# MONITORING YEAR 2 ANNUAL REPORT

Final

## LONE HICKORY MITIGATION SITE

Yadkin County, NC
DEQ Contract No. 6897
DMS Project No. 97135
DWR No. 20161044
USACE Action ID No. SAW-2017-00100
Yadkin River Basin
HUC 03040101

Data Collection Period: February – November 2020
Draft Submission Date: November 30, 2020
Final Submission Date: December 21, 2020

**PREPARED FOR:**

**NC Department of Environmental Quality**
**Division of Mitigation Services**
217 West Jones Street; 3rd Floor
Raleigh, NC 27603

| | | | |
|---|---|---|---|
| **Mitigation Project Name** | **Lone Hickory Mitigation Site** | **USACE Action ID** | **2017-00100** |
| **DMS ID** | **97135** | **DWR Permit** | **2016-1044** |
| **River Basin** | **Yadkin** | **Date Project Instituted** | **5/23/2016** |
| **Cataloging Unit** | **03040101** | **Date Prepared** | **4/20/2020** |
| **County** | **Yadkin** | **Stream/Wet. Service Area** | **Yadkin 03040101** |


**Signature & Date of Official Approving Credit Release**

1 - For NCDMS, no credits are released during the first milestone

2 - For NCDMS projects, the initial credit release milestone occurs when the as-built report (baseline monitoring report) has been approved by the IRT and posted to the DMS portal, provided the following have been met:

1) Approved of Final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan.
4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met.

| **Credit Release Milestone** | **Warm Stream Credits** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Credits** | **Scheduled Releases %** | **Proposed Releases %** | **Proposed Released #** | **Not Approved # Releases** | **Approved Credits** | **Anticipated Release Year** | **Actual Release Date** |
| **1 - Site Establishment** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **2 - Year 0 / As-Built** | 30.00% | 30.00% | 3,949.372 | 0.000 | 3,949.372 | 2019 | 7/17/2019 |
| **3 - Year 1 Monitoring** | 10.00% | 10.00% | 1,316.457 | 0.000 | 1,316.457 | 2020 | 4/20/2020 |
| **4 - Year 2 Monitoring** | 10.00% | | | | | 2021 | |
| **5 - Year 3 Monitoring** | 10.00% | | | | | 2022 | |
| **6 - Year 4 Monitoring** | 5.00% | | | | | 2023 | |
| **7 - Year 5 Monitoring** | 10.00% | | | | | 2024 | |
| **8 - Year 6 Monitoring** | 5.00% | | | | | 2025 | |
| **9 - Year 7 Monitoring** | 10.00% | | | | | 2026 | |
| **Stream Bankfull Standard** | 10.00% | | | | | | |
| | | | **Totals** | | 5,265.829 | | |

| | |
|---|---|
| **Total Gross Credits** | 13,164.574 |
| **Total Unrealized Credits to Date** | 0.000 |
| **Total Released Credits to Date** | 5,265.829 |
| **Total Percentage Released** | 40.00% |
| **Remaining Unreleased Credits** | 7,898.745 |

| **Credit Release Milestone** | **Riparian Credits** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Credits** | **Scheduled Releases %** | **Proposed Releases %** | **Proposed Released #** | **Not Approved # Releases** | **Approved Credits** | **Anticipated Release Year** | **Actual Release Date** |
| **1 - Site Establishment** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **2 - Year 0 / As-Built** | 30.00% | 30.00% | 2.850 | 0.000 | 2.850 | 2019 | 7/17/2019 |
| **3 - Year 1 Monitoring** | 10.00% | 10.00% | 0.950 | 0.000 | 0.950 | 2020 | 4/20/2020 |
| **4 - Year 2 Monitoring** | 10.00% | | | | | 2021 | |
| **5 - Year 3 Monitoring** | 15.00% | | | | | 2022 | |
| **6 - Year 4 Monitoring** | 5.00% | | | | | 2023 | |
| **7 - Year 5 Monitoring** | 15.00% | | | | | 2024 | |
| **8 - Year 6 Monitoring** | 5.00% | | | | | 2025 | |
| **9 - Year 7 Monitoring** | 10.00% | | | | | 2026 | |
| **Stream Bankfull Standard** | N/A | N/A | N/A | N/A | | 2021 | N/A |
| | | | **Totals** | | 3.800 | | |

| | |
|---|---|
| **Total Gross Credits** | 9.500 |
| **Total Unrealized Credits to Date** | 0.000 |
| **Total Released Credits to Date** | 3.800 |
| **Total Percentage Released** | 40.00% |
| **Remaining Unreleased Credits** | 5.700 |

| | | | |
|---|---|---|---|
| **Mitigation Project Name** | **Lone Hickory Mitigation Site** | **USACE Action ID** | **2017-00100** |
| **DMS ID** | **97135** | **DWR Permit** | **2016-1044** |
| **River Basin** | **Yadkin** | **Date Project Instituted** | **5/23/2016** |
| **Cataloging Unit** | **03040101** | **Date Prepared** | **4/20/2020** |
| **County** | **Yadkin** | **Stream/Wet. Service Area** | **Yadkin 03040101** |

**Notes**

**Contingencies (if any)**

**Project Quantities**

| Mitigation Type | Restoration Type | Physical Quantity |
|---|---|---|
| Warm Stream | Restoration | 11,565.000 |
| Warm Stream | Preservation | 1,065.000 |
| Riparian | Restoration | 9.500 |

**Debits**

| | | | | | | | Stream Restoration Credits | Stream Restoration Equivalent Credits | Riparian Restoration |
|---|---|---|---|---|---|---|---|---|---|
| **Beginning Balance (mitigation credits)** | | | | | | | **13,058.074** | **106.500** | **9.500** |
| **Released Credits** | | | | | | | **5,223.229** | **42.600** | **3.800** |
| **Unrealized Credits** | | | | | | | **0.000** | **0.000** | **0.000** |
| **Owning Program** | **Req. Id** | **TIP #** | **Project Name** | **USACE Permit #** | **DWR Permit #** | **DCM Permit #** | | | |
| NCDOT Stream & Wetland ILF Program | REQ-007183 | U-2579B | U-2579B - Winston-Salem Northern Beltway | 2008-03183 | 2014-0090 | | 3,917.422 | | |
| NCDOT Stream & Wetland ILF Program | REQ-007183 | U-2579B | U-2579B - Winston-Salem Northern Beltway | 2008-03183 | 2014-0090 | | | 31.950 | |
| **Total Credits Debited** | | | | | | | **3,917.422** | **31.950** | **0.000** |
| **Remaining Available balance (Released credits)** | | | | | | | **1,305.807** | **10.650** | **3.800** |
| **Remaining balance (Unreleased credits)** | | | | | | | **7,834.845** | **63.900** | **5.700** |

December 21, 2020

Mr. Paul Wiesner
Western Regional Supervisor
NCDEQ – Division of Mitigation Services
5 Ravenscroft Dr., Suite 102
Asheville, NC 28801

RE: Lone Hickory Mitigation Site – Monitoring Year 2 Report Final
Yadkin River Basin – CU# 03040101 – Yadkin County
DMS Project ID No. 97135
Contract # 6897

Dear Mr. Wiesner:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Monitoring Year (MY) 2 report for the Lone Hickory Mitigation Site. DMS's comments are noted below in **bold**. Wildlands' responses to those comments are noted in *italics*.

**DMS comment: Section 1.2.5 Areas of Concern and Management Activities: This section notes; "A repair memo detailing the plans for BMP4 was submitted to DMS in November 2020." DMS received the proposed draft BMP repair memo from WEI on 11/12/2020 and provided comments to WEI on 11/16/2020. DMS did not receive any additional correspondence or the final repair memo from WEI. If the proposed BMP4 repair is still anticipated, please include the final BMP4 repair memo in the final MY2 report as an Appendix and reference it in the text for IRT review. DMS also recommends including any additional proposed 2021 (MY3) repairs in the updated repair memo and repair drawings.**

*Wildlands response: Based on DMS comments provided in the draft memo, internal discussions amongst staff, potential repair schedules, and current project conditions, Wildlands has delayed the submittal of the repair memorandum and the associated repairs. The final repair memo was not included with the MY2 report, but once a final plan is conceptualized for site repairs, the memorandum will be updated and submitted to DMS and the IRT. Language within the monitoring report was updated to reflect the current standing of repairs and the associated memorandum.*

**DMS comment: Table 1 – Mitigation Assets and Components and Report Text (Executive Summary & Project Overview): Very minor rounding issues exists in the asset table (Table 1). This minor difference is a total of 0.574 SMUs. Some of these minor discrepancies are due to the adjusted stream credits based on buffer width deviations in the DMS accounting system (CRM). Please make the following report asset updates so the final MY2 report matches the DMS asset accounting system (CRM) and the 2020/2021 credit ledger. Please utilize the updated credit amounts in future project reports as well:**

**UT1, R1, R2a, R2b, R3: Project Credits = 6,698.044 SMUs**

**UT1 R4: Project Credits = 65.900 SMUs**
**UT1A: Project Credits = 28.200 SMUs**
**UT1B: Project Credits = 12.400 SMUs**
**UT2 R1, R2: Project Credits = 1,933.009 SMUs**
**UT2A: Project Credits = 699.002 SMUs**
**UT2B: Project Credits = 893.000 SMUs (current amount)**
**UT3 R1, R2, R3: Project Credits = 2,835.019 SMUs**
**West Side Wetlands: Project Credits = 9.500 WMUs (current amount)**
**Total Project Stream Credits: = 13,164.574 SMUs**
**(13,058.074 Restoration & 106.500 Preservation)**
**Total Project Wetland Credits: = 9.500 WMUs (current amount)**

*Wildlands response: The project credits in the report text and Table 1 have been updated so that the credit amounts match the DMS asset accounting system and the 2020/2021 credit ledger.*

**DMS comment: CCPV Sheet 5 & Table 6A: The CCPV sheet notes three (3) "structure issues" on UT1 Reach 1. There appear to be numerous structures on this reach; however, Table 6a for UT1 Reach 1 reports "n/a" for all engineered structures. Please review and update as necessary. Please QA/QC all Visual Stream Morphology Stability Assessment Tables (Table 6a-k) to confirm that they accurately reflect what is shown on the CCPV maps and presented in the report text.**

*Wildlands response: The number of engineered structures along UT1 Reach 1 have now been included in Table 6a and accurately reflects what is shown on the CCPV maps. In addition, Table 6b-k have been reviewed for accuracy and updated as needed.*

Two (2) hard copies of the Final Monitoring Report and a full electronic submittal has been mailed to the DMS western field office. The monitoring bond was submitted to Jeff Jurek on 12/16/2020. Please contact me at 704-332-7754 x106 if you have any questions.

Sincerely,

Emily Reinicker, PE, CFM
Project Manager

**PREPARED BY:**

**Wildlands Engineering, Inc**.
1430 South Mint Street, Suite 104
Charlotte, NC 28203

Phone: 704.332.7754
Fax: 704.332.3306

## EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) implemented a full-delivery stream and wetland mitigation project at the Lone Hickory Mitigation Site (Site) for the North Carolina Department of Environmental Quality (DEQ) Division of Mitigation Services (DMS). The project restored and preserved a total of 12,621 linear feet (LF) of perennial and intermittent stream and restored 9.5 acres of riparian wetland in Yadkin County, NC. The Site is located within the DMS targeted watershed for the Yadkin River Basin HUC 03040101130020 and the NC Division of Water Resources (NCDWR) Subbasin 03-07-02. The project is providing 13,164.574 stream mitigation units (SMUs) and 9.500 wetland mitigation units (WMUs) for the Yadkin River Basin Hydrologic Unit Code (HUC) 03040101 (Yadkin 01).

The watershed has a long history of agricultural activity and most of the stressors to stream functions are related to this historic and current land use practices. The major stream stressors for the Site were concentrated agricultural runoff inputs, active stream incision and head cutting, lack of stabilizing streamside vegetation, extensive agricultural manipulation through ditching, and the lack of bedform diversity. The effects of these stressors resulted in degraded water quality and habitat throughout the Site's watershed when compared to reference conditions. The project approach for the Site focused on evaluating the Site's existing functional condition and evaluating its potential for recovery and need for intervention.

The project goals defined in the Mitigation Plan (Wildlands, 2017) were established with careful consideration of 2009 Upper Yadkin Pee Dee River Basin Restoration Priorities (RBRP) goals and objectives to address stressors identified in the watershed. The established project goals include:

- Improve stream channel stability,
- Reconnect channels with historic floodplains and re-establish wetland hydrology and function in relic wetland areas,
- Improve instream habitat,
- Reduce sediment and nutrient input from adjacent farm fields,
- Restore and enhance native floodplain and wetland vegetation, and
- Permanently protect the project site from harmful uses.

The Site construction and as-built surveys were completed in April 2019. Monitoring Year (MY) 2 assessments and site visits were completed between February and November 2020 to evaluate the conditions of the project.

Overall, the Site is meeting the required stream, vegetation, and hydrology success criteria for MY2. The overall average planted stem density for the Site is 489 stems per acre and is on track to meet the MY3 requirement of 320 stems per acre. Geomorphic surveys indicate that cross-section bankfull dimensions closely match the baseline monitoring, and streams are functioning as intended. At least one bankfull event has been documented on all restoration stream reaches in MY2. Eight of the nine groundwater gages in the wetland re-establishment area are meeting or exceeding hydrology success criteria. The MY2 visual assessment identified a few areas of concern including pockets of invasive plant species populations, areas of low stem density, and an isolated area of bank scour. Wildlands will continue to monitor these areas and an adaptive management plan will be implemented as necessary throughout the seven-year monitoring period to benefit the ecological health of the Site.

**LONE HICKORY MITIGATION SITE**

Monitoring Year 2 Annual Report

## TABLE OF CONTENTS



## APPENDICES

# Section: 1 PROJECT OVERVIEW

The Lone Hickory Mitigation Site (Site) is located in Yadkin County approximately 3.5 miles south of the town of Yadkinville, NC in the Yadkin River Basin HUC 03040101130020 and NCDWR Subbasin 03-07-02 (Figure 1). Located in the Inner Piedmont lithotectonic belt within the Piedmont physiographic province (NCGS, 1985), the project watershed is dominated by agricultural and forested land.

