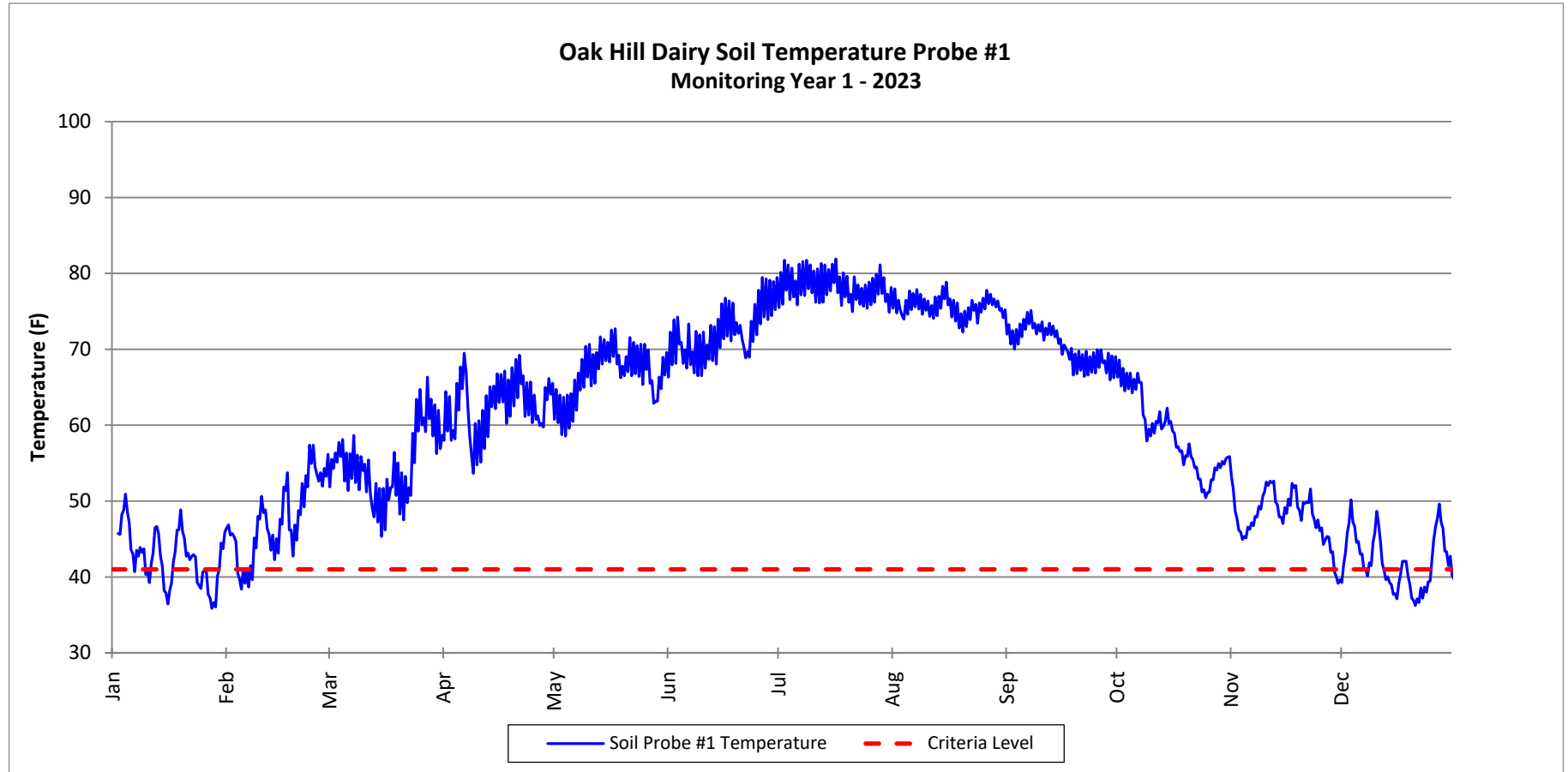


Soil Temperature Probe Plot

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023



Appendix E

Project Timeline and Contact Information

Table 13. Project Activity and Reporting History

Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 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	June 2023	December 2023
	Vegetation Survey	August 2023	
	Invasive Treatment	September 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 14. Project Contact Table

