MAPLE SWAMP WETLAND MITIGATION SITE
ANNUAL MONITORING REPORT – YEAR 1

Edgecombe County, NC
NCDEQ Contract No. 200206-01
NCDMS ID No. 100190
NCDWR Project No. 2021-0409v2
USACE Action ID: SAW-2021-00345
RFP No. 16-20200206

Tar-Pamlico River Basin
HUC 03020102
January 2023
Prepared For:
NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center, Raleigh, NC 27699-1652

Mitigation Services
ENVIRONMENTAL QUALITY

MEMO
Lindsay Crocker, DMS

January 13, 2023

Re: Maple Swamp Wetland MY1 (email dated 12/21/22)
DMS Site #100190, Contract #200206-01

DMS received the MY1 report 12/1 and offers the following comments:

- The report describes some pine treatment following IRT site visit. Please describe extent of this work (% or area treated, photo documentation required) and add treatment to table 10 with applicable date.
  No sweetgum or pine treatment has occurred at the Site to date. Section 3.1 reads that sweetgum and pine treatment is to occur sometime in winter at the end of 2022 and early 2023 (MY2). Once completed, photo documentation will be provided in the MY2 Annual Report.

- The report describes a reference gage which provides helpful context for the site hydrology. Please provide this gage graph, hydroperiod (%) on the gage results table, and show location of reference on CCPV or separate map.
  The reference gauge groundwater graph is provided in Appendix C after well 9. The longest recorded hydroperiod for MY1 has been added to Table 9 in Appendix C. The reference gauge location is shown to the southwest of the Site on the CCPV.

- It was noted that the rain data was incomplete for MY1. Please indicate why or what happened.
  The automatic rainfall data collector malfunctioned due to a possible "bad battery." A new rain gauge will be installed to ensure more accurate site data is provided to correlate with hydrology monitoring data. Additional site visits will be conducted during MY2 to ensure gauges are functioning during the year and specifically during the growing season.

- The IRT requested a random vegetation plot in the shallow water area during their site walk. Please add this data or explain.
  Monitoring Year 1 vegetation data collection occurred prior to the IRT site walk on 10/17/22. It was understood that the additional random vegetation plot in this area would be added to subsequent monitoring year events. This data will be included in the MY2 report and subsequent MY reports.

Digital Comments:

1. The tables submitted contain Maple Swamp and Colonial Farm tables; resubmit and ensure the submission is limited to and includes the required Maple Swamp tables.
   The proper Excel workbook has been resubmitted. Eco Terra apologizes for this oversight.

2. All areas indicated on the visual assessment tables must appear on the CCPV and GIS files indicating location/extent must be submitted.
   This has been updated and shallow water areas are shown on the CCPV with more clarity.

3. The vegetation table displayed in the report is not representative of the data submitted digitally; these must be duplicated and data for all plots, fixed and random, must be submitted.
   Tables 6a-c & 7 were reviewed and numbers now match the CSV Table 4&7 exports.

4. All hydrology data is missing from the submission. Data included in the report must be submitted in digital format.
   Well spreadsheets were reuploaded to amend for this omission.

5. The assets and monitoring stations files are complete and accurate no need for resubmission or revision.
   Thank you.

Please let us know if you have further comments or questions related to the Annual Report. We look forward to working with you to ensure a successful project moving forward.

Regards,

D. Norton Webster, Eco Terra

cc: Richard Wright, McAdams

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HUC 03020102

Prepared For:

NC Department of Environmental Quality

Division of Mitigation Services

1652 Mail Service Center, Raleigh, NC 27699-1652

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Durham, NC 27713

919-361-5000

January 2023

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1.0 Project Overview

The Site is a 15.34-acre wetland mitigation project located in Edgecombe County, North Carolina. The Site is approximately two miles northeast of the Town of Leggett, on the north side of NC HWY 97E and is accessed via a dirt farm path. The Site is within the Tar-Pamlico 8-digit HUC 03020102, more specifically in the 14-digit HUC 03020102060010. The 15.34-acre Site includes 8.635 acres of wetland re-establishment (REE) and 0.449 acres of wetland rehabilitation (RH) to provide a total of 9.084 acres of non-riparian wetland credits for the Tar-Pamlico 03020102 watershed.

1.1 Project Mitigation Quantities and Credits

Site restoration activities included filling on-Site agricultural ditches, planting of native woody wetland vegetation, and establishment of a conservation easement to protect the site in perpetuity. Table 1a and 1b give the as-built quantities and credits for the Site.

Table 1a – Project Mitigation Quantities and Credits

Project Segment	Original Mitigation Plan ft/ac	As-Built ft/ac	Original Mitigation Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Credits
Wetland						
Wetland 1	8.635	8.635	NR	REE	1.000	8.635
Wetland 2 (Ditch A)	0.449	0.449	NR	RH	1.000	0.449
					Total:	**9.084**

Table 1b – Project Credit Summary

Restoration Level	Stream			Riparian Wetland	Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold			
Restoration						
Re-establishment					8.635	
Rehabilitation					0.449	
Enhancement						
Enhancement I						
Enhancement II						
Creation						
Preservation						
Total:	**0.000**	**0.000**	**0.000**	**0.000**	**9.084**	**0.000**

1.2 Project Goals and Objectives

The Site was chosen due to proximity of adjacent forested corridors servicing the sub-watershed to Maple Swamp as well as the ability to restore and protect a non-riparian system and support overarching goals listed by the North Carolina Division of Mitigation Services (DMS) in the 2018 Tar-Pamlico River Basin Restoration Priorities (RBRP) document. Restoration of the Site will directly and indirectly address specific goals and stressors related to the goals identified in the RBRP. Table 2 lists the goals and objectives of the project.

Table 2 – Site Goals and Performance Standards

Goal	Objective	Expected Outcome	Function Supported	Performance Standard	Measurement
Reduce Nutrients and Sediment in Agricultural Areas	Remove fertilizer and agricultural byproducts applied to wetland. Establish native woody wetland vegetation, securing soil in place, and reducing wind and runoff erosion.	Improve Water Quality through nutrient & sediment reduction.	Biological Physicochemical	N/A	Vegetation Plots - Fixed (n=9) - Random (n=2) Visual assessment of the Site
Restore Wetland Hydrology	Fill drainage ditches and remove drain tiles to restore Site hydrology.	Increase hydrology and shallow water table during the early growing season (9%), reduce nutrients and sediment in agricultural areas, and increase wetland habitats.	Hydrological Physicochemical Biological	Shallow groundwater within 12 inches of the soil surface for a minimum of 9% (21 consecutive growing season days) (MY1-MY2) and 12% (28 consecutive growing season days (MY3-MY7).	Groundwater Gauges (n=9)

Table 2 (continued) – Site Goals and Performance Standards

Goal	Objective	Expected Outcome	Function Supported	Performance Standard	Measurement
Improve Habitat	Establish native woody wetland vegetation. Promote habitat in near vicinity to existing conserved lands.	Increase native wetland tree species diversity and habitats. Increase habitat from non-riparian forest wetland to Maple Swamp non-riparian corridor and near vicinity protected lands associated with 1,290 NCWRC Lower Fishing Creek Game Lands.	Biological	N/A	Visual assessment of the Site
Restore Wetland Vegetation	Establish native woody wetland vegetation in proposed wetland re-establishment areas.	Increase native wetland tree species quantity and diversity. Increase nutrient cycling and sequestering sediment.	Physiochemical Biological	Survival of 210 planted stems/ac (MY7). Interim survival of at least 320 planted stems/ac (MY3) and at least 260 stems/ac (MY5). Planted stems must average 7 ft in height (MY5) and 10 feet in height (MY7).	Vegetation Plots - Fixed (n=9) - Random (n=2)
Protect the Site in Perpetuity	Record permanent Conservation Easement to protect the Site in perpetuity.	Protect Site from future impacts and encroachment and direct impacts to wetlands. Support all wetland functions in perpetuity.	Hydrological Physicochemical Biological	Record Conservation Easement	Visual assessment for easement encroachment and Site integrity

1.3 Project Attributes

The Site is situated on an approximately 356-acre parcel used for row crop production and agricultural rotations. Mature forests along Moore's Swamp to the north and Maple Swamp to the east border the cleared parcel and a smaller stand of mature forest exists to the west. Moore's Swamp and Maple Swamp are classified as water supply (WS-IV) and nutrient sensitive waters (NSW). Site hydrology drains to Maple Swamp (28-79-31-(0.7)) via a series of agricultural ditches which artificially drain groundwater from the adjacent agricultural fields.

Table 3: Project Attributes

Project Information			
Project Name	Maple Swamp Wetland Mitigation Site		
County	Edgecombe		
Project Area [Planted Area] (acres)	15.34 [13.68]		
Project Coordinates (latitude and longitude decimal degrees)	36.013378, -77.559158		
Project Watershed Summary Information			
Physiographic Province	Coastal Plain		
River Basin	Tar-Pamlico		
USGS Hydrologic Unit 8-digit; 14-digit	3020102; 03020102060010		
DWR Sub-basin	03-03-04		
Project Drainage Area (acres)	49.4		
Project Drainage Area Percentage of Impervious Area	0%		
Land Use Classification	Agriculture		
Wetland Summary Information			
Parameters	**Wetland 1**	**Wetland 2 (Ditch A)**	
Pre-project (acres)	8.635	0.449	
Post-project (acres)	8.635	0.449	
Wetland Type (non-riparian, riparian)	Non-Riparian	Non-Riparian	
Mapped Soil Series	Roanoke	Roanoke	
Soil Hydric Status	Hydric (100%)	Hydric (100%)	
Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	PJD
Water of the United States - Section 401	Yes	Yes	PJD
Endangered Species Act	Yes	Yes	Cat. Ex.
Historic Preservation Act	Yes	Yes	Cat. Ex.
Coastal Zone Management Act (CZMA or CAMA)	No	Yes	Cat. Ex.
Essential Fisheries Habitat	No	Yes	Cat. Ex.