The Site contains two valleys, separated by a ridge that runs north to south through the project limits. South Deep Creek flows along the northern boundary of the project. On the east side of the ridge (herein referenced as the East Side), UT1 flows through a steep, narrow valley that gradually widens and flattens in slope as it flows downstream to the South Deep Creek floodplain. UT1 is joined by UT1A and UT1B within the Site limits before flowing offsite to join South Deep Creek. On the west side of the ridge (herein referenced as the West Side), UT2 and UT3 flow out of steep, narrow valleys into the broad, flat floodplain of South Deep Creek. UT2B begins downstream of BMP4 and flows into UT2. UT2A and UT2 join UT3 before the stream's confluence with South Deep Creek. The East Side of the Site drains 0.44 square miles, and the West Side of the Site drains 0.87 square miles of rural land.

Prior to construction activities, the Site has a history of use for both crop production and as a dairy farm resulting in degraded in-stream habitat and sediment erosion. Within the East Side of the Site, the streams were manipulated through ditching, impoundments, and land use changes. The West Side streams were ditched and re-routed with the adjacent floodplain previously altered for agricultural uses. The riparian buffers on both sides exhibited a lack of stabilizing streamside vegetation due to agricultural practices. Tables 11a – 11d in Appendix 4 present the pre-restoration conditions in detail.

Construction activities were completed in April 2019 by KBS Earthworks, Inc. Turner Land Surveying, PLLC. completed the as-built survey in April 2019. Planting was completed following construction in the spring of 2019 by Bruton Natural Systems, Inc. A conservation easement has been recorded and is in place on 103 acres. The project is providing 13,164.574 SMUs and 9.500 WMUs for the Yadkin River Basin 03040101 HUC (Yadkin 01). Annual monitoring will be conducted for seven years with close-out anticipated to commence in 2026 given the success criteria are met.

Directions and a map of the Site are provided in Figure 1 and project components are illustrated for the Site in Figure 2.

## 1.1 Project Goals and Objectives

The Site is providing numerous ecological benefits within the Yadkin Valley Basin. The project goals were established with careful consideration to address stressors that were identified in the NCDWR 2008 Yadkin River Basinwide Plan (NCDWR, 2008) and the RBRP (EEP, 2009).

The following project specific goals and objectives outlined in the Mitigation Plan (Wildlands, 2017) include:

| Goals | Objectives |
|---|---|
| Improve stream channel stability. | Restore 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. Create stable tie-ins for tributaries joining restored channels. Add bank revetments and in-stream structures to protect restored streams. |
| Reconnect channels with historic floodplains and re-establish wetland hydrology and function in relic wetland areas. | Remove man-made impoundments, remove culvert crossings, and restore historic valley profile. Remove historic overburden from farm fields. Reconstruct stream channels with bankfull dimensions relative to the floodplain. Restore stream plan form to promote development of mutually beneficial stream/wetland complex. |
| Improve instream habitat. | Remove man-made impoundments and culvert crossings within easement. 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. |
| Reduce sediment and nutrient input from adjacent farm fields. | Construct two step pool stormwater conveyance and three dry detention BMPs to slow and treat runoff from farm fields before entering Site streams. |
| Restore and enhance native floodplain and wetland vegetation. | Plant native tree and understory species in riparian zone where currently insufficient. |
| Permanently protect the project site from harmful uses. | Establish a conservation easement on the Site. |

## 1.2 Monitoring Year 2 Data Assessment

Annual monitoring was conducted during between February and November 2020 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 Lone Hickory Mitigation Plan (Wildlands, 2017).

### 1.2.1 Vegetation Assessment

Vegetation plot monitoring is being conducted in post-construction monitoring years 1, 2, 3, 5, and 7. Permanent plots are monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008) and the 2016 USACE Stream and Wetland Mitigation Guidance to assess the vegetation success. A total of 25 permanent vegetation plots were established within the project easement area. All of the permanent plots were established as a

standard 10 meter by 10 meter square plot. In addition, 15 mobile vegetation plots were established in MY1 throughout the planted conservation easement to evaluate the random vegetation performance for the Site. These plots are reestablished in different random locations in monitoring years 2, 3, 5 and 7. Mobile vegetation monitoring plot assessments will document stems, species, and height using a circular or 100 meter square/rectangular plot. The final vegetative performance standard will be the survival of 210 planted stems per acre in the planted riparian areas at the end of the required seven-year monitoring period. The interim measure of vegetative success for the Site will be the survival of at least 320 planted stems per acre at the end of MY3 and at least 260 stems per acre at the end of MY5.

The MY2 vegetation survey was completed in August 2020, resulting in an average planted stem density of 489 stems per acre for all monitored permanent and mobile vegetation plots. The Site is on track to meet the MY3 density requirement of 320 planted stems per acre with 88% (21/25) of the permanent plots individually on track to meet this requirement. For the mobile vegetation plots, all 15 plots are individually on track to meet the interim MY3 density requirement. The four permanent vegetation plots not meeting the MY3 density requirement were located within the West Side of the Site in areas where either dense herbaceous cover is competing with planted stems or saturated soil conditions are deterring some stem growth. Please refer to section 1.2.5 for further discussion about areas of low stem density.

Approximately 70% of the planted stems in permanent plots are thriving with a health score (vigor) of 3 or greater. The planted tree species with the highest health scores included river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), and overcup oak (*Quercus lyrata*). However, about 13% of the stems have a vigor of 2 or less indicating that some may not survive next year and 3% of the stems were missing. The poor tree health is a result of suffocation from dense herbaceous cover, storm damage, insects, wet or dry soil conditions, and/or other unknown factors. This leaves a mortality rate of about 13% of the MY1 planted stem count in the permanent vegetation plots. Furthermore, willow oak (*Quercus phellos*), tulip poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*) were the planted tree species with the highest mortality rates in MY2. Please refer to Appendix 2 for vegetation plot photographs, Current Condition Plan View (CCPV) Figures 3.0-3.5 for vegetation plot locations, and Appendix 3 for vegetation data tables.

### 1.2.2 Stream Assessment

Riffle cross-sections on the restoration and enhancement I reaches should be stable and show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Per the Interagency Review Team (IRT) guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios shall be at least 1.4 for restored B channels and 2.2 for restored C channels to be considered stable. All riffle cross-sections should fall within the parameters defined for channels of the appropriate stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include trends in vertical incision or bank erosion. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. Remedial action would not be taken if channel changes indicate a movement toward stability. Please note that the downstream extent of UT3 Reach 3 was designed to deepen relative to its floodplain as it transitions to meet the invert of South Deep Creek, and this reach is expected to have a bank height ratio greater than 1.0 and an entrenchment ratio less than 2.2.

Morphological surveys for MY2 were completed in July 2020. Cross-section survey results indicate that channel dimensions are stable and functioning as designed on all restoration reaches. When occurring, adjustments are minor in comparison to baseline conditions. Along UT1, riffle cross-sections 5, 7, and 10 have lowered somewhat which has thus slightly increased bankfull areas and bank height ratios but not

enough to be of concern. This is representative of the steeper riffles along UT1 Reach 2A, Reach 2B, and Reach 3. Also along UT1 Reach 3, point bar deposition is evident within pool cross-sections 12 and 13. On the West Side, where project streams have flatter channel slopes, some minor bed and bank deposition is present as displayed within cross-sections 21, 24, and 29 along UT2A, UT2B, and UT3 Reach 2, respectively. In future years, as woody vegetation becomes more established and shades out herbaceous cover, the baseflow is expected to be stronger and transport the accumulated sediment in streams that are currently showing some minor aggradation. The remaining project streams' cross-sections show little change in bankfull dimensions in comparison to the baseline survey.

Overall, reachwide pebble counts along restoration reaches indicate maintenance of coarser materials in riffle features and finer particles in the pool features. Refer to Appendix 2 for the visual stability assessment tables, CCPV figures, and reference photographs. Refer to Appendix 4 for the morphological tables and plots.

### 1.2.3 Stream Hydrology Assessment

At the end of the seven-year monitoring period, four or more bankfull flow events must have occurred in separate years within the restoration reaches. In MY2, multiple bankfull events were recorded within all stream restoration reaches using stream gage pressure transducers. Therefore, two reaches (UT3 Reach 3 and UT2B) have recorded two bankfull events in separate years, while three reaches (UT1 Reach 3, UT2 Reach 2, UT2A) have recorded one bankfull event in separate years. Currently the Site is on track to meet the hydrologic success criteria for bankfull events.

Consistent flow must be documented in the restored intermittent channels (UT1 Reach 1, UT2A, and UT2B) at the Site. Under periods of normal rainfall, stream flow must be documented to occur every year for at least 30 consecutive days during the seven-year monitoring period. Per the IRT recommendation following the site walk on August 19, 2019, the stream gages on UT2A and UT2B were relocated upstream above mid-reach on these intermittent channels on October 25, 2019. The CCPV figures in Appendix 2 show the current locations of the stream gages on UT2A and UT2B.

On UT1 Reach 1 and UT2A, 241 and 143 consecutive days were documented respectively in MY2, indicating that these two reaches exceeded success criteria for intermittent channels. UT2B was one day short of meeting the success criteria with 29 consecutive days of stream flow documented in MY2. In MY1, UT2B was seven days short of meeting the success criteria with 23 consecutive days documented. Please refer to Appendix 5 for hydrology summary data and plots.

### 1.2.4 Wetland Assessment

Nine groundwater monitoring gages (GWGs) were initially installed during baseline monitoring within the wetland re-establishment area using In-situ Level TROLL® 100 pressure transducers. Following recommendations from the August 19, 2019 IRT site walk, an additional gage (GWG 10) was installed adjacent to GWG 4 but outside of the former ditch location at the end of October 2019. Reporting for GWG 10 began in MY2 and GWG 4 is omitted from current and future monitoring reports.

A reference gage was established in a nearby reference wetland and will be utilized to compare the hydrologic response within the restored wetland areas at the Site. However, at the reference gage site it was observed in November 2020 that a debris jam has formed causing the main creek to flow out of the channel onto the adjacent floodplain and reference wetland. This confirms the steady water level data at or above the ground surface and may compromise this as being a useful reference wetland in the future.

All monitoring gages are downloaded on a quarterly basis and maintained as needed. Calibration was completed by manually measuring water levels on all gages which confirmed the downloaded data. The

final performance standard for wetland hydrology is the presence of groundwater within 12 inches of the ground surface for 19 consecutive days (9.2%) of the defined growing season for Yadkin County (April 4 through October 27) under typical precipitation conditions. The Site does not contain a rainfall gage; therefore, the daily precipitation data was collected from closest NC Climate Retrieval and Observations Network of the Southeast Database (NC CRONOS) Station, Yadkinville 0.2 E, NC.

Of the nine GWGs (GWG 1 – 3 and 5 – 10), eight met or exceeded the success criteria for MY2 with the percentage of consecutive days of the growing season ranging from 12.6% to 41.5%. GWG 7 did not meet the success criteria for MY2 with a measured maximum 16 consecutive days during the growing season, three days short of the success criteria; however, it exceeded the success criteria in MY1. Monthly rainfall data in 2020 indicated with higher than normal rainfall amounts occurred during the months of January, February, April, May, August, September, and October. The remaining months' (March, June, and July) rainfall amounts fell between the 30$^{th}$ and 70$^{th}$ percentiles for Yadkin County. Please refer to CCPV figures in Appendix 2 for the groundwater gage locations and Appendix 5 for hydrology data and plots.

### 1.2.5 Areas of Concern and Management Activities

Vegetation

MY2 visual assessments indicate that some invasive plant populations are present within the conservation easement. These species include kudzu (*Pueraria montana*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), and multiflora rose (*Rosa multiflora*). Invasive treatments occurred in May and September 2020 which focused on tree of heaven (*Ailanthus altissima*) and kudzu re-sprouts within the West Side of the Site. In addition, aquatic invasive plant species including Asian spiderwort (*Murdannia keisak*) were treated within project streams in August 2020. These treatments have been successful in reducing the percentage of the conservation easement affected by invasive species. Additional treatments will continue as needed to help manage and eliminate remaining invasive species populations.

A few areas of low stem density were documented during the MY2 vegetation and visual assessments. Three of these areas are represented by permanent vegetation plots 11, 12, and 16 where they are not meeting the MY3 interim density criteria and lack volunteers of desired woody stem species. The fourth area is located in the floodplain of UT1B where ATV encroachment, as described below, damaged planted woody stems. These areas will continue to be evaluated in MY3 to determine whether supplemental planting is warranted.

Some areas with poor herbaceous cover, gully formation, and floodplain scour have been identified throughout the Site. A few gullies persist along the East Side valley slopes and isolated areas of floodplain scour are visible along UT1. Areas with poor herbaceous cover, originally identified in MY1, are recovering within the wetland re-establishment area and broad floodplain along UT3. Adaptive management activities that occurred in 2020, which consisted of reseeding and adding herbaceous plugs and live stake fascines to the floodplain, have helped reduce the size and severity of these areas. These floodplain adaptive management activities will continue in the winter of 2020/2021.

Streams

An isolated area of bank scour and riffle degradation along UT3 Reach 1 (near station 303+75), that was first noted in MY1, was repaired in April 2020 by installing brush toe in the meander bend, adding riffle substrate, and planting live stakes along the banks. The bank repair has remained effective throughout MY2.

Numerous large storm events throughout MY2 have generated additional stream areas of concern including some bank scour along the meander bend of UT3 Reach 1 near station 306+00 and instability

at the inlet channel to BMP3 and outlet channel to BMP4. A draft repair memo was submitted to DMS in November 2020. Wildlands has received comments from DMS and is working to complete a final set of repair plans. Once complete, they will be submitted to DMS and the IRT.

Additional stream areas of concern, that are shown on the CCPV figures include aggradation within UT2A and UT1B and small areas of bank scour along UT1, are minor but will continue to be evaluated for signs of accelerated instability.

Conservation Easement

In August 2020, Wildlands staff noted obvious tracks from ATVs that accessed the East Side of the conservation easement where UT1B enters the Site. Since then, Wildlands has added signage, blocked access, and communicated with the adjacent landowners to resolve the encroachment issue. This area will continue to be monitored for any signs of trespass in the future.

Quarterly site visits will continue to be conducted to monitor and address areas of concern. If necessary, future adaptive management will be implemented to improve herbaceous cover and woody stem densities, treat and control invasive plants, and address stream stability issues. Please refer to Appendix 2 for CCPV figures and stream stability and vegetation assessment tables.