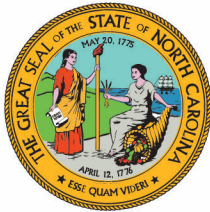
Oak Hill Dairy Mitigation Site

DMS Project No. 100120

Monitoring Year 1 - 2023

Designer Jake McLean, PE, CFM	Wildlands Engineering, Inc. 167-B Haywood Rd Asheville, NC 28806 828.774.5547
Construction Contractor	Wildlands Construction, Inc. 1430 S. Mint St., Suite 140 Charlotte, NC 28203
Planting Contractor	Bruton Natural Systems, Inc. P.O. Box 1197 Fremont, NC 27830
Monitoring Performers Monitoring, POC	Wildlands Engineering, Inc. Mimi Caddell 828.774.5547 x107

Appendix F
Correspondence



NORTH CAROLINA
Environmental Quality

ROY COOPER

Governor

ELIZABETH S. BISER

Secretary

MARC RECKTENWALD

Director

June 8, 2023

Matthew Reid
Western Project Manager
Division of Mitigation Services

Subject: Boundary Inspection Report – MY0 Site
Oak Hill Dairy Project, Gaston, NC; DMS ID No. 100120

Matthew,

The MY0 boundary inspection was conducted by DMS on June 1, 2023. The inspection was conducted in accordance with the DMS Property Checklist which included an office review and a site visit to document site conditions. The entire easement boundary was inspected during the site visit to validate easement integrity and identify any potential issues on the site. This report summarizes those inspection results. Site photos and locations are shown on the attached kmz map.

Office Review:

- The office review did indicate a few small areas of concern. There is a small structure listed as a barn on the plat that is not part of the project but is located very close to the CE line.
- Multiple other farm structures are located close to the easement boundary.
- Multiple ROW's are located on the plat.

Field Inspection:

- The easement corners were adequately monumented with aluminum caps but a few of my checks revealed missing stamps.
- Corner and in-line markings were generally adequate with the few exceptions noted on the action items and documented in the attached kmz file.
- The small internal trail indicated on the plat is no longer used and is excluded from the project.

Action Items

1. Check stamps on all corners and add stamps where missing.
2. Remove debris from KMZ points #P9.
3. Remove old fence at KMZ #P5,#P6
4. The PVC pipes added during construction that drain the road have been added to property geodatabase queue for the infrastructure feature class.

Let me know if you have any questions or need additional information.

Sincerely,

Jeffrey Horton

Project Specialist
NCDEQ-DMS

Cell: (919) 218-3480



North Carolina Department of Environmental Quality | Division of Mitigation Services
217 West Jones Street | 1652 Mail Service Center | Raleigh, North Carolina 27699-1652
919.707.8976

cc: R:\EEP PROJECT LIBRARY FILES\PROJECT DELIVERABLES(REPORTS)\FD PROJECTS\Liberty Rock
787701 (#100135)\4_T2_Cons_Ease\DMS Easement Inspections\MY0



North Carolina Department of Environmental Quality | Division of Mitigation Services
217 West Jones Street | 1652 Mail Service Center | Raleigh, North Carolina 27699-1652
919.707.8976



November 17, 2023

ATTN: Matthew Reid
Western Project Manager
North Carolina Department of Environmental Quality
Division of Mitigation Services
Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

RE: Boundary Inspection – MY0 Site
Oak Hill Dairy Project
Gaston, NC
DMS Project ID No. 100120

Dear Matthew Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Oak Hill Dairy - MY0 boundary inspection report by the Division of Mitigation Services (DMS). The following Wildlands responses to DMS's comments are noted below.

Office Review:

- The office review did indicate a few small areas of concern. There is a small structure listed as a barn on the plat that is not part of the project but is located very close to the CE line.

Wildlands Response: *The referenced barn was removed during construction.*

- Multiple other farm structures are located close to the easement boundary.