2.0 As-Built Condition (Baseline)

2.1 Site Planting

Quercus pagoda (Cherrybark Oak) was incorrectly listed in the MY0 report as a species included in the Final Mitigation Plan. *Q. pagoda* has been replaced in the table with *Populus heterophylla* (Swamp Cottonwood), the correct species listed in the Final Mitigation Plan. Eco Terra has revised and included Table 4 in this report at the request of the IRT.

Table 4: Site Planted Stems

Scientific Name	Common Name	Vegetative Strata	Planting Zone	Wetland Indicator Status	%	Quantity
Quercus michauxii	Swamp Chestnut Oak	Canopy	1	FACW	17%	2000
~~*Gordonia lasianthus*~~	~~Loblolly bay~~	~~Understory~~	~~1~~	~~FACW~~	--	--
~~*Populus heterophylla*~~	~~Swamp Cottonwood~~	~~Canopy~~	~~2~~	~~OBL~~	--	--
~~*Carpinus caroliniana*~~	~~Ironwood~~	~~Understory~~	~~1~~	~~FACW~~	--	--
Quercus phellos	Willow Oak	Canopy	1	FACW	8%	1000
Quercus laurifolia	Laurel Oak	Canopy	1	FACW	4%	500
Quercus nigra	Water Oak	Canopy	1	FAC	8%	1000
~~*Nyssa biflora*~~	~~Swamp blackgum~~	~~Canopy~~	~~1~~	~~OBL~~	--	--
~~*Magnolia virginiana*~~	~~Sweetbay magnolia~~	~~Understory~~	~~1~~	~~FACW~~	--	--
Ulmus americana	American elm	Canopy	1	FAC	4%	500
~~*Persea palustris*~~	~~Swamp bay~~	~~Understory~~	~~1~~	~~FACW~~	--	--
Platanus occidentalis	Sycamore	Overstory	1	FACW	4%	500
Taxodium distichum	Bald cypress	Overstory	1/2	OBL	17%	2000
Nyssa aquatica	Swamp tupelo	Overstory	2	FACW	4%	500
Quercus shumardii	Shumard Oak	Overstory	1	FAC	17%	2000
Fraxinus pennsylvanica	Green ash	Overstory	1	FACW	3%	300
Cephalanthus occidentalis	Buttonbush	Understory	2	OBL	4%	500
Quercus lyrata	Overcup Oak	Overstory	1/2	OBL	8%	1000
				Total:	100%	11800

Species listed in Table 4 with strike-through marks were included in the conceptual planting plan in the Final Mitigation Plan but were not planted at the Site.

3.0 Monitoring Year 1 Data Assessment

Site monitoring for MY1 took place from March – October 2022. Collected data for MY1 was analyzed and is summarized the following sections. MY1 data is presented in the appropriate appendices of this report.

3.1 Vegetation Assessment

- Vegetation assessment for MY1 was conducted in October 2022. Vegetation surveys of the nine fixed and two random vegetation plots resulted in calculated stem densities ranging from 566-1093 stems per acre and an 94% overall survival rate of panted stems from the as-built (baseline) condition. The calculated average stem density for the Site was 805 stems per acre, well above the interim success criteria of 320 stems per acres in MY3. All 11 vegetation plots exceeded the MY3 interim success criteria. Vegetation plot photographs are included in Appendix A and vegetation plot data is included in Appendix B.
- *Diospyros virginiana* (American Persimmon) volunteers were observed in fixed vegetation plot 7. *D. virginiana* was not included in the Final Mitigation plan and was not planted at the Site. Eco Terra requests that the IRT approve occurrences of *D. virginiana* to count towards the stem count and overall success criteria of the Site. Occurrences of *D. virginiana* were noted in reference forest communities to the north and west of the Site.
- Mowing between planted rows of woody stems occurred once during the monitoring period to reduce herbaceous competition, allow for easier identification of planted stems in during MY1 vegetation data collection, provide a better visual understanding of the overall survival rate of planted stems, and increase effectiveness of herbicide treatments and supplemental planting if necessary.
- During the as-built IRT site walk on October 17, 2022, members of the IRT reiterated desires to girdle sweetgum and pine trees growing on the embankment west of the existing irrigation pond. Sweetgum and pine management, including girdling and herbicide treatment, will occur in the subsequent monitoring years, starting at the end of 2022 and early 2023 (MY2). Discussion of the practices and results will be included in annual monitoring reports.
- Site grading during construction and uplift of the water table due to Site planting and ditch plugging was led to the formation of two shallow water areas in the southern portion of the Site (see Figure 1). Members of the IRT and Eco Terra noted during the as-built site walk that these two areas exhibited lower than average stem survival as compared to the remainder of the Site. Eco Terra plans to supplementally plant these areas with hydrophytic species included in the Final Mitigation Plan and place a random vegetation plot in these areas in MY2. Description of the supplemental planting, including species, quantity, and area, will be included in the MY2 annual monitoring report.
- Sporadic growth of *Lespedeza cuneata* was observed in the vicinity of vegetation plot 7. The current state and growth rate of the invasive species does not warrant any treatment or remedial action in the area. Eco Terra will continue to monitor *Lespedeza cuneata* in this area

and the remainder of the Site. Remedial actions and/or treatments will be discussed in future monitoring reports.

- There are currently no areas of concern with respect to Site vegetation. The Site will continue to be monitored for invasive and aggressive pioneer species. Any future vegetation treatments will be conducted in accordance with the approved adaptive management plan and will be discussed the annual monitor reports.

3.2 Wetland Assessment

- Performance standard for wetlands at the Site during MY1 is groundwater elevation within 12 inches of the ground surface for 21 consecutive days (9% of the growing season). The estimated growing season for the Site, as determined by NRCS WETS tables for Edgecombe County, is March 20 to November 11. Site groundwater monitoring for MY1 began on March 10, 2022 and ended October 12, 2022. Of the nine groundwater wells installed at the Site, two wells achieved the MY1 performance standard. Summary of MY1 groundwater hydrology is included in Appendix D.
- Assessment of data collected by the reference groundwater well located in a forested wetland to the east of the Site indicates that groundwater in the area did not come within 12 inches of the ground surface during the monitoring period. The area received less than average rainfall during 2022. Rainfall data analysis indicates that six of the first ten months in 2022 (January – October) experienced cumulative rainfall less than the 30th percentile value for the month.
- Interim groundwater well data collection occurred on May 3, 2022. Data ranging from March 11, 2022 – May 3, 2022 was unable to be downloaded from groundwater well 4 (GW4) due to an unknown error (most likely a dead battery). Groundwater data for GW4 begins on May 3, 2022.
- Rainfall data collected at the Site was incomplete for the MY1 monitoring period. Rainfall data collected prior to May 3, 2022 was unable to be downloaded due to an electronic malfunction within the data logger. To maintain consistency of record, rainfall data for the entirety of the MY1 monitoring period was obtained from USGS gauge station 02082585 (Tar River at NC97), located approximately 13 miles southwest of the Site in Rocky Mount, NC.

3.3 Visual Assessment

Visual assessment of the Site indicates that the Site is stable and planted vegetation is in good health. The constructed ditch plug in the southeast corner of the Site shows no signs of deterioration and the constructed sediment forebays on the western side of the Site appear to be functioning as they were intended to (Note: On the day of the as-built site walk, members of the IRT requested that riprap placed around the sediment forebays on the western side of the Site be removed from within the Site boundary. Eco Terra removed the riprap on the day of the site walk). The Site boundary has been well marked with signage and there is no evidence of encroachment. Photographs taken from the seven established photo points are presented in the Appendix A.

3.4 MY1 Assessment Summary

- Overall, the Site is in good condition. Planted stems appear to be in good health and herbaceous ground cover is establishing across the Site. Stem density in the 11 vegetation plots ranged between 566-1093 stems per acre, well above the MY3 performance standard of 320 stems per acre. Average stem height and vigor for the Site is 2.4 feet (62.1 cm) and 3.9/4.0 respectively.
- Only two of the nine installed groundwater wells achieved the MY1 performance standard. Assuming a more standard precipitation pattern, hydrologic performance of the Site is expected to improve in MY2 as soil structure and organic material accumulation increases in the upper soil horizons and the water table in the vicinity of the Site continues to adjust to current land management practices.
- There have been no noticed signs of encroachment within the Site.

Summary information of the Site for MY1 can be found in the report appendices. Raw data for the Site supporting the observations and conclusions in this report will be made available to DMS upon request.

4.0 Methodology

Hydrologic monitoring and instrument installation followed guidance put forth by the USACE (2003) and the USACE and NCIRT Stream and Wetland Compensatory Mitigation Update (2016). Vegetation monitoring followed the Carolina Vegetation Survey – EEP Level II Protocol (Lee et al., 2008). Visual assessment followed most recent guidance put forth by the USACE and NCIRT (USACE, 2016).

5.0 References

Eco Terra, LLC. 2022. Final Mitigation Plan - Maple Swamp Wetland Mitigation Site.