## 1.3 Monitoring Year 2 Summary

Overall, the Site is meeting the required stream, vegetation, and hydrology success criteria for MY2. The overall average planted stem density for the Site is 489 stems per acre and is on track to meet the MY3 requirement of 320 stems per acre. Geomorphic surveys indicate that cross-section bankfull dimensions closely match the baseline monitoring, and streams are functioning as intended. At least one bankfull event has been documented on all restoration stream reaches in MY2. Eight of the nine groundwater gages in the wetland re-establishment area are meeting or exceeding hydrology success criteria. The MY2 visual assessment identified a few areas of concern including pockets of invasive plant species populations, areas of low stem density, and an isolated area of bank scour. Wildlands will continue to monitor these areas and an adaptive management plan will be implemented as necessary throughout the seven-year monitoring period to benefit the ecological health of the Site.

# 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 a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Stream gages were installed in riffles and monitored quarterly. Hydrologic monitoring instrument installation and monitoring methods are in accordance with the United States Army Corps of Engineers (USACE, 2016) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008).

# Section: 3 REFERENCES


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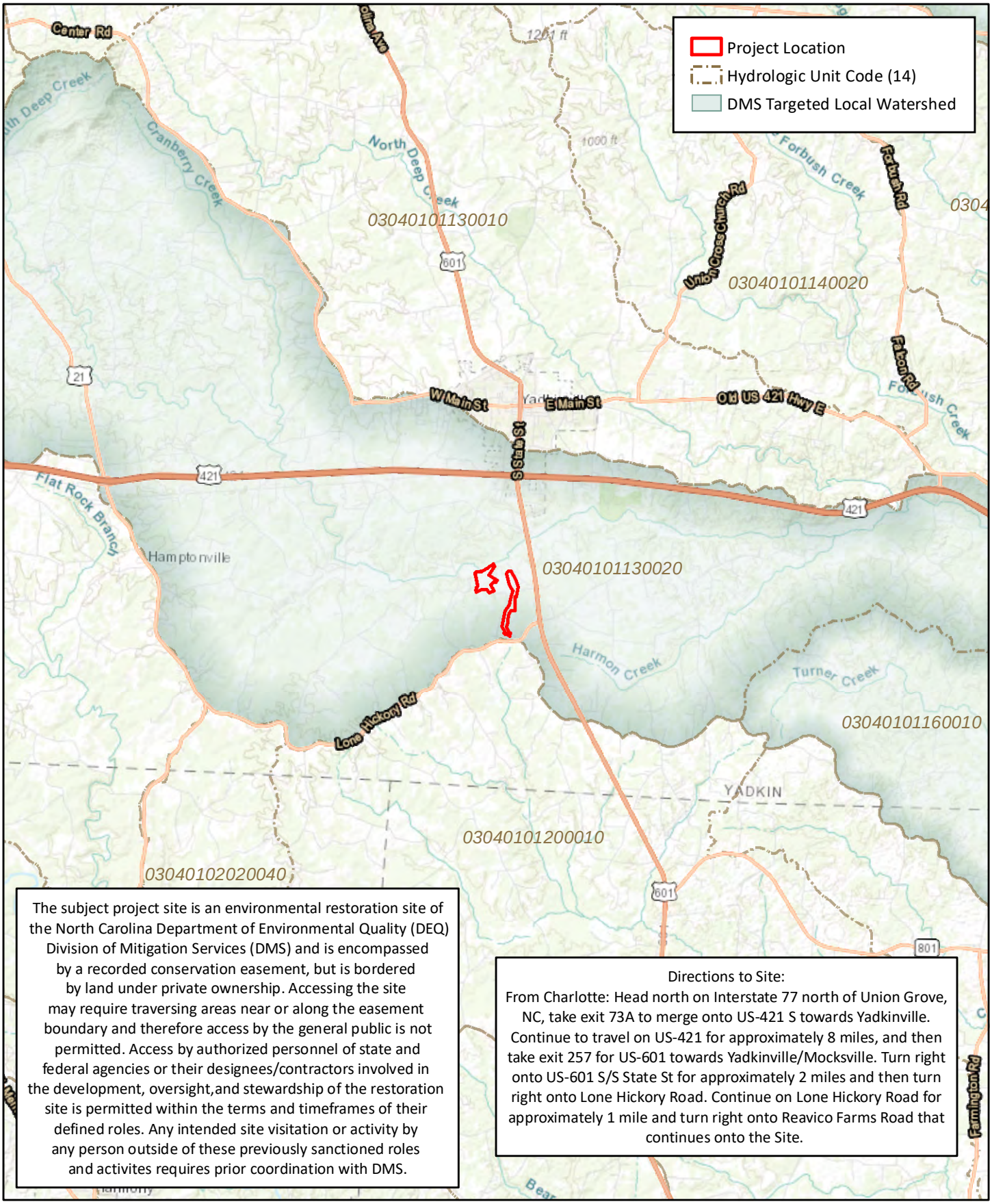
Wildlands Engineering, Inc (Wildlands), 2019. Lone Hickory Mitigation Site As-Built Baseline Monitoring Report. DMS, Raleigh, NC.

# APPENDIX 1. General Figures and Tables



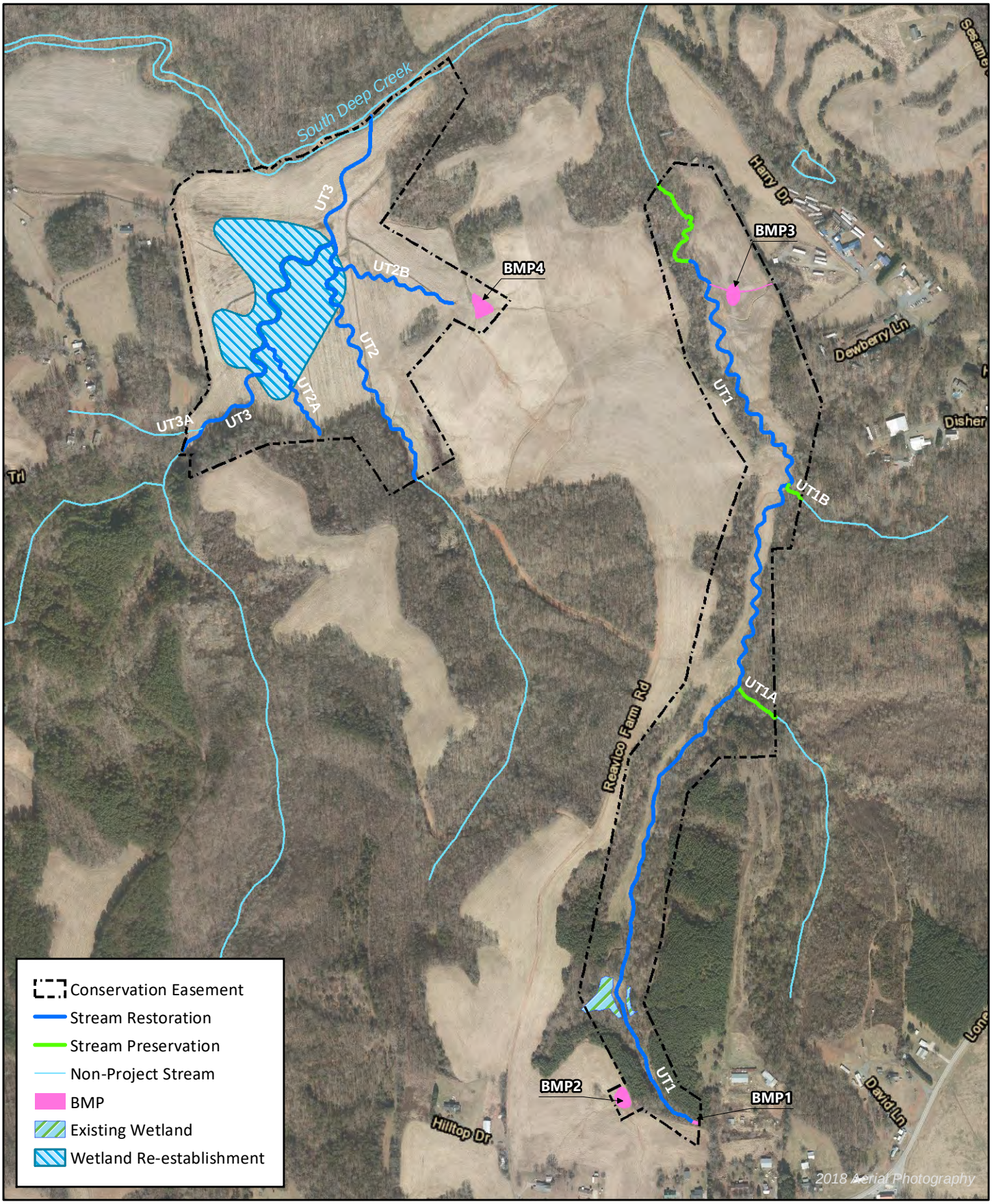

The subject project site is an environmental restoration site of the North Carolina Department of Environmental Quality (DEQ) Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing 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:
From Charlotte: Head north on Interstate 77 north of Union Grove, NC, take exit 73A to merge onto US-421 S towards Yadkinville. Continue to travel on US-421 for approximately 8 miles, and then take exit 257 for US-601 towards Yadkinville/Mocksville. Turn right onto US-601 S/S State St for approximately 2 miles and then turn right onto Lone Hickory Road. Continue on Lone Hickory Road for approximately 1 mile and turn right onto Reavico Farms Road that continues onto the Site.

WILDLANDS ENGINEERING

Figure 1 Project Vicinity Map
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*




WILDLANDS ENGINEERING

0 350 700 Feet

N

Figure 2 Project Component/Asset Map
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*

## Table 1. Mitigation Assets and Components

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Project Components | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Area/Reach** | **Existing Footage (LF) or Acreage** | **Mitigation Plan Footage/ Acreage** | **Mitigation Category** | **Restoration Level** | **Priority Level** | **Mitigation Ratio (X:1)** | **As-Built Footage/ Acreage** | **Project Credit [1 2]** |
| UT1, R1, R2a, R2b, R3 | 6,015 | 5,721 | Warm | Restoration | P1, P2 | 1.000 | 5,721 | 6,698.044 |
| UT1 R4 | 659 | 659 | Warm | Preservation | P4 | 10.000 | 659 | 65.900 |
| UT1A | 230 | 282 | Warm | Preservation | N/A | 10.000 | 282 | 28.200 |
| UT1B | 48 | 124 | Warm | Preservation | N/A | 10.000 | 123 | 12.400 |
| UT2 R1, R2 | 2,527 | 1,703 | Warm | Restoration | P1, P2 | 1.000 | 1,703 | 1,933.009 |
| UT2A | 1,184 | 655 | Warm | Restoration | P1 | 1.000 | 655 | 699.002 |
| UT2B | 699 | 784 | Warm | Restoration | P1, P2 | 1.000 | 776 | 893.000 |
| UT3 R1, R2, R3 | 2,008 | 2,702 | Warm | Restoration | P1, P2 | 1.000 | 2,702 | 2,835.019 |
| West Side Wetlands | N/A | 9.5 | Warm | Re-establishment | | 1.000 | 9.5 | 9.500 |

| Project Credits | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Restoration Level** | **Stream** | | | **Riparian Wetland** | | **Non-Riparian Wetland** | **Coastal Marsh** |
| | **Warm** | **Cool** | **Cold** | **Riverine** | **Non-Riv** | | |
| Restoration | 13,058.074 | N/A | N/A | N/A | N/A | N/A | N/A |
| Re-establishment | | | | 9.500 | N/A | N/A | N/A |
| Rehabilitation | | | | N/A | N/A | N/A | N/A |
| Enhancement | | | | N/A | N/A | N/A | N/A |
| Enhancement I | N/A | N/A | N/A | | | | |
| Enhancement II | N/A | N/A | N/A | | | | |
| Creation | | | | N/A | N/A | N/A | N/A |
| Preservation | 106.500 | N/A | N/A | N/A | N/A | N/A | |
| **Totals** | **13,164.574** | **N/A** | **N/A** | **9.500** | **N/A** | **N/A** | **N/A** |

Notes:

1. No direct credit for BMPs.

2. Credits reported have been adjusted based on buffer width deviations from standard 50-foot buffer width.

### Table 2. Project Activity and Reporting History

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Activity or Report | | Data Collection Complete | Completion or Delivery |
|---|---|---|---|
| 404 Permit | | April 2018 | April 2018 |
| Mitigation Plan | | July - December 2016 | December 2017 |
| Final Design - Construction Plans | | June 2018 | June 2018 |
| Construction | | Oct 2018 - April 2019 | Oct 2018 - April 2019 |
| Temporary S&E mix applied to entire project area[1] | | Oct 2018 - April 2019 | Oct 2018 - April 2019 |
| Permanent seed mix applied to reach/segments | | Oct 2018 - April 2019 | Oct 2018 - April 2019 |
| Bare root and live stake plantings for reach/segments | | February 2019 - April 2019 | April 2019 |
| Baseline Monitoring Document (Year 0) | | February 2019 - May 2019 | June 2019 |
| Invasive Species Treatment | | September 2019 - October 2019 | October 2019 |
| Supplemental seeding applied to UT3 floodplain | | September 2019 - October 2019 | October 2019 |
| Year 1 Monitoring | Stream Survey | October 2019 | November 2019 |
| | Vegetation Survey | October 2019 | |
| Stream Repair | | April 2020 | April 2020 |
| Supplemental seeding, herbaceous plug, and live stake planting | | June 2020 - August 2020 | August 2020 |
| Invasive Species Treatment | | May, August, & September 2020 | September 2020 |
| Year 2 Monitoring | Stream Survey | July 2020 | November 2020 |
| | Vegetation Survey | August 2020 | |
| Year 3 Monitoring | Stream Survey | 2021 | November 2021 |
| | Vegetation Survey | 2021 | |
| Year 4 Monitoring | Stream Survey | 2022 | November 2022 |
| | Vegetation Survey | 2022 | |
| Year 5 Monitoring | Stream Survey | 2023 | November 2023 |
| | Vegetation Survey | 2023 | |
| Year 6 Monitoring | Stream Survey | 2024 | November 2024 |
| | Vegetation Survey | 2024 | |
| Year 7 Monitoring | Stream Survey | 2025 | November 2025 |
| | Vegetation Survey | 2025 | |