Wildlands Response: *Wildlands will continue to monitor the easement boundary for encroachments. Any issues will be addressed with the landowner and reported in annual monitoring reports.*

- Multiple ROW's are located on the plat.

Wildlands Response: Noted.

Field Inspection:

- The easement corners were adequately monumented with aluminum caps but a few of my checks revealed missing stamps.
- Corner and in-line markings were generally adequate with the few exceptions noted on the action items and documented in the attached kmz file.
- The small internal trail indicated on the plat is no longer used and is excluded from the project.

Action Items:

1. Check stamps on all corners and add stamps where missing.

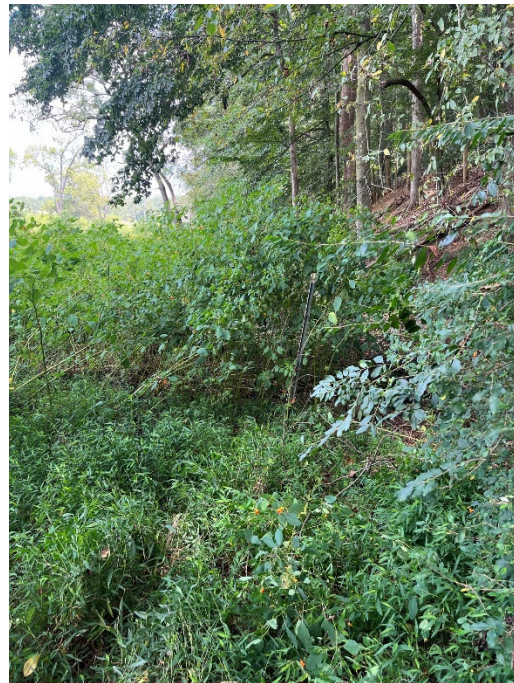
Wildlands Response: *All corners were checked by Kee Mapping and Surveying. Easement markers with missing stamps were stamped and ones that were stamped with incorrect marker number were corrected.*

2. Remove debris from KMZ points #P9.

Wildlands Response: *Metal debris was removed from the easement at this location by the landowner.*

3. Remove old fence at KMZ #P5, #P6.

Wildlands Response: *Old fencing was removed from the easement at these locations.*

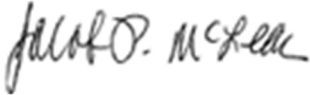


4. The PVC pipes added during construction that drain the road have been added to property geodatabase queue for the infrastructure feature class.

Wildlands Response: *Noted*

Please let me know if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Jake McLean". The signature is written in a cursive, slightly slanted style.

Jake McLean

Senior Water Resource Engineer, Project Manager
jmclean@wildlandseng.com



August 17, 2023

ATTN: Steve Kichefski
Regulatory Project Manager
U.S. Army Corps of Engineers
Wilmington District, Asheville Field Office
151 Patton Avenue, Suite 208
Asheville, NC 28801

RE: Notice of Initial Credit Release
Oak Hill Dairy Mitigation Site
Catawba River Basin – CU#03050102 – Gaston County
DMS Project ID No. 100120
Contract No. 7867
SAW-2019-00833

Dear Steve Kichefski:

Wildlands Engineering, Inc. (Wildlands) has reviewed North Carolina Interagency Review Team (NCIRT) comments from the As-Built/MYO review for the Oak Hill Dairy Mitigation Site. The following Wildlands responses to NCIRT's comments are noted below.

Casey Haywood/Steve Kichefski, USACE:

- 1. It is understood that the BMP's were designed to address stressors and potential impacts to the mitigation site from the adjacent land use. To confirm, are either of the BMP's located within the 50 ft buffer or was additional land acquired for both BMPs? Were the BMPs built to plan and were they part of the regrading in 2022? Please confirm the depth of each.*

Wildlands Response: BMP #1 along UT1 is located mostly within the 50 ft buffer, although some additional land acquisition was required to implement the BMP and tie into field grades. BMP #2 along Oak Hill Creek is located mostly outside of the 50 ft buffer and approximately 1 acre of land was acquired to implement the BMP.

