MONITORING YEAR 6 ANNUAL REPORT

FINAL

VILE CREEK MITIGATION SITE

Alleghany County, NC
DEQ Contract No. 5999
DMS Project No. 96582

DWR No. 14-0869
USACE Action ID 2014-01585

Data Collection Period: April – October 2022
Submission Date: February 3, 2023

PREPARED FOR:

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

February 3, 2023

Mr. Harry Tsomides
NC Department of Environmental Quality
Division of Mitigation Services
2090 US 70 Highway
Swannanoa, NC 28778

RE: Response to Monitoring Year 6 (MY06) Report – Draft Submittal Comments
Vile Creek Mitigation Site
DMS Project # 96582
Contract Number 5999
New River Basin - HUC# 05050001 - Alleghany County, North Carolina

Dear Mr. Tsomides:

As a reminder, monitoring providers are responsible for checking the easement integrity across the project site for encroachments, missing markers, fence breaks, etc. Please confirm that the site was checked and what the results are.

Wildlands Response: The Site was monitored for easement integrity in MY6. One easement encroachment was observed along the upstream section of UT1. Wildlands was informed of additional issues after a DMS easement inspection of the Site on October 12, 2022. In reference to listed action items, monument caps with missing markings will be stamped in MY7 by the contracted surveyor per agency requirements. Wildlands will repair damaged fencing along UT1 Reach 2 and the damaged sign along UT1c. There was no vegetation trimming observed around the mobile deer stand in the easement along Vile Creek Reach 2 and no damage due to easement access. An explanation of UT1 and UT2 easement concerns is available in the comment response below. Wildlands will continue to closely monitor these areas and conduct detailed easement inspections in MY7. Refer to Appendix 2 for encroachment details and Appendix 6 for email correspondence.

DMS' Comment: Thank you for summarizing the UT1 easement encroachment and planning additional marking efforts to rectify the scalloping/mowing; however DMS is concerned that this continues to be an issue headed into the final monitoring year, and during DMS site visit October 2022 it was evident that the area is still being mowed. As a reminder, all encroachments and property issues need to be resolved adequately in order for the project to be a) accepted into DEQ stewardship and b) closed by the IRT. Have marking measures and landowner contact been completed yet? If possible please provide a few photos of the area that has been a concern, showing the marking measures taken (or planned), and please keep a close eye on this area (and the newly marked section along UT2) over the next 6-12 months to ensure that the landowner(s) are heeding the signage and avoiding those areas. In addition please evaluate and advise on whether WEI feels additional plantings are warranted in this area.

Wildlands Response: Wildlands installed additional signage and horse tape in January 2023 to clearly mark the boundary of the easement along UT1. The area will be replanted along with scheduled UT1 supplemental planting before the 2023 growing season. Wildlands investigated potential encroachment

along the left bank of UT2 in January 2023. Pasture mowing appeared to be up to the easement line and no encroachment was observed. The landowner was notified, and additional signage will be added in MY7. The mobile deer stand was located outside of the easement. Photograph of UT1 available in Appendix 2.

At the 2022 credit release IRT meeting, WEI noted that UT2 will be supplementally planted in the future. The CCPV did not reflect any supplementally planting along UT2. Please advise or clarify.

Wildlands Response: Additional supplemental planting will occur before the onset of the 2023 growing season in low stem density areas on Site (approximately 1 acre) including an area along the left bank of UT1, and upstream sections of UT2. The areas will be replanted with one, three, and/or five-gallon containerized trees. Species will include those approved in the Vile Creek Mitigation Site Final Mitigation Plan and 2021 Vile Creek Mitigation Site Adaptive Management Plan (Wildlands 2016, 2021). The planted species, sizes, wetland indicator status, and quantities will be documented in the MY7 monitoring report. Refer to CCPV Figures 3.1 and 3.3 in Appendix 2 and Section 1.2.5 for supplemental planting locations and low stem density acreages.

Enclosed please find two (2) hard copies and one (1) electronic submittal of the Final Monitoring Report and the support files on USB. Please contact me at 704-332-7754 x101 if you have any questions.

Sincerely,

Kristi Suggs,
Senior Environmental Scientist
ksuggs@wildlandseng.com

PREPARED BY:

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Charlotte, NC 28203

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EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) completed a full-delivery stream and wetland mitigation project at the Vile Creek Mitigation Site (Site) for the North Carolina Division of Mitigation Services (DMS) to restore and enhance a total of 8,056 linear feet (LF) of perennial and intermittent stream and to restore 6.40 acres of riparian wetlands in Alleghany County, NC. The Site is expected to generate 5,053.000 stream mitigation units (SMUs) and 5.703 riparian wetland mitigation units (WMUs) for the New River Basin (Table 1). The Site is located approximately one mile east of the Town of Sparta, NC in the New River Basin eight-digit Hydrologic Unit Code (HUC) 05050001 and the 14-digit HUC 05050001030020 (Figure 1). The Site streams consist of Vile Creek and five unnamed tributaries (UT) to Vile Creek including UT1, UT1b, UT1c, UT2, UT3, and a portion of Little River (Figure 2). Vile Creek flows into Little River near the downstream project boundary. The land adjacent to the streams and wetlands is primarily maintained cattle pasture and forest.

The Site is within a Targeted Local Watershed (TLW) identified in the New River Basin Restoration Priority (RBRP) plan (NCDENR, 2009). The Site is also located within the planning area for the Little River & Brush Creek Local Watershed Plan (LWP). The LWP identified the following stressors to watershed function: Heavily grazed deforested buffer, livestock access to the streams, heavily eroded stream banks, land-disturbing activities on steep slopes, non-point source pollution from the Town of Sparta and surrounding areas, and drained and deforested wetland areas (NCDENR, 2007).

The project goals defined in the Mitigation Plan (Wildlands, 2016) were established with careful consideration of goals and objectives that were described in the RBRP and to meet DMS mitigation needs while maximizing the ecological and water quality uplift with the watershed. The project goals established in the Mitigation Plan focused on permanent protection for the Site, re-establishing natural hydrology and vegetation, reducing water quality stressors, and enhancing terrestrial and aquatic habitat.

The Site construction and as-built survey were completed in February 2017. Monitoring Year (MY) 6 assessments and Site visits were completed between April and October 2022 to assess the conditions of the project.

The Site has largely met the required stream, vegetation, and hydrology success criteria for MY6 and is on track to meet final MY7 performance standards. All restored and enhancement I streams are geomorphically stable and functioning as designed. Bankfull and geomorphically significant event criteria was met in MY2 with additional events recorded in MY6 including geomorphically significant events for Vile Reach 2 on 3/23/2022 and 9/5/2022 and UT1 Reach 2 on 7/6/2022, 7/17/2022, and 8/9/2022. Fourteen of seventeen permanent vegetation plots and both transect plots met criteria. All eight bog plots met appropriate percent cover. All ten gages in the wetland re-establishment, wetland rehabilitation, and bog areas met or exceeded hydrology success criteria. Adaptive Management Plan (AMP) tasks completed in MY5 are functioning as intended and MY6 supplemental planting appears successful and will be closely monitored in MY7. Additional supplemental planting will occur before the onset of the 2023 growing season in low stem density areas on the Site along sections of UT1 and UT2. The MY6 Visual assessments revealed minor areas of concern including pockets of invasive plant species and areas of low stem growth. The UT1 easement encroachment was addressed in January 2023 and all other action items associated with the 2022 DMS easement inspection will be addressed in MY7. These areas will continue to be monitored and adaptive management will be performed as needed.

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APPENDICES

*Content not required for Monitoring Year 6 Report

Section 1: PROJECT OVERVIEW

The Site is located approximately one mile east of the Town of Sparta in eastern Alleghany County, NC. The project is within the New River Basin eight-digit HUC 05050001 and the 14-digit HUC 05050001030020 (Figure 1). Located in the Blue Ridge Belt of the Blue Ridge Province (USGS, 1998), the project watershed primarily includes managed herbaceous, mixed upland hardwoods, and other forested land. The drainage area for the project streams ranges from 0.01 square miles to 2.69 square miles.

The project streams consist of Vile Creek and five unnamed tributaries (UT) to Vile Creek including UT1, UT1b, UT1c, UT2, UT3, and a portion of Little River. Stream restoration reaches include Vile Creek (Reaches 1 and 2) and UT1 Reach 2, which together comprise 3,047 linear feet (LF) of perennial stream channel. Stream enhancements reaches include UT1 Reach 1, UT1b, UT1c, UT2, UT3, and a portion of Little River, totaling 5,009 LF. Wetland components include 3.02 acres of wetland rehabilitation and 3.38 acres of wetland re-establishment.

Construction activities were completed by Land Mechanic Designs, Inc. in February 2017. Planting and seeding activities were completed by Bruton Natural Systems, Inc. in February 2017. The land required for construction, management, and stewardship of the mitigation project included portions of five parcels resulting in 25.04 acres of the conservation easement. The project is expected to generate 5,053.000 stream mitigation units (SMUs) and 5.703 riparian wetland mitigation units (WMUs). Annual monitoring will be conducted for seven years with close-out anticipated to commence in 2024 given the success criteria are met.

1.1 Project Goals and Objectives

The Site is intended to provide numerous ecological benefits within the New River Basin. While many of these gains are limited to the Vile Creek project area, other benefits are anticipated to create more widespread impacts including pollutant removal, reduced sediment loading, and improved aquatic and terrestrial habitat. Expected enhancements to water quality and ecological processes are outlined below as project goals and objectives. These intentions were established with careful consideration of targets described in the RBRP and to address stressors identified in the LWP.

The following project specific goals established in the Mitigation Plan (Wildlands, 2016) include:

Goals	Objectives
Reduce pollutant inputs to streams including fecal coliform, nitrogen, and phosphorous.	Exclude cattle from streams and buffers by installing fencing around conservation easements adjacent to cattle pastures. Install wells and drinkers to provide alternative water sources for cattle.
Reduce inputs of sediment into streams from eroding stream banks.	Reconstruct stream channels with stable dimensions. Add bank revetments and in-stream structures to protect restored/enhanced streams.
Return a network of streams to a stable form that is capable of supporting hydrologic, biologic, and water quality functions.	Construct stream channels that will maintain a stable pattern and profile considering the hydrologic and sediment inputs to the system, the landscape setting, and the watershed conditions.

Goals	Objectives
Improve aquatic communities in project streams and provide improved habitat for trout migrating from Little River into Vile Creek. *Note: Presence of aquatic organisms and trout will not be tied to project success criteria.*	Install habitat features such as constructed riffles, cover logs, and brush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.
Raise local groundwater elevations and allow for more frequent overbank flows to provide a source of hydration for floodplain wetlands. Reduce shear stress on channels during larger flow events.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain.
Restore wetland hydrology, soils, and plant communities.	Restore riparian wetlands by raising stream beds, plugging existing ditches, removing fill material over relict hydric soils, and planting native wetland species.
Improve and expand Southern Appalachian bog habitat to support bog species such as bog turtles. *Note: Presence of bog turtles will not be tied to project success criteria.*	Widen low lying ditched areas that represent bog conditions.
Create and improve riparian and wetland habitats by planting native vegetation. Provide a canopy to shade streams and reduce thermal loadings. Create a source of woody inputs for streams. Reduce flood flow velocities on floodplain and improve long-term lateral stability of streams. Improve bog habitat by planting herbaceous wetland plants.	Plant native tree and shrub species in riparian zone and wetland areas other than bog areas. Bog areas will be planted with herbaceous species.
Ensure that development and agricultural uses that would damage the site or reduce the benefits of project are prevented.	Establish conservation easements on the site.

1.2 Monitoring Year 6 Data Assessment

Annual monitoring and quarterly Site visits were conducted during MY6 to assess the condition of the project. The stream, vegetation, and hydrologic success criteria for the Site follows the approved success criteria presented in the Vile Creek Mitigation Plan (Wildlands, 2016).

1.2.1 Stream Assessment

MY6 is a reduced monitoring year that does not require morphological surveys therefore the stream assessment was not performed this year. Visual Assessments revealed that project streams are functioning as designed. Refer to Appendix 2 for visual assessment tables, Current Conditions Plan View (CCPV) Figures 3.0-3.2, and reference photographs.

1.2.2 Stream Hydrology Assessment

At the end of the seven-year monitoring period, two or more bankfull events and geomorphically significant (60% of bankfull flow) events must have occurred in separate years within the restoration and enhancement reaches.

The success criteria for bankfull and geomorphically significant events has been met on all monitored reaches with at least five bankfull events occurring in separate years documented on UT1 Reach 2 and at least four bankfull events occurring in separate years documented on Vile Creek. Two geomorphically

significant events were recorded in MY6 including Vile Creek Reach 2 on 3/23/2022 and 9/5/2022 and on UT1 Reach 2 on 7/6/2022, 7/17/2022, and 8/9/2022. No bankfull events were recorded in MY6. Crest gage (CG) 1 and CG2 probes experienced freezing temperatures and recorded incorrect water level data during these times. Bankfull or geomorphically significant events recorded during freezing temperatures were disregarded if they were not associated with rainfall events. Refer to Appendix 5 for hydrology summary data and plots.

1.2.3 Vegetative Assessment

A total of 25 vegetation monitoring plots were installed during baseline monitoring throughout the project easement to measure the survival of the planted trees, shrubs, and herbaceous vegetation. Seventeen of the plots were established to evaluate woody species composition, density, and survival rates, while 8 of the plots were established to evaluate percent coverage of herbaceous species of bog areas. The size of individual quadrants is 100 square meters (10m x 10m or 5m x 20m) for woody tree and shrub species and 20 square meters (5m x 4m) for herbaceous vegetation bog plots. In MY5 two transect vegetation plots were added to evaluate a supplemental planting area from March 2021. Transect vegetation monitoring plot assessments will document number of planted stems and species using a circular or 100 square meters/rectangular plot.

Tree and shrub assessments are conducted following the 2006 Carolina Vegetation Survey (CVS) Level 2 Protocol for Recording Vegetation. The final planted stem vegetative success criterion for the Site is the survival of 210 planted stems per acre in the planted riparian and wetland corridor at the end of the required monitoring period (MY7). The interim measure of vegetative success for the Site is the survival of at least 320 planted stems per acre at the end of the third monitoring year (MY3) and at least 260 stems per acre at the end of the fifth monitoring year (MY5). In addition, planted trees must average 8 feet in height in each plot at the end of the seventh year of monitoring according to the 2021 Vile Creek Mitigation Site Adaptive Management Plan. Vegetation plots one and two contain only shrub species; therefore, shrub stem density success criteria of 160 surviving plants per acre at the end of year 3, 130 at the end of year 5, and 105 at the end of year 7 is used for these plots. There are no height criteria for shrubs. The bog plots are assessed by visually estimating the percent herbaceous coverage within each plot and must have at least 80% coverage success criteria.

MY6 is typically a reduced monitoring year that does not require vegetation plot monitoring, but the survey was completed in August 2022 as described in the 2021 Adaptive Management Plan (AMP). The MY6 permanent plot vegetation monitoring resulted in an average planted stem density of 402 stems per acre for woody tree species and 284 stems per acre for shrubs species, both of which exceed the final requirement of 210 stems per acre for tree species and 105 stems per acre required for shrub species and are on target to meet the requirements for MY7. In addition, 14 of the 17 plots individually met the success criteria with a stem density ranging from 121 to 567 stems per acre for tree species and 243 to 324 for shrub species. Vegetation plots (VP) five, nine, and fourteen did not meet stem density requirements at 202, 162, and 121 stems per acre respectively. Two of fifteen tree plots are meeting or exceeding MY7 average height requirements and average height across all woody plots (excluding shrub plots) is below the MY7 requirement at 5.6 feet. All herbaceous bog plots are exceeding success criteria with each reaching a minimum of 98% herbaceous cover. Both transect vegetation plots added to the supplemental planting area in March 2021 exceed the final requirement with an average of 445 stems per acre and are on target to meet the tree density requirements for MY7.

The Gray's Lily (*Lilium grayi*) GPS locations are included in the CCPV. Photographs from the last known occurrence on the Site are included in Appendix 2. The two locations will be surveyed in during peak blooming season in June and July of MY7. Refer to Appendix 2 for vegetation plot photographs and Appendix 3 for vegetation data tables.

1.2.4 Wetland Assessment

A total of ten groundwater hydrology gages (GWG) and two soil temperature gages were established during baseline monitoring within the wetland rehabilitation, wetland re-establishment, and bog areas. A barotroll logger, used to measure barometric pressure and aid in the calculation of groundwater levels, was also installed on-site. The original site Barotroll failed on 9/22/2021 and was replaced on 2/11/2022. Groundwater monitoring gages are downloaded on a quarterly basis and maintained as needed. Calibration is completed by manually measuring water levels on all gages to confirm the downloaded data. Under typical precipitation conditions, the final performance success criteria for groundwater hydrology includes the documentation of free groundwater within 12 inches of the ground surface for 14 consecutive days (8.5%) of the defined 169-day growing season (April 26 – October 11) for wetland re-establishment and wetland rehabilitation areas and 20 consecutive days (12%) of the defined 169-day growing season (April 26 – October 11) for bog areas.

All 10 GWGs met MY6 success criteria with an overall hydroperiod ranging from 14% to 100% of the growing season. The failed barotroll resulted in minor dormant season data loss. Manual measurements of GWG water levels were recorded quarterly during MY6. Instances of uncharacteristically low water levels on several hydrographs in May 2022 signify readings directly after a well was pumped to remove unwanted bentonite from the bottom of the well and does not reflect true hydrologic conditions.