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

### Table 3. Project Contact Table

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| | |
|---|---|
| **Designers**<br>Emily Reinicker, PE, CFM | **Wildlands Engineering, Inc.**<br>1430 South Mint Street, Suite 104<br>Charlotte, NC 28203<br>704.332.7754 |
| **Construction Contractors** | **KBS Earthworks, Inc.**<br>5616 Coble Church Road<br>Julian, NC 27283 |
| **Planting Contractor** | **Bruton Natural Systems, Inc.**<br>PO Box 1197<br>Freemont, NC 27830 |
| **Seeding Contractor** | **KBS Earthworks, Inc.** |
| **Seed Mix Sources** | **KBS Earthworks, Inc.** |
| **Nursery Stock Suppliers**<br>**Bare Roots**<br>**Live Stakes**<br>**Herbaceous Plugs** | **Bruton Natural Systems, Inc.** |
| **Monitoring Performers** | **Wildlands Engineering, Inc.**<br>Kristi Suggs 704.332.7754 ext. 110 |

**Table 4. Project Information and Attributes**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

| Project Information | |
|---|---|
| Project Name | Lone Hickory Mitigation Site |
| | Yadkin County |
| Project Area (acres) | 103.000 |
| Project Coordinates (latitude and longitude) | 36° 5' 39.16"N 80° 40' 2.14"W |
| Planted Acreage (Acre of Woody Stems Planted) | 99.000 |

| Project Watershed Summary Information | |
|---|---|
| Physiographic Province | Piedmont Physiographic Province |
| River Basin | Yadkin River |
| USGS Hydrologic Unit 8-digit | 03040101 |
| USGS Hydrologic Unit 14-digit | 03040101130020 |
| DWR Sub-basin | 03-07-02 |
| Project Drainage Area (acres) | 286 (East Side), 170 (UT2 - West Side), 392 (UT3 – West Side) |
| Project Drainage Area Percentage of Impervious Area | 3% (UT1 - East Side), 1% (UT2 – West Side), 2% (UT3 – West Side) |
| 2011 NLCD Land Use Classification | UT1 - East Side: Forest (39%), Cultivated (42%), Grassland (4%), Shrubland (7%), Urban (8%), Open Water (0%)<br>UT2 - West Side: Forest (31%), Cultivated (40%), Grassland (9%), Shrubland (10%), Urban (0%), Open Water (10%)<br>UT3 - West Side: Forest (57%), Cultivated (22%), Grassland (5%), Shrubland (10%), Urban (3%), Open Water (3%) |

**Reach Summary Information**

| Parameters | UT1 | | | | UT1A | UT1B | UT2 | | UT2A | UT2B | UT3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R1 | R2A/R2B | R3 | R4 | | | R1 | R2 | | | R1 | R2 | R3 |
| Length of reach (linear feet) - Post-Restoration | 966 | 3,114 | 1,641 | 659 | 282 | 123 | 623 | 1,080 | 655 | 776 | 779 | 1,159 | 764 |
| Valley confinement (Confined, moderately confined, unconfined) | Confined | Confined to moderately confined | | | Confined | Confined | Moderately confined to unconfined | | Unconfined | Unconfined | Moderately confined to unconfined | | |
| Drainage area (acres) | 286 | | | | 92 | 31 | 170 | | 27 | 6 | 392 | | |
| Perennial, Intermittent, Ephemeral | I/P | P | P | P | P | P | P | | I/P | P | P | | |
| NCDWR Water Quality Classification | WS-III | | | | WS-III | WS-III | WS-III | | WS-III | WS-III | WS-III | | |
| Morphological Description (stream type) - Pre-Restoration | G, Straigthened E/G | | | | - | - | G | G | G | G | G | G | G |
| Morphological Description (stream type) - Post-Restoration | A | B | C | - | - | - | B | C | C | C/Cb | Bc | C | C |
| Evolutionary trend (Simon's Model) - Pre- Restoration | III/IV/V | | | | VI | VI | III/IV/V | | III/IV/V | IV/V | IV/V | | |
| FEMA classification | Last 400LF in Zone AE backwater from South Deep | | | | None | None | Zone AE backwater from South Deep Creek | | | | | | |

**Wetland Summary Information**

| Parameters | West Side Wetlands |
|---|---|
| Size of Wetland (acres) | 9.5 |
| Wetland Type | Riparian Riverine |
| Mapped Soil Series | Codorus loam/Dan River and Comus soils |
| Drainage class | Somewhat poorly drainage/well drained |
| Soil Hydric Status | Yes/No |
| Source of Hydrology | Groundwater |
| Restoration or enhancement method (hydrologic, vegetative etc.) | Re-establishment |

**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. 4134. |
| Waters of the United States - Section 401 | Yes | Yes | USACE Action ID #SAW-2017-00100 |
| Division of Land Quality (Erosion and Sediment Control) | Yes | Yes | NPDES Construction Stormwater General Permit NCG010000 |
| Endangered Species Act | Yes | Yes | Categorical Exclusion Document in Mitigation Plan |
| Historic Preservation Act | Yes | Yes | Categorical Exclusion Document in Mitigation Plan |
| Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA) | No | N/A | N/A |
| FEMA Floodplain Compliance | Yes | Yes | Yadkin County Floodplain Development Permit #2017-4. |
| Essential Fisheries Habitat | No | N/A | N/A |

**Table 5a. Monitoring Component Summary**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

**East Side**

| Parameter | Monitoring Feature | Quantity / Length by Reach | | | | | | Frequency | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | UT1 Reach 1 | UT1 Reach 2 | UT1 Reach 3 | UT1 Reach 4 | UT1A | UT1B | | |
| **Dimension** | Riffle Cross-Section | 1 | 4 | 2 | N/A | N/A | N/A | Year 1, 2, 3, 5, and 7 | 1 |
| | Pool Cross-Section | 1 | 3 | 2 | N/A | N/A | N/A | | |
| **Pattern** | Pattern | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 2 |
| **Profile** | Longitudinal Profile | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| **Substrate** | Reach Wide (RW) Pebble Count | 1 RW | 1 RW | 1 RW | N/A | N/A | N/A | Year 1, 2, 3, 5, and 7 | 3 |
| **Hydrology** | Crest Gage (CG) and or/Transducer (SG) | 1 SG | 1 SG | | | | | Semi-Annual | 4 |
| **Vegetation** | CVS Level 2/Mobile plots | 15 (10 permanent, 5 mobile) | | | | | | Year 1, 2, 3, 5, and 7 | 5 |
| **Visual Assessment** | | Yes | | | | | | Semi-Annual | |
| **Exotic and Nuisance Vegetation** | | | | | | | | Semi-Annual | 6 |
| **Project Boundary** | | | | | | | | Semi-Annual | 7 |
| **Reference Photos** | Photographs | 22 | | | | | | Annual | |

Notes:

1. Cross-sections were permanently marked with rebar to establish location. Surveys include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg.

2. Pattern and profile will be assessed visually during semi-annual site visits. Longitudinal profile was collected during as-built baseline monitoring survey only, unless observations indicate widespread lack of vertical stability (greater than 10% of reach is affected) and profile survey is warranted in additional years to monitor adjustments or survey repair work.

3. Riffle 100-count substrate sampling were collected during the baseline monitoring only.

4. Crest gages and/or transducers will be inspected quarterly or semi-annually, evidence of bankfull events will be documented with a photo when possible. Transducers, if used, will be set to record stage once every 2 hours. The transducer will be inspected and downloaded semi-annually. A transducer was installed on the intermittent portion of UT1 Reach 1 to document 30 days of continuous flow.

5. Permanent vegetation monitoring plot assessments will follow CVS Level 2 protocols. Mobile vegetation monitoring plot assessments will document number of planted stems, height, and species using a circular or 100 m2 square/rectangular plot. 2% of the non-shaded planted acreage will be monitored with permanent plots within the 50' stream buffer, and 1% of the non-shaded planted acreage will be monitored with mobile plots beyond the 50' stream buffer. Planted shaded areas will be visually assessed.

6. Locations of exotic and nuisance vegetation will be mapped.
7. Locations of vegetation damage, boundary encroachments, etc. will be mapped.

**Table 5b. Monitoring Component Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**West Side**

| Parameter | Monitoring Feature | Quantity / Length by Reach | | | | | | | | Frequency | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UT2 Reach 1 | UT2 Reach 2 | UT2A | UT2B | UT3 Reach 1 | UT3 Reach 2 | UT3 Reach 3 | Wetland Re-establishment | | |
| **Dimension** | Riffle Cross-Section | 1 | 2 | 2 | 2 | 1 | 1 | 1 | N/A | Year 1, 2, 3, 5, and 7 | 1 |
| | Pool Cross-Section | 1 | 1 | 2 | 2 | 1 | 1 | 1 | N/A | | |
| **Pattern** | Pattern | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 2 |
| **Profile** | Longitudinal Profile | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| **Substrate** | Reach Wide (RW) Pebble Count | 1 RW | 1 RW | 1 RW | 1 RW | 1 RW | 1 RW | 1 RW | N/A | Year 1, 2, 3, 5, and 7 | 3 |
| **Stream Hydrology** | Crest Gage (CG) and/or Transducer (SG) | 1 SG | | 1 SG | 1 SG | 1 SG | | | N/A | Semi-Annual | 4 |
| **Wetland Hydrology** | Groundwater Gages | | | | | | | | 9 | Quarterly | |
| **Vegetation** | CVS Level 2/Mobile Plots | 25 (15 permanent, 10 mobile) | | | | | | | | Year 1, 2, 3, 5, and 7 | 5 |
| **Visual Assessment** | | Yes | | | | | | | | Semi-Annual | |
| **Exotic and Nuisance Vegetation** | | | | | | | | | | Semi-Annual | 6 |
| **Project Boundary** | | | | | | | | | | Semi-Annual | 7 |
| **Reference Photos** | Photographs | 22 | | | | | | | | Annual | |

Notes:

1. Cross-sections were permanently marked with rebar to establish location. Surveys include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg.

2. Pattern and profile will be assessed visually during semi-annual site visits. Longitudinal profile was collected during as-built baseline monitoring survey only, unless observations indicate widespread lack of vertical stability (greater than 10% of reach is affected) and profile survey is warranted in additional years to monitor adjustments or survey repair work.

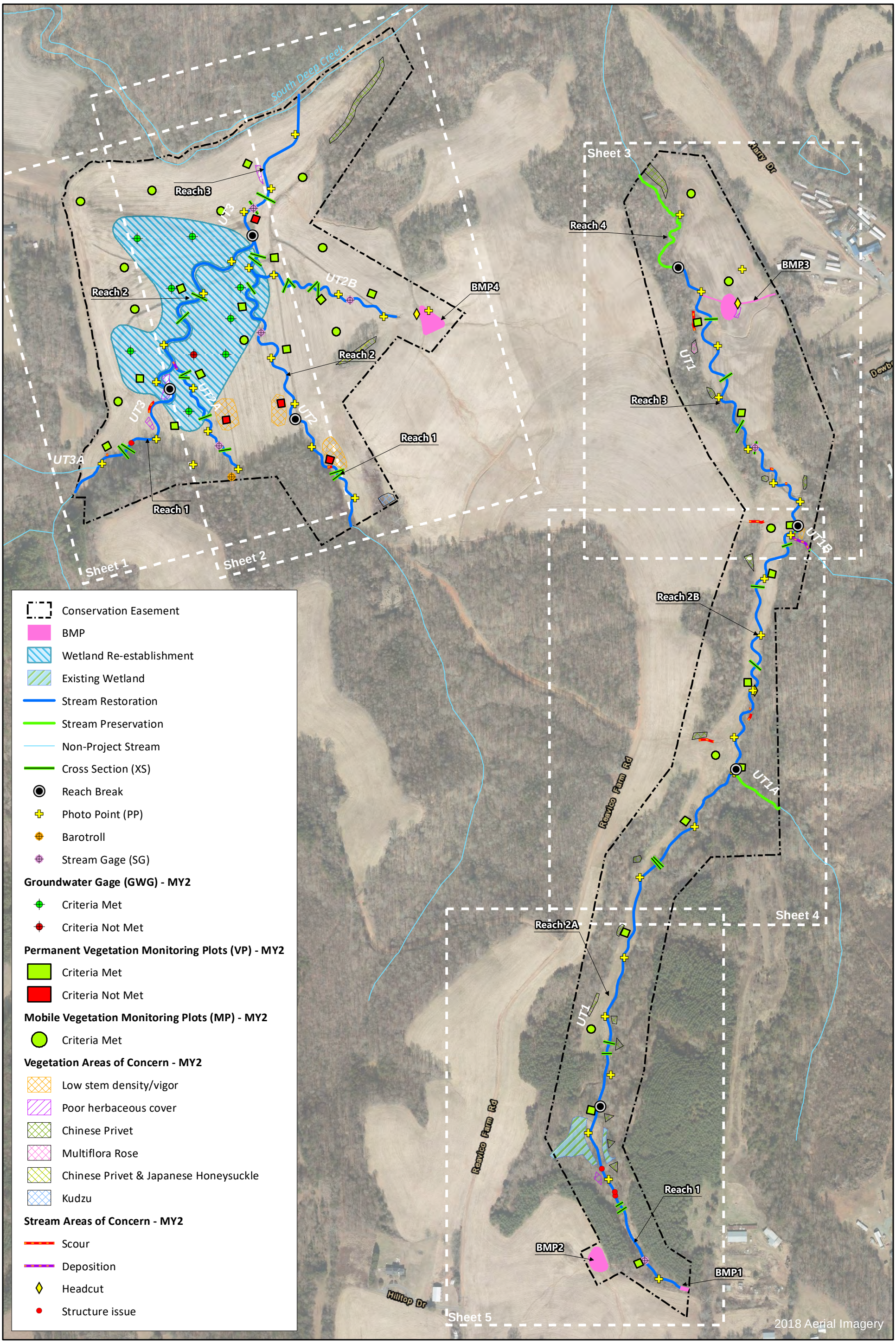
3. Riffle 100-count substrate sampling was collected during the baseline monitoring only.

4. Crest gages and/or transducers will be inspected quarterly or semi-annually, evidence of bankfull events will be documented with a photo when possible. Transducers, if used, will be set to record stage once every 2 hours. The transducer will be inspected and downloaded semi-annually. A transducer was installed on the intermittent portion of UT2A and UT2B to document 30 days of continuous flow.