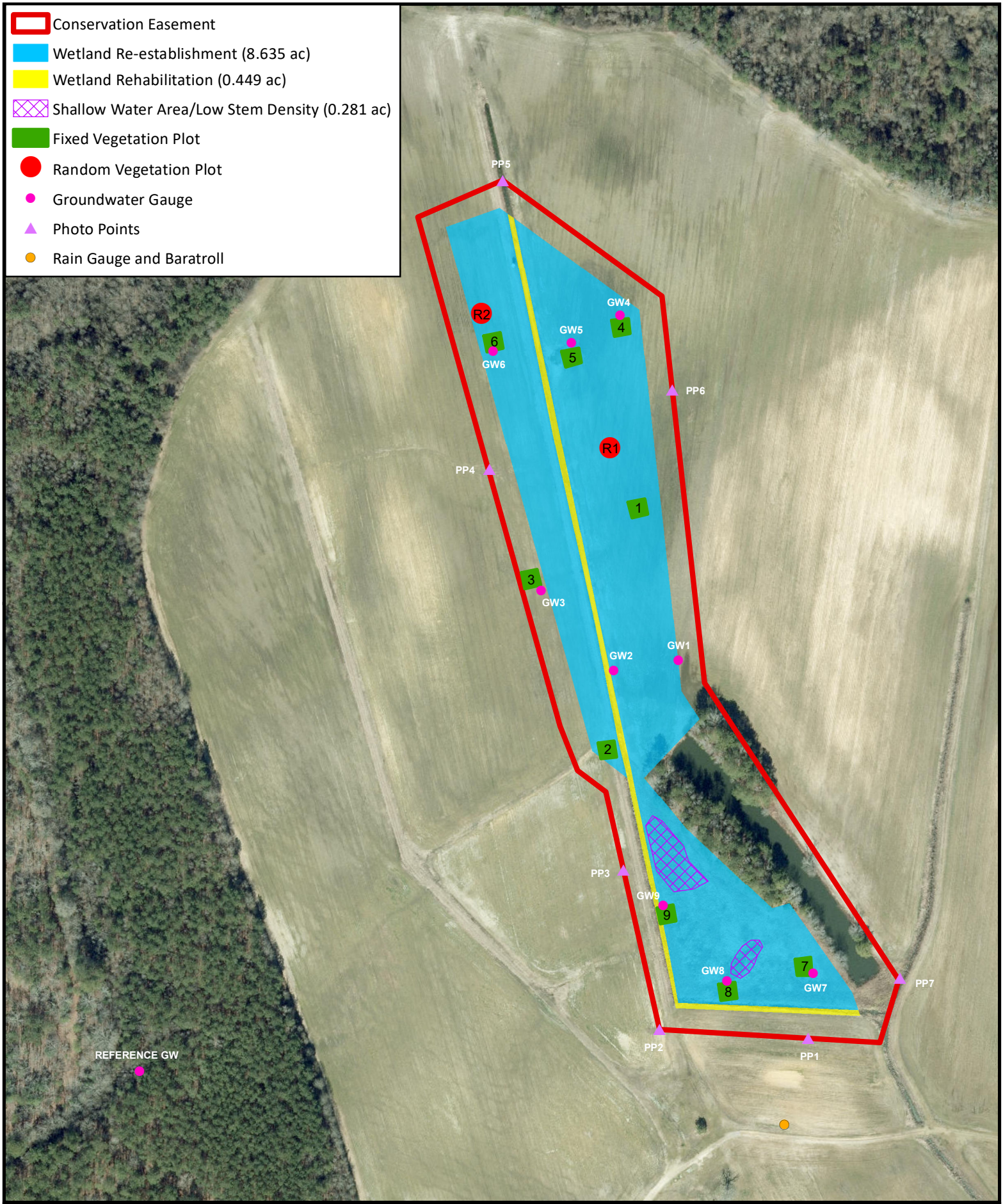
Lee, M.T., Peet, R.K., Roberts, S.D., & Wentworth, T.R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Available: http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-2.pdf

Natural Resources Conservation Service (NRCS). 2022. North Carolina Field Office Technical Guide. Available: http://agacis.rcc-acis.org/?fips=37065

N.C. Department of Environmental Quality. Division of Mitigation Services. 2018. Tar-Pamlico Basin Restoration Priorities 2010. Amended 2018. Available: https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Tar-Pamlico_River_Basin/FINAL%20RBRP%20Tar-Pamlico%202010_%2020111207%20CORRECTED.pdf

US Army Corps of Engineers (USACE). 2003. Stream Mitigation Guidelines.

US Army Corps of Engineers (USACE) and North Carolina Interagency Review team (NCIRT). 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update. North Carolina Interagency Review Team – October 24, 2016. Available: http://saw-reg.usace.army.mil/PN/2016/Wilmington-District-Mitigation-Update.pdf



McAdams

Prepared For: ecoterra

MAPLE SWAMP WETLAND MITIGATION SITE

MONITORING YEAR 1 - CURRENT CONDITIONS SITE MAP

Tar-Pamlico 03020102
Edgecombe County, North Carolina

N

0 125 250
Feet

FIGURE

1

APPENDIX A

Visual Assessment Data

Table 5: Visual Vegetation Assessment
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – November 2022

Planted Acreage = 13.68 ac

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10 acres	0.28*	2.1%
		Total	0.28	2.1%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.00	0.0%
		Cumulative Total	0.28	2.1%

*Stem density in the shallow water areas was not measured. Visual observation indicates stem density in these areas is lower than the remainder of the Site.

Easement Acreage = 15.34 ac

Vegetation Category	Definitions	Mapping Threshold	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. Species included in summation above should be identified in report summary.	0.10 acres	0.00	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	

Vegetation Plot Photographs

MAPLE SWAMP WETLAND MITIGATION SITE – MY1 VEGETATION PLOTS PHOTO LOG

Vegetation Plot 1 – taken 10/12/2022

Vegetation Plot 2 – taken 10/12/2022

Vegetation Plot 3 – taken 10/12/2022

Vegetation Plot 4 – taken 10/12/2022

Vegetation Plot 5 – taken 10/12/2022

Vegetation Plot 6 – taken 10/12/2022

Vegetation Plot 7 – taken 10/12/2022

Vegetation Plot 8 – taken 10/12/2022

Vegetation Plot 9 – taken 10/12/2022

Random Vegetation Plot 1 (background)– taken 10/12/2022

Random Vegetation Plot 2 (background) – taken 10/12/2022

Photo Point Photographs

MAPLE SWAMP WETLAND MITIGATION SITE – MY1 PHOTO POINT LOG

Photo Point 1 – taken 10/12/2022

Photo Point 2 – taken 10/12/2022

Photo Point 3 – taken 10/12/2022

Photo Point 4 – taken 10/12/2022

Photo Point 5 – taken 10/120/2022

Photo Point 6 – taken 10/12/2022

Photo Point 7 – taken 10/12/2022

View of Site facing northwest (taken 10/26/2022)

APPENDIX B

Vegetation Plot Data

Table 6a: Vegetation Plot Data
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – November 2022

	Scientific Name	Common Name	Tree / Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	*Cephalanthus occidentalis*	Buttonbush	Tree	OBL			2	2				
	Fraxinus pennsylvanica	Green ash	Tree	FACW	2	2	4	4	3	3		
	Nyssa aquatica	Swamp tupelo	Tree	FACW			6	6				
	Platanus occidentalis	Sycamore	Tree	FACW	2	2			1	1	2	2
	Quercus laurifolia	Laurel oak	Tree	FACW	1	1	1	1			2	2
	Quercus lyrata	Overcup oak	Tree	OBL			1	1	7	7	2	2
	Quercus michauxii	Swamp chestnut oak	Tree	FACW	3	3	2	2	2	2	2	2
	Quercus nigra	Water oak	Tree	FAC	3	3	1	1	2	2	4	4
	Quercus phellos	Willow oak	Tree	FACW	1	1	3	3	4	4	2	2
	Quercus shumardii	Shumard oak	Tree	FAC	3	3			1	1	1	1
	Taxodium distichum	Bald-cypress	Tree	OBL	5	5			4	4	4	4
	Ulmus americana	American elm	Tree	FAC	3	3			1	1	1	1
Sum				Performance Standard	23	23	20	20	25	25	20	20
Post Mitigation Plan Species	***Diospyros virginiana***	**American Persimmon**	**Tree**	**FAC**								
Sum				Proposed Standard								
Mitigation Plan Performance Standard				Current Year Stem Count		23		20		25		20
				Stems/Acre		931		809		1012		809
				Species Count		9		8		9		9
				Dominant Species Composition (%)		22%		30%		28%		20%
				Average Plot Height (ft)		3.6		1.9		2.4		2.6
				% Invasives		0%		0%		0%		0%
Post Mitigation Plan Performance Standard				Current Year Stem Count		23		20		25		20
				Stems/Acre		931		809		1012		809
				Species Count		9		8		9		9
				Dominant Species Composition (%)		22%		30%		28%		20%
				Average Plot Height (ft)		3.6		1.9		2.4		2.6
				% Invasives		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
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – November 2022

	Scientific Name	Common Name	Tree / Shrub	Indicator Status	Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	*Cephalanthus occidentalis*	Buttonbush	Tree	OBL	1	1						
	Fraxinus pennsylvanica	Green ash	Tree	FACW	1	1	1	1				
	Nyssa aquatica	Swamp tupelo	Tree	FACW	1	1					3	3
	Platanus occidentalis	Sycamore	Tree	FACW	1	1	3	3				
	Quercus laurifolia	Laurel oak	Tree	FACW	3	3	2	2	2	2	1	1
	Quercus lyrata	Overcup oak	Tree	OBL	1	1			5	5	5	5
	Quercus michauxii	Swamp chestnut oak	Tree	FACW	1	1	2	2	3	3	1	1
	Quercus nigra	Water oak	Tree	FAC	1	1	1	1	2	2		
	Quercus phellos	Willow oak	Tree	FACW	3	3	4	4	1	1		
	Quercus shumardii	Shumard oak	Tree	FAC	3	3	2	2			1	1
	Taxodium distichum	Bald-cypress	Tree	OBL	3	3	1	1	2	2	6	6
	Ulmus americana	American elm	Tree	FAC	1	1	3	3				
Sum				Performance Standard	20	20	19	19	15	15	17	17
Post Mitigation Plan Species	***Diospyros virginiana***	**American Persimmon**	**Tree**	**FAC**						**12**		
Sum				Proposed Standard								
Mitigation Plan Performance Standard				Current Year Stem Count		20		19		15		17
				Stems/Acre		809		769		607		688
				Species Count		12		9		6		6
				Dominant Species Composition (%)		15%		21%		33%		35%
				Average Plot Height (ft)		2.2		2.5		2.5		2.6
				% Invasives		0%		0%		0%		0%
Post Mitigation Plan Performance Standard				Current Year Stem Count		20		19		27		17
				Stems/Acre		809		769		1093		688
				Species Count		12		9		7		6
				Dominant Species Composition (%)		15%		21%		44%		35%
				Average Plot Height (ft)		2.2		2.5		2.5		2.6
				% Invasives		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