Rainfall data was collected from the NC-AG-1-Sparta 3.5 SSW(NCCRONOS) rain gage. Average rainfall was recorded in March, April, and June. Higher than average rainfall occurred in February, May, July, and August while below average rainfall occurred in January and July. Refer to the CCPV Maps in Appendix 2 for groundwater gage locations and Appendix 5 for groundwater hydrographs and rainfall summary plots.

1.2.5 Areas of Concern

The UT1 Reach 1 (Station 205+10-205+60) natural stream realignment that occurred in MY4 (approximately 21-feet) appears to be stable and will remain closely monitored.

Stream repairs addressed in the IRT approved MY5 Adaptive Management Plan (AMP) and completed in September 2021 are stable and functioning as designed as shown in the Repair Photo Log in Appendix 2.

Supplemental planting occurred along Vile Creek Reaches 1 and 3 in April 2022 in accordance with the MY5 AMP. Approximately 200 one-gallon and 3-gallon container plants were planted in four areas totaling one acre. Some planted species were not in the approved Final Mitigation Plain but were subsequently approved in the MY5 AMP (Wildlands 2016, 2021). These include boxelder (*Acer negundo*), red oak (*Quercus rubra*), white oak (*Quercus alba*), and black gum (*Nyssa sylvatica*). Additionally, soil amendments comprised of humic acid, biochar, dried molasses, slow-release fertilizer (2-4-3), rock phosphate, and azomite were added to the base of each planted tree in June 2022 to improve moisture-holding capacity, organic matter, and nutrient availability. These areas will remain closely monitored in MY7.

Additional supplemental planting will occur before the onset of the 2023 growing season in low stem density areas on Site (approximately 1 acre) including an area along the left bank of UT1 and upstream sections of UT2. The areas will be replanted with one, three, and/or five-gallon containerized trees. Species will include those approved in the Vile Creek Mitigation Site Final Mitigation Plan and 2021 Vile Creek Mitigation Site Adaptive Management Plan (Wildlands 2016, 2021). The planted species, sizes, wetland indicator status, and quantities will be documented in the MY7 monitoring report. Refer to Appendix 2 for supplemental planting locations and low stem density acreages.

Aggradation on UT1b (Station 251+02 – 251+64 (62')) and UT1c (Station 271+66 – 272+81 (115')), continues to result in sheet flow onto the floodplain rather than maintaining flow within a single thread channel. Wetland vegetation and hydrology was observed in these areas in MY6. At MY7 Wildlands will verify the jurisdictional limits of UT1C and UT1B and include it in the monitoring report. Wildlands will coordinate with IRT and DMS prior to closeout to determine the mitigation approach, credit ratios, and acreage of these features so the appropriate amount of wetland credit can be added to the site and the necessary amount of stream credit can be removed. Refer to Appendix 2 for photographs and Appendix 5 for hydrology data.

Small pockets of invasive species including multiflora rose (*Rosa multiflora*) and Chinese bittersweet (*Celastrus orbiculatus*) exist on <1% of the Site and are not impacting survival rates of planted stems. Targeted spray treatment conducted in June 2022 along most restoration and enhancement reaches reduced the presence of multiflora rose within the easement. Additional treatments will continue as needed to help manage and eliminate remaining invasive species populations.

One easement encroachment was observed along the upstream section of UT1. Wildlands installed additional signage and horse tape in January 2023 to clearly mark the boundary of the easement along UT1. The area will be replanted along with scheduled UT1 supplemental planting before the onset of the 2023 growing season. Wildlands was informed of additional issues after a DMS easement inspection of the Site on October 12, 2022. In reference to listed action items, monument caps with missing markings will be stamped in MY7 by the contracted surveyor per agency requirements. Wildlands will repair damaged fencing along UT1 Reach 2 and the damaged sign along UT1c. There was no vegetation trimming observed around the mobile deer stand in the easement along Vile Creek Reach 2 and no damage due to easement access. Wildlands investigated potential encroachment along the left bank of UT2 in January 2023. Pasture mowing appeared to be up to the easement line and no encroachment was observed. The landowner was notified, and additional signage will be added in MY7. The mobile deer stand was located outside of the easement. Refer to Appendix 2 for encroachment details and Appendix 6 for email correspondence.

Isolated stream areas of concern are noted on the CCPV. These areas are not negatively impacting overall stream function or stability, but they will be monitored in MY7 for signs of instability. Refer to Appendix 2 for vegetation and stream condition assessment tables and the CCPV maps.

1.3 Monitoring Year 6 Summary

The Site has largely met the required stream, vegetation, and hydrology success criteria for MY6 and is on track to meet final MY7 performance standards. All restored and enhancement I streams are geomorphically stable and functioning as designed. Bankfull and geomorphically significant event criteria was met in MY2 with additional events recorded in MY6 including geomorphically significant events for Vile Reach 2 on 3/23/2022 and 9/5/2022 and UT1 Reach 2 on 7/6/2022, 7/17/2022, and 8/9/2022. Fourteen of seventeen permanent vegetation plots and both transect plots met criteria. All eight bog plots met appropriate percent cover. All ten gages in the wetland re-establishment, wetland rehabilitation, and bog areas met or exceeded hydrology success criteria. Adaptive Management Plan (AMP) tasks completed in MY5 are functioning as intended and MY6 supplemental planting appears successful and will be closely monitored in MY7. Additional supplemental planting will occur before the 2023 growing season in low stem density areas on the Site along sections of UT1 and UT2. The MY6 Visual assessments revealed minor areas of concern including pockets of invasive plant species and areas of low stem growth. The UT1 easement encroachment was addressed in January 2023 and all

other action items associated with the 2022 DMS easement inspection will be addressed in MY7. These areas will continue to be monitored and adaptive management will be performed as needed.

Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Mitigation Plan documents available on DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 2: METHODOLOGY

Geomorphic data were collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was recorded using either a Trimble or Topcon handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Crest gages were installed in surveyed riffle cross sections and monitored quarterly. Hydrologic monitoring instrument installation and monitoring methods are in accordance with the United States Army Corps of Engineers (USACE, 2016) standards. Planted woody vegetation is being monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2006).

Section 3: REFERENCES

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

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

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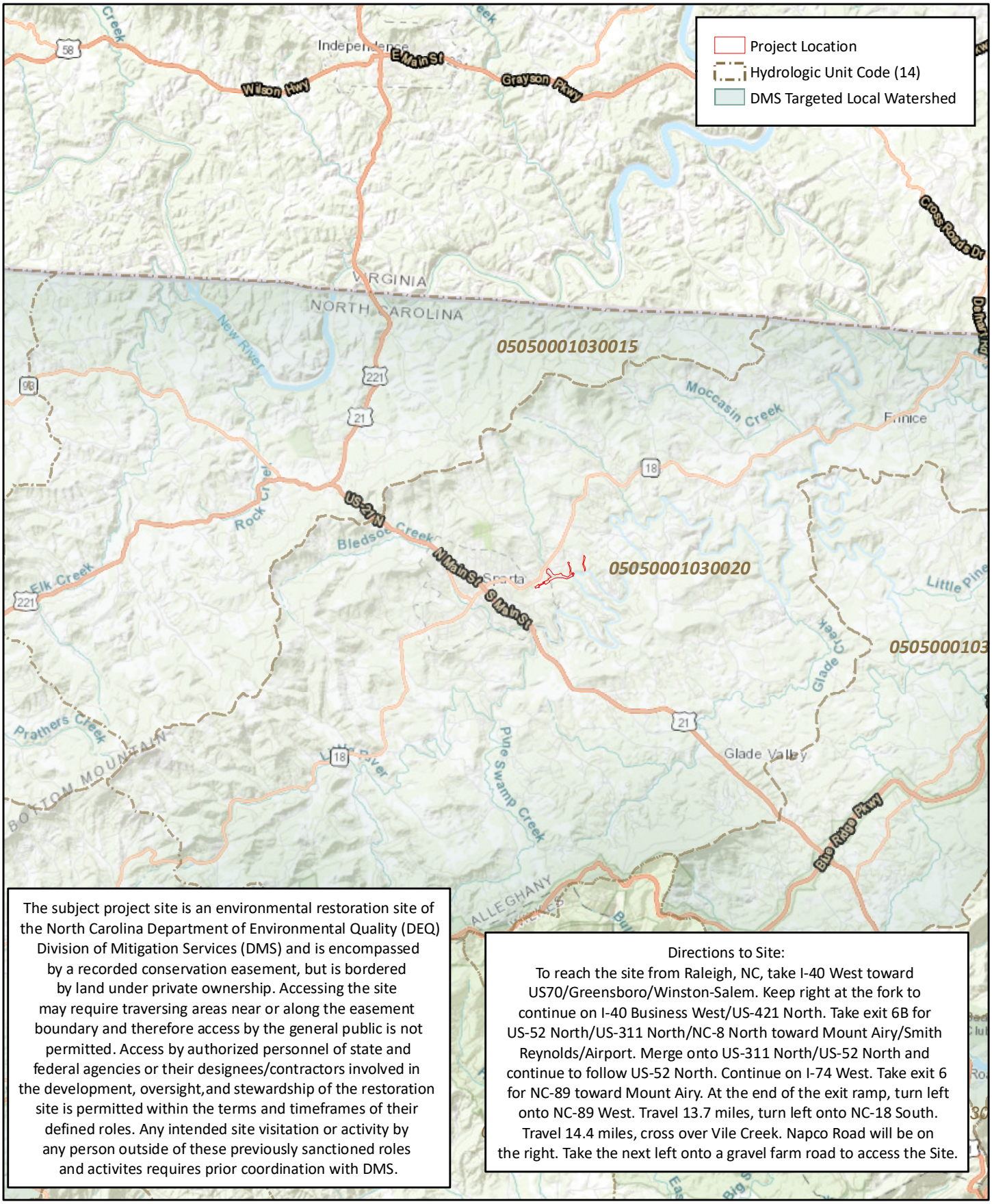
Wildlands Engineering, Inc. 2016. Vile Creek Mitigation Site Final Mitigation Plan. NCDMS, Raleigh, NC.

Wildlands Engineering, Inc. 2017. Vile Creek Stream Mitigation Site Baseline Monitoring Document and As-Built Baseline Report. DMS, Raleigh, NC.

Wildlands Engineering, Inc. 2021. Vile Creek Mitigation Site Adaptive Management Plan. DMS, Raleigh, NC.

APPENDIX 1. General Figures and Tables



The subject project site is an environmental restoration site of the North Carolina Department of Environmental Quality (DEQ) Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight,and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with DMS.

Directions to Site:
To reach the site from Raleigh, NC, take I-40 West toward US70/Greensboro/Winston-Salem. Keep right at the fork to continue on I-40 Business West/US-421 North. Take exit 6B for US-52 North/US-311 North/NC-8 North toward Mount Airy/Smith Reynolds/Airport. Merge onto US-311 North/US-52 North and continue to follow US-52 North. Continue on I-74 West. Take exit 6 for NC-89 toward Mount Airy. At the end of the exit ramp, turn left onto NC-89 West. Travel 13.7 miles, turn left onto NC-18 South. Travel 14.4 miles, cross over Vile Creek. Napco Road will be on the right. Take the next left onto a gravel farm road to access the Site.

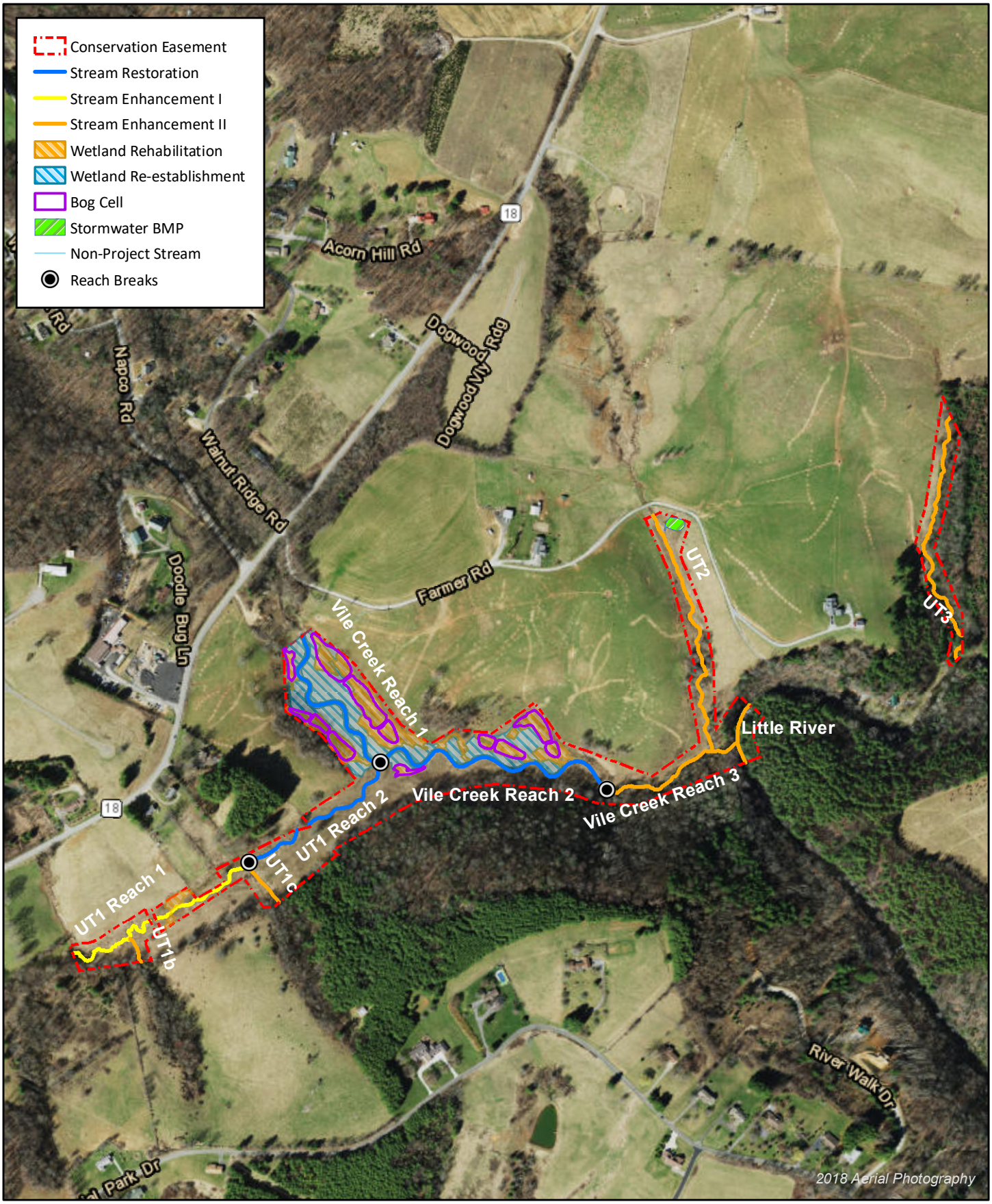
WILDLANDS ENGINEERING

0 1 2 Mile

N

Figure 1 Project Vicinity Map
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Alleghany County, NC



WILDLANDS ENGINEERING

0 300 600 Feet

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Figure 2 Project Component Map
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Alleghany County, NC

Table 1. Project Components and Mitigation Credits
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

PROJECT COMPONENTS									
Project Area/Reach	**Existing Footage (LF) or Acreage**	**Mitigation Plan Footage (LF)/Acreage**	**Mitigation Category**	**Restoration Level**	**Priority Level**	**Mitigation Ratio (X:1)**	**As Built Footage/ Acreage[2]**	**Project Credit (SMU/WMU)[1,2]**	**Notes**
Vile Creek Reach 1	962	920	Warm	Restoration	P1	1:1	882	882.000	Alignment changed from mitigation plan/final design due to bedrock obstruction.
Vile Creek Reach 2	1,247	1,260	Warm	Restoration	P1	1:1	1,311	1,311.000	Alignment changed from mitigation plan/final design due to bedrock obstruction.
Vile Creek Reach 3	714	714	Warm	Enhancement II	N/A	2.5:1	713	279.000	As-Built credits were reduced for areas where easement is restricted and the full buffer width is not possible
UT1 Reach 1	1,143	1,107	Warm	Enhancement I	N/A	1.5:1	1,114	630.000	Excludes one 25 foot easement crossing break from 207+13 - 207+38. As-Built credits were reduced for areas where easement is restricted and the full buffer width is not possible.
UT1 Reach 2	989	825	Warm	Restoration	P1	1:1	777	750.000	Excludes 77 feet of stream outside of conservation easement from 215+68 - 216+45. Alignment changed from design due to bedrock obstruction. As-Built credits were reduced for areas where easement is restricted and the full buffer width is not possible.
UT1B	128	128	Warm	Enhancement II	N/A	2.5:1	128	48.000	As-Built credits were reduced for areas where easement is restricted and the full buffer width is not possible. 62 LF aggraded channel on UT1b.
UT1C	234	228	Warm	Enhancement II	N/A	2.5:1	228	89.000	As-Built credits were reduced for areas where easement is restricted and the full buffer width is not possible. 115 LF of aggraded channel on UT1c
UT2	1,226	1,226	Warm	Enhancement II	N/A	2.5:1	1,226	490.000	
UT3	1,316	1,236	Warm	Enhancement II	N/A	2.5:1	1,236	461.000	Creditable length reduced by 45 LF to account for 45 LF of alignment that does not have the full bankfull width within the CE.
Little River	284	284	Warm	Enhancement II	N/A	2.5:1	284	114.000	
Wetland Rehabilitation	3.02	3.02	Warm	Rehabilitation		1.3:1	3.02	2.323	
Wetland Re-establishment	0	3.50	Warm	Re-establishment		1:1	3.38	3.380	The reduction in wetland re-establishment acreage from design to as-built stages was mainly due to Vile Creek Reaches 1 and 2 having wider top widths in the as-built survey than in the design wetland area calculations. Thus, Vile Creek cut more into the wetland area in the as-built plans than it did in the design calculations, resulting in lower as-built wetland acreage.