5. Permanent vegetation monitoring plot assessments will follow CVS Level 2 protocols. Mobile vegetation monitoring plot assessments will document number of planted stems, height, and species using a circular or 100 m2 square/rectangular plot. 2% of the non-shaded planted acreage will be monitored with permanent plots within the 50' stream buffer, and 1% of the non-shaded planted acreage will be monitored with mobile plots beyond the 50' stream buffer. Planted shaded areas will be visually assessed.

6. Locations of exotic and nuisance vegetation will be mapped.
7. Locations of vegetation damage, boundary encroachments, etc. will be mapped.

# APPENDIX 2. Visual Assessment Data



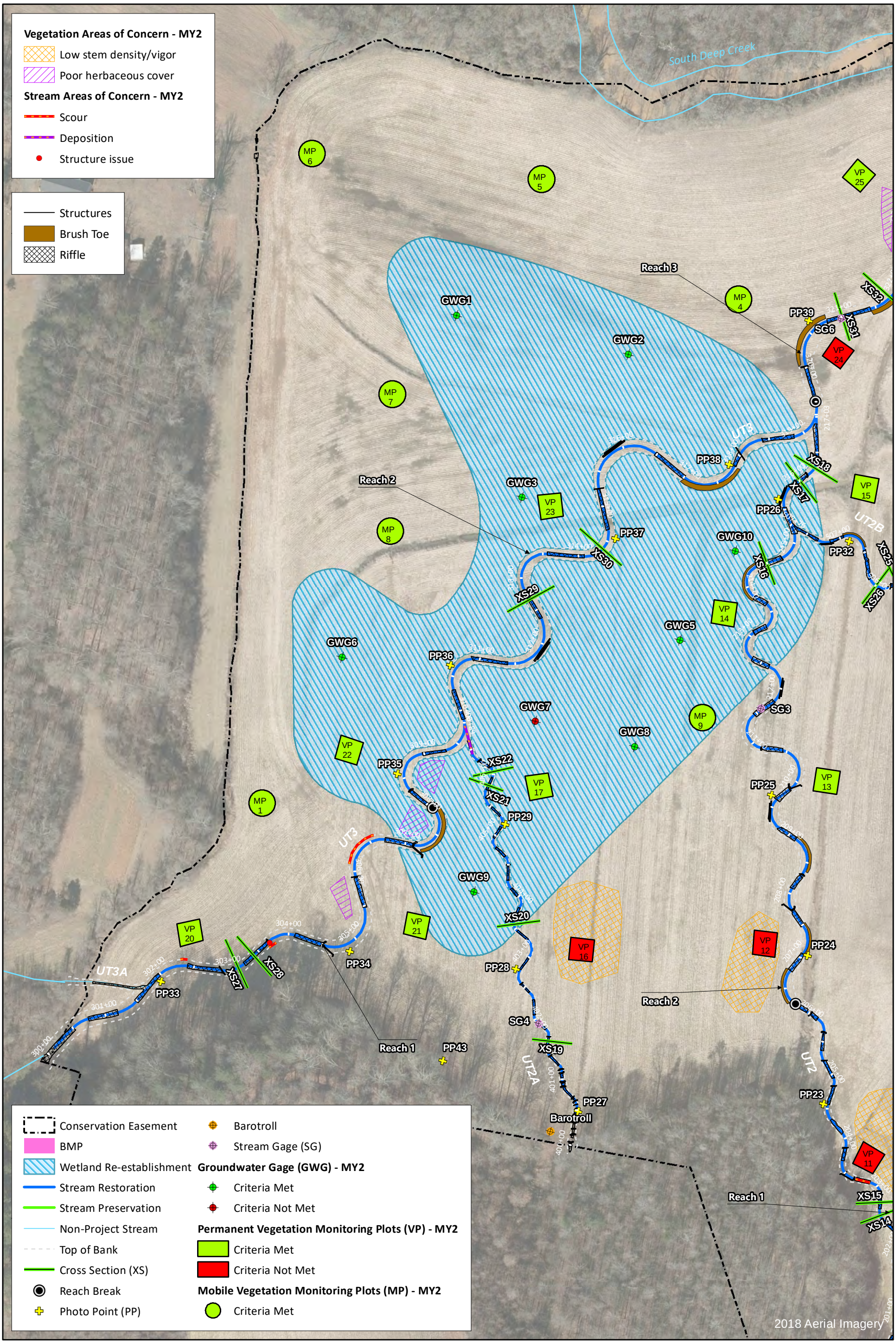

WILDLANDS ENGINEERING

0 400 800 Feet

N

Figure 3.0 Current Condition Plan View Map (Key)
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*

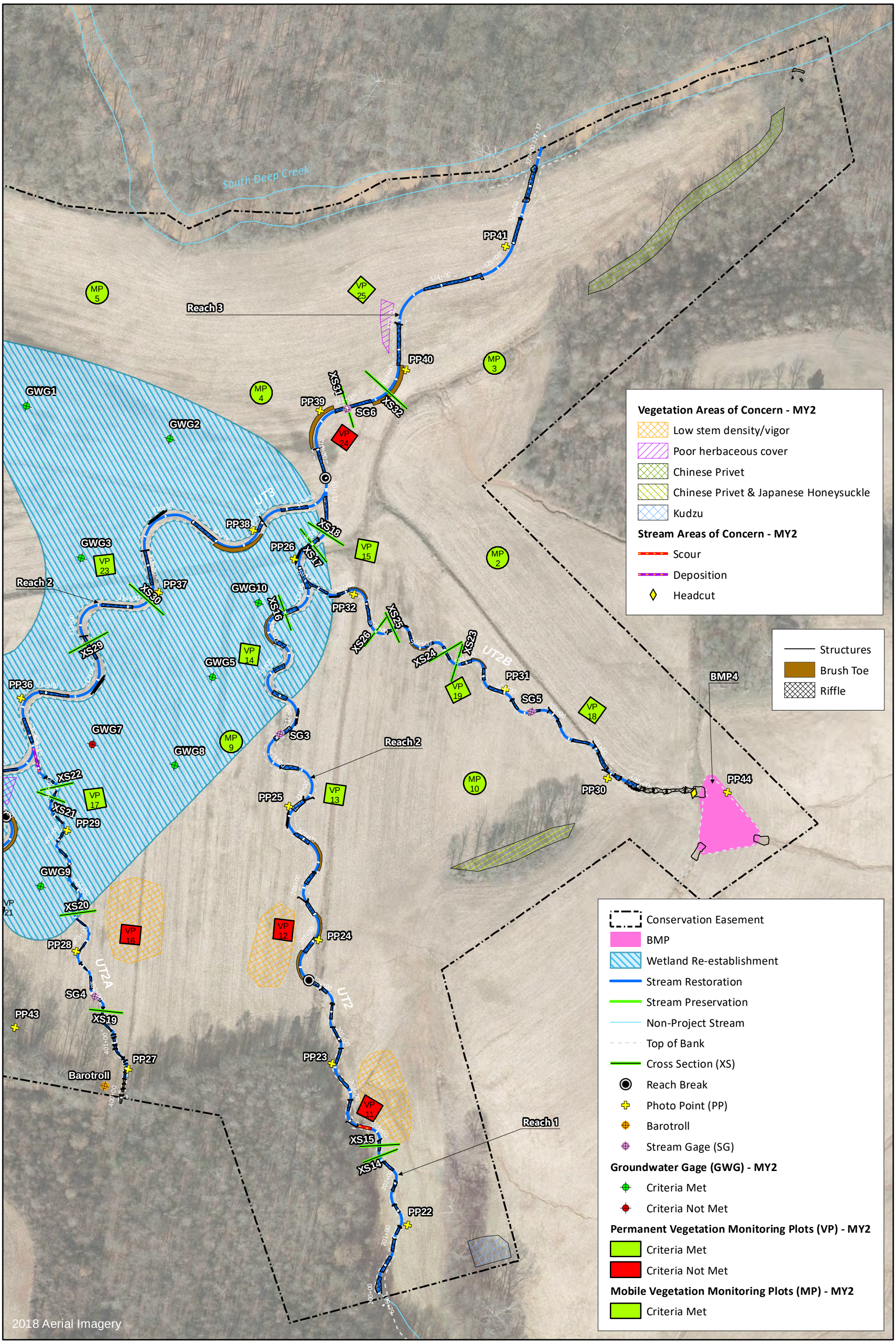



WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.1 Current Condition Plan View Map (Sheet 1)
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*

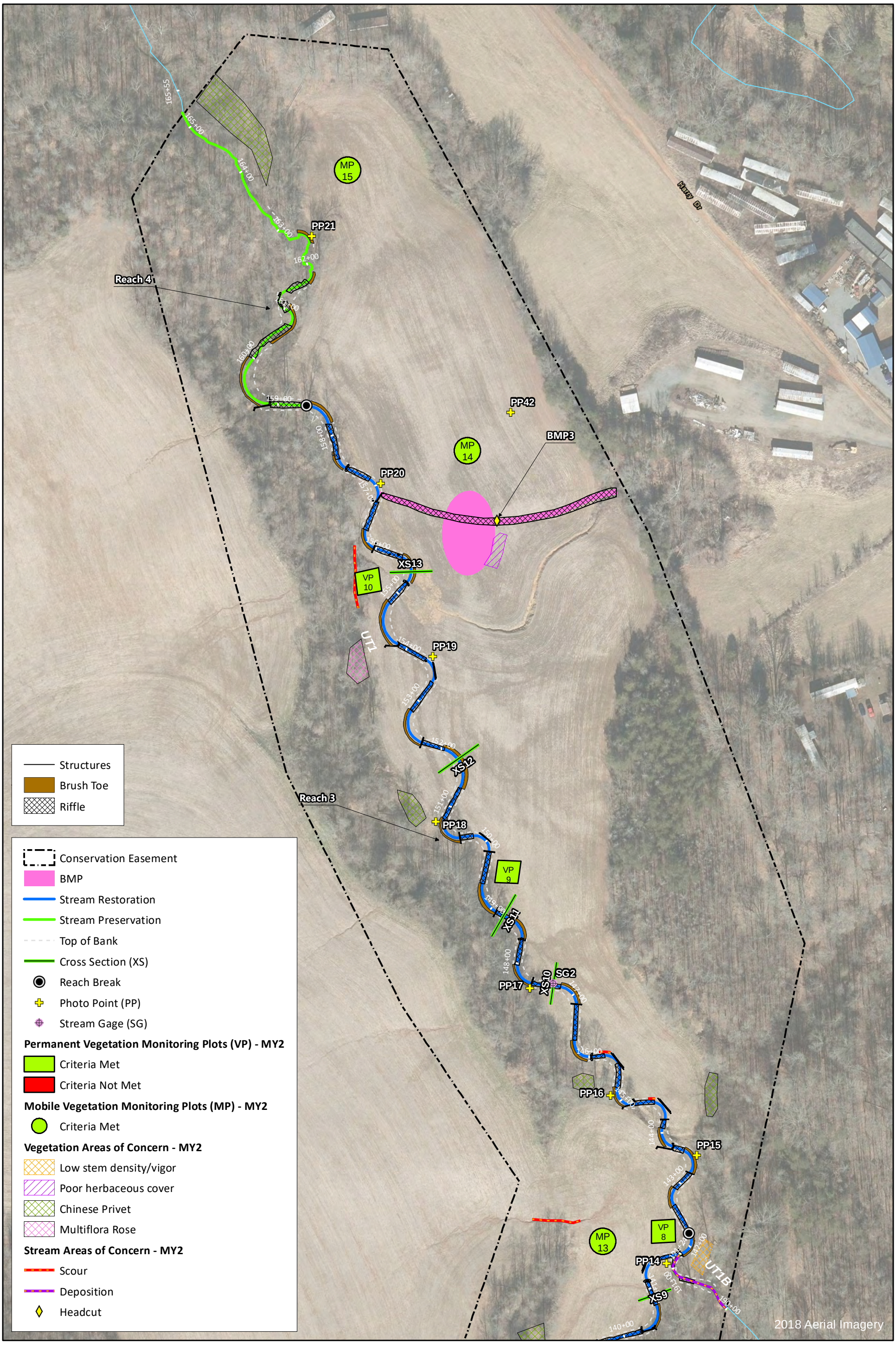



WILDLANDS ENGINEERING

0 150 300 Feet

Figure 3.2 Current Condition Plan View Map (Sheet 2)
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*

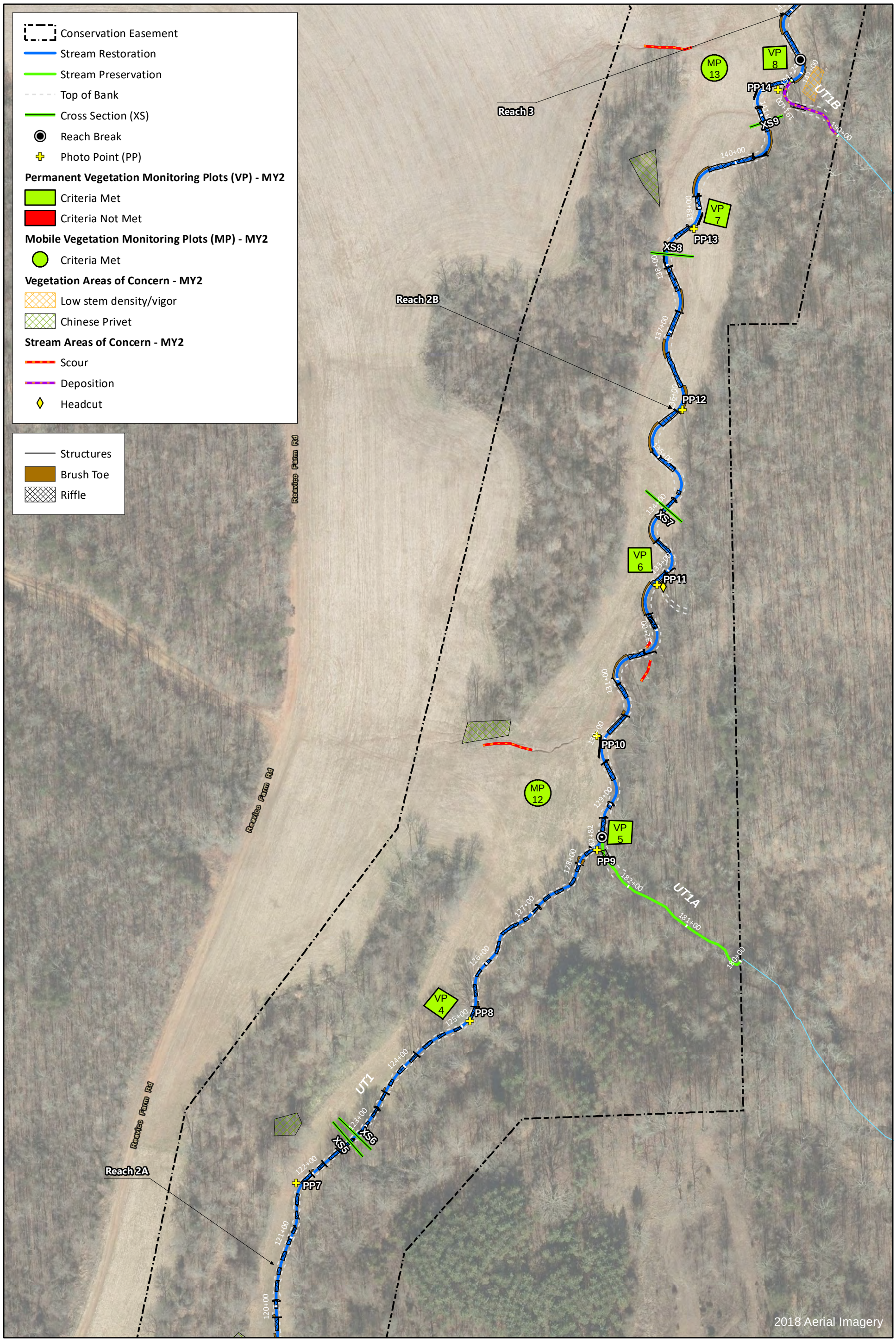



WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.3 Current Condition Plan View Map (Sheet 3)
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*