Maple Swamp Wetland Mitigation Site

DMS ID No. 100190

Monitoring Year 1 – November 2022

	Scientific Name	Common Name	Tree / Shrub	Indicator Status	Veg Plot 9 F		Veg Plot R1	Veg Plot R2
					Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	*Cephalanthus occidentalis*	Buttonbush	Tree	OBL				
	Fraxinus pennsylvanica	Green ash	Tree	FACW			1	1
	Nyssa aquatica	Swamp tupelo	Tree	FACW	2	2		
	Platanus occidentalis	Sycamore	Tree	FACW	1	1		
	Quercus laurifolia	Laurel oak	Tree	FACW			1	2
	Quercus lyrata	Overcup oak	Tree	OBL	4	4		
	Quercus michauxii	Swamp chestnut oak	Tree	FACW	4	4		
	Quercus nigra	Water oak	Tree	FAC			2	4
	Quercus phellos	Willow oak	Tree	FACW	1	1	5	5
	Quercus shumardii	Shumard oak	Tree	FAC			5	2
	Taxodium distichum	Bald-cypress	Tree	OBL	2	2	4	
	Ulmus americana	American elm	Tree	FAC				2
Sum				Performance Standard	14	14	18	16
Post Mitigation Plan Species	***Diospyros virginiana***	**American Persimmon**	**Tree**	**FAC**				
Sum				Proposed Standard				
Mitigation Plan Performance Standard				Current Year Stem Count		14	18	16
				Stems/Acre		566	728	647
				Species Count		6	6	6
				Dominant Species Composition (%)		29%	28%	31%
				Average Plot Height (ft)		2.3	2.1	2.1
				% Invasives		0%	0%	0%
Post Mitigation Plan Performance Standard				Current Year Stem Count		14	18	16
				Stems/Acre		566	728	647
				Species Count		6	6	6
				Dominant Species Composition (%)		29%	28%	31%
				Average Plot Height (ft)		2.3	2.1	2.1
				% Invasives		0%	0%	0%

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

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

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

Table 7: Vegetation Performance Standards Summary

Maple Swamp Wetland Mitigation Site

DMS ID No. 100190

Monitoring Year 1 – 2022

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	931	3.6	9	0	809	1.9	8	0	1012	2.4	9	0
Monitoring Year 0	931	1.5	9	0	809	1.5	8	0	1012	1.6	9	0
	Veg Plot 4 F				**Veg Plot 5 F**				**Veg Plot 6 F**			
	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	809	2.6	9	0	809	2.2	12	0	769	2.5	9	0
Monitoring Year 0	850	1.5	9	0	769	1.6	12	0	809	1.6	10	0
	Veg Plot 7 F				**Veg Plot 8 F**				**Veg Plot 9 F**			
	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	1093	2.5	7	0	688	2.6	6	0	566	2.3	6	0
Monitoring Year 0	607	1.6	6	0	809	1.7	6	0	809	1.5	8	0
	Veg Plot R1				**Veg Plot R2**							
	Stems/Acre	Avg Ht (ft)	# Species	% Invasive	Stems/Acre	Avg Ht (ft)	# Species	% Invasive				
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	728	2.1	6	0	647	2.1	6	0				
Monitoring Year 0	728	1.5	9	0	769	1.9	7	0				

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

APPENDIX C

Hydrologic Data and Soil Descriptions

Table 8: Rainfall Summary
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – 2022

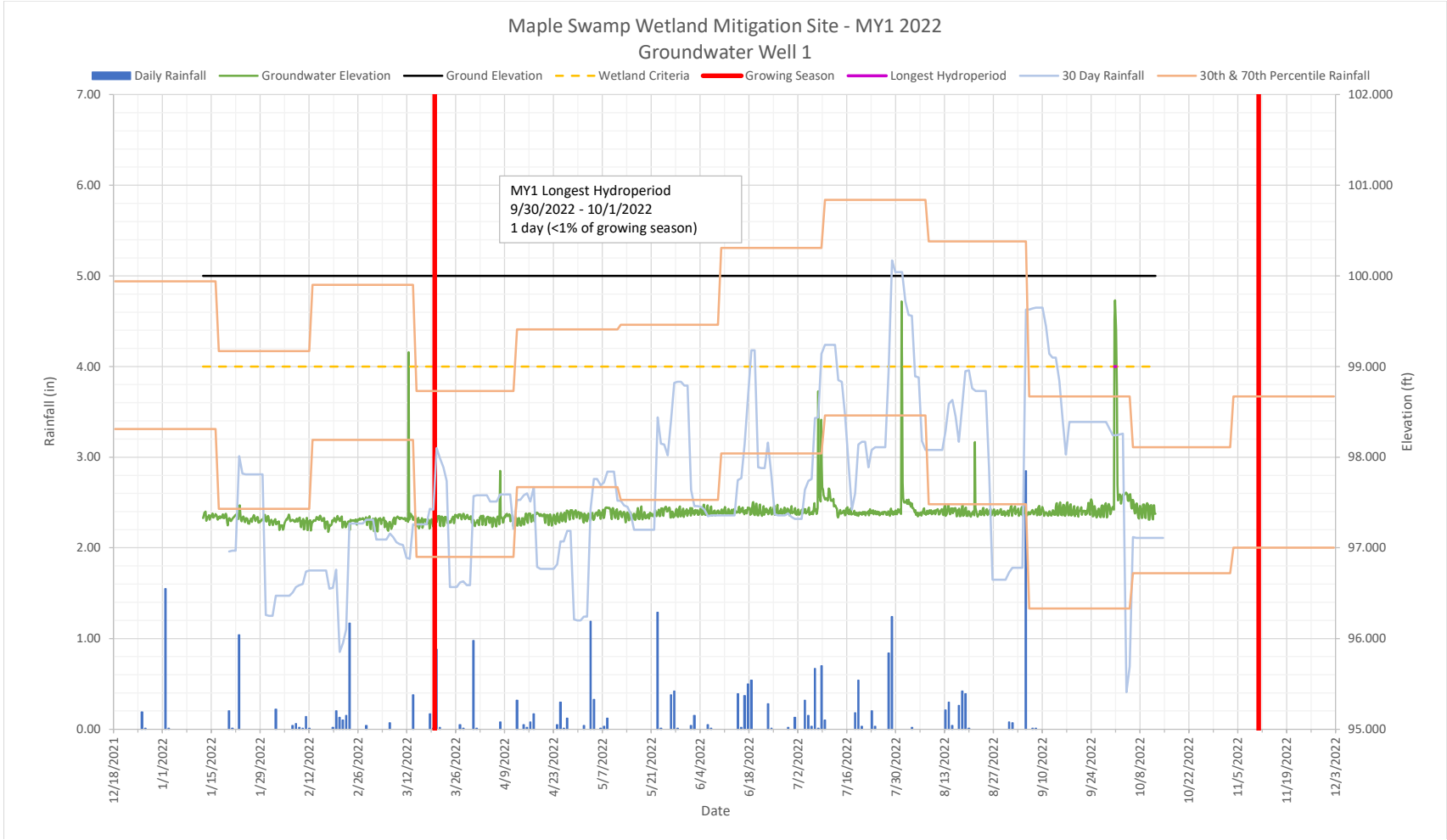
Month	Cumulative Rainfall (in)							
	30th / 70th Percentile	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2027
January	3.31 / 4.94	1.76						
February	2.43 / 4.17	1.75						
March	3.19 / 4.90	2.26						
April	1.90 / 3.73	2.21						
May	2.67 / 4.41	2.84						
June	2.53 / 4.46	2.36						
July	3.04 / 5.31	4.14						
August	3.46 / 5.94	3.18						
September	2.48 / 5.38	4.63						
October	1.33 / 3.67	0.69						
November	1.72 / 3.11							
December	2.00 / 3.67							