[1] As-Built credits (SMUs) have been adjusted where the easement is restricted and the full buffer width and/or bankfull width is not fully contained within the conservation easement. The reductions are greater in the as-built compared to the mitigation plan. The as-built credit reductions follows the updated 2016 USACE Wilmington District Stream and Wetland Compensatory Mitigation update.

[2] Stream mitigation credits and stationg noted above are based on the as-built stream centerline.

Project Credits							
Restoration Level	**Stream**			**Riparian Wetland**		**Non-Riparian Wetland**	**Coastal Marsh**
	Warm	**Cool**	**Cold**	**Riverine**	**Non-Riv**		
Restoration	2,943.000	N/A	N/A	N/A	N/A	N/A	N/A
Re-establishment				3.380	N/A	N/A	N/A
Rehabilitation				2.323	N/A	N/A	N/A
Enhancement							
Enhancement I	630.000	N/A	N/A				
Enhancement II	1,481.000	N/A	N/A				
Creation							
Preservation							
Total	5,053.000	N/A	N/A	5.703	N/A	N/A	N/A

Table 2. Project Activity and Reporting History
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Activity or Report		Data Collection Complete	Completion or Scheduled Delivery
Mitigation Plan		N/A	June 2016
Final Design - Construction Plans		N/A	June 2016
Construction		N/A	February 2017
Temporary S&E mix applied to entire project area[1]		N/A	February 2017
Permanent seed mix applied to reach/segments[1]		N/A	February 2017
Bare root and live stake plantings for reach/segments		N/A	February 2017
Baseline Monitoring Document (Year 0)	Stream Survey	March 2017	April 2017
	Vegetation Survey	April 2017	
Year 1 Monitoring	Stream Survey	September 2017	December 2017
	Vegetation Survey	September 2017	
Year 2 Monitoring	Stream Survey	April 2018	November 2018
	Vegetation Survey	September 2018	
Year 3 Monitoring	Stream Survey	April 2019	December 2019
	Shrub Planting	June 2019	
	Invasive Treatment	June 2019	
	Vegetation Survey	September 2019	
Year 4 Monitoring	Supplemental Planting	March 2020	November 2020
	Stream Repairs	March 2020	
	Invasive Treatment	September 2020	
Year 5 Monitoring	Supplemental Planting	March 2021	November 2021
	Stream Survey	June 2021	
	Invasive Treatment	August 2021	
	Stream Repairs	September 2021	
	Vegetation Survey	September 2021	
Year 6 Monitoring	Vegetation Survey	August 2022	November 2022
	Supplemental Planting	April 2022	
	Invasive Treatment	August 2022	
	Soil Ammedments	June 2022	
Year 7 Monitoring	Stream Survey	N/A	November 2023
	Vegetation Survey	N/A	November 2023

[1]Seed and mulch was added as each section of construction was completed.

Table 3. Project Contact Table
Vile Creek Mitigation Site
DMS Project No.96582
Monitoring Year 6 - 2022

Designer Jeff Keaton, PE	**Wildlands Engineering, Inc.** 1430 South Mint Street, Ste 104 Charlotte, NC 28205 704.332.7754
Construction Contractor	**Land Mechanics Design, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Land Mechanics Design, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Seed Mix Sources	**Green Resource, LLC**
Nursery Stock Suppliers **Bare Roots** **Live Stakes** **Plugs**	 **Dykes and Son Nursery** **Bruton Natural Systems, Inc.; Foggy Mountain Nursery, LLC** **Wetland Plants Inc.**
Monitoring Performers	**Wildlands Engineering, Inc.**
Monitoring, POC	Kristi Suggs 704.332.7754, ext. 110

Table 4. Project Information and Attributes
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

PROJECT INFORMATION	
Project Name	Vile Creek Mitigation Site
County	Alleghany County
Project Area (acres)	25.04
Project Coordinates (latitude and longitude)	36.510530° N, -80.104092° W

PROJECT WATERSHED SUMMARY INFORMATION	
Physiographic Province	Blue Ridge Belt of the Blue Ridge Province
River Basin	New
USGS Hydrologic Unit 8-digit	05050001
USGS Hydrologic Unit 14-digit	05050001030020
DWR Sub-basin	05-07-03
Project Drainiage Area (acres)	22,912
Project Drainage Area Percentage of Impervious Area	2%
CGIA Land Use Classification	Managed Herbaceous (50%), Forested (45%), Mountain Conifers (3%), Impervious (2%)

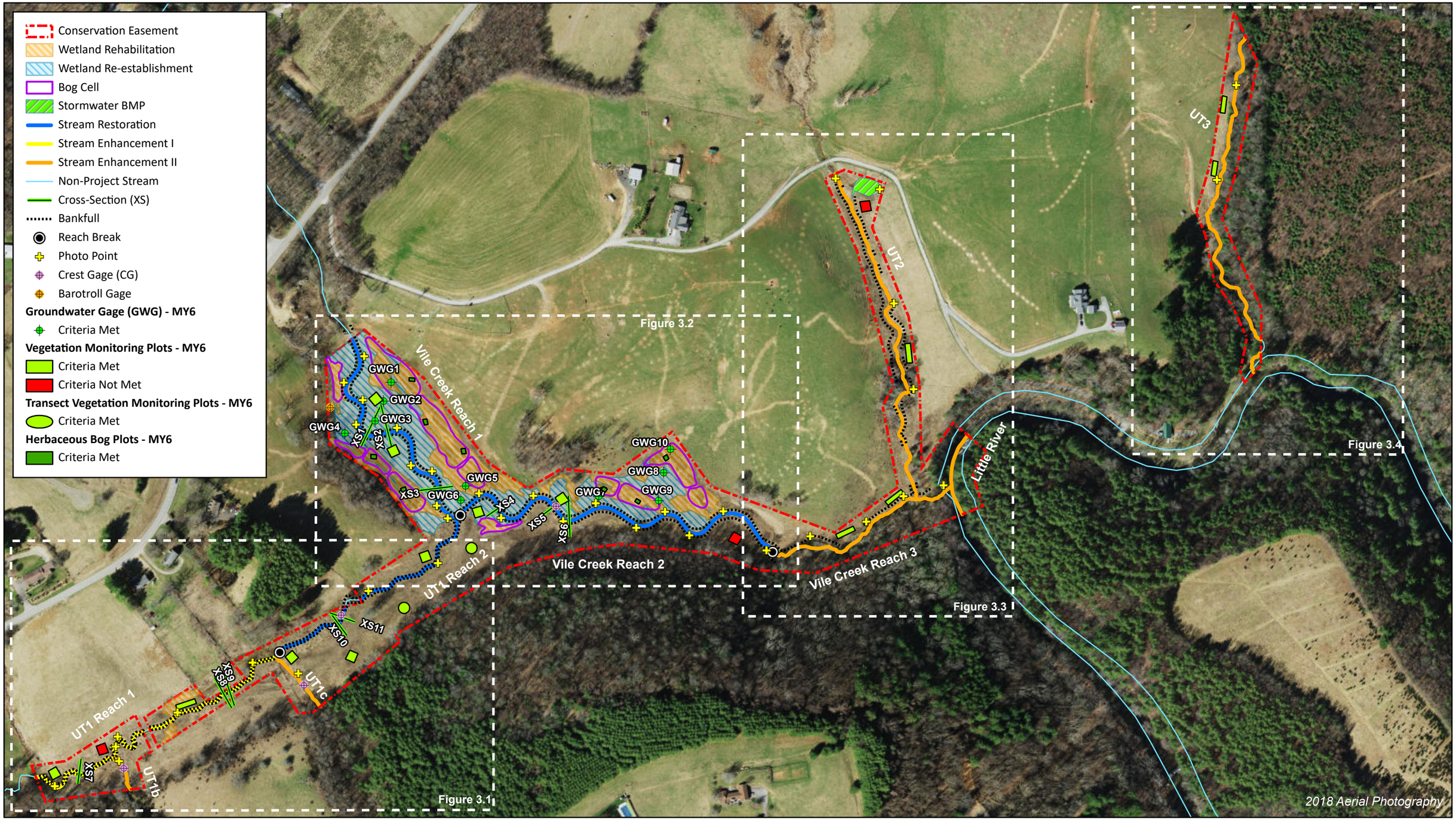
REACH SUMMARY INFORMATION

Parameters	Vile Creek Reach 1	Vile Creek Reach 2	Vile Creek Reach 3	UT1 Reach 1	UT1 Reach 2	UT1B	UT1C	UT2	Little River	UT3
Length of Reach (linear feet) - Post-Restoration	882	1,311	713	1,114	854	128	228	1,226	284	1,316
Drainage Area (acres)	1,375	1,639	1,720	190	218	8	8	80	22,912	38
NCDWR Stream Identification Score - Pre-Restoration	45.5	45.5	45.5	43	43	28.25	26	27, 42.5	49.5	33.5
NCDWR Water Quality Classification	C									
Morphological Desription (stream type) - Pre-Restoration	C3	C4	C4	E4b	F4b	E4b	E4b	B4	C4	B4a
Evolutionary Trend (Simon's Model) - Pre-Restoration	IV	IV	IV	III	IV	III	III	II	I	III
Underlying Mapped Soils	Alluvial land, wet (Nikwasi); Chandler silt loam; Chandler stony silt loam; Chester loam; Chester stony loam; Clifton loam; Fannin silt loam; Stony Steep Land; Tate loam; Tusquitee loam; Watauga loam									
Drainage Class	Very poorly drained (Alluvial land, wet (Nikwasi); Well Drained (Chester loam, Chester stony loam, Clifton loam, Fannin silt loam, Tate loam, Tusquitee loam, Watauga loam); Somewhat excessively drained (Chandler silt loam, Chandlery stony silt loam); Excessively drained (Stony steep land).									
Soil Hydric Status	A/D (Nikwasi); A (Chandler silt loam, Chandler stony silt loam, Tusquitee loam, Stony steep land); B (Chester silt loam, Chester stony loam, Clifton loam, Fannin silt loam, Tate loam, Watauga loam)									
Valley Slope - Pre-Restoration	0.017	0.016	0.015	0.032	0.033	0.071	0.067	0.048	N/A	0.070
FEMA Classification	AE									
Native Vegetation Community	Montane Alluvial Forest, Southern Appalachian Bog									
Percent Composition Exotic Invasive Vegetation -Post-Restoration	<1%									

REGULATORY CONSIDERATIONS

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885. Action ID# SAW-2014-01585
Waters of the United States - Section 401	Yes	Yes	
Division of Land Quality (Dam Safety)	N/A	N/A	N/A
Endangered Species Act	Yes	Yes	Vile Creek Mitigation Site Categorical Exclusion (CE) Approved 9/15/2014
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 7/25/2014)
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	No impact application was prepared for local review. No post-project activities required.	Vile Creek Final Mitigation Plan (June 2016) and Vile Creek Categorical Exclusion (CE) Approved 9/15/2014
Essential Fisheries Habitat	No	No	Vile Creek Final Mitigation Plan (June 2016) and Vile Creek Categorical Exclusion (CE) Approved 9/15/2014

APPENDIX 2. Visual Assessment Data



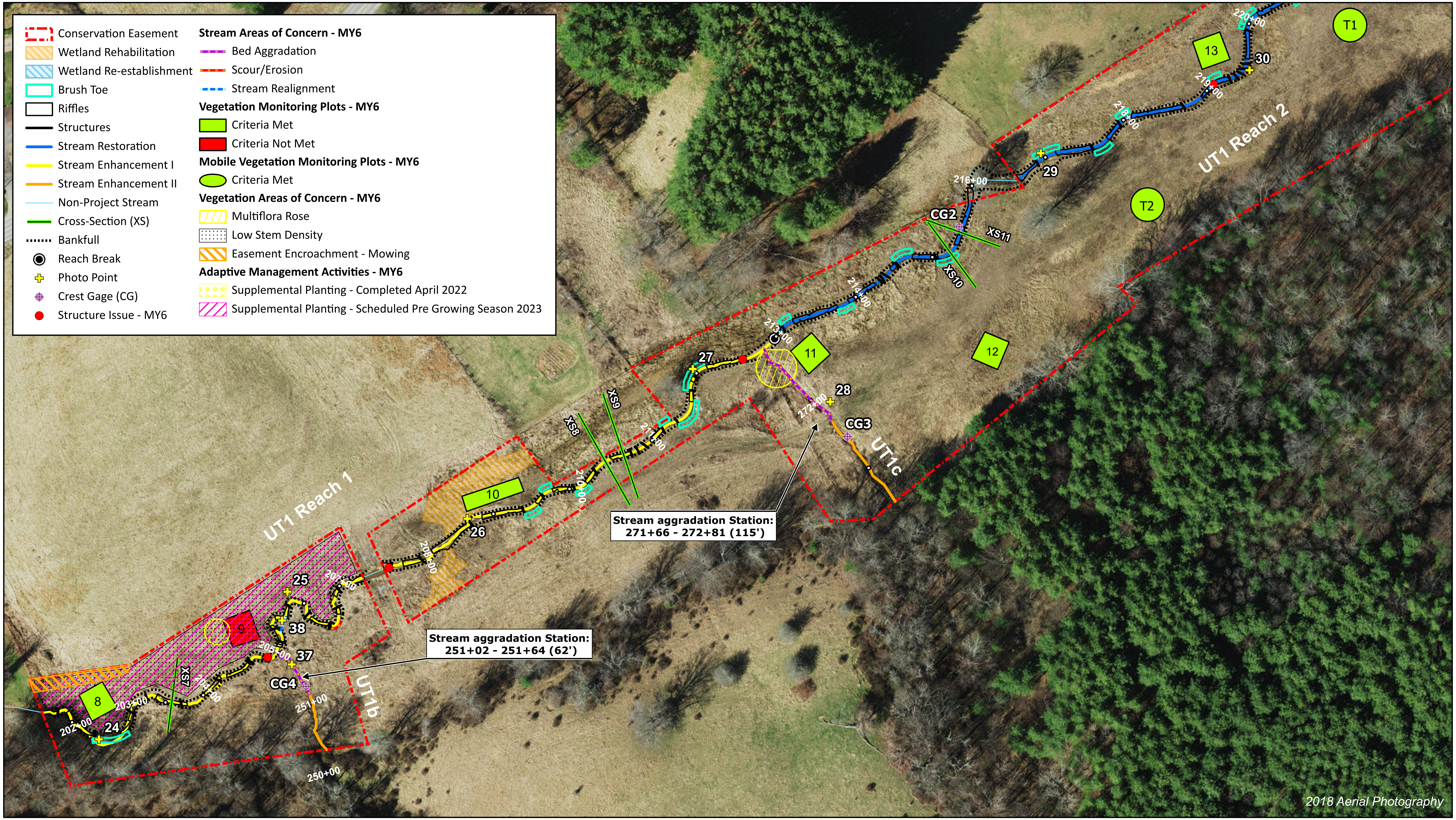
WILDLANDS ENGINEERING

0 300 600 Feet

N

Figure 3.0 Integrated Current Condition Plan View
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