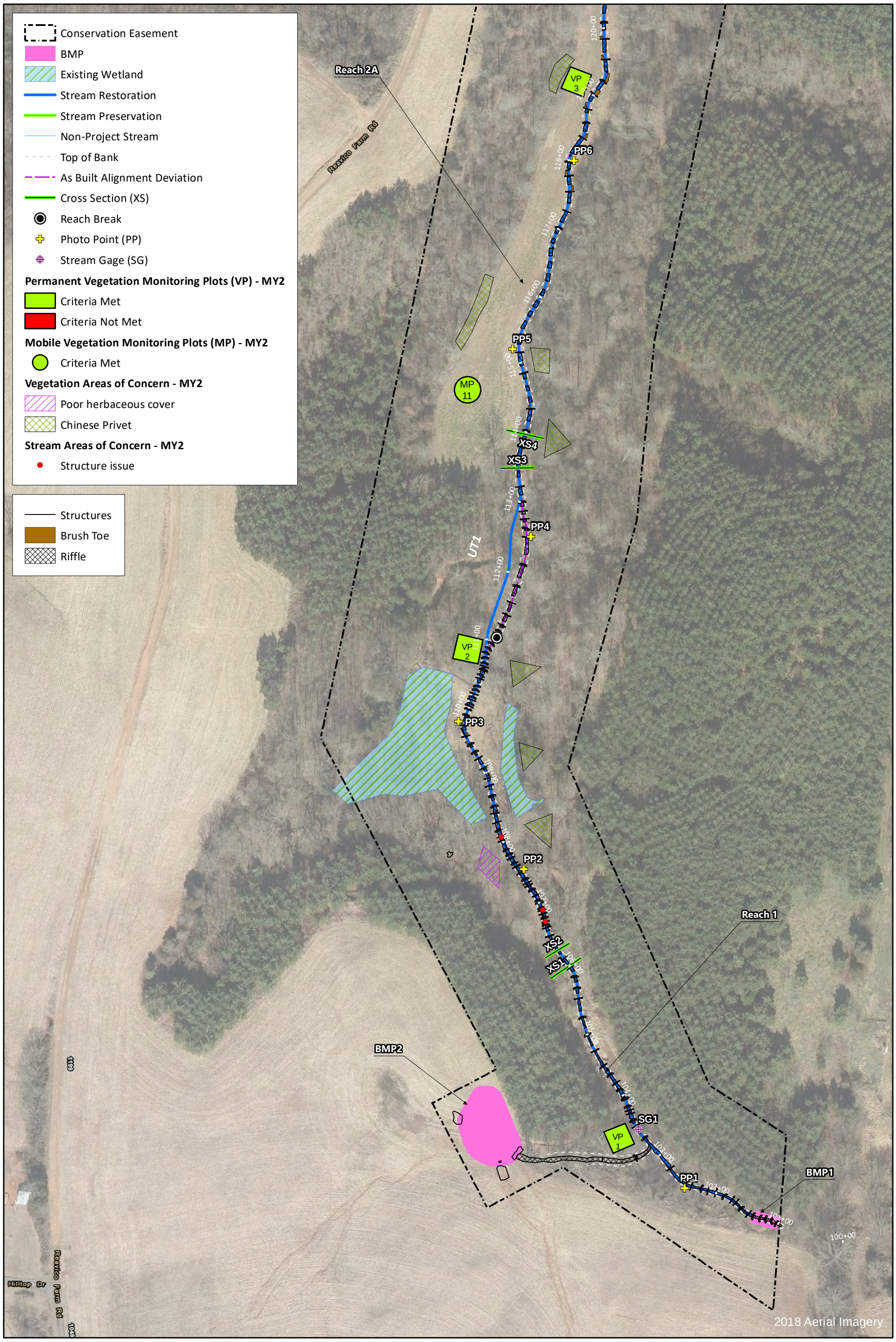



WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.4 Current Condition Plan View Map (Sheet 4)
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*




WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.5 Current Condition Plan View Map (Sheet 5)
Lone Hickory Mitigation Site
DMS Project No. 97135
Monitoring Year 2 - 2020

*Yadkin County, NC*

**Table 6a. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT1 Reach 1 (STA 101+39 to 111+05)**
**Assessed Length: 966**

| 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 | 25 | 25 | | | 100% | | | |
| | 3. Step Pool Condition | Depth Sufficient | 25 | 25 | | | 100% | | | |
| | | 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 | | | 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. | 83 | 86 | | | 97% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 83 | 86 | | | 97% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 83 | 86 | | | 97% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 83 | 86 | | | 97% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 83 | 86 | | | 97% | | | |

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

**Table 6b. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT1 Reach 2A (STA 111+05 to 128+51)**
**Assessed Length: 1,746**

| 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 | 35 | 35 | | | 100% | | | |
| | 3. Step Pool Condition | Depth Sufficient | 35 | 35 | | | 100% | | | |
| | | 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 | | | 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. | 42 | 42 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 41 | 41 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 41 | 41 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 41 | 41 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 41 | 41 | | | 100% | | | |

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

**Table 6c. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT1 Reach 2B (STA 128+51 to 142+19)**
**Assessed Length: 1,368**

| 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 | 20 | 20 | | | 100% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 20 | 20 | | | 100% | | | |
| | | Length Appropriate | 20 | 20 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 20 | 20 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 20 | 20 | | | 100% | | | |
| | | | | | | | | | | |
| 2. Bank | 1. Scoured/Eroded | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 1 | 10 | 99.6% | 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 | 1 | 10 | 99.6% | 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 | 19 | 19 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 19 | 19 | | | 100% | | | |
| | 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 6d. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT1 Reach 3 (STA 142+19 to 158+60)**
**Assessed Length: 1,641**

| 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 | 22 | 22 | | | 100% | | | |
| | | Length Appropriate | 22 | 22 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 22 | 22 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 22 | 22 | | | 100% | | | |
| | | | | | | | | | | |
| 2. Bank | 1. Scoured/Eroded | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 2 | 25 | 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** | 2 | 25 | 99% | 0 | 0 | 99% |
| 3. Engineered Structures[1] | 1. Overall Integrity | Structures physically intact with no dislodged boulders or logs. | 38 | 38 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 17 | 17 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 17 | 17 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 38 | 38 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 38 | 38 | | | 100% | | | |

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

**Table 6e. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT2 Reach 1 (STA 200+00 to 206+23)**
**Assessed Length: 623**

| 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 | | | 1 | 10 | 99% | | | |
| | 2. Riffle Condition | Texture/Substrate | 15 | 15 | | | 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) | 15 | 15 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 15 | 15 | | | 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. | 12 | 12 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 11 | 11 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 11 | 11 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 12 | 12 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 12 | 12 | | | 100% | | | |

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

**Table 6f. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT2 Reach 2 (STA 206+23 to 217+03)**
**Assessed Length: 1,080**

| 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 | 14 | 14 | | | 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 | | | 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. | 12 | 12 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 6 | 6 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 6 | 6 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 12 | 12 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 12 | 12 | | | 100% | | | |

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

**Table 6g. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT2A (STA 400+34 to 406+89)**
**Assessed Length: 655**

| 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 | 40 | 97% | | | |
| | | Degradation | | | 0 | 0 | 100% | | | |
| | 2. Riffle Condition | Texture/Substrate | 17 | 19 | | | 89% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 17 | 17 | | | 100% | | | |
| | | Length Appropriate | 17 | 17 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 17 | 17 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 17 | 17 | | | 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 | 13 | 13 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 13 | 13 | | | 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 6h. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT2B (STA 500+00 to 507+76)**
**Assessed Length: 776**

| 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 | 16 | 17 | | | 94% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 15 | 15 | | | 100% | | | |
| | | Length Appropriate | 15 | 15 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 15 | 15 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 15 | 15 | | | 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. | 12 | 12 | | | 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%. | 12 | 12 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 12 | 12 | | | 100% | | | |

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

**Table 6i. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT3 Reach 1 (STA 300+13 to 307+92)**
**Assessed Length: 779**

| 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 | | | 3 | 78 | 95% | 0 | 0 | 95% |
| | 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 | 3 | 78 | 95% | 0 | 0 | 95% |
| 3. Engineered Structures[1] | 1. Overall Integrity | Structures physically intact with no dislodged boulders or logs. | 5 | 6 | | | 83% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 4 | 5 | | | 80% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 4 | 5 | | | 80% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 5 | 6 | | | 83% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 6 | 6 | | | 100% | | | |

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

**Table 6j. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT3 Reach 2 (STA 307+92 to 319+51)**
**Assessed Length: 1,159**

| 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 | 9 | 10 | | | 90% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 10 | 10 | | | 100% | | | |
| | | Length Appropriate | 10 | 10 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 10 | 10 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 10 | 10 | | | 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. | 7 | 7 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 4 | 4 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 4 | 4 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 7 | 7 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 7 | 7 | | | 100% | | | |

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

**Table 6k. Visual Stream Morphology Stability Assessment Table**

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**Reach: UT3 Reach 3 (STA 319+51 to STA 327+15)**
**Assessed Length: 764**

| 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 | 6 | 6 | | | 100% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 4 | 4 | | | 100% | | | |
| | | Length Appropriate | 4 | 4 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 4 | 4 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 4 | 4 | | | 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. | 6 | 6 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 4 | 4 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms. | 4 | 4 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15%. | 6 | 6 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow. | 6 | 6 | | | 100% | | | |

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

**Table 7. Vegetation Condition Assessment Table**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

**Planted Acreage** **68.3**

| Vegetation Category | Definitions | Mapping Threshold (acres) | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---|---|---|---|---|---|
| **Bare Areas** | Very limited cover of both woody and herbaceous material | 0.1 | 6 | 0.14 | 0.2% |
| **Low Stem Density Areas** | Woody stem densities clearly below target levels based on MY3, 4, 5, or 7 stem count criteria. | 0.1 | 4 | 0.69 | 1.0% |
| | | **Total** | **10** | **0.83** | **1.2%** |
| **Areas of Poor Growth Rates or Vigor** | Areas with woody stems of a size class that are obviously small given the monitoring year. | 0.1 | 0 | 0.00 | 0.0% |
| | | **Cumulative Total** | **10** | **0.83** | **1.2%** |

**Easement Acreage** **103.2**

| Vegetation Category | Definitions | Mapping Threshold (SF) | Number of Polygons | Combined Acreage | % of Easement Acreage |
|---|---|---|---|---|---|
| **Invasive Areas of Concern** | Areas or points (if too small to render as polygons at map scale). | 1000 | 18 | 0.87 | 0.8% |
| | | | | | |
| **Easement Encroachment Areas** | Areas or points (if too small to render as polygons at map scale). | none | 0 | 0.0 | 0.0% |

**Stream Photographs**

| | |
|---|---|
|  |  |
| **Photo Point 1** – UT1 Reach 1, view upstream (*11/05/2020)* | **Photo Point 1** – UT1 Reach 1, view downstream *(11/05/2020)* |
|  |  |
| **Photo Point 2** – UT1 Reach 1, view upstream *(11/05/2020)* | **Photo Point 2** – UT1 Reach 1, view downstream *(11/05/2020)* |
|  |  |
| **Photo Point 3** – UT1 Reach 1, view upstream *(11/05/2020)* | **Photo Point 3** – UT1 Reach 1, view downstream *(11/05/2020)* |

| | |
|---|---|
|  |  |
| **Photo Point 4** – UT1 Reach 2A, view upstream *(11/05/2020)* | **Photo Point 4** – UT1 Reach 2A, view downstream *(11/05/2020)* |
|  |  |
| **Photo Point 5** – UT1 Reach 2A, view upstream *(11/05/2020)* | **Photo Point 5** – UT1 Reach 2A, view downstream *(11/05/2020)* |
|  |  |
| **Photo Point 6** – UT1 Reach 2A, view upstream *(6/30/2020)* | **Photo Point 6** – UT1 Reach 2A, view downstream *(6/30/2020)* |

| | |
|---|---|
|  |  |
| **Photo Point 7** – UT1 Reach 2A, view upstream *(6/30/2020)* | **Photo Point 7** – UT1 Reach 2A, view downstream *(6/30/2020)* |
|  |  |
| **Photo Point 8** – UT1 Reach 2A, view upstream *(6/30/2020)* | **Photo Point 8** – UT1 Reach 2A, view downstream *(6/30/2020)* |
|  |  |
| **Photo Point 9** – UT1 Reach 2A, view upstream *(6/30/2020)* | **Photo Point 9** – UT1 Reach 2A, view downstream *(6/30/2020)* |