Neither BMP was regraded as part of floodplain grading efforts in 2022. Both BMPs were built approximately to plan as shown on the as-built drawing, with minor changes expanded upon here:

BMP#1 was adjusted from 4 smaller cells down to 2 larger cells and truncated slightly. The larger cells help maintain comparable volume storage to the original design. The reason for the truncation was that it was deemed advantageous (and feasible) to use the truncated area to distribute and spread flows across the floodplain, serving as a filter strip and de facto extension of the BMP between stations 205+50 – 208+50. A

critical component of feasibility was that the designer and contractor agreed that the valley wall could be moved slightly near 206+75 in order to allow flows to remain on the floodplain instead of forcing them back into the channel in the outer meander near 206+75. This was deemed a net benefit to treatment and therefore implemented as described.

BMP#2 was modified slightly near the uphill entrance due to hillslope grading considerations. It was constructed an average of 6" deeper than proposed, in part to offset the minor loss in volume storage due to the grading modification at the entrance.

BMP#1 has an average depth of 12". BMP #2 has an average depth of 15-18" (with maximum depths of approximately 24").

2. *There were several areas of wetland that were not planted with bareroots due to inundation. Were any of these areas part of the regrading that was completed in October 2022? What is the estimated size of each area? Do you believe they will remain inundated through the life of the project and/or are there any concerns that the area of inundation may increase? Please continue monitoring these areas to determine if supplemental planting or remedial action will be needed since credits are tied to vegetative performance standards. With no bare root plantings, will the area meet vigor and diversity standards, and is the strata appropriate for the identified wetland community?*

Wildlands Response: The inundated areas were not regraded. The areas were originally planted with live stakes instead of bare roots, which are doing well. There are five inundated areas that were only planted with live stakes and they range from 365 sq. ft. to 0.20 acres, with most being "pocket" size. Areas of greater ponding depth are not expected to affect the project meeting vegetation success criteria and we do not believe these areas will increase in size, but potentially decrease if anything as the influence of site vegetation increases. Wildlands will continue to monitor these areas and will supplement trees, as necessary. The inundated areas are becoming increasingly vegetated with both herbaceous and woody plants- vegetation primarily consists of black willow, silky willow, elderberry, dogwood, jewelweed, rushes, and sedges, which are appropriate species for the wetland community.

3. *Appendix F shows a map of potential wetland areas to be regraded to design grade from the August 8, 2022 IRT memo, but it is unclear if all these areas were regraded. Provide a figure that shows which areas were regraded including the BMPs and whether any remaining areas do not match the approved design. If areas currently are not meeting design grade or were graded deeper than the approved, please provide a figure that shows grading depths using pre-and-post construction survey data.*

Wildlands Response: The areas that were proposed for regrading were approximately the same as those ultimately regraded during the fall 2022 regrading efforts. A figure of regraded areas is being provided that shows the minor field changes. BMPs were not regraded. The figure title is: "Regraded Areas – Prop. Vs. Actual". (Continued)

An additional figure of areas that were left higher or lower than the proposed design is being provided as well. Information is provided on this figure discussing each area that was left high or low. Only three areas were graded (or left) deeper than proposed and the figure indicates the depth of these areas. The figure title is: "Areas Higher and Lower than Design Grade".

4. *Appreciate the fencing realignment to the top of slope on UT1 and Oak Hill Creek. In addition, thank you for providing the groundwater gauge soil boring data.*

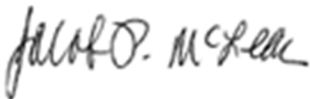
Wildlands Response: Noted.

5. *Since gages were installed prior to growing season 2022, please include 2022 data in the MY1 for gages that were not relocated due to regrading. This is just supplemental information to show wetland trends for the site considering the amount and various types of wetland credit.*

Wildlands Response: Wildlands will include both 2022 and 2023 groundwater gage data in the MY1 report.

A copy of these NCIRT comments and our response letter will be included in the MY1 report. Please let me know if you have any questions.