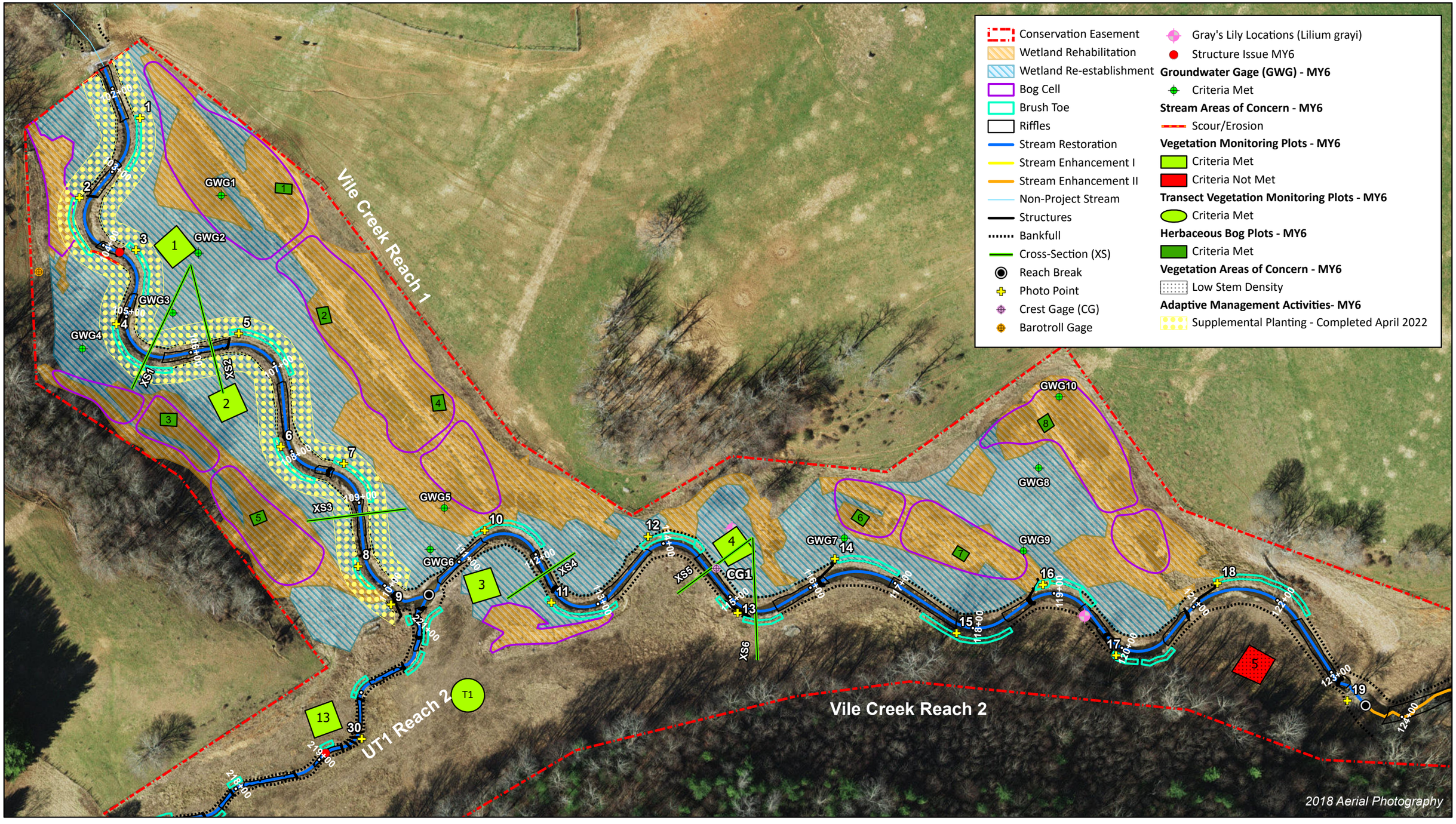
Alleghany County, NC


Conservation Easement
Wetland Rehabilitation
Wetland Re-establishment
Brush Toe
Riffles
Structures
Stream Restoration
Stream Enhancement I
Stream Enhancement II
Non-Project Stream
Cross-Section (XS)
Bankfull
Reach Break
Photo Point
Crest Gage (CG)
Structure Issue - MY6
Stream Areas of Concern - MY6
Bed Aggradation
Scour/Erosion
Stream Realignment
Vegetation Monitoring Plots - MY6
Criteria Met
Criteria Not Met
Mobile Vegetation Monitoring Plots - MY6
Criteria Met
Vegetation Areas of Concern - MY6
Multiflora Rose
Low Stem Density
Easement Encroachment - Mowing
Adaptive Management Activities - MY6
Supplemental Planting - Completed April 2022
Supplemental Planting - Scheduled Pre Growing Season 2023
UT1 Reach 1
UT1 Reach 2
UT1b
UT1c
Stream aggradation Station:
271+66 - 272+81 (115')
Stream aggradation Station:
251+02 - 251+64 (62')
CG2
CG3
CG4
XS7
XS8
XS9
XS10
XS11
T1
T2
8
9
10
11
12
13
24
25
26
27
28
29
30
37
38
202+00
203+00
204+00
205+00
207+00
208+00
209+00
210+00
211+00
213+00
214+00
216+00
218+00
219+00
220+00
250+00
251+00
272+00
2018 Aerial Photography

0 100 200 Feet

Figure 3.1 Integrated Current Condition Plan View
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Alleghany County, NC

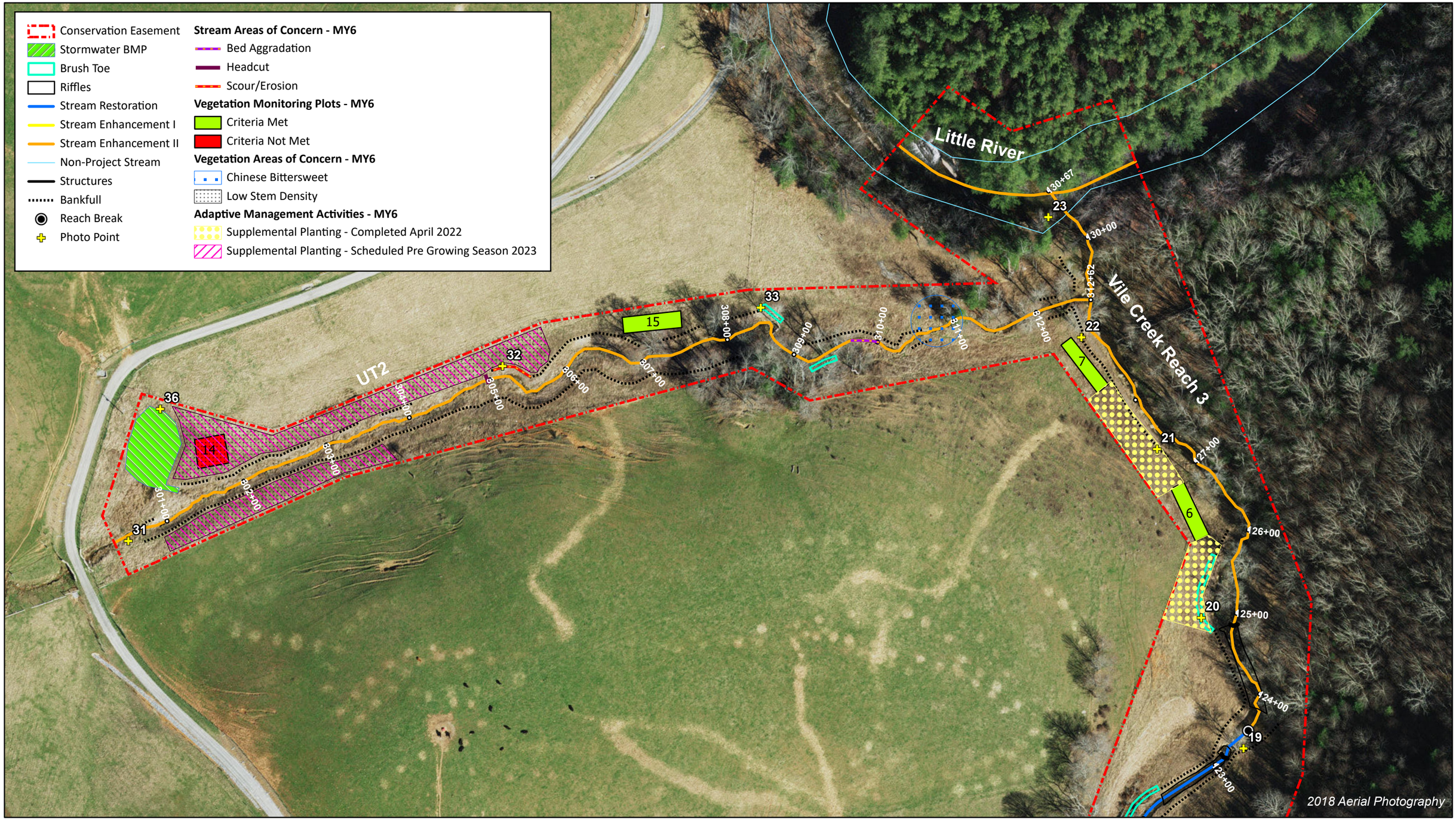


WILDLANDS ENGINEERING

0 100 200 Feet

Figure 3.2 Integrated Current Condition Plan View
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Alleghany County, NC



WILDLANDS ENGINEERING

0 100 200 Feet

Figure 3.3 Integrated Current Condition Plan View
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Alleghany County, NC

WILDLANDS ENGINEERING

0 100 200 Feet

Figure 3.4 Integrated Current Condition Plan View
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Alleghany County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Date of visual assessments: October 2022
UT1 Reach 1 (1,114 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	22	22			100%			
	3. Meander Pool Condition	Depth Sufficient	14	14			100%			
		Length Appropriate	14	14			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	14	14			100%			
		Thalweg centering at downstream of meander bend (Glide)	14	14			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	16	99%	0	0	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	1	16	99%	0	0	99%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	36	37			97%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	28	30			93%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	28	30			93%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	37	37			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	37	37			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5b. Visual Stream Morphology Stability Assessment Table
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Date of visual assessments: October 2022
UT1 Reach 2 (854 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	11	11			100%			
	3. Meander Pool Condition	Depth Sufficient	11	11			100%			
		Length Appropriate	11	11			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	33	33			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	21	22			95%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	21	22			95%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	33	33			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	33	33			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5c. Visual Stream Morphology Stability Assessment Table

Vile Creek Mitigation Site

DMS Project No. 96582

Monitoring Year 6 - 2022

Date of visual assessments: October 2022

Vile Creek Reach 1 (882 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	8	8			100%			
	3. Meander Pool Condition	Depth Sufficient	8	8			100%			
		Length Appropriate	8	8			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	8	8			100%			
		Thalweg centering at downstream of meander bend (Glide)	8	8			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	35	96%	0	0	96%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	1	35	96%	0	0	96%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	15	16			94%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	7	8			88%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	8			88%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	16	16			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	16	16			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5d. Visual Stream Morphology Stability Assessment Table
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Date of visual assessments: October 2022
Vile Creek Reach 2 (1,311 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	10			100%			
	3. Meander Pool Condition	Depth Sufficient	9	9			100%			
		Length Appropriate	9	9			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	9	9			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	16	16			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	7			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	16	16			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	16	16			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5e. Visual Stream Morphology Stability Assessment Table
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Date of visual assessments: October 2022
Vile Creek Reach 3 (713 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	1	1			100%			
	3. Meander Pool Condition	Depth Sufficient	1	1			100%			
		Length Appropriate	1	1			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	1	1			100%			
		Thalweg centering at downstream of meander bend (Glide)	1	1			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5f. Visual Stream Morphology Stability Assessment Table
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Date of visual assessments: October 2022
UT2: (763 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			1	32	96%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	N/A	N/A			n/a			
	3. Meander Pool Condition	Depth Sufficient	N/A	N/A			n/a			
		Length Appropriate	N/A	N/A			n/a			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	N/A	N/A			n/a			
		Thalweg centering at downstream of meander bend (Glide)	N/A	N/A			n/a			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			1	45	94%	0	0	94%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	1	45	94%	0	0	94%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.
N/A - Not applicable: No Engineered Structures applies to UT2

Table 6. Vegetation Condition Assessment Table
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Date of visual assessments: October 2022
Planted Acreage **17**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0.0	0.0%
Low Stem Density Areas*	Woody stem densities clearly below target levels based on MY7 stem count criteria.	0.1	4	0.9	5.0%
		Total	**4**	**0.9**	**5.0%**
Areas of Poor Growth Rates or Vigor*	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25	4	0.8	4.9%
		Cumulative Total	**8**	**1.7**	**9.9%**

*Most low stem density areas and poor growth areas overlap on site.

Easement Acreage **25**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1,000	3	0.1	0.6%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	1	0.03	0.1%

Stream Photographs

Monitoring Year 6

	
Photo Point 1 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 1** – view downstream Vile Creek R1 *(5/11/2022)*
	
Photo Point 2 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 2** – view downstream Vile Creek R1 *(5/1/2022)*
	
Photo Point 3 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 3** – view downstream Vile Creek R1 *(5/11/2022)*

	
Photo Point 4 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 4** – view downstream Vile Creek R1 *(5/11/2022)*
	
Photo Point 5 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 5** – view downstream Vile Creek R1 *(5/11/2022)*
	
Photo Point 6 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 6** – view downstream Vile Creek R1 *(5/11/2022)*

	
Photo Point 7 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 7** – view downstream Vile Creek R1 *(5/11/2022)*
	
Photo Point 8 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 8** – view downstream Vile Creek R1 *(5/11/2022)*
	
Photo Point 9 – view upstream Vile Creek R1 *(5/11/2022)*	**Photo Point 9** – view downstream Vile Creek R1 *(5/11/2022)*

	
Photo Point 10 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 10** – view downstream Vile Creek R2 *(5/11/2022)*
	
Photo Point 11 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 11** – view downstream Vile Creek R2 *(5/11/2022)*
	
Photo Point 12 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 12** – view downstream Vile Creek R2 *(5/11/2022)*

	
Photo Point 13 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 13** – view downstream Vile Creek R2 *(5/11/2022)*
	
Photo Point 14 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 14** – view downstream Vile Creek R2 *(5/11/2022)*
	
Photo Point 15 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 15** – view downstream Vile Creek R2 *(5/11/2022)*

	
Photo Point 16 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 16** – view downstream Vile Creek R2 *(5/11/2022)*
	
Photo Point 17 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 17** – view downstream Vile Creek R2 *(5/11/2022)*
	
Photo Point 18 – view upstream Vile Creek R2 *(5/11/2022)*	**Photo Point 18** – view downstream Vile Creek R2 *(5/11/2022)*

	
Photo Point 19 – view upstream Vile Creek R3 *(5/11/2022)*	**Photo Point 19** – view downstream Vile Creek R3 *(5/11/2022)*
	
Photo Point 20 – view upstream Vile Creek R3 *(5/11/2022)*	**Photo Point 20** – view downstream Vile Creek R3 *(5/11/2022)*
	
Photo Point 21 – view upstream Vile Creek R3 *(5/11/2022)*	**Photo Point 21** – view downstream Vile Creek R3 *(5/11/2022)*

	
Photo Point 22 – view upstream Vile Creek R3 *(5/11/2022)*	**Photo Point 22** – view downstream Vile Creek R3 *(5/11/2022)*

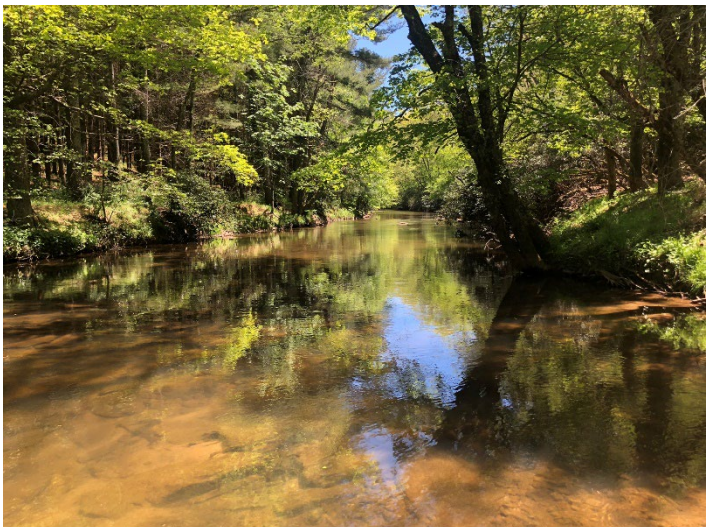



Photo Point 23 – view upstream Little River *(5/11/2022)*	**Photo Point 23** – view downstream Little River *(5/11/2022)*
	
Photo Point 24 – view upstream UT1 R1 *(5/11/2022)*	**Photo Point 24** – view downstream UT1 R1 *(5/11/2022)*

	
Photo Point 25 – view upstream UT1 R1 *(5/11/2022)*	**Photo Point 25** – view downstream UT1 R1 *(5/11/2022)*
	
Photo Point 26 – view upstream UT1 R1 *(5/11/2022)*	**Photo Point 26** – view downstream UT1 R1 *(5/11/2022)*
	
Photo Point 27 – view upstream UT1 R1 *(5/11/2022)*	**Photo Point 27** – view downstream UT1 R1 *(5/11/2022)*

	
Photo Point 28 – view upstream UT1C *(5/11/2022)*	**Photo Point 28** – view downstream UT1C *(5/11/2022)*
	
Photo Point 29 – view upstream UT1 R2 *(5/11/2022)*	**Photo Point 29** – view downstream UT1 R2 *(5/11/2022)*
	
Photo Point 30 – view upstream UT1 R2 *(5/11/2022)*	**Photo Point 30** – view downstream UT1 R2 *(5/11/2022)*

Photo Point 31 – view upstream UT2 *(5/11/2022)*

Photo Point 31 – view downstream UT2 *(5/11/2022)*

Photo Point 31 – view of UT2 BMP *(5/11/2022)*

Photo Point 32 – view upstream UT2 *(5/11/2022)*

Photo Point 32 – view downstream UT2 *(5/11/2022)*

	
Photo Point 33 – view upstream UT2 *(5/11/2022)*	**Photo Point 33** – view downstream UT2 *(5/11/2022)*
	
Photo Point 34 – view upstream UT3 *(5/11/2022)*	**Photo Point 34** – view downstream UT3 *(5/11/2022)*
	
Photo Point 35 – view upstream UT3 *(5/11/2022)*	**Photo Point 35** – view downstream UT3 *(5/11/2022)*

Photo Point 36 –stormwater wetland *(5/11/2022)*

Photo Point 37 – UT1B wetland view upstream *(10/12/2022)*

Photo Point 38 – UT1 Reach 1 stream realignment *(2/11/2022)*

Vegetation Photographs

Monitoring Year 6

Vegetation Plot 1 - *(8/10/2022)*

Vegetation Plot 2 - *(8/10/2022)*

Vegetation Plot 3 - *(8/10/2022)*

Vegetation Plot 4 - *(8/10/2022)*

Vegetation Plot 5 - *(8/10/2022)*

Vegetation Plot 6 - *(8/10/2022)*

Vegetation Plot 7 - *(8/10/2022)*

Vegetation Plot 8 - *(8/10/2022)*

Vegetation Plot 9 - *(8/10/2022)*

Vegetation Plot 10 - *(8/10/2022)*

Vegetation Plot 11 - *(8/10/2022)*

Vegetation Plot 12 - *(8/10/2022)*

Vegetation Plot 13 - *(8/10/2022)*

Vegetation Plot 14 - *(8/10/2022)*

Vegetation Plot 15 - *(8/10/2022)*

Vegetation Plot 16 – *(8/10/2022)*

Vegetation Plot 17 - *(8/10/2022)*

Transect Vegetation Plot 1 - *(8/10/2022)*

Transect Vegetation Plot 2 - *(8/10/2022)*

Bog Vegetation Photographs

Monitoring Year 6

Bog Vegetation Plot 1 - *(10/12/2022)*

Bog Vegetation Plot 2 - *(10/12/2022)*

Bog Vegetation Plot 3 - *(10/12/2022)*

Bog Vegetation Plot 4 - *(10/12/2022)*

Bog Vegetation Plot 5 - *(10/12/2022)*

Bog Vegetation Plot 6 - *(10/12/2022)*

	
Bog Vegetation Plot 7 - *(10/12/2022)*	**Bog Vegetation Plot 8** - *(10/12/2022)*