**Photo Point 9** – UT1A, view upstream *(6/30/2020)*

**Photo Point 10** – UT1 Reach 2B, view upstream *(6/30/2020)*

**Photo Point 10** – UT1 Reach 2B, view downstream *(6/30/2020)*

**Photo Point 11** – UT1 Reach 2B, view upstream *(6/30/2020)*

**Photo Point 11** – UT1 Reach 2B, view downstream *(6/30/2020)*

| | |
|---|---|
|  |  |
| **Photo Point 12** – UT1 Reach 2B, view upstream *(6/30/2020)* | **Photo Point 12** – UT1 Reach 2B, view downstream *(6/30/2020)* |
|  |  |
| **Photo Point 13** – UT1 Reach 2B, view upstream *(6/30/2020)* | **Photo Point 13** – UT1 Reach 2B, view downstream *(6/30/2020)* |
|  |  |
| **Photo Point 14** – UT1 Reach 2B, view upstream *(6/30/2020)* | **Photo Point 14** – UT1 Reach 2B, view downstream *(6/30/2020)* |

**Photo Point 14** – UT1B, view upstream *(6/30/2020)*

**Photo Point 15** – UT1 Reach 3, view upstream *(6/30/2020)*

**Photo Point 15** – UT1 Reach 3, view downstream *(6/30/2020)*

**Photo Point 16** – UT1 Reach 3, view upstream *(6/30/2020)*

**Photo Point 16** – UT1 Reach 3, view downstream *(6/30/2020)*

| | |
|---|---|
|  |  |
| **Photo Point 17** – UT1 Reach 3, view upstream *(6/30/2020)* | **Photo Point 17** – UT1 Reach 3, view downstream *(6/30/2020)* |
|  |  |
| **Photo Point 18** – UT1 Reach 3, view upstream *(6/30/2020)* | **Photo Point 18** – UT1 Reach 3, view downstream *(6/30/2020)* |
|  |  |
| **Photo Point 19** – UT1 Reach 3, view upstream *(6/30/2020)* | **Photo Point 19** – UT1 Reach 3, view downstream *(6/30/2020)* |

**Photo Point 20** – UT1 Reach 3, view upstream *(6/30/2020)*

**Photo Point 20** – UT1 Reach 3, view downstream *(6/30/2020)*

**Photo Point 20** – UT1 Reach 3 BMP 3, view upstream *(6/30/2020)*

**Photo Point 21** – UT1 Reach 4, view upstream *(6/30/2020)*

**Photo Point 21** – UT1 Reach 4, view downstream *(6/30/2020)*

| | |
|---|---|
|  |  |
| **Photo Point 22** – UT2 Reach 1, view upstream *(8/26/2020)* | **Photo Point 22** – UT2 Reach 1, view downstream *(8/26/2020)* |
|  |  |
| **Photo Point 23** – UT2 Reach 1, view upstream *(8/26/2020)* | **Photo Point 23** – UT2 Reach 1, view downstream *(8/26/2020)* |
|  |  |
| **Photo Point 24** – UT2 Reach 2, view upstream *(8/26/2020)* | **Photo Point 24** – UT2 Reach 2, view downstream *(8/26/2020)* |

**Photo Point 25** – UT2 Reach 2, view upstream *(8/26/2020)*

**Photo Point 25** – UT2 Reach 2, view downstream *(8/26/2020)*

**Photo Point 26** – UT2 Reach 2, view upstream *(8/26/2020)*

**Photo Point 26** – UT2 Reach 2, view downstream *(8/26/2020)*

**Photo Point 27** – UT2A, view upstream *(8/26/2020)*

**Photo Point 27** – UT2A, view downstream *(8/26/2020)*

| | |
|---|---|
|  |  |
| **Photo Point 28** – UT2A, view upstream *(8/26/2020)* | **Photo Point 28** – UT2A, view downstream *(8/26/2020)* |
|  |  |
| **Photo Point 29** – UT2A, view upstream *(8/26/2020)* | **Photo Point 29** – UT2A, view downstream *(8/26/2020)* |
|  |  |
| **Photo Point 30** – UT2B, view upstream *(8/26/2020)* | **Photo Point 30** – UT2B, view downstream *(8/26/2020)* |

**Photo Point 31** – UT2B, view upstream *(8/26/2020)*

**Photo Point 31** – UT2B, view downstream *(8/26/2020)*

**Photo Point 32** – UT2B, view upstream *(7/1/2020)*

**Photo Point 32** – UT2B, view downstream *(7/1/2020)*

**Photo Point 33** – UT3 Reach 1, view upstream *(7/1/2020)*

**Photo Point 33** – UT3 Reach 1, view downstream *(7/1/2020)*

**Photo Point 34** – UT3 Reach 1, view upstream *(7/14/2020)*

**Photo Point 34** – UT3 Reach 1, view downstream *(7/14/2020)*

**Photo Point 35** – UT3 Reach 1, view upstream *(8/26/2020)*

**Photo Point 35** – UT3 Reach 1, view downstream *(8/26/2020)*

**Photo Point 36** – UT3 Reach 2, view upstream *(8/26/2020)*

**Photo Point 36** – UT3 Reach 2, view downstream *(8/26/2020)*

**Photo Point 37** – UT3 Reach 2, view upstream *(7/14/2020)*

**Photo Point 37** – UT3 Reach 2, view downstream *(7/14/2020)*

**Photo Point 38** – UT3 Reach 2, view upstream *(8/26/2020)*

**Photo Point 38** – UT3 Reach 2, view downstream *(8/26/2020)*

**Photo Point 39** – UT3 Reach 3, view upstream *(7/1/2020)*

**Photo Point 39** – UT3 Reach 3, view downstream *(7/1/2020)*

| | |
|---|---|
|  |  |
| **Photo Point 40** – UT3 Reach 3, view upstream *(7/1/2020)* | **Photo Point 40** – UT3 Reach 3, view downstream *(7/1/2020)* |
|  |  |
| **Photo Point 41** – UT3 Reach 3, view upstream *(7/1/2020)* | **Photo Point 41** – UT3 Reach 3, view downstream *(7/1/2020)* |
|  |  |
| **Photo Point 42** – UT1 Reach 3, up valley *(6/30/2020)* | **Photo Point 42** – UT1 Reach 4, down valley *(6/30/2020)* |

**Photo Point 43** – UT2A, northeast view *(8/26/2020)*

**Photo Point 43** – UT2A, north view *(8/26/2020)*

**Photo Point 43** – UT3 Reach 3, northwest view *(8/26/2020)*

**Photo Point 44** – BMP 4 above UT2B, inlet view *(7/14/2020)*

**Photo Point 44** – BMP 4 above UT2B, outlet view *(7/14/2020)*

# Permanent Vegetation Plot Photographs

**Vegetation Plot 1** – *(08/25/2020)*

**Vegetation Plot 2** – *(08/25/2020)*

**Vegetation Plot 3** – *(08/25/2020)*

**Vegetation Plot 4** – *(08/25/2020)*

**Vegetation Plot 5** – *(08/25/2020)*

**Vegetation Plot 6** – *(08/25/2020)*

**Vegetation Plot 7** – *(08/25/2020)*

**Vegetation Plot 8** – *(08/25/2020)*

**Vegetation Plot 9** – *(08/25/2020)*

**Vegetation Plot 10** – *(08/25/2020)*

**Vegetation Plot 11** – *(08/12/2020)*

**Vegetation Plot 12** – *(08/12/2020)*

| | |
|---|---|
|  |  |
| **Vegetation Plot 13** – *(08/12/2020)* | **Vegetation Plot 14** – *(08/12/2020)* |
|  |  |
| **Vegetation Plot 15** – *(08/12/2020)* | **Vegetation Plot 16** – *(08/12/2020)* |
|  |  |
| **Vegetation Plot 17** – *(08/12/2020)* | **Vegetation Plot 18** – *(08/12/2020)* |

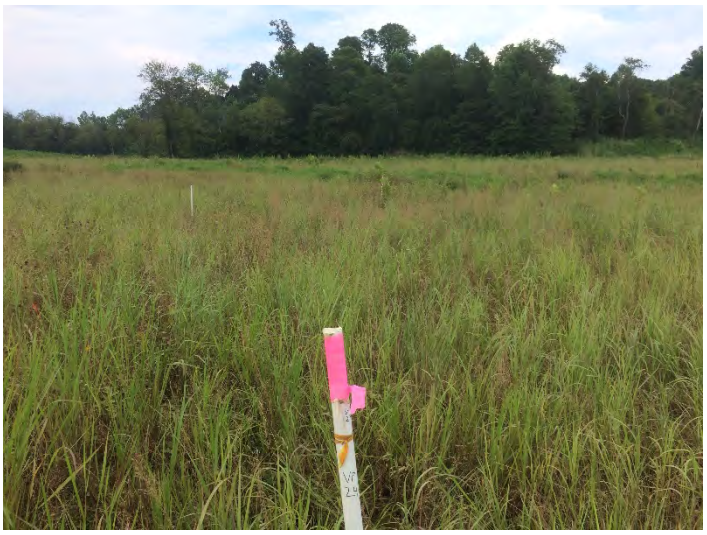
**Vegetation Plot 19** – *(08/12/2020)*

**Vegetation Plot 20** – *(08/12/2020)*

**Vegetation Plot 21** – *(08/12/2020)*

**Vegetation Plot 22** – *(08/12/2020)*

**Vegetation Plot 23** – *(08/12/2020)*



**Vegetation Plot 24** – *(08/12/2020)*

**Vegetation Plot 25** – *(08/12/2020)*

# Mobile Vegetation Plot Photographs

**Mobile Vegetation Plot 1** – *(08/11/2020)*

**Mobile Vegetation Plot 2** – *(08/12/2020)*

**Mobile Vegetation Plot 3** – *(08/26/2020)*

**Mobile Vegetation Plot 4** – *(08/12/2020)*

**Mobile Vegetation Plot 5** – *(08/12/2020)*

**Mobile Vegetation Plot 6** – *(08/12/2020)*

| | |
|---|---|
|  |  |
| **Mobile Vegetation Plot 7** – *(08/11/2020)* | **Vegetation Plot 8** – *(08/11/2020)* |
|  |  |
| **Mobile Vegetation Plot 9** – *(08/26/2020)* | **Mobile Vegetation Plot 10** – *(08/12/2020)* |
|  |  |
| **Mobile Vegetation Plot 11** – *(08/25/2020)* | **Mobile Vegetation Plot 12** – *(08/25/2020)* |

**Mobile Vegetation Plot 13** – *(08/25/2020)*

**Mobile Vegetation Plot 14** – *(08/26/2020)*

**Mobile Vegetation Plot 15** – *(08/26/2020)*

# APPENDIX 3. Vegetation Plot Data

**Table 8a. Vegetation Plot Criteria Attainment**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Permanent Vegetation Plot | MY2 Success Criteria Met (Y/N) | Tract Mean |
|---|---|---|
| 1 | Y | |
| 2 | Y | |
| 3 | Y | |
| 4 | Y | |
| 5 | Y | |
| 6 | Y | |
| 7 | Y | |
| 8 | Y | |
| 9 | Y | |
| 10 | Y | |
| 11 | N | |
| 12 | N | |
| 13 | Y | 88% |
| 14 | Y | |
| 15 | Y | |
| 16 | N | |
| 17 | Y | |
| 18 | Y | |
| 19 | Y | |
| 20 | Y | |
| 21 | Y | |
| 22 | Y | |
| 23 | Y | |
| 24 | N | |
| 25 | Y | |

**Table 8b. Vegetation Plot Criteria Attainment**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Mobile Vegetation Plot | MY2 Success Criteria Met (Y/N) | Tract Mean |
|---|---|---|
| 1 | Y | 100% |
| 2 | Y | |
| 3 | Y | |
| 4 | Y | |
| 5 | Y | |
| 6 | Y | |
| 7 | Y | |
| 8 | Y | |
| 9 | Y | |
| 10 | Y | |
| 11 | Y | |
| 12 | Y | |
| 13 | Y | |
| 14 | Y | |
| 15 | Y | |

**Table 9. CVS Permanent Vegetation Plot Metadata**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

| | |
|---|---|
| **Database Name** | cvs-eep-entrytool-v2.5.0 Lone Hickory MY2.mdb |
| **Database Location** | L:\Active Projects\005-02163 Lone Hickory FDP\Monitoring\Monitoring Year 2\Vegetation Assessment |
| **Computer Name** | MIMI-PC |
| **File Size** | 51904512 |
| **DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------** | |
| **Metadata** | Description of database file, the report worksheets, and a summary of project(s) and project data. |
| **Proj, planted** | Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes. |
| **Proj, 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** | 97135 |
| **Project Name** | Lone Hickory Mitigation Site |
| **Description** | Stream and wetland mitigation project in Yadkin County, NC. |
| **River Basin** | Yadkin River Basin |
| **Length(ft)** | 12,621 |
| **Required Plots (calculated)** | 25 |
| **Sampled Plots** | 25 |