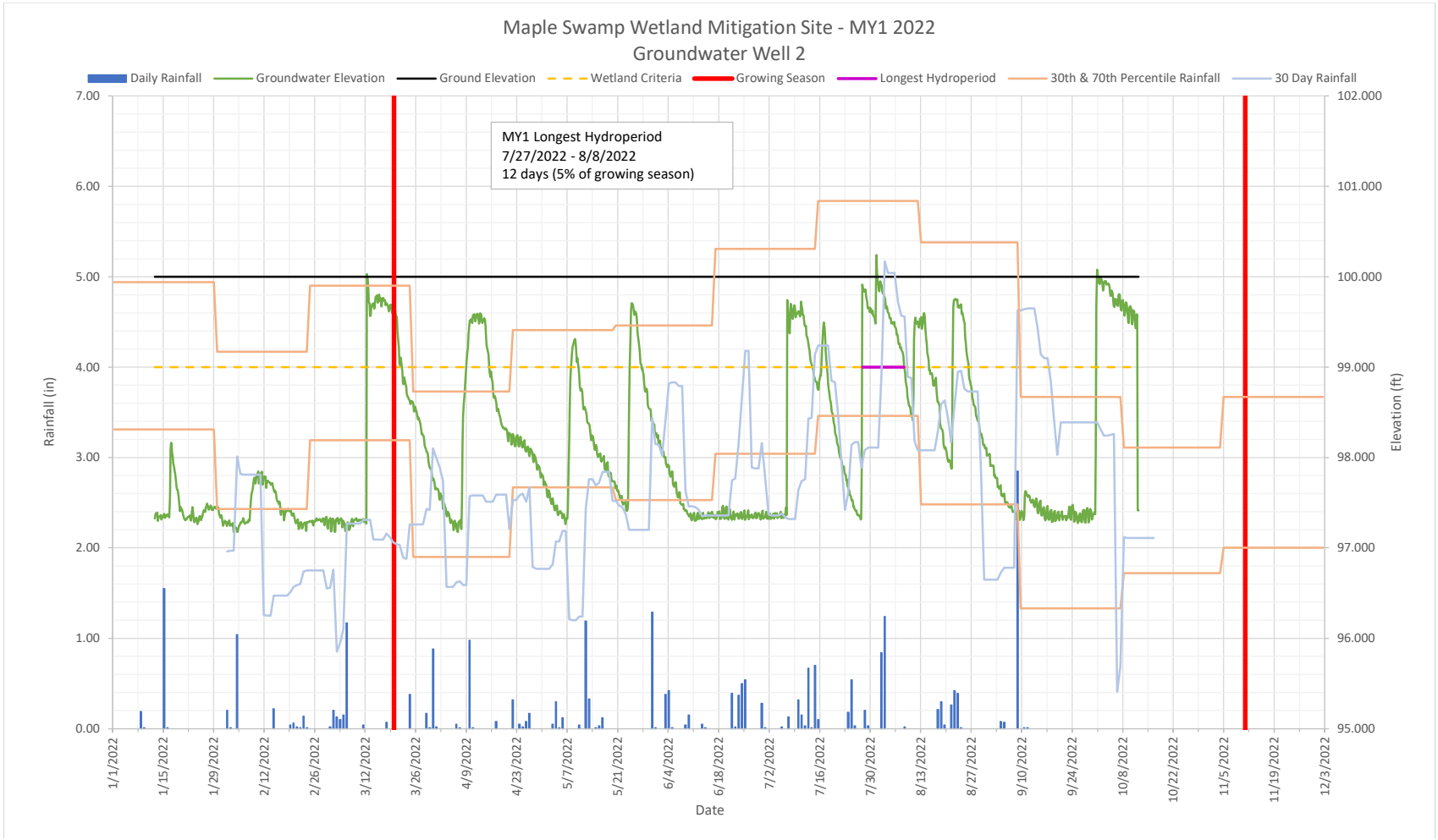
Red values indicate recorded rainfall less than the 30th percentile value.
Blue values indicate recorded rainfall greater than the 70th percentile value.
30th and 70th percentile rainfall values based on NRCS WETS station Tarboro 1 S, NC
Rainfall data obtianed from USGS 02082585 (Tar River at NC97)

Table 9: Goundwater Gauge Summary
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – 2022

Growing Season 3/20 - 11/11 236 days	Performance Standard	Longest Hydroperiod									
		GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9	Reference
MY1 - 2022	21 days 9%	1 day <1%	12 days 5%	0 days 0%	0 days 0%	0 days 0%	0 days 0%	0 days 0%	43 days 18%	23 days 10%	0 days 0%
MY2 - 2023											
MY3 - 2024	28 days 12%										
MY4 - 2025											
MY5 - 2026											
MY6 - 2027											
MY7 - 2028											