Gray's Lily Photographs

Monitoring Year 6

	
Gray's Lily location 1 - *(5/11/2022)*	**Gray's Lily location 2** - *(6/04/2019)*

Vile Creek
Repairs Photo Log
MY6

Vile Creek R2: STA 118+50 - 118+80 - Right Bank Repair 05-11-2022

Vile Creek R2: STA 118+80 – J-Hook Repair 05-11-2022

Vile Creek R2: STA 119+50 - 119+70 - Bank Repair 05-11-2022

Vile Creek R2: STA 121+00 - 121+25 - Right Bank Repair 05-11-2022

Vile Creek R2: STA 122+20 - 123+00 – Stream Repair 05-11-2022

Vile Creek R2: STA 123+00 – Rock Sill Repair 05-11-2022

	
Vile Creek R3: STA 125+00 - 125+60 - Secondary Channel Repair 05-11-2022	UT2 BMP – Headcut Repair 05-11-2022

Vile Creek
Easement Encroachment Photographs
MY6

UT1 R1: Easement encroachment- additional signage and horse tape added in January 2023

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment

Vile Creek Mitigation Site

DMS Project No. 96582

Monitoring Year 6 - 2022

Plot	MY7 Success Criteria Met (Y/N)	Tract Mean
1	Y	
2	Y	
3	Y	
4	Y	
5	N	
6	Y	
7	Y	
8	Y	
9	N	82%
10	Y	
11	Y	
12	Y	
13	Y	
14	N	
15	Y	
16	Y	
17	Y	

Table 8. CVS Vegetation Plot Metadata
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Report Prepared By	Jessica Waller
Date Prepared	10/1/2022 11:32
Database Name	cvs-eep-entrytool-v2.5.0 Vile MY6.mdb
Database Location	C:\Users\jwaller\OneDrive - Wildlands Engineering Inc\Desktop
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project Total Stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	96582
project Name	Vile Creek Restoration Project
Description	Stream and Wetland Mitigation
Required Plots (calculated)	17
Sampled Plots	17

Table 9a. Planted and Total Stem Counts

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

			Current Plot Data (MY6 2022)																		
			Vegetation Plot 1*			Vegetation Plot 2*			Vegetation Plot 3			Vegetation Plot 4			Vegetation Plot 5			Vegetation Plot 6			Vegetation Plot 7		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree																					
Acer rubrum	red maple	Tree			45			30	1	1	1			50			1						
Alnus serrulata	Tag Alder	Shrub Tree			2			1															
Aronia arbutifolia	Red Chokeberry	Shrub																					
Betula nigra	River Birch, Red Birch	Tree										3	3	3	1	1	1	4	4	6			
Carpinus caroliniana	American hornbeam	Shrub Tree										1	1	1				2	2	8	1	1	1
Cephalanthus occidentalis	Buttonbush	Shrub Tree	5	5	5	5	5	5															
Cornus amomum	Silky Dogwood	Shrub Tree	1	1	1	3	3	3	13	13	13												
Diospyros virginiana	American Persimmon	Tree																			1	1	1
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree										3	3	3	2	2	2	2	2	2	6	6	6
Lindera benzoin	Northern Spicebush	Shrub Tree																					
Liriodendron tulipifera	tulip poplar	Tree																1	1	1			
Nyssa sylvatica	Black Gum	Tree																					
Platanus occidentalis	Sycamore, Plane-tree	Tree										4	4	4	2	2	2	3	3	3	2	2	2
Quercus pagoda	Cherrybark Oak	Tree										2	2	2				2	2	2	2	2	2
		Stem count	6	6	53	8	8	39	14	14	14	13	13	63	5	5	6	14	14	22	12	12	12
		size (ares)	1			1			1			1			1			1			1		
		size (ACRES)	0.0247			0.0247			0.0247			0.0247			0.0247			0.0247			0.0247		
		Species count	2	2	4	2	2	4	2	2	2	5	5	6	3	3	4	6	6	6	5	5	5
		Stems per ACRE	243	243	2145	324	324	1578.274	567	567	567	526	526	2550	202	202	243	567	567	890	486	486	486

			Current Plot Data (MY6 2022)																		
			Vegetation Plot 8			Vegetation Plot 9			Vegetation Plot 10			Vegetation Plot 11			Vegetation Plot 12			Vegetation Plot 13			Vegetation Plot 14		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree															1			10			
Acer rubrum	red maple	Tree																					
Alnus serrulata	Tag Alder	Shrub Tree										1	1	1						1			
Aronia arbutifolia	Red Chokeberry	Shrub																					
Betula nigra	River Birch, Red Birch	Tree							2	2	2	3	3	3	2	2	2						
Carpinus caroliniana	American hornbeam	Shrub Tree										3	3	3	1	1	1	1	1	1			
Cephalanthus occidentalis	Buttonbush	Shrub Tree																					
Cornus amomum	Silky Dogwood	Shrub Tree																					
Diospyros virginiana	American Persimmon	Tree	1	1	1													1	1	1			
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	6	6	6	1	1	1	4	4	4	1	1	1	3	3	3	1	1	1			
Lindera benzoin	Northern Spicebush	Shrub Tree																					
Liriodendron tulipifera	tulip poplar	Tree	1	1	1															5			
Nyssa sylvatica	Black Gum	Tree													1	1	1			1			
Platanus occidentalis	Sycamore, Plane-tree	Tree	2	2	2	3	3	3	5	5	5	2	2	2	2	2	2	5	5	5	1	1	1
Quercus pagoda	Cherrybark Oak	Tree							3	3	3	1	1	1	3	3	3	2	2	2	2	2	2
		Stem count	10	10	10	4	4	4	14	14	14	11	11	11	12	12	13	10	10	27	3	3	3
		size (ares)	1			1			1			1			1			1			1		
		size (ACRES)	0.0247			0.0247			0.0247			0.0247			0.0247			0.0247			0.0247		
		Species count	4	4	4	2	2	2	4	4	4	6	6	6	6	6	7	5	5	9	2	2	2
		Stems per ACRE	405	405	405	162	162	162	567	567	567	445	445	445	486	486	526	405	405	1093	121	121	121

			Current Plot Data (MY6 2022)								
			Vegetation Plot 15			Vegetation Plot 16			Vegetation Plot 17		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree									
Acer rubrum	red maple	Tree									
Alnus serrulata	Tag Alder	Shrub Tree									
Aronia arbutifolia	Red Chokeberry	Shrub									
Betula nigra	River Birch, Red Birch	Tree	1	1	1	6	6	6			
Carpinus caroliniana	American hornbeam	Shrub Tree	3	3	3	1	1	1			
Cephalanthus occidentalis	Buttonbush	Shrub Tree									
Cornus amomum	Silky Dogwood	Shrub Tree									
Diospyros virginiana	American Persimmon	Tree			1				1	1	1
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree							1	1	1
Lindera benzoin	Northern Spicebush	Shrub Tree									
Liriodendron tulipifera	tulip poplar	Tree							3	3	3
Nyssa sylvatica	Black Gum	Tree									
Platanus occidentalis	Sycamore, Plane-tree	Tree	5	5	5				3	3	3
Quercus pagoda	Cherrybark Oak	Tree	1	1	1	1	1	1	1	1	1
		Stem count	10	10	11	8	8	8	9	9	9
		size (ares)	1			1			1		
		size (ACRES)	0.0247			0.0247			0.0247		
		Species count	4	4	5	3	3	3	5	5	5
		Stems per ACRE	405	405	445	324	324	324	364	364	364

* MY3 - MY7 vegetation plots one and two will use shrub density requirements to determine if success critera is met.

Color For Density

Exceeds requirements by 10% or greater
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9b. Planted Stem Annual Means

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Current Permanent Vegetation Plot Data (MY6 2022) Total Stem Counts and Annual Means																				
			MY6 (8/2022)			MY5 (9/2021)			MY3 (9/2019)			MY2 (9/2018)			MY1 (9/2017)			MY0 (3/2017)		
Scientific Name	**Common Name**	**Species Type**	PnoLS	P-all	T	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	boxelder	Tree			11															
Acer rubrum	red maple	Tree	1	1	127	1	1	69	1	1	1	1	1	2	1	1	1			
Alnus serrulata	Tag Alder	Shrub Tree	1	1	5			6						3						
Aronia arbutifolia	Red Chokeberry	Shrub																1	1	1
Betula nigra	River Birch, Red Birch	Tree	22	22	24	20	20	20	27	27	27	29	29	29	43	43	43	55	55	55
Carpinus caroliniana	American hornbeam	Shrub Tree	13	13	19	12	12	12	13	13	13	16	16	16	21	21	21	21	21	21
Cephalanthus occidentalis	Buttonbush	Shrub Tree	10	10	10	10	10	10	8	8	8	12	12	12	12	12	12	14	14	14
Cornus amomum	Silky Dogwood	Shrub Tree	17	17	17	17	17	18	17	17	17	17	17	19	16	16	16	19	19	19
Diospyros virginiana	American Persimmon	Tree	4	4	5	5	5	5	7	7	7	9	9	9	11	11	11	12	12	12
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	30	30	30	33	33	33	34	34	34	35	35	35	36	36	36	35	35	35
Lindera benzoin	Northern Spicebush	Shrub Tree							2	2	2	7	7	7	11	11	11	14	14	14
Liriodendron tulipifera	tulip poplar	Tree	5	5	10	6	6	7	15	15	16	18	18	18	24	24	24	38	38	38
Nyssa sylvatica	Black Gum	Tree	1	1	2															
Platanus occidentalis	Sycamore, Plane-tree	Tree	39	39	39	36	36	37	37	37	37	38	38	39	40	40	40	40	40	40
Quercus pagoda	Cherrybark Oak	Tree	20	20	20	22	22	22	26	26	26	29	29	29	35	35	35	39	39	39
		Stem count	163	163	319	162	162	239	187	187	188	211	211	218	250	250	250	288	288	288
		size (ares)	17			17			17			17			17			17		
		size (ACRES)	0.420			0.420			0.420			0.420			0.420			0.420		
		Species count	12	12	13	10	10	11	11	11	11	11	11	12	11	11	11	11	11	11
		Stems per ACRE	388	388	759	386	386	569	445	445	448	502	502	519	595	595	595	686	686	686

Color For Density

Exceeds requirements by 10% or greater
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9c. Transect Plots and Planted Stem Annual Means

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Supplimental Planting Transect Vegetation Plot (MP) Data (MY6 2022) and Total Stem Counts and Annual Means						
			MP 1	MP2	MY6 (8/2022)	MY5 (9/2021)
Scientific Name	**Common Name**	**Species Type**	**Pnols**	**Pnols**	**PnoLS**	**PnoLS**
Acer rubrum	Red Maple	Tree				
Aronia arbutifolia	Red Chokeberry	Shrub				
Alnus serrulata	Tag Alder	Shrub Tree				
Betula nigra	River Birch	Tree	3	3	6	7
Carpinus caroliniana	Ironwood	Shrub Tree	2	2	4	2
Cephalanthus occidentalis	Buttonbush	Shrub Tree				
Cornus amomum	Silky Dogwood	Shrub Tree	1		1	
Diospyros virginiana	American Persimmon	Tree		1	1	
Fraxinus pennsylvanica	Green Ash	Tree				
Lindera benzoin	Northern Spicebush	Shrub Tree				
Liriodendron tulipifera	Tulip Poplar	Tree				1
Platanus occidentalis	Sycamore	Tree	6	3	9	8
Quercus pagoda	Cherrybark Oak	Tree	1		1	1
Nyssa sylvatica**	Blackgum	Tree				2
		Stem count	13	9	22	21
		size (ares)	1	1	2	2
		size (ACRES)	0.0247	0.0247	0.049	0.049
		Species count	5	4	6	6
		Stems per ACRE	526	364	445	425

** Blackgum included in the approved supplimental planting list.

Color For Density

Exceeds requirements by 10% or greater
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total Stems

Table 9d. Planted Herbaceous Cover (Bog Cells)
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Percent Cover %								
Plot ID	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
1	<5	30	65	100	N/A	100	100	
2	10	75	100	100	N/A	95	98	
3	<5	75	95	95	N/A	100	100	
4	<5	90	100	100	N/A	100	100	
5	<5	80	90	100	N/A	95	100	
6	<5	85	95	100	N/A	98	100	
7	<5	100	100	100	N/A	98	100	
8	50	95	100	100	N/A	100	100	

Table 9e. Planted Tree Heights

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Tree Height Averages	
Plot	**Average (ft)**
VP3	2.7
VP4	5.5
VP5	3.2
VP6	4.6
VP7	5.2
VP8	5.0
VP9	9.3
VP10	5.8
VP11	5.8
VP12	4.8
VP13	4.6
VP14	3.5
VP15	8.0
VP16	7.8
VP17	7.9
Site Average	5.6

*VP1 and VP2 excluded; no height requirements for shrub plots

APPENDIX 4. Morphological Summary Data and Plots

Morphological surveys and analysis not required in Monitoring Year 6

APPENDIX 5. Hydrology Summary Data and Plots

Table 13a. Verification of Bankfull Events
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Reach	Monitoring Year	Date of Occurrence	Method
Vile Reach 2	MY1	3/31/2017	Crest Gage
		4/24/2017	
		10/8/2017	
	MY2	9/16/2018	
		10/11/2018	
	MY4	1/11/2020	
		1/22/2020	
		2/7/2020	
		4/13/2020	
		5/20/2020	
		5/27/2020	
		8/15/2020	
		9/29/2020	
		10/29/2020	
	MY5	4/10/2021	
UT1 Reach 2	MY1	5/5/2017	
		10/8/2017	
	MY2	10/11/2018	
	MY3	6/17/2019	
		8/1/2019	
		9/30/2019	
	MY4	1/11/2020	
		1/24/2020	
		2/6/2020	
		4/13/2020	
		4/29/2020	
		5/20/2020	
		5/27/2020	
		7/23/2020	
		8/15/2020	
		9/12/2020	
		9/29/2020	
		10/29/2020	
	MY5	2/3/2021	
		4/10/2021	

Table 13b. Verification of Geomorphically Significant Events
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Reach	Monitoring Year	Date of Occurrence	Method
Vile Reach 2	MY3	2/23/2019	Crest Gage
		4/14/2019	
		4/19/2019	
		6/17/2019	
		7/5/2019	
		8/1/2019	
		9/30/2019	
	MY4	1/11/2020	
		1/21/2020	
		1/24/2020	
		2/6/2020	
		4/13/2020	
		4/29/2020	
		5/20/2020	
		5/27/2020	
		8/3/2020	
		8/15/2020	
		9/12/2020	
		9/29/2020	
		10/11/2020	
		10/29/2020	
	MY5	4/10/2021	
		8/17/2021	
	MY6	3/23/2022	
		9/5/2022	
UT1 Reach 2	MY3	2/23/2019	
		4/14/2019	
		4/19/2019	
		6/17/2019	
		7/30/2019	
		8/1/2019	
		9/30/2019	
	MY4	1/11/2020	
		1/21/2020	
		1/24/2020	
		2/6/2020	
		4/13/2020	
		4/29/2020	
		5/20/2020	
		5/27/2020	
		7/19/2020	
		7/23/2020	
		8/15/2020	
		8/20/2020	
		9/12/2020	
		9/29/2020	
		10/11/2020	
		10/29/2020	
	MY5	2/3/2021	
		4/10/2021	
	MY6	7/6/2022	
		7/17/2022	
		8/9/2022	

Table 14. Wetland Gage Attainment Summary

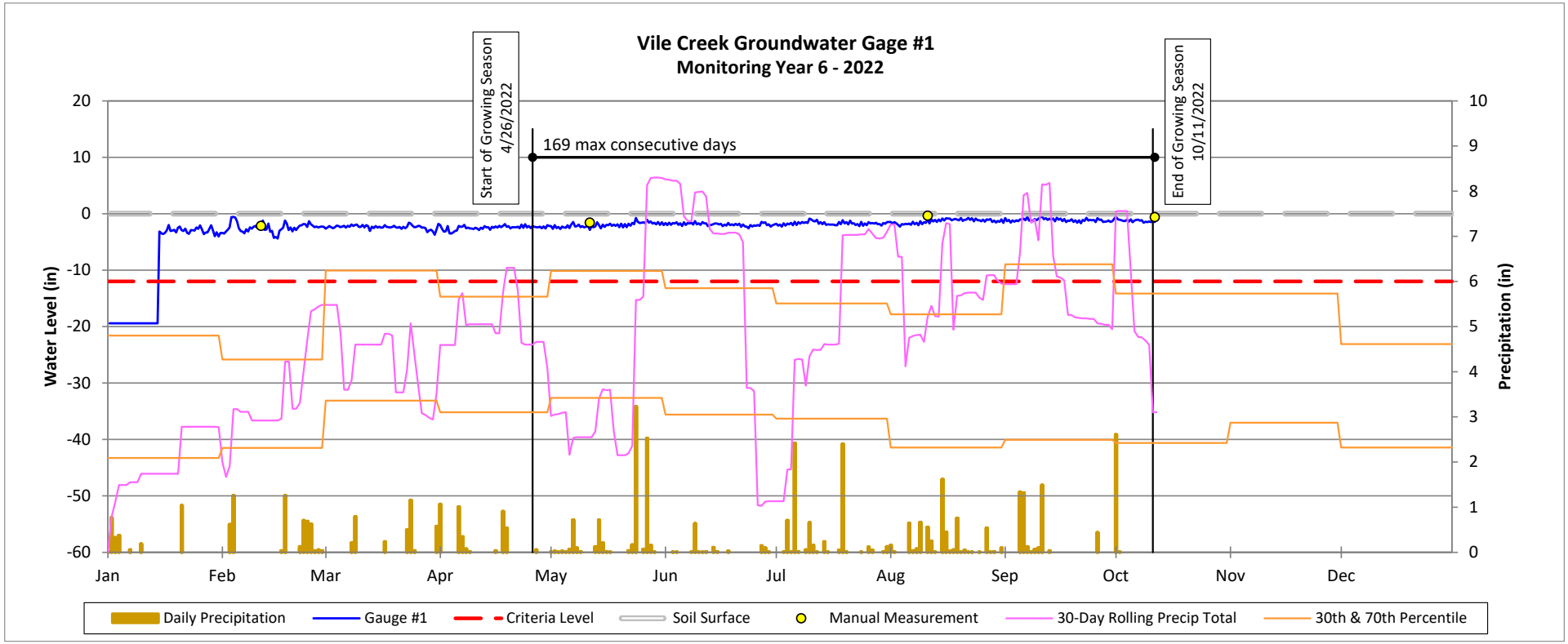
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