Sincerely,

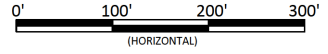


Jake McLean

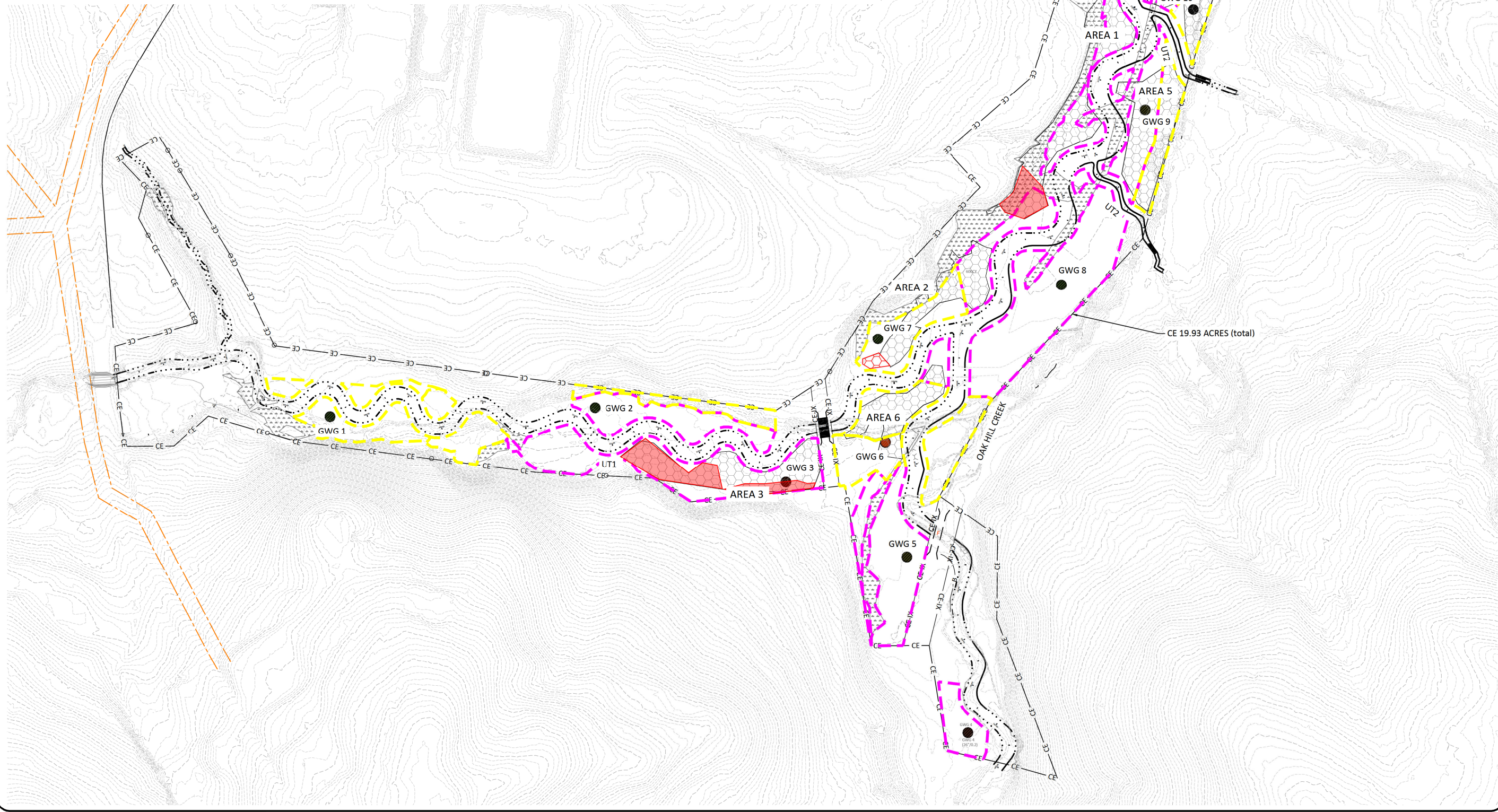
Senior Water Resource Engineer, Project Manager
jmclean@wildlandseng.com

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	

THESE WERE ACREAGE AND DEPTH ESTIMATES FROM ORIGINAL EFFORT AND ARE CONSISTENT WITH WORK ACTUALLY PERFORMED.