WETS Station: Tarboro 1 S, NC
MY1 Monitoring dates: 3/10/2022 - 10/12/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 1
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
Longest Hydroperiod
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
9/30/2022 - 10/1/2022
1 day (<1% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
12/18/2021
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
7/30/2022
8/13/2022
8/27/2022
9/10/2022
9/24/2022
10/8/2022
10/22/2022
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 2
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
Longest Hydroperiod
30th & 70th Percentile Rainfall
30 Day Rainfall
MY1 Longest Hydroperiod
7/27/2022 - 8/8/2022
12 days (5% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
7/30/2022
8/13/2022
8/27/2022
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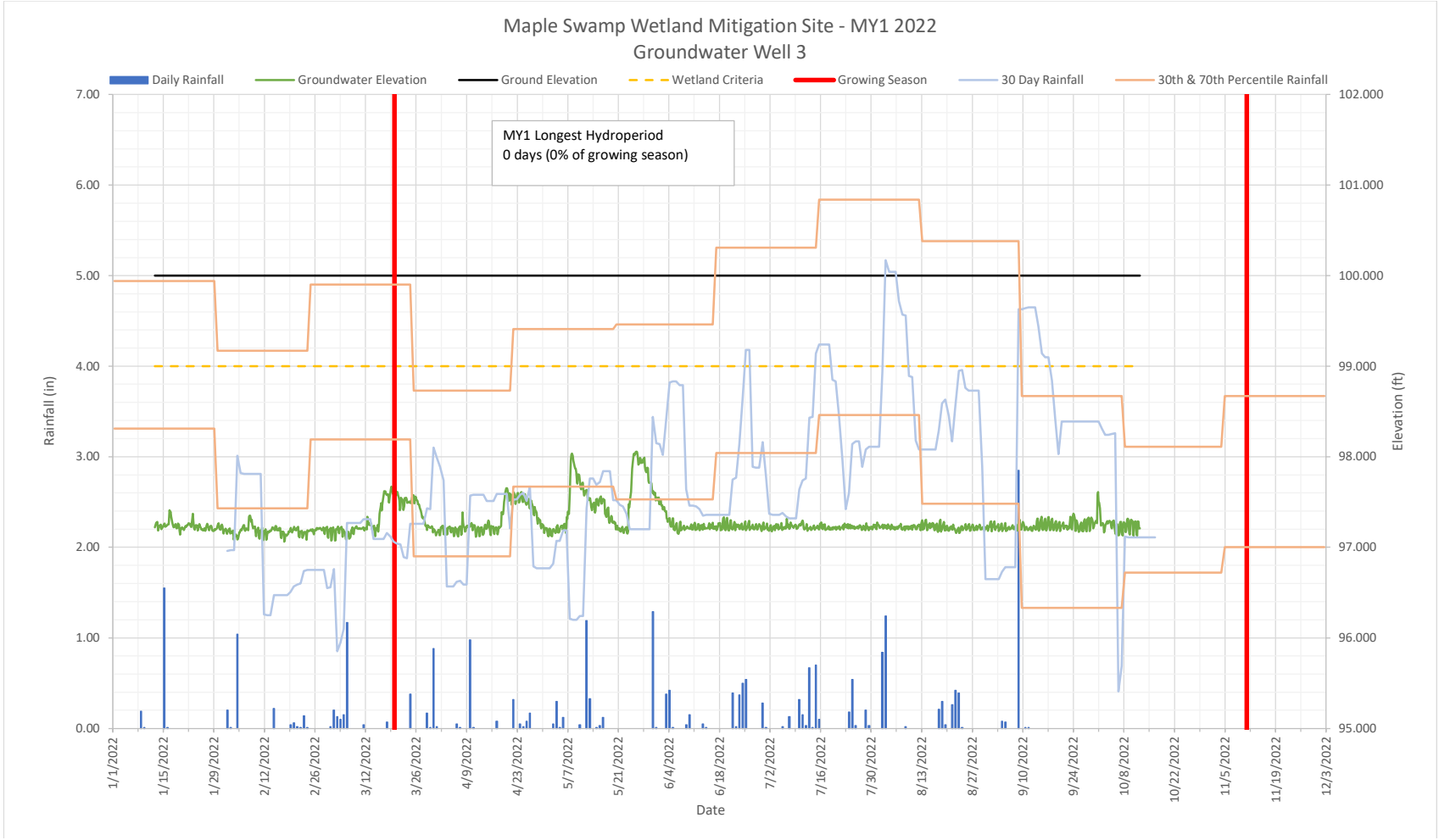
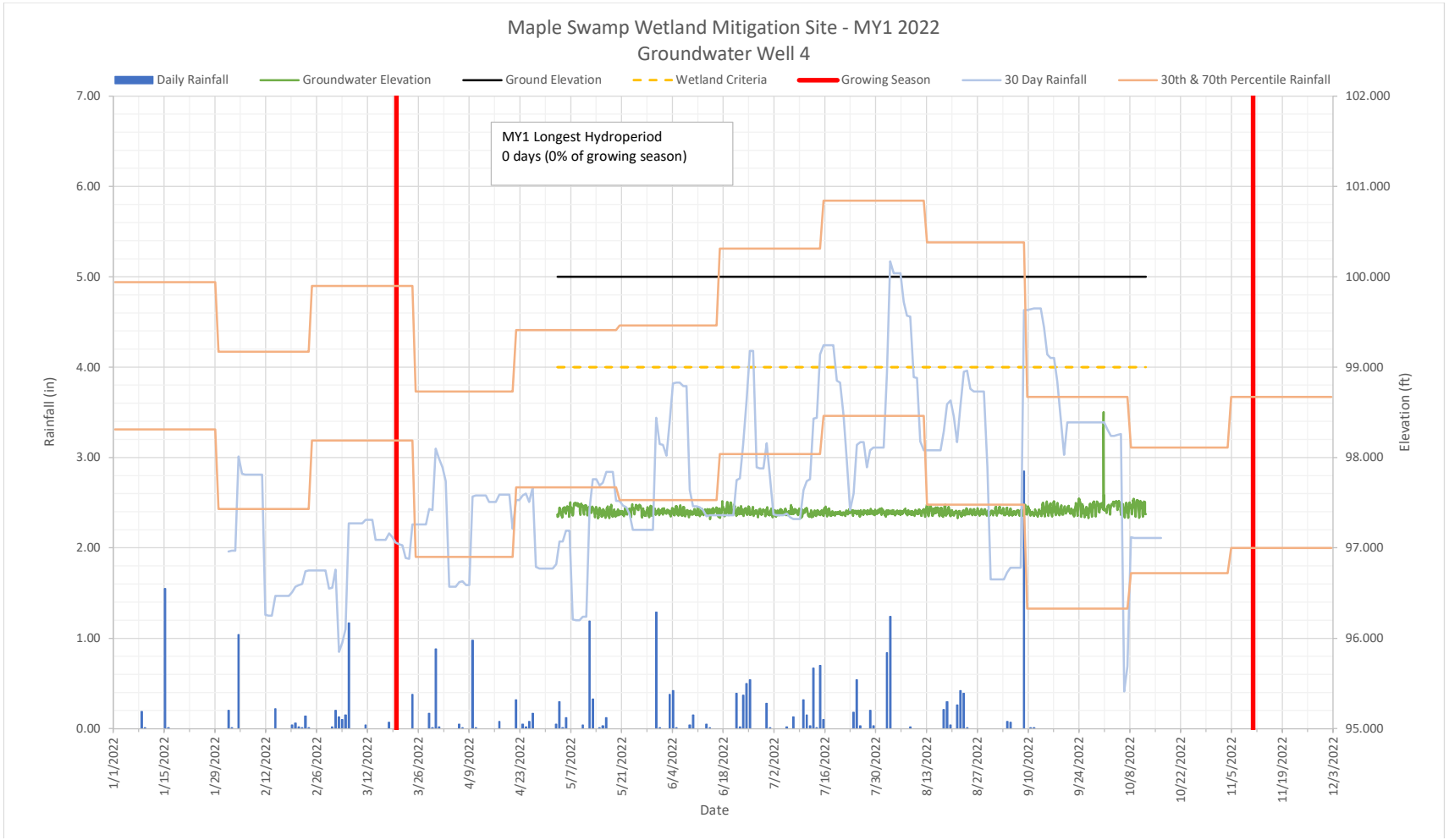
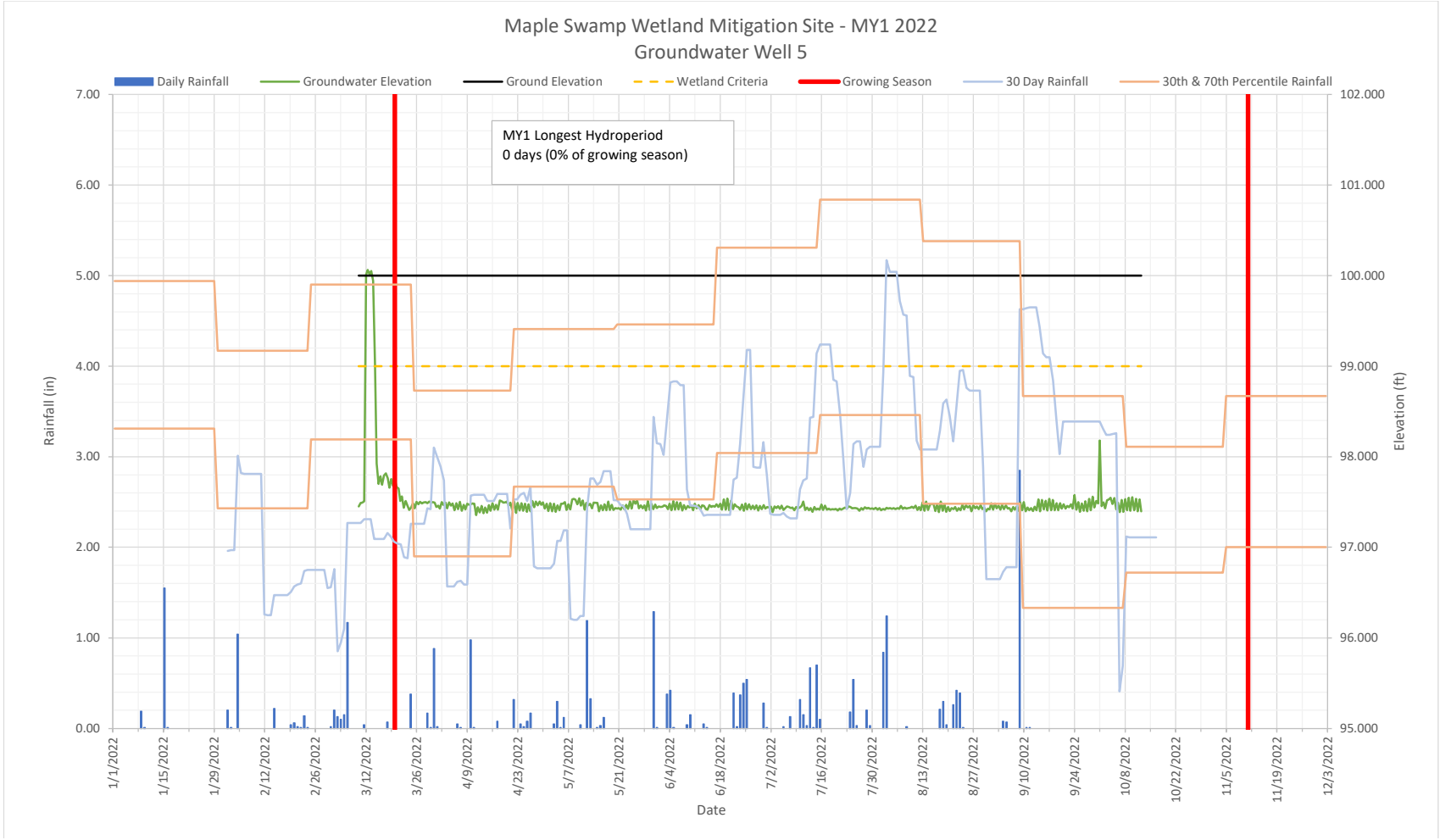
9/24/2022
10/8/2022
10/22/2022
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 3
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
0 days (0% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
7/30/2022
8/13/2022
8/27/2022
9/10/2022
9/24/2022
10/8/2022
10/22/2022
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 4
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
0 days (0% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
7/30/2022
8/13/2022
8/27/2022
9/10/2022
9/24/2022
10/8/2022
10/22/2022
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 5
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
0 days (0% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
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8/13/2022
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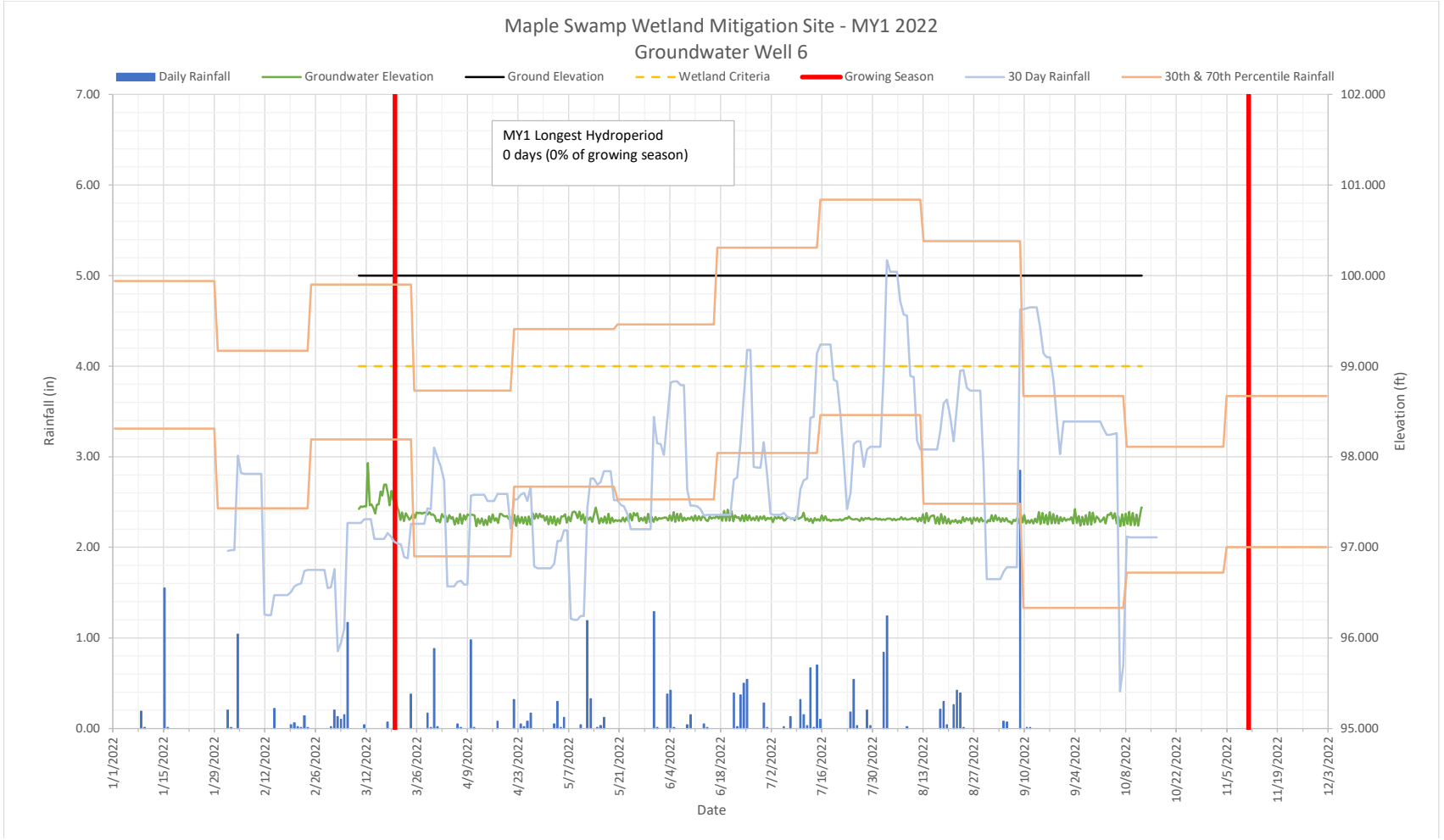