Summary of Groundwater Gage Results for Monitoring Years 1 through 7							
Gage	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)**	Year 6 (2022)	Year 7 (2023)
1*	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/150 Days (89%)	Yes/169 Days (100%)	
2	Yes/ 129 Days (77%)	Yes/33 Days (20%)	Yes/15 Days (9%)	Yes/70 Days (41%)	Yes/150 Days (89%)	Yes/24 Days (14%)	
3	Yes/169 Days (100%)	Yes/73 Days (43%)	Yes/14 Days (8.5%)	Yes/85 Days (50%)	Yes/127 Days (75%)	Yes/23 Days (14%)	
4	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/150 Days (89%)	Yes/169 Days (100%)	
5	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/150 Days (89%)	Yes/153 Days (91%)	
6	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/150 Days (89%)	Yes/153 Days (91%)	
7	Yes/ 129 Days (77%)	Yes/33 Days (20%)	Yes/24 Days (14%)	Yes/85 Days (50%)	Yes/150 Days (89%)	Yes/169 Days (100%)	
8	Yes/125 Days (74%)	Yes/14 Days (8%)	No/4 Days (2%)	Yes/44 Days (26%)	Yes/27 Days (16%)	Yes/29 Days (17%)	
9	Yes/40 Days (24%)	Yes/33 Days (20%)	Yes/106 Days (63%)	Yes/169 Days (100%)	Yes/150 Days (89%)	Yes/153 Days (91%)	
10*	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/169 Days (100%)	Yes/150 Days (89%)	Yes/169 Days (100%)	

*Gages are located in bog habitat.
**Vile Creek Barotroll malfunctioned on 9/22/21 and all subsequent data was omitted from the report
Growing season: April 26th -October 11th
Success criteria for wetlands is 14 consecutive days (8.5%) and 20 consecutive days (12%) for bogs.

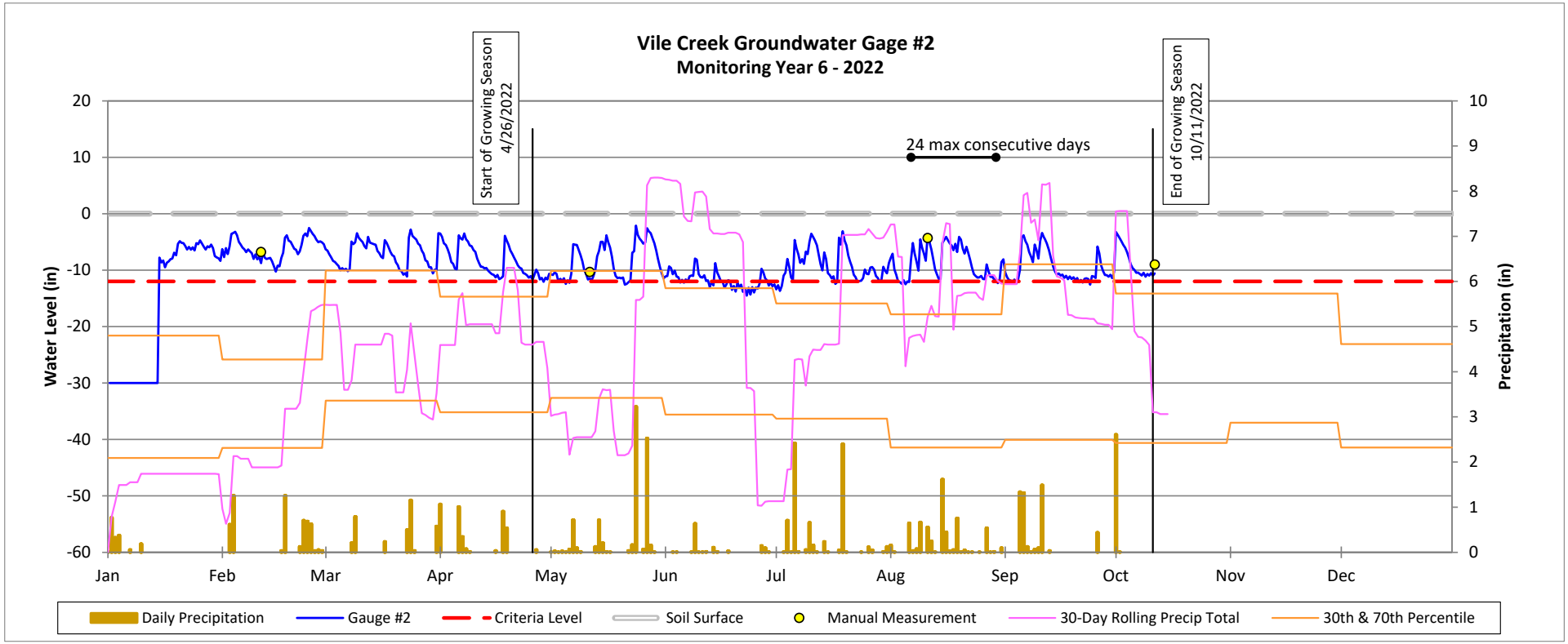
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Wetland Bog Rehabilitation



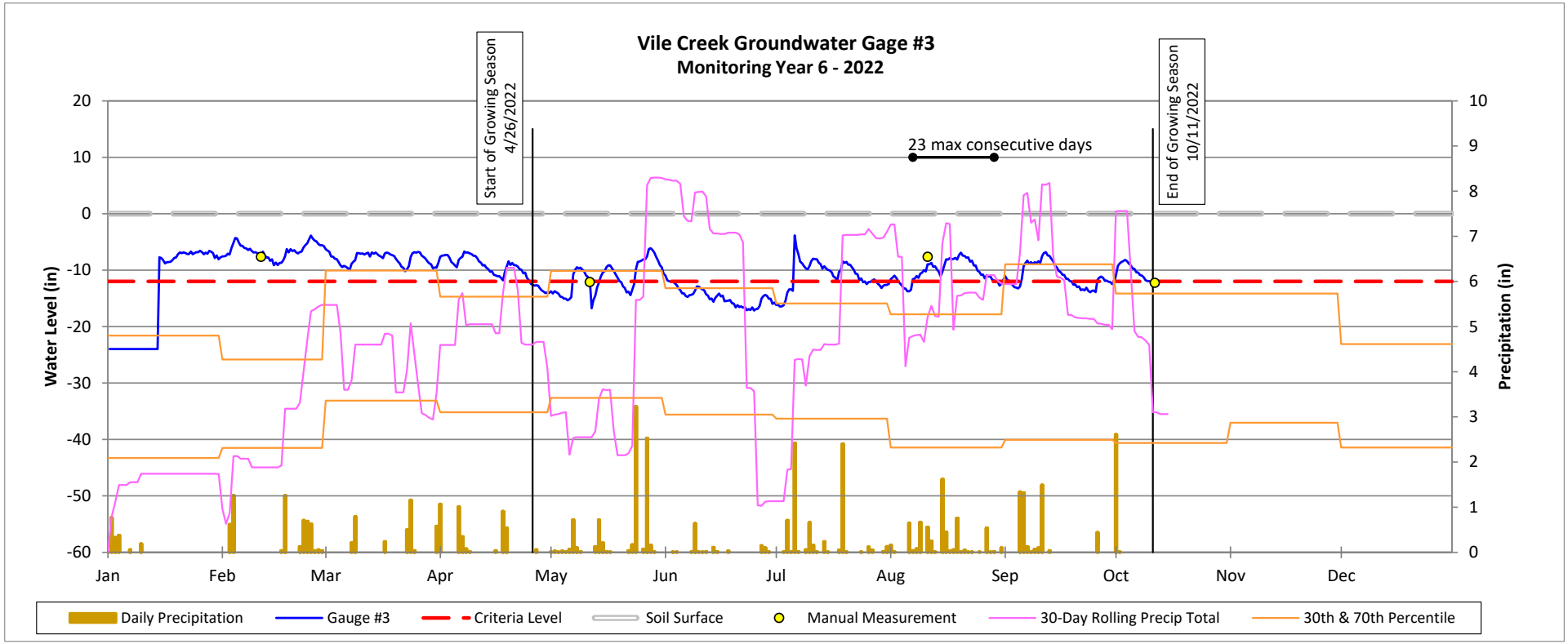
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



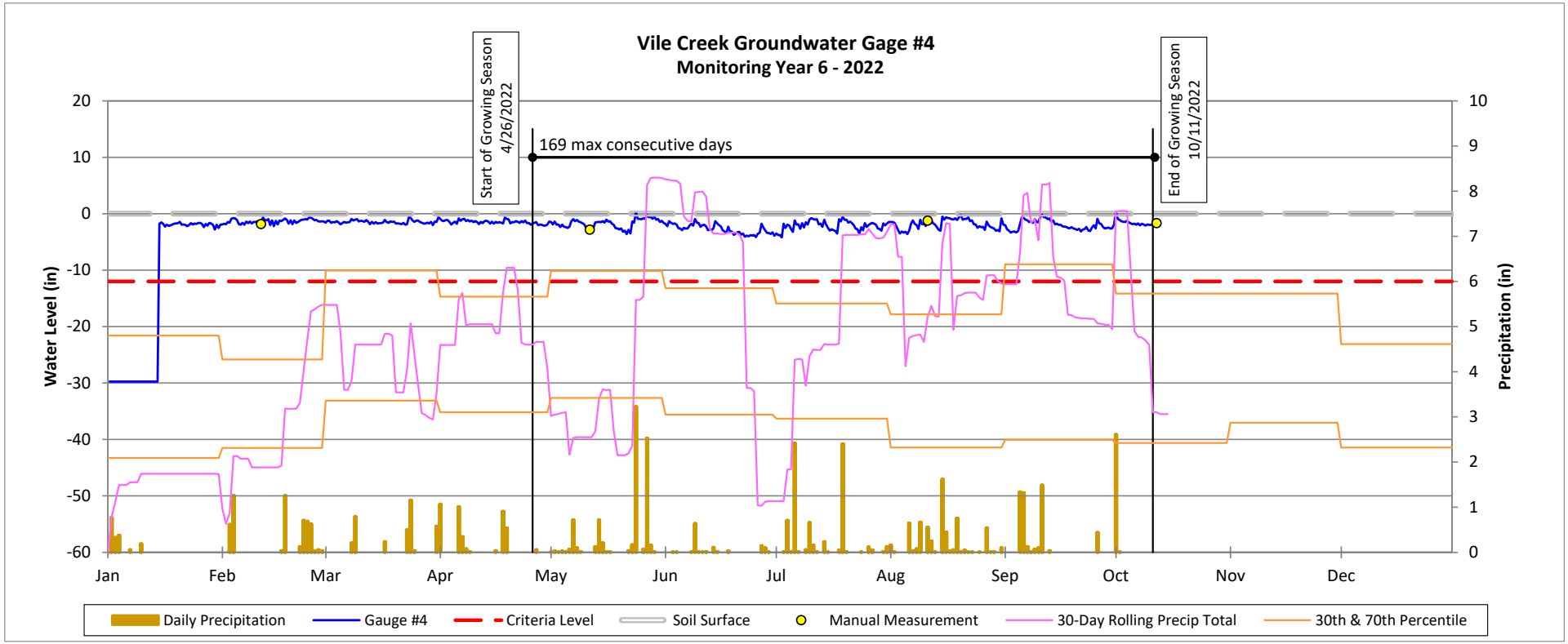
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



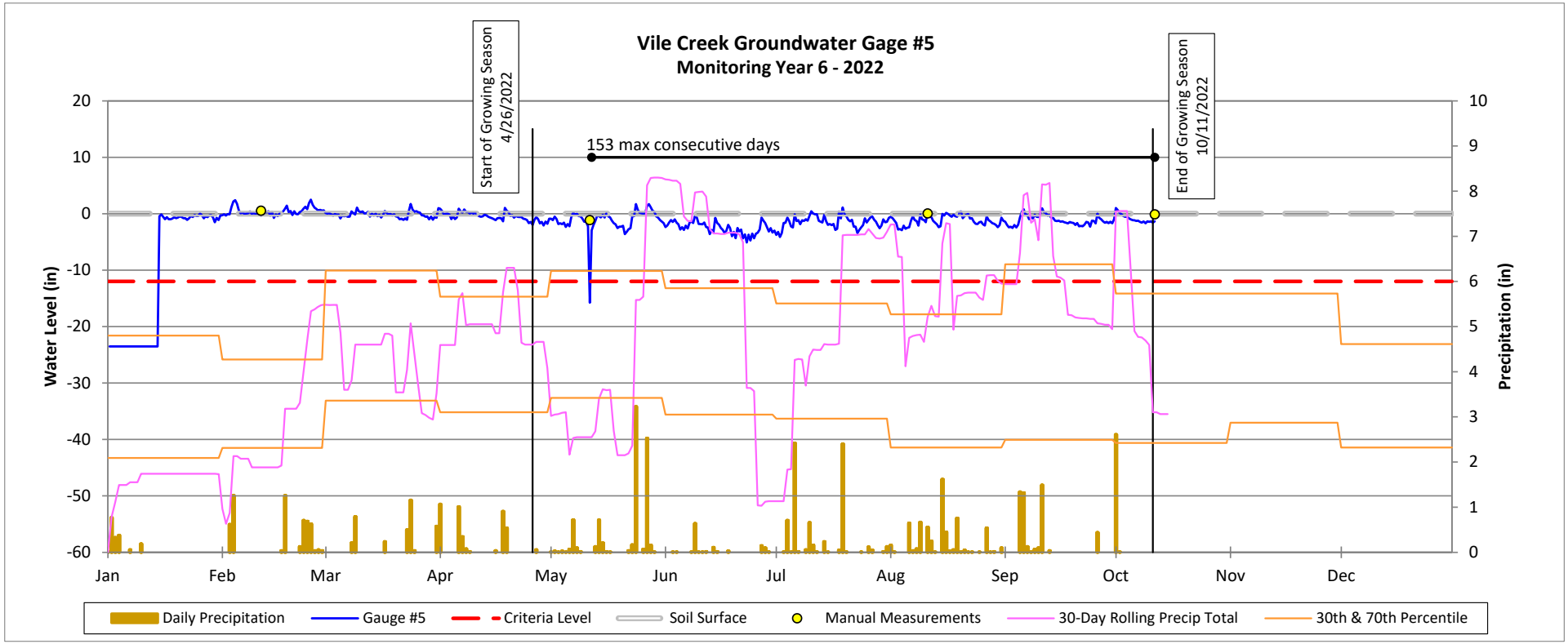
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



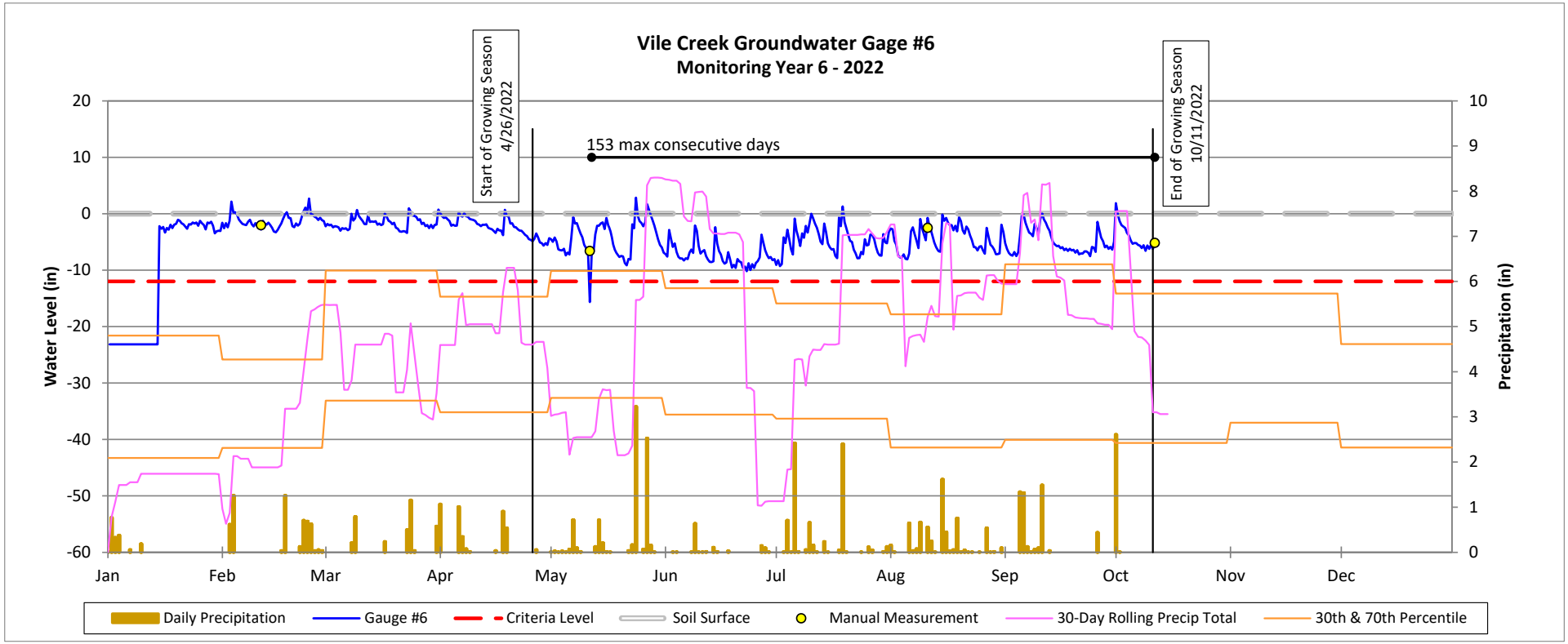
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Rehabilitation