- POTENTIAL AREAS NOT REGRADED DURING REGRADING EFFORTS
- ADDITIONAL AREAS GRADED DURING REGRADING EFFORTS
- POTENTIAL WETLAND RESTORATION AREAS TO BE LOWERED TO DESIGN GRADE THAT WERE VERIFIED AS HAVING BEEN REGRADED IN FALL 2022
- WETLAND RE-ESTABLISHMENT AND WETLAND REHABILITATION
- WETLAND CREATION
- PRE-PROJECT WETLANDS
- EXISTING 1 AND 5' CONTOURS



PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

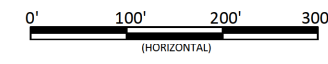
Oak Hill Dairy Mitigation Site
Gaston County, North Carolina
Proposed vs. Actual Regrading Areas

Revisions:

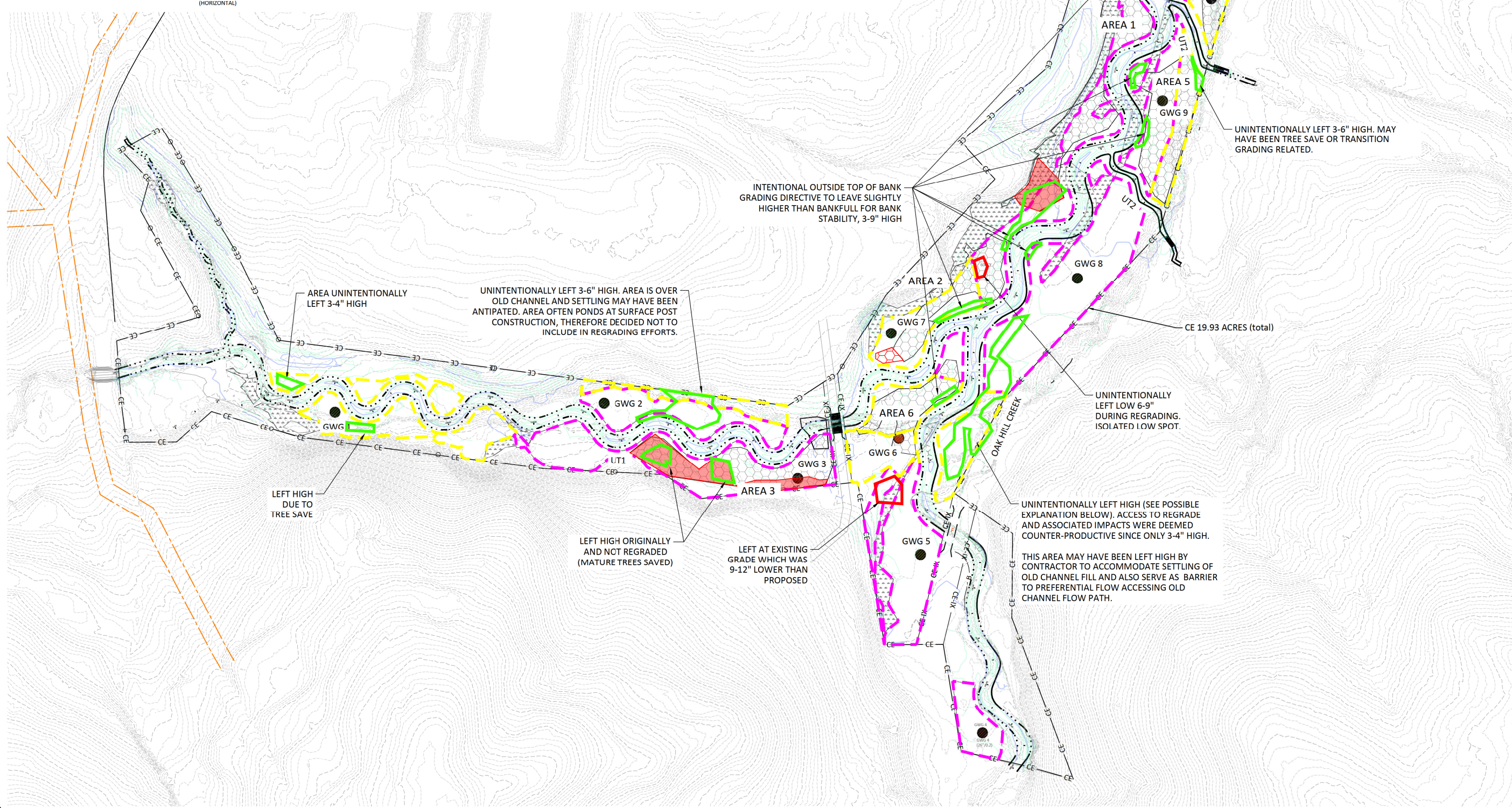
Date: August 17, 2023
Job Number: 005-02182
Project Engineer: JM
Drawn By: JM
Checked By: JM