10/22/2022
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 6
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
0 days (0% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
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3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
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8/13/2022
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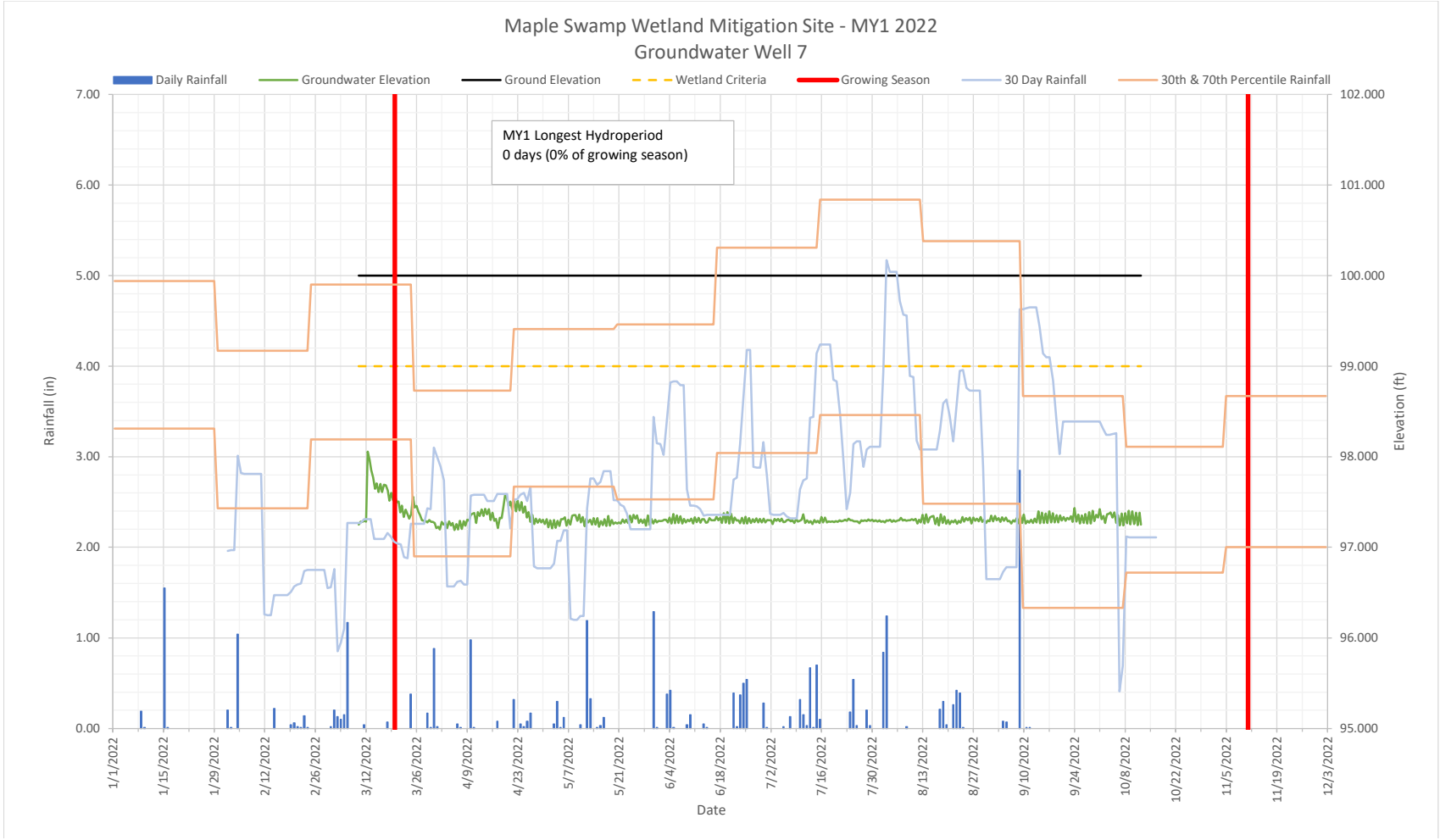
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 7
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
0 days (0% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
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4/9/2022
4/23/2022
5/7/2022
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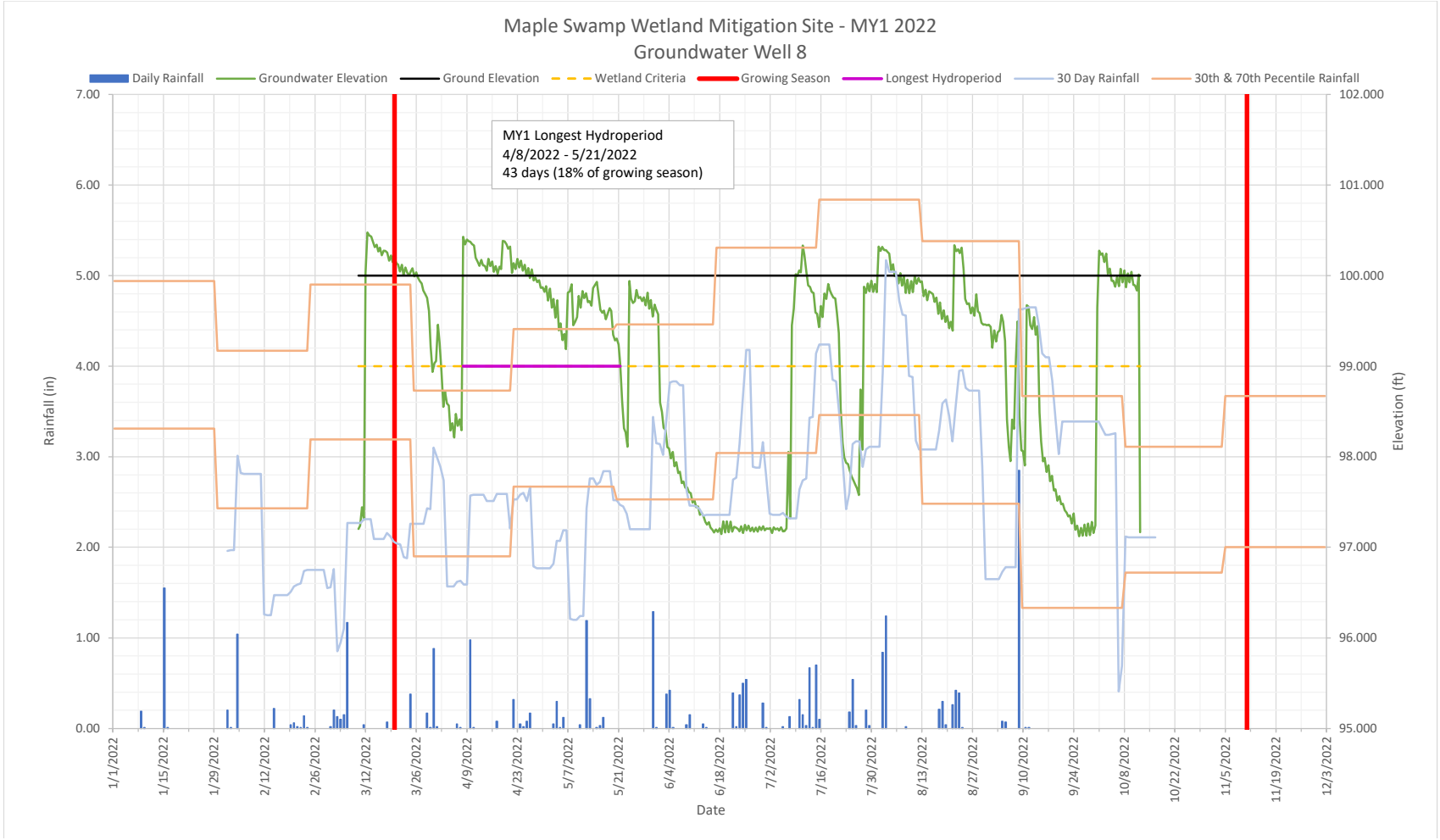
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 8
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
Longest Hydroperiod
30 Day Rainfall
30th & 70th Pecentile Rainfall
MY1 Longest Hydroperiod
4/8/2022 - 5/21/2022
43 days (18% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
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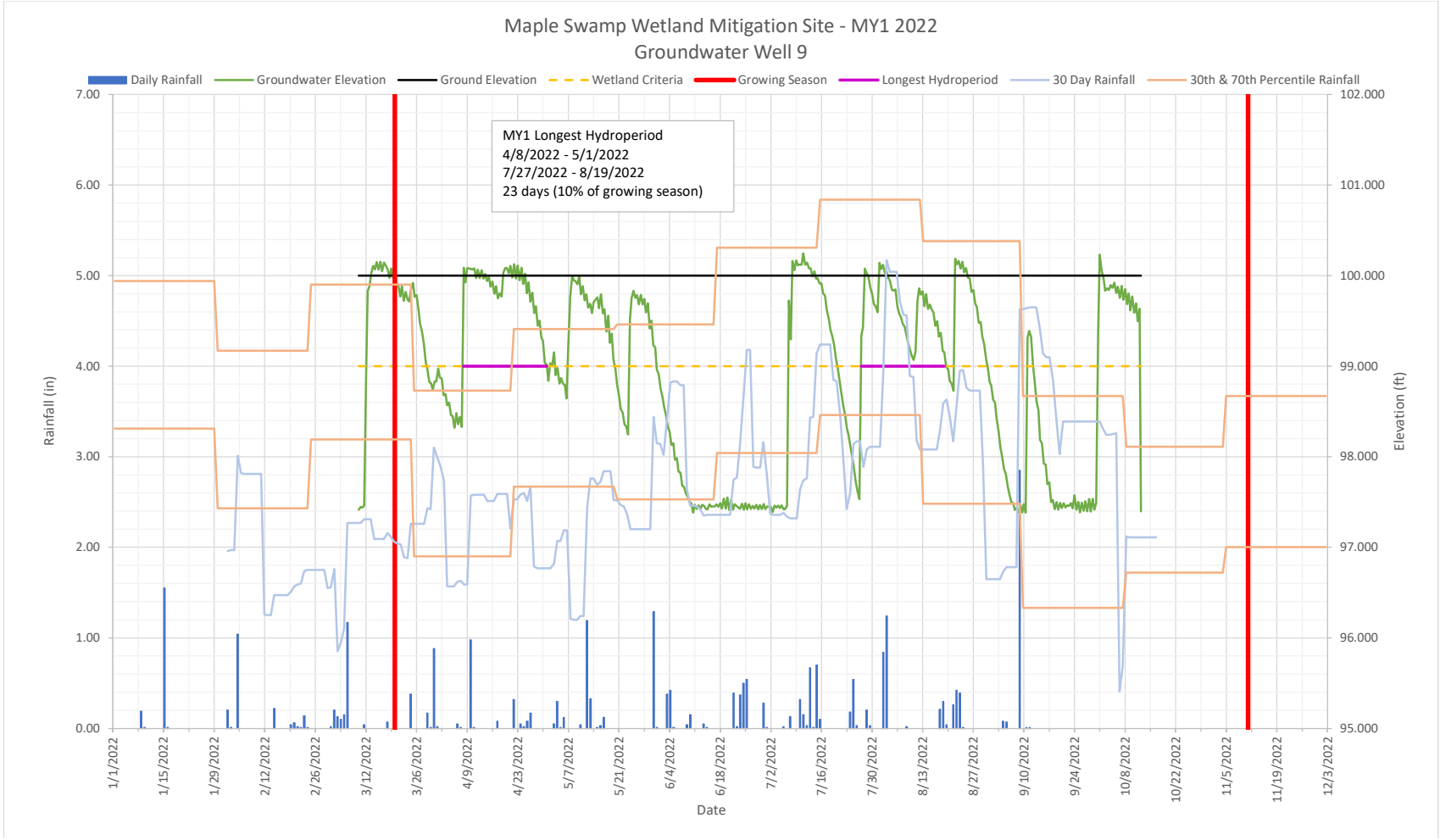
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Groundwater Well 9
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
Longest Hydroperiod
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
4/8/2022 - 5/1/2022
7/27/2022 - 8/19/2022
23 days (10% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
1/1/2022
1/15/2022
1/29/2022
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
7/30/2022
8/13/2022
8/27/2022
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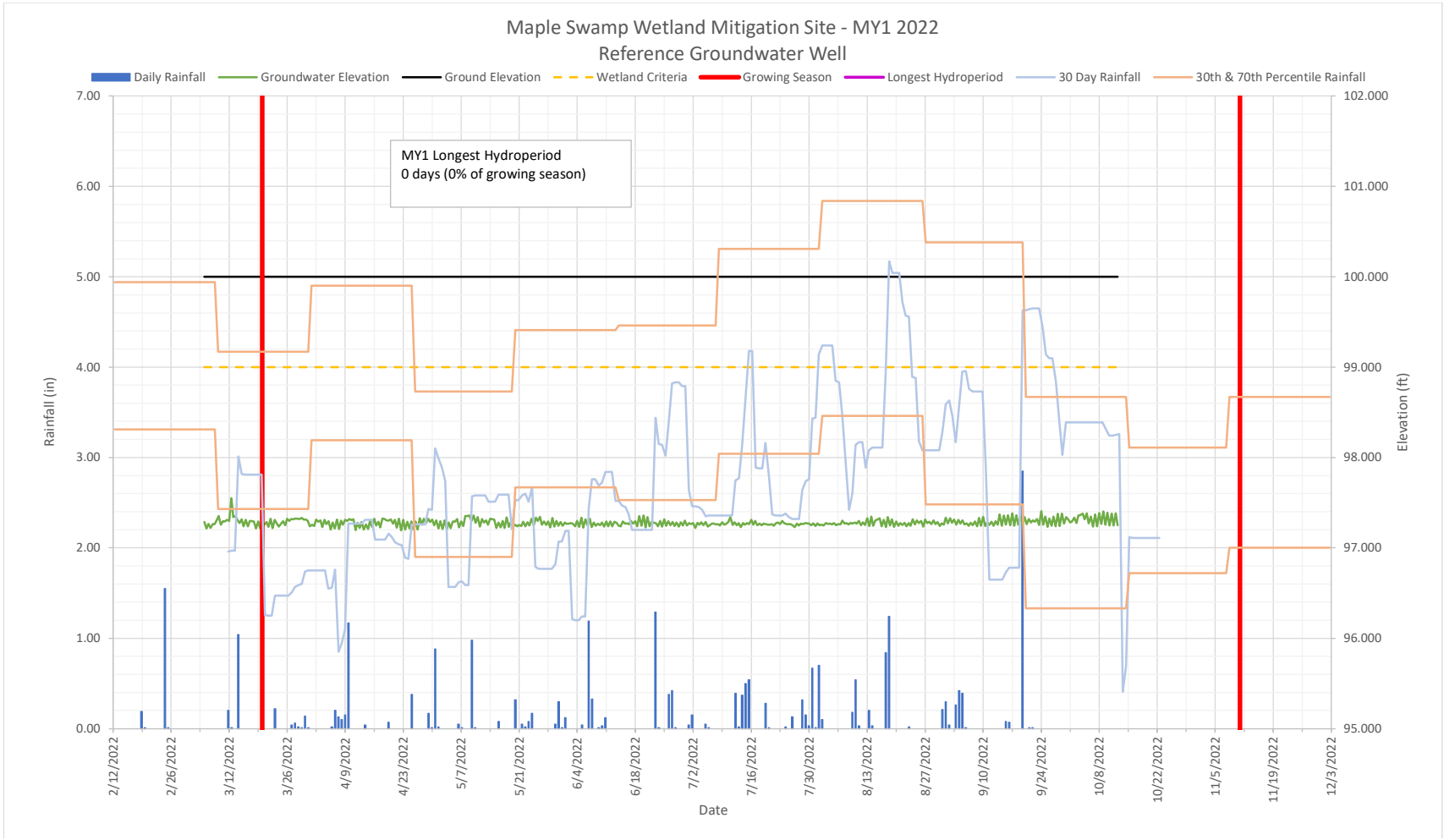
11/5/2022
11/19/2022
12/3/2022