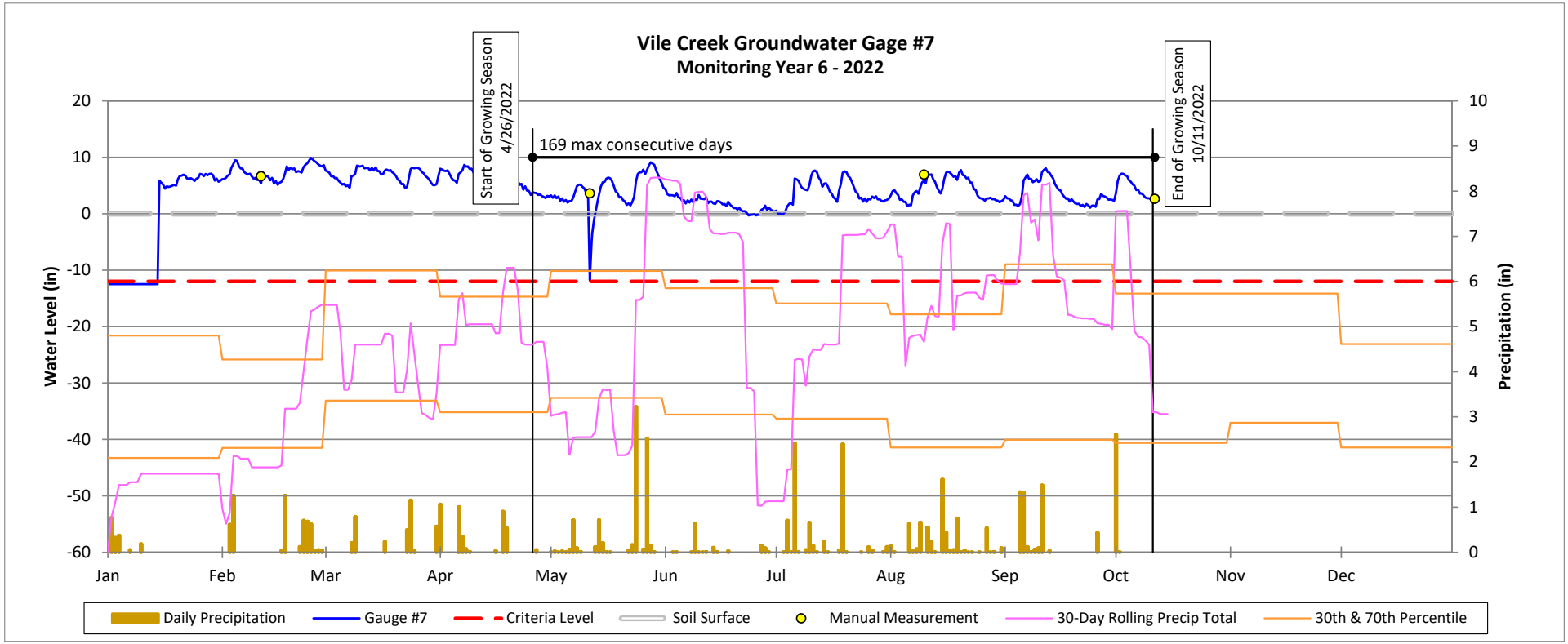
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



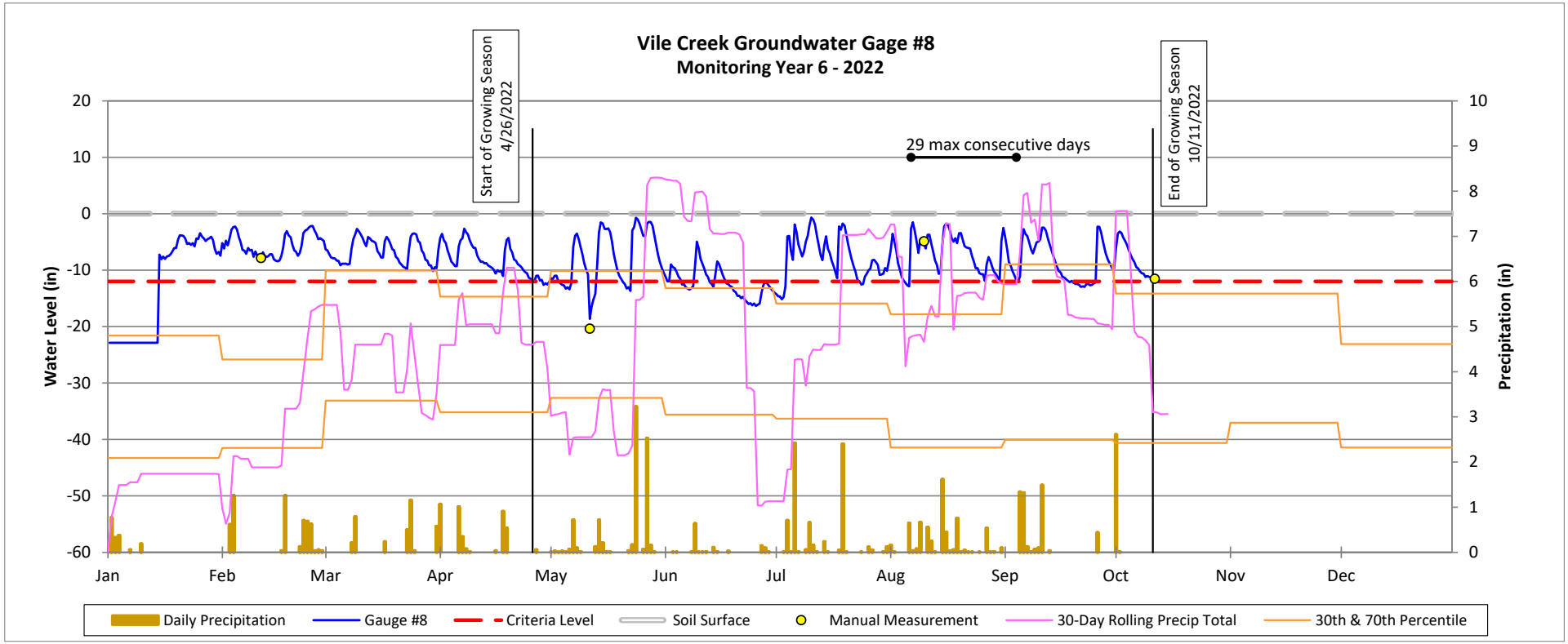
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



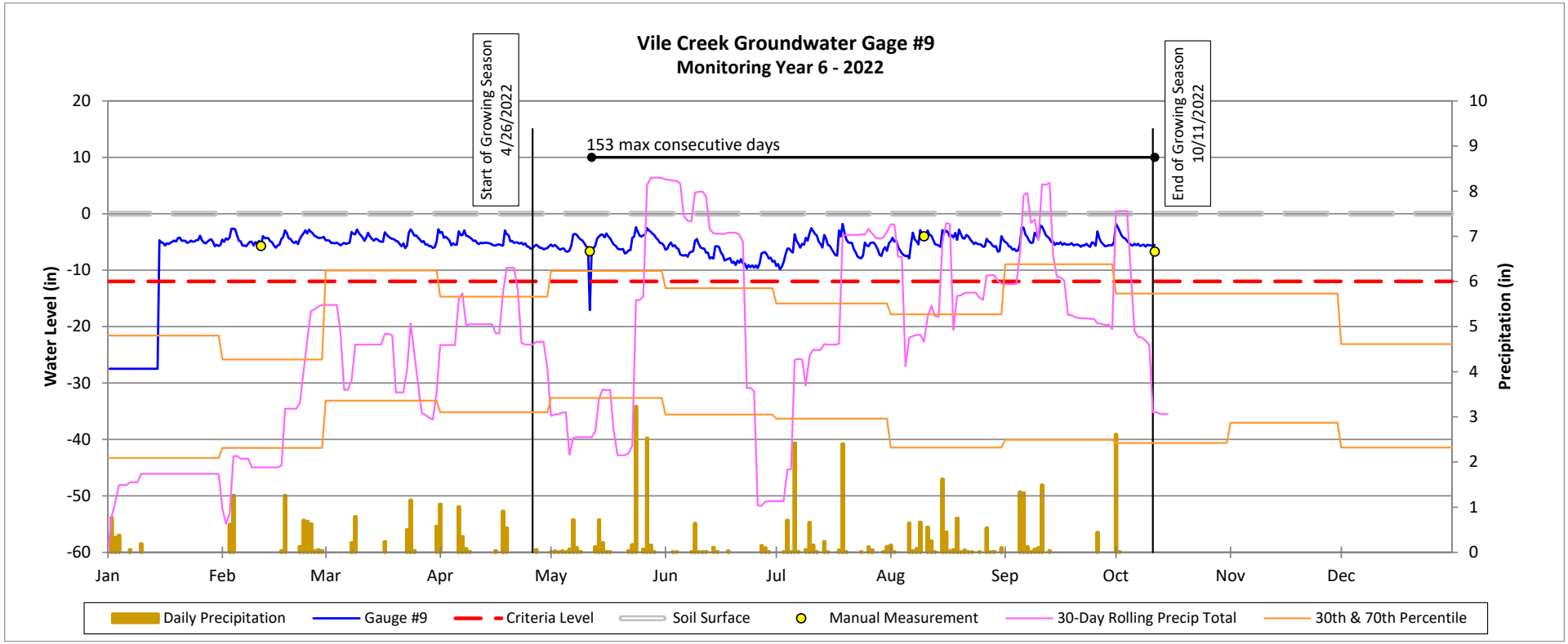
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



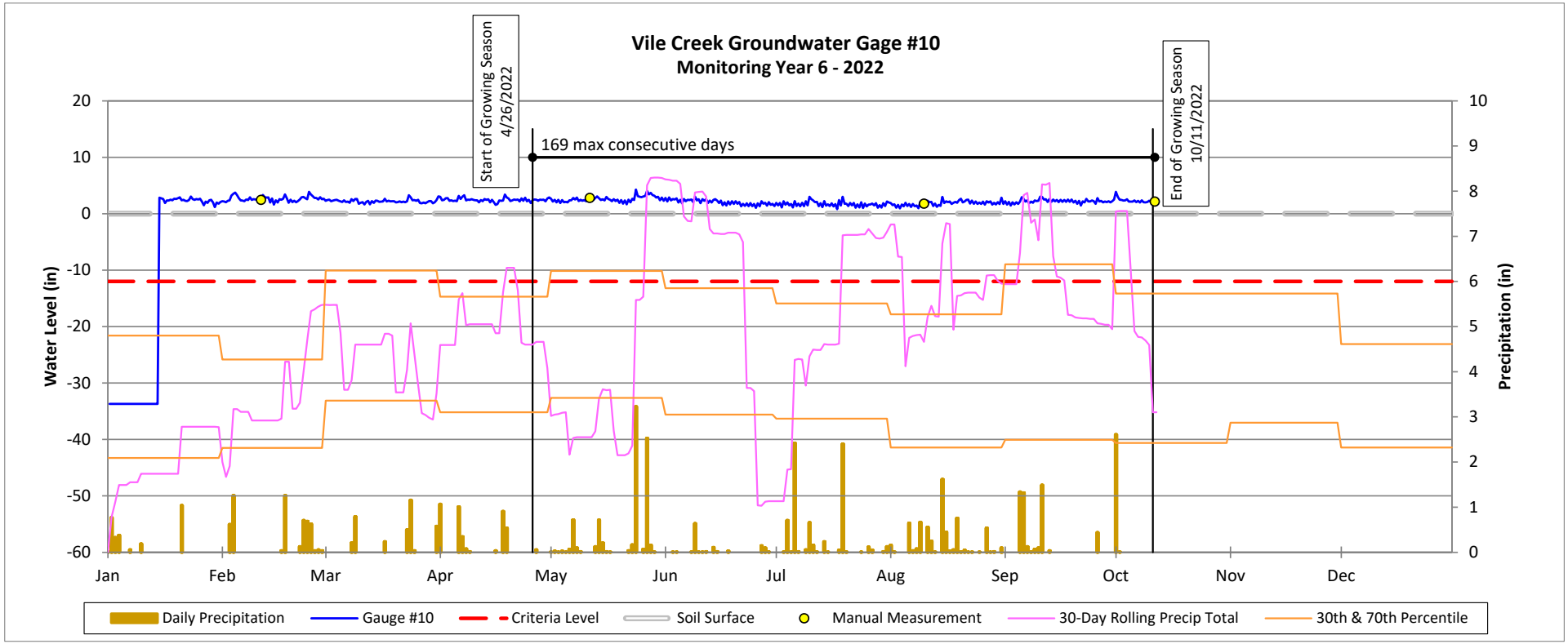
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Re-Establishment



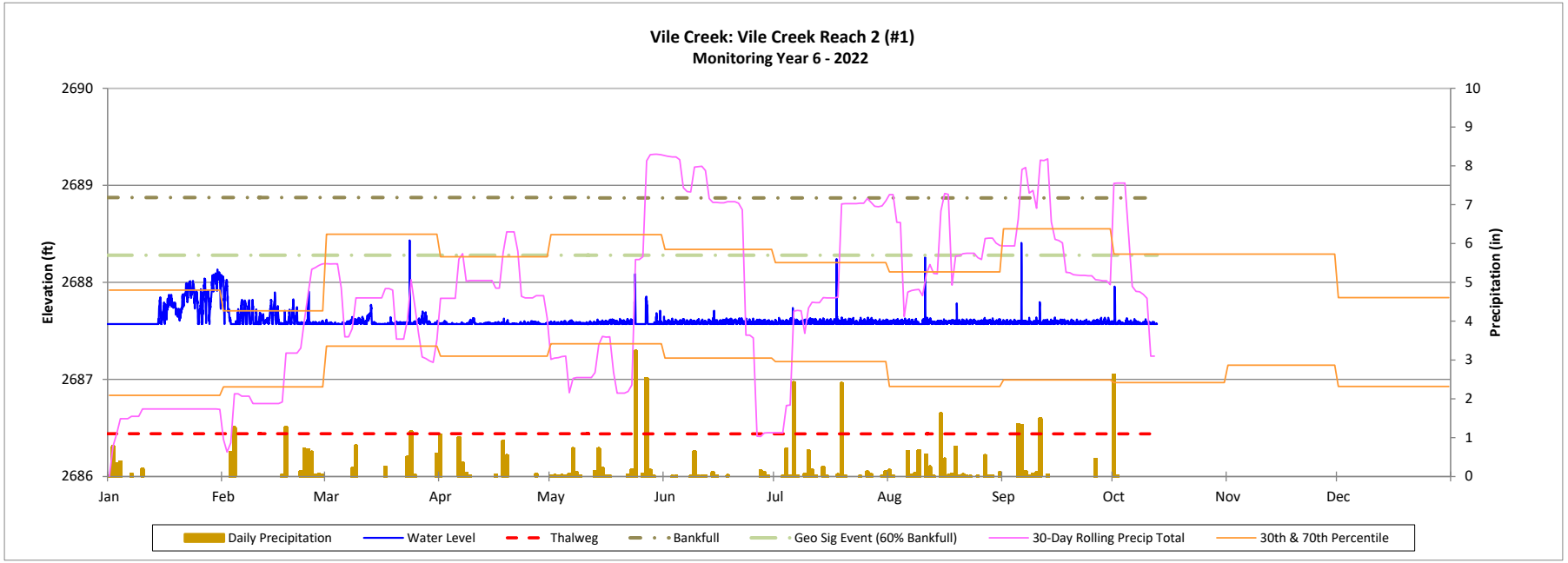
Groundwater Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022
Wetland Wetland Bog Rehabilitation