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- WETLAND CREATION
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- EXISTING 1 AND 5' CONTOURS
- FINAL ASBUILT 1 AND 5' CONTOURS



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

Areas Higher and Lower than Design Grade

Revisions:

Date: August 17, 2023
Job Number: 005-02182
Project Engineer: JM
Drawn By: JM
Checked By: JM



January 5, 2024
ATTN: Matthew Reid
Western Project Manager
NCDEQ – Division of Mitigation Service

RE: Oak Hill Dairy Draft MY1 Report Review
Catawba River Basin – CU# 03050102 – Gaston County
DMS Project ID No. 100120
Contract # 7867

Dear Matthew Reid,

Wildlands Engineering, Inc. (Wildlands) has reviewed the NC Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 1 (MY1) Report for the Oak Hill Dairy Mitigation Site. The DMS's comments and Wildlands' responses are noted below.

- *Report indicates that Hydrilla was discovered in approximately 450 linear feet of Oak Hill Creek Reach 4 and was mechanically treated. Was heavy equipment used to remove the invasive species or was this completed using handwork? Please provide an update of treatment success in the MY2 report.*

Wildlands Response: Hand tools were used to remove Hydrilla. Wildlands will continue to monitor and treat the Hydrilla. Updates will be included in the MY2 (2024) report.

- *Did the large tree that was removed from Oak Hill Creek Reach 1 result in any bank damage and does WEI think this blockage may be responsible for the aggradation upstream?*

Wildlands Response: No bank damage has been observed due to fallen tree. The blockage is unlikely to have caused or contributed to the aggradation upstream. Off-site erosion is likely causing the increased sediment load within the project area. Wildlands expects aggradation to be flushed through the system during larger rainfall events.

- *Only 5 of 11 gauges met success criteria. Recognizing that this is only MY1 and below average rainfall was received, does WEI have concerns with the wetland hydrology success on the site? Are there plans to install additional gauges at this time?*

Wildlands Response: Due to the below average rainfall during the MY1 growing season, Wildlands is not currently concerned about the wetland hydrology success on site and does not have plans to install additional groundwater gages at this time. Wildlands will continue to closely monitor groundwater levels and if any gage's performance trajectory indicates continued failure, Wildlands will consider installing additional gages.

- *Has WEI considered installing a rain gauge onsite since the closest gauge is 15 miles away?*

Wildlands Response: The daily and monthly rainfall data is collected from the CHERRYVILLE 2.2 SSE station which is located 3.5 miles from the Site and is an accurate representation of the rainfall for the Site. This station does not include 20 years of data; therefore, the WETS data is collected from the GASTONIA, NC station which is located 15 miles from the Site.

- *Thank you for providing the 2022 gauge data that was requested by the IRT during the MYO review as well as addressing the Boundary Inspection action items.*

Wildlands Response: Noted.

Digital Deliverable Comments:

- *No comments.*

Wildlands Response: Noted.

As requested, two copies of the report along with Wildland's response letter will be included inside the front cover of the FINAL MY1 (2023) revised report as well as in the digital support files. Please let me know if you have any questions.

Sincerely,



Mimi Caddell

Environmental Scientist

mcaddell@wildlandseng.com