Maple Swamp Wetland Mitigation Site - MY1 2022
Reference Groundwater Well
Daily Rainfall
Groundwater Elevation
Ground Elevation
Wetland Criteria
Growing Season
Longest Hydroperiod
30 Day Rainfall
30th & 70th Percentile Rainfall
MY1 Longest Hydroperiod
0 days (0% of growing season)
Rainfall (in)
Elevation (ft)
Date
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
2/12/2022
2/26/2022
3/12/2022
3/26/2022
4/9/2022
4/23/2022
5/7/2022
5/21/2022
6/4/2022
6/18/2022
7/2/2022
7/16/2022
7/30/2022
8/13/2022
8/27/2022
9/10/2022
9/24/2022
10/8/2022
10/22/2022
11/5/2022
11/19/2022
12/3/2022

APPENDIX D

Project Timeline and Contacts Info

Table 10: Project Activity and Reporting History
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – November 2022

Activity or Report	Data Collection Complete	Completion or Scheduled Delivery
Project Instituted	N/A	February 11, 2021
Mitigation Plan Approved	N/A	January 26, 2022
Construction (Grading) Completed	N/A	April 7, 2022
As-Built Survey Completed	May 2022	May 2022
Planting Completed	N/A	April 7, 2022
Baseline Monitoring Document (Year 0) - Vegetation Survey	March 2022	July 2022
Year 1 Monitoring - Vegetation Survey	October 2022	November 2022
Year 2 Monitoring - Vegetation Survey	2023	November 2023
Year 3 Monitoring - Vegetation Survey	2024	November 2024
Year 4 Monitoring - Vegetation Survey	2025	November 2025
Year 5 Monitoring - Vegetation Survey	2026	November 2026
Year 6 Monitoring - Vegetation Survey	2027	November 2027
Year 7 Monitoring - Vegetation Survey	2028	November 2028

Table 11: Project Contacts
Maple Swamp Wetland Mitigation Site
DMS ID No. 100190
Monitoring Year 1 – November 2022

Designer Eco Terra - Scott Frederick	Eco Terra, LLC 117 Centrewest Ct Cary, NC 27513 984.354.3800
Engineer McAdams - Rebecca Stubbs, PE	McAdams 2905 Meridian Parkway Durham, NC 27713 919.361.5000
Construction Contractor William Gilbert	W Gilbert and Co., Inc 487 Fillmore Rd Tarboro, NC 27886 252.469.3989
Monitoring Eco Terra - Scott Frederick	Eco Terra, LLC 117 Centrewest Ct Cary, NC 27513 984.354.3800

APPENDIX E

Additional Project Info

17 October 2022

Maple Swamp Wetland
Edgecombe County
Tar-Pamlico 03020102
USACE Action ID#: SAW-2021-00345
DWR Project #: 2021-0409
DMS Project #: 100190

As-Built IRT Field Review
Lindsay Crocker – NC Division of Mitigation Services
Todd Tugwell – US Army Corps of Engineers
Kim Isenhour – US Army Corps of Engineers
Casey Haywood – US Army Corps of Engineers
Erin Davis – NC Division of Water Resources
Travis Wilson – NC Wildlife Resources Commission
Norton Webster – Eco Terra, LLC

- Girdle sweet gum and pine and report in MY1 (Photo documentation)
- Ensure there is a random vegetation plot in the shallow water section of the site (near outlet) for MY1. Provide mapping of area of swallow water.
- Remove rip rap that was installed inside credit area and report with picture in MY1 (small area outside of sediment forebay). Rip rap was removed on same day. See attached photograph.
- Monitor and spot treat as needed *Lespedeza cuneata*.
- Correct the As-built planted vegetation table and show in MY1 report. This table should be from the Mitigation Plan, and red-lined with actual planted stems. Currently, this has not been reported correctly (i.e. there are spp. In MY0 reported as being from MP which were not)
- Ensure verbiage is corrected in future reports, like berm when it is an earthen level spreader, ditch when it is a swale. As-Built drawings identify berm as earthen sill.
- Ensure any replant is <20% of site or required IRT adaptive management review.
- For future reports and projects: use at least 5 spp. for permanent seed mixes, QAQC reports, be careful with terminology, changes from design should go through IRT. Future designs and installation changes should minimize hardened structures/armoring for flow diffusion and favor natural structures if possible.