Crest Gage Plot

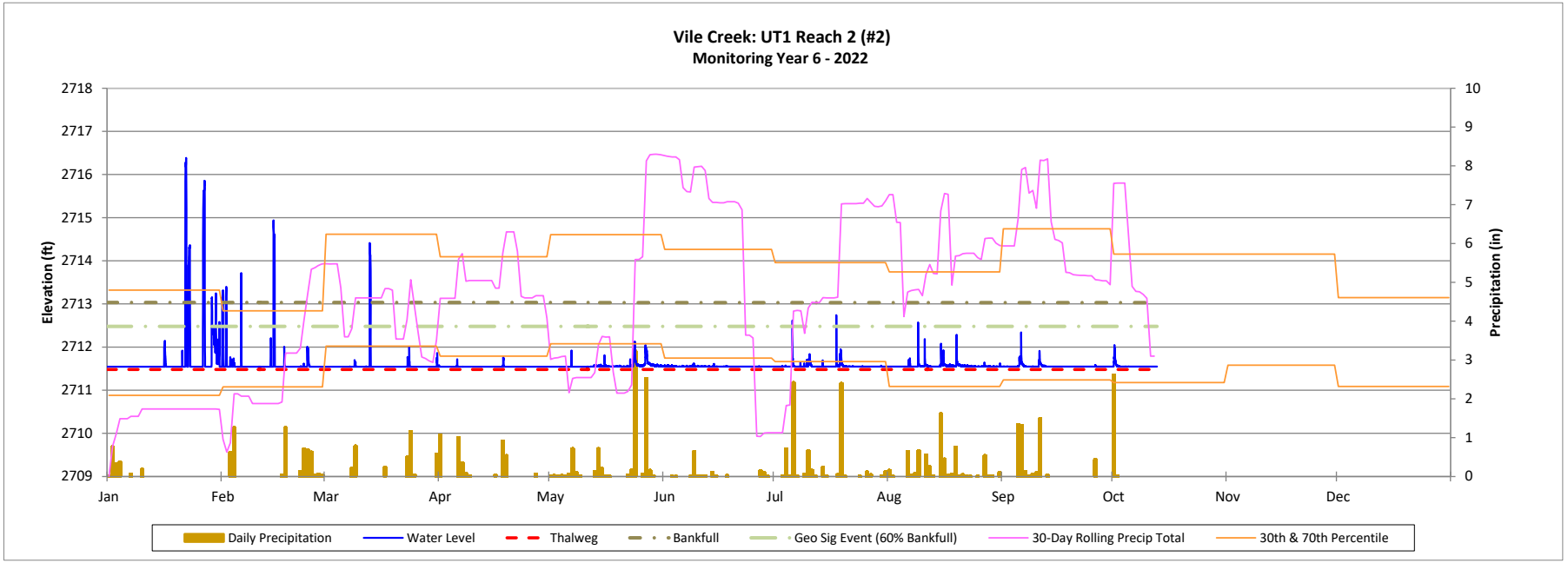
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022



*Crest Gage probe experienced intermittent freezing temperatures Jan - Mar 2022 resulting in incorrect water level readings

Crest Gage Plot

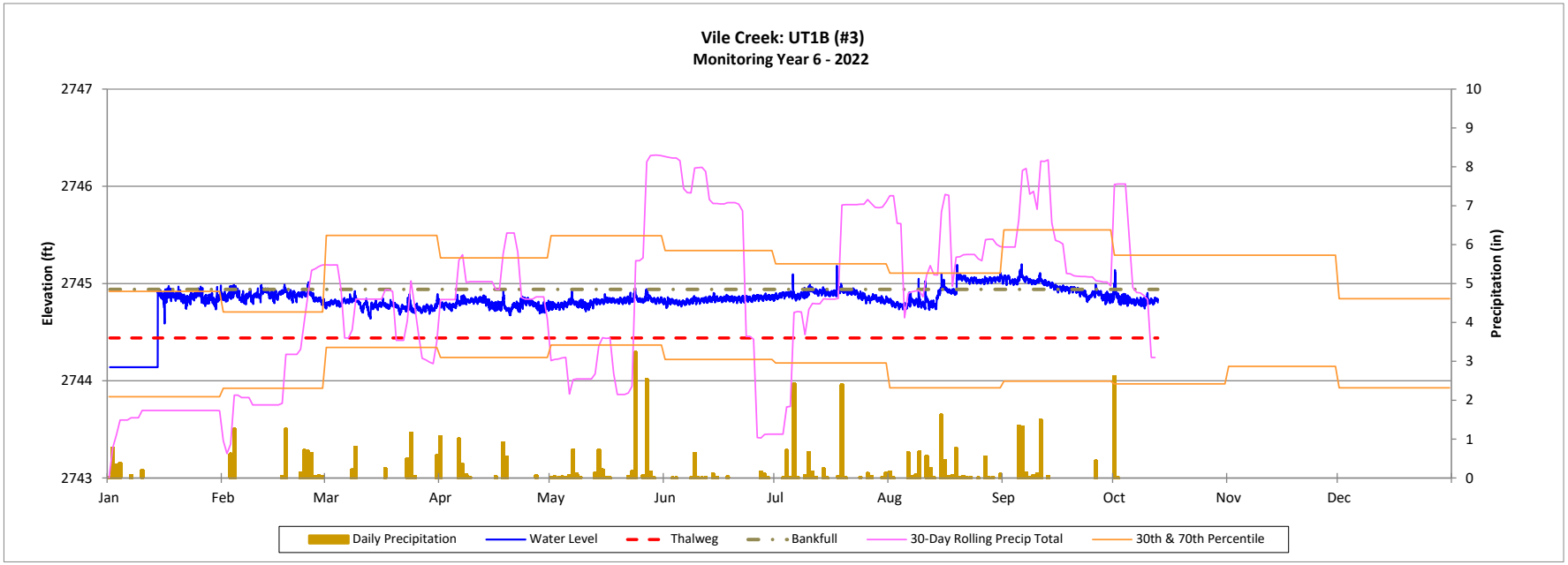
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022



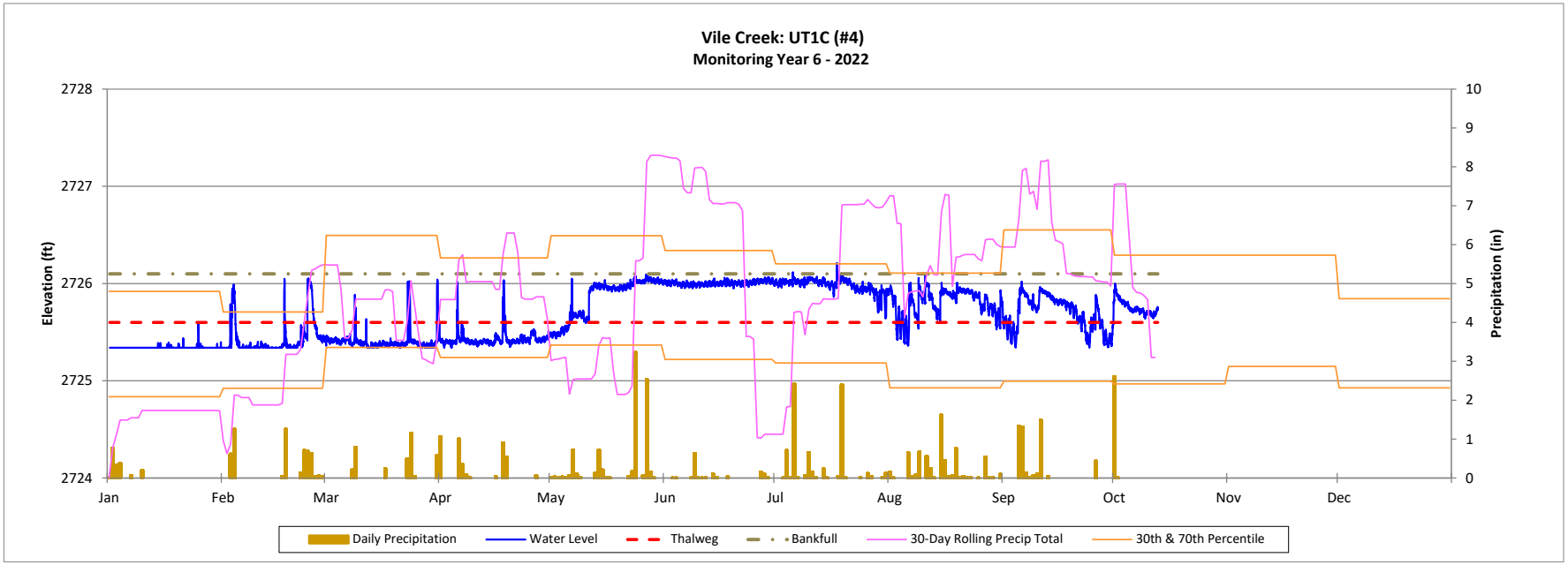
*Crest Gage probe experienced intermittent freezing temperatures Jan-Mar 2022 resulting in incorrect water level readings

Crest Gage Plot

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022

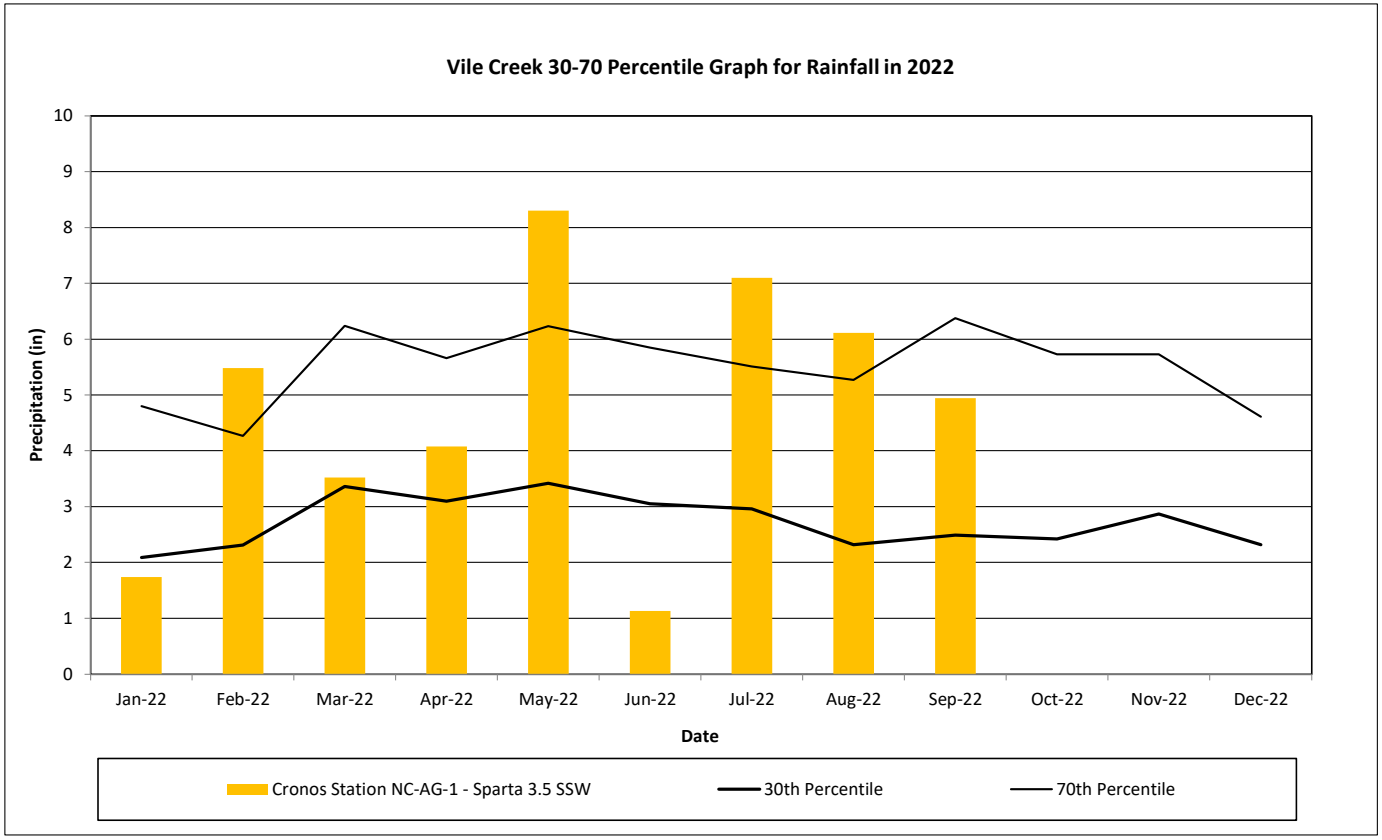


Crest Gage Plot
Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022



Monthly Rainfall Data

Vile Creek Mitigation Site
DMS Project No. 96582
Monitoring Year 6 - 2022



2022 rainfall collected by Cronos Station NC-AG-1 - Sparta 3.5 SSW
30th and 70th percentile rainfall data collected from Wets Station Sparta 3.5 SSW, NC (Years 1971 - 2021)

APPENDIX 6. Correspondence

Jessica Waller

From: Tsomides, Harry <harry.tsomides@ncdenr.gov>
Sent: Monday, January 23, 2023 4:19 PM
To: Kristi Suggs
Cc: Jeff Keaton; Sam Kirk; Phillips, Kelly D; Jessica Waller
Subject: RE: [External] RE: Property Action Items for MY6 (2022) Closeout preparation (2024) - Vile Creek_DMS# 96582

Great, thanks so much!!!

Harry Tsomides, Project Manager
NCDEQ - Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801
(828) 545-7057 cell phone

From: Kristi Suggs <ksuggs@wildlandseng.com>
Sent: Monday, January 23, 2023 4:15 PM
To: Tsomides, Harry <harry.tsomides@ncdenr.gov>
Cc: Jeff Keaton <jkeaton@wildlandseng.com>; Sam Kirk <skirk@wildlandseng.com>; Phillips, Kelly D <Kelly.Phillips@ncdenr.gov>; Jessica Waller <jwaller@wildlandseng.com>
Subject: [External] RE: Property Action Items for MY6 (2022) Closeout preparation (2024) - Vile Creek_DMS# 96582

Harry,

Your ears must have been burning. We were just talking about this a little bit ago. We checked and stamping the caps was included as a task of Kee's contract. Sam is going to follow-up with Kee to have them verify if there are any additional caps that need stamped and to stamp the caps as required. Thank you for the reminder.

From: Tsomides, Harry <harry.tsomides@ncdenr.gov>
Sent: Monday, January 23, 2023 2:45 PM
To: Kristi Suggs <ksuggs@wildlandseng.com>
Cc: Jeff Keaton <jkeaton@wildlandseng.com>; Sam Kirk <skirk@wildlandseng.com>; Phillips, Kelly D <Kelly.Phillips@ncdenr.gov>
Subject: RE: Property Action Items for MY6 (2022) Closeout preparation (2024) - Vile Creek_DMS# 96582

Kristi
Can you comment on this and provide some guidance; I believe this is part of your contract requirement, not sure what you had talked about with Kee when they did the work originally, normally they would stamp all their caps. We weren't sure if this were a sitewide issue or just the four we observed.

- Four aluminum marker caps were found in the field. None of the caps were number stamped.

Harry Tsomides, Project Manager
NCDEQ - Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801
(828) 545-7057 cell phone

From: Tsomides, Harry
Sent: Wednesday, November 9, 2022 9:09 AM
To: Kristi Suggs <ksuggs@wildlandseng.com>
Cc: Jeff Keaton <jkeaton@wildlandseng.com>; Sam Kirk <skirk@wildlandseng.com>; Phillips, Kelly D <Kelly.Phillips@ncdenr.gov>
Subject: Property Action Items for MY6 (2022) Closeout preparation (2024) - Vile Creek_DMS# 96582

Hi Kristi,

DMS conducted an easement inspection of the Vile Creek site in Alleghany County on October 12, 2022. The easement inspection was conducted in accordance with the DMS Property Checklist an includes completion of a pre-inspection office review of the plat, as-built and monitoring reports. The field effort included inspection of the entire easement boundary to validate the easement integrity.

I have attached the .kmz file showing these locations; if the photo links do not work and you would like these photos let me know. The action items and statuses should be summarized in the MY6 report. Areas of encroachment should be discussed directly with the property owner and resolved as soon as possible. I understand the project will not close until 2024 but the sooner these are addressed the better. The mowing encroachment at the west has been a problem for a few years now.

Thanks and let me know if you have any questions on this!
Harry

Office Review:

- Dedicated access was not seen on the plat.

Field Inspection:

Locations of field observations are shown on the attached kmz map.

- An area of observed mowing encroachment was located on the western end of the easement. Previously, horse tape was installed along most of the mowed area but stopped short near veg plot 8 and the scallop mowing continued west of the protective horse tape.
- Area of possible encroachment near UT2 station 309+00. The section is being actively maintained/mowed with no fencing and needs an easement post/sign to help the landowner identify the proper mowing line. The adjacent corners are not visible from one to the other.
- A damaged sign was located along UT1c.
- Leaning fence post were seen at UT1Reach2.
- Mobile deer stand inside easement near UT2 and Little River, insufficient markings at unfenced area. No encroachments were observed.
- Mobile corn feeder inside easement /gate near Vile Creek wetlands, area lacks sufficient protective markers.

Action Items

- Mowing encroachment at the west side of the easement needs installation of additional horse tape to protect the easement. Landowner should be notified of the restrictions.

- Evaluate the possible encroachment near UT2 STA 309+00. Install supplemental marking on the easement line in mowing area and notify landowner to ensure compliance; an additional marker or two along that line will help the landowner know where the line is when they want to mow.
- Evaluate the agency requirements for numbering on the monument caps and determine if marking is needed.
- Repair damaged easement signs.
- Repair any damaged fencing that is at risk.
- Evaluate the mobile deer stand and feeder to ensure all easement protections are being adhered to. Make sure that vegetation is not being trimmed and that access is protective of the easement.

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Harry Tsomides
Western Project Manager
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-545-7057 Mobile
harry.tsomides@ncdenr.gov

Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211