**Table 10a. Planted and Total Stem Counts**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Current Permanent Vegetation Plot Data (MY2 2020) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **Permanent Plot 1** | | | **Permanent Plot 2** | | | **Permanent Plot 3** | | | **Permanent Plot 4** | | | **Permanent Plot 5** | | |
| | | | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** |
| *Acer negundo* | Box Elder | Tree | | | | | | | | | | | | | | | |
| *Acer rubrum* | Red Maple | Tree | | | | | | | | | | | | | | | |
| *Betula nigra* | River Birch | Tree | 3 | 3 | 3 | | | | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 6 |
| *Diospyros virginiana* | American Persimmon | Tree | | | | | | | | | | | | | | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | | | | | | | | | | | | | 3 | 3 | 3 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | | | | | | | | | | | | | 1 |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | 2 | 2 | 3 | 4 | 4 | 6 | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| *Platanus occidentalis* | Sycamore | Tree | 3 | 3 | 6 | 4 | 4 | 7 | 3 | 3 | 3 | 4 | 4 | 5 | 3 | 3 | 3 |
| *Populus deltoides* | Eastern Cottonwood | Tree | | | | | | | | | | | | | | | |
| *Quercus lyrata* | Overcup Oak | Tree | | | | | | | | | | | | | | | |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Quercus pagoda* | Cherrybark Oak | Tree | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | | | |
| *Quercus phellos* | Willow Oak | Tree | | | | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Salix nigra* | Black Willow | Tree | | | | | | | | | | | | | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | | | | | | | | | | | | | |
| | | **Stem count** | 14 | 14 | 18 | 13 | 13 | 18 | 13 | 13 | 14 | 11 | 11 | 12 | 13 | 13 | 17 |
| | | **size (ares)** | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | |
| | | **size (ACRES)** | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | |
| | | **Species count** | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 7 |
| | | **Stems per ACRE** | 567 | 567 | 728 | 526 | 526 | 728 | 526 | 526 | 567 | 445 | 445 | 486 | 526 | 526 | 688 |

| Current Permanent Vegetation Plot Data (MY2 2020) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **Permanent Plot 6** | | | **Permanent Plot 7** | | | **Permanent Plot 8** | | | **Permanent Plot 9** | | | **Permanent Plot 10** | | |
| | | | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** |
| *Acer negundo* | Box Elder | Tree | | | | | | | | | | | | 2 | | | |
| *Acer rubrum* | Red Maple | Tree | | | | | | | | | | | | | | | |
| *Betula nigra* | River Birch | Tree | 3 | 3 | 3 | 3 | 3 | 5 | 3 | 3 | 9 | 2 | 2 | 2 | 2 | 2 | 2 |
| *Diospyros virginiana* | American Persimmon | Tree | | | | | | | | | | | | | | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | | | | | | | | | | | | | 2 | 2 | 2 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | | | | 3 | | | 7 | | | 1 | | | |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | | | | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| *Platanus occidentalis* | Sycamore | Tree | 3 | 3 | 3 | 5 | 5 | 7 | 2 | 2 | 87 | 5 | 5 | 9 | | | |
| *Populus deltoides* | Eastern Cottonwood | Tree | | | 1 | | | | | | | | | | | | |
| *Quercus lyrata* | Overcup Oak | Tree | | | | | | | | | | | | | | | |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | | | | 3 | 3 | 3 |
| *Quercus pagoda* | Cherrybark Oak | Tree | | | | | | | 5 | 5 | 5 | 1 | 1 | 1 | 2 | 2 | 2 |
| *Quercus phellos* | Willow Oak | Tree | 2 | 2 | 2 | | | | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| *Salix nigra* | Black Willow | Tree | | | | | | | | | | | | | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | | | | 1 | | | | | | | | | |
| | | **Stem count** | 9 | 9 | 10 | 11 | 11 | 19 | 14 | 14 | 112 | 12 | 12 | 19 | 13 | 13 | 13 |
| | | **size (ares)** | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | |
| | | **size (ACRES)** | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | |
| | | **Species count** | 4 | 4 | 5 | 4 | 4 | 6 | 6 | 6 | 7 | 5 | 5 | 7 | 6 | 6 | 6 |
| | | **Stems per ACRE** | 364 | 364 | 405 | 445 | 445 | 769 | 567 | 567 | 4532 | 486 | 486 | 769 | 526 | 526 | 526 |

**Color for Density**

Exceeds requirements by 10%
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 10b. Planted and Total Stem Counts**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Current Permanent Vegetation Plot Data (MY2 2020) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **Permanent Plot 11** | | | **Permanent Plot 12** | | | **Permanent Plot 13** | | | **Permanent Plot 14** | | | **Permanent Plot 15** | | |
| | | | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** |
| *Acer negundo* | Box Elder | Tree | | | | | | | | | | | | | | | |
| *Acer rubrum* | Red Maple | Tree | | | | | | | | | | | | | | | |
| *Betula nigra* | River Birch | Tree | 1 | 1 | 1 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | | | |
| *Diospyros virginiana* | American Persimmon | Tree | | | | | | | | | | | | | | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | | | | | | | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | | | | | | | | | | | | | |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | | | | | | | | | | | | | | | |
| *Platanus occidentalis* | Sycamore | Tree | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 3 | 3 | 3 |
| *Populus deltoides* | Eastern Cottonwood | Tree | | | | | | | | | | 3 | 3 | 3 | | | |
| *Quercus lyrata* | Overcup Oak | Tree | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | | | | | | | | | | | | | | | |
| *Quercus pagoda* | Cherrybark Oak | Tree | | | | 2 | 2 | 2 | 2 | 2 | 2 | | | | 2 | 2 | 2 |
| *Quercus phellos* | Willow Oak | Tree | 1 | 1 | 1 | | | | 1 | 1 | 1 | | | | | | |
| *Salix nigra* | Black Willow | Tree | | | | | | | | | | | | | | | 5 |
| *Salix sericea* | Silky Willow | Shrub Tree | | | | | | | | | | | | | | | 1 |
| | | **Stem count** | 6 | 6 | 6 | 7 | 7 | 8 | 12 | 12 | 13 | 13 | 13 | 14 | 8 | 8 | 14 |
| | | **size (ares)** | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | |
| | | **size (ACRES)** | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | |
| | | **Species count** | 4 | 4 | 4 | 4 | 4 | 4 | 6 | 6 | 6 | 5 | 5 | 5 | 4 | 4 | 6 |
| | | **Stems per ACRE** | 243 | 243 | 243 | 283 | 283 | 324 | 486 | 486 | 526 | 526 | 526 | 567 | 324 | 324 | 567 |

| Current Permanent Vegetation Plot Data (MY2 2020) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **Permanent Plot 16** | | | **Permanent Plot 17** | | | **Permanent Plot 18** | | | **Permanent Plot 19** | | | **Permanent Plot 20** | | |
| | | | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** |
| *Acer negundo* | Box Elder | Tree | | | | | | | | | 1 | | | | | | 1 |
| *Acer rubrum* | Red Maple | Tree | | | | | | | | | | | | | | | |
| *Betula nigra* | River Birch | Tree | | | | 1 | 1 | 1 | | | | 3 | 3 | 3 | 3 | 3 | 3 |
| *Diospyros virginiana* | American Persimmon | Tree | | | | 1 | 1 | 1 | | | | | | | | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | | | | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | | | | | | | | | | | | | 1 |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | | | | | | | | | | | | | 3 | 3 | 4 |
| *Platanus occidentalis* | Sycamore | Tree | 2 | 2 | 3 | 5 | 5 | 5 | 6 | 6 | 6 | 3 | 3 | 3 | 3 | 3 | 9 |
| *Populus deltoides* | Eastern Cottonwood | Tree | | | | 1 | 1 | 1 | | | | | | | | | |
| *Quercus lyrata* | Overcup Oak | Tree | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | | | | | | | | | | | | | | | |
| *Quercus pagoda* | Cherrybark Oak | Tree | | | | | | | 1 | 1 | 1 | | | | 1 | 1 | 1 |
| *Quercus phellos* | Willow Oak | Tree | | | | | | | | | | 2 | 2 | 2 | 1 | 1 | 1 |
| *Salix nigra* | Black Willow | Tree | | | | | | | | | | | | | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | | | | | | | | | | | | | |
| | | **Stem count** | 4 | 4 | 5 | 13 | 13 | 13 | 11 | 11 | 12 | 11 | 11 | 11 | 15 | 15 | 24 |
| | | **size (ares)** | | 1 | | | 1 | | | 1 | | | 1 | | | 1 | |
| | | **size (ACRES)** | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | |
| | | **Species count** | 2 | 2 | 2 | 6 | 6 | 6 | 4 | 4 | 5 | 5 | 5 | 5 | 7 | 7 | 9 |
| | | **Stems per ACRE** | 162 | 162 | 202 | 526 | 526 | 526 | 445 | 445 | 486 | 445 | 445 | 445 | 607 | 607 | 971 |

**Color for Density**

Exceeds requirements by 10%
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 10c. Planted and Total Stem Counts**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Current Permanent Vegetation Plot Data (MY2 2020) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **Permanent Plot 21** | | | **Permanent Plot 22** | | | **Permanent Plot 23** | | | **Permanent Plot 24** | | | **Permanent Plot 25** | | |
| | | | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** |
| *Acer negundo* | Box Elder | Tree | | | | | | | | | | | | 2 | | | 21 |
| *Acer rubrum* | Red Maple | Tree | | | | | | | 1 | 1 | 1 | | | | | | 2 |
| *Betula nigra* | River Birch | Tree | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | |
| *Diospyros virginiana* | American Persimmon | Tree | | | | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | | | | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | | | |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | | | | | | | | | | | | | |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | 1 | 1 | 1 | | | | | | | | | | 2 | 2 | 2 |
| *Platanus occidentalis* | Sycamore | Tree | 3 | 3 | 18 | 3 | 3 | 6 | | | | 1 | 1 | 19 | 1 | 1 | 3 |
| *Populus deltoides* | Eastern Cottonwood | Tree | | | | 2 | 2 | 2 | 1 | 1 | 1 | | | | | | |
| *Quercus lyrata* | Overcup Oak | Tree | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | | | | | | | | | | | | | | | |
| *Quercus pagoda* | Cherrybark Oak | Tree | 2 | 2 | 2 | | | | | | | | | | 4 | 4 | 4 |
| *Quercus phellos* | Willow Oak | Tree | 3 | 3 | 3 | | | | 2 | 2 | 2 | | | | 1 | 1 | 1 |
| *Salix nigra* | Black Willow | Tree | | | | | | | | | | | | | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | | | | | | | | | | | | | |
| | | **Stem count** | 13 | 13 | 28 | 11 | 11 | 14 | 13 | 13 | 13 | 5 | 5 | 25 | 10 | 10 | 35 |
| | | **size (ares)** | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | |
| | | **size (ACRES)** | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | | | 0.0247 | | |
| | | **Species count** | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 3 | 3 | 4 | 5 | 5 | 7 |
| | | **Stems per ACRE** | 526 | 526 | 1133 | 445 | 445 | 567 | 526 | 526 | 526 | 202 | 202 | 1012 | 405 | 405 | 1416 |

| Current Permanent Vegetation Plot Data (MY2 2020) Total Stem Counts & Annual Means | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **MY2 (2020)** | | | **MY1 (2019)** | | | **MY0 (2019)** | | |
| | | | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** | **PnoLS** | **P-all** | **T** |
| *Acer negundo* | Box Elder | Tree | | | 27 | | | 32 | | | |
| *Acer rubrum* | Red Maple | Tree | 1 | 1 | 3 | 3 | 3 | 4 | 3 | 3 | 3 |
| *Betula nigra* | River Birch | Tree | 45 | 45 | 56 | 43 | 43 | 61 | 55 | 55 | 55 |
| *Diospyros virginiana* | American Persimmon | Tree | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 |
| *Fraxinus pennsylvanica* | Green Ash | Tree | 21 | 21 | 21 | 22 | 22 | 23 | 23 | 23 | 23 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | 13 | | | 6 | | | |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | 21 | 21 | 26 | 32 | 32 | 34 | 58 | 58 | 58 |
| *Platanus occidentalis* | Sycamore | Tree | 72 | 72 | 218 | 75 | 75 | 188 | 77 | 77 | 77 |
| *Populus deltoides* | Eastern Cottonwood | Tree | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| *Quercus lyrata* | Overcup Oak | Tree | 31 | 31 | 31 | 32 | 32 | 32 | 33 | 33 | 33 |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | 16 | 16 | 16 | 18 | 18 | 18 | 23 | 23 | 23 |
| *Quercus pagoda* | Cherrybark Oak | Tree | 31 | 31 | 31 | 36 | 36 | 36 | 42 | 42 | 42 |
| *Quercus phellos* | Willow Oak | Tree | 25 | 25 | 25 | 39 | 39 | 39 | 46 | 46 | 46 |
| *Salix nigra* | Black Willow | Tree | | | 5 | | | | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | 2 | | | 2 | | | |
| | | **Stem count** | 275 | 275 | 487 | 314 | 314 | 489 | 374 | 374 | 374 |
| | | **size (ares)** | 25 | | | 25 | | | 25 | | |
| | | **size (ACRES)** | 0.6178 | | | 0.6178 | | | 0.6178 | | |
| | | **Species count** | 11 | 11 | 15 | 11 | 11 | 14 | 11 | 11 | 11 |
| | | **Stems per ACRE** | 445 | 445 | 788 | 508 | 508 | 792 | 605 | 605 | 605 |

**Color for Density**

Exceeds requirements by 10%
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 10d. Planted and Total Stem Counts**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Current Mobile Vegetation Plot (MP) Data (MY2 2020) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **MP1** | **MP2** | **MP3** | **MP4** | **MP5** | **MP6** | **MP7** | **MP8** | **MP9** | **MP10** | **MP11** | **MP12** | **MP13** | **MP14** | **MP15** |
| | | | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** | **PnoLS** |
| *Acer negundo* | Box Elder | Tree | | | | | | 2 | | | | 1 | | | | | |
| *Acer rubrum* | Red Maple | Tree | | | | | | | | | | | | | | | |
| *Betula nigra* | River Birch | Tree | 3 | 3 | | 1 | 2 | 4 | | 2 | | | 3 | 1 | 2 | | 3 |
| *Diospyros virginiana* | American Persimmon | Tree | | | | | | | | | 3 | | | | | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | 1 | | 6 | 1 | | | 1 | 1 | 1 | 1 | 1 | 2 | | | 1 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | | | | | | | | | | | | | |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | 1 | | | 3 | | | | | | | 1 | | 2 | 3 | |
| *Platanus occidentalis* | Sycamore | Tree | 4 | 1 | 5 | 5 | 2 | | 4 | 1 | 2 | | 6 | 6 | 3 | 1 | 7 |
| *Populus deltoides* | Eastern Cottonwood | Tree | | | | | | | 1 | | 4 | | | | | | |
| *Quercus lyrata* | Overcup Oak | Tree | 3 | 2 | | 3 | 3 | 4 | 5 | 4 | | 7 | | | | | |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | | | | | 4 | | | | | | 2 | | | | 3 |
| *Quercus pagoda* | Cherrybark Oak | Tree | 2 | 1 | 3 | | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 5 | 6 | 6 | 4 |
| *Quercus phellos* | Willow Oak | Tree | | 5 | | | | 1 | | 1 | 1 | 3 | 1 | 2 | 3 | 2 | |
| *Salix nigra* | Black Willow | Tree | | | | | | | | | | | | | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | | | | | | | | | | | | | |
| | | **Stem count** | 14 | 12 | 14 | 13 | 13 | 12 | 12 | 11 | 13 | 15 | 17 | 16 | 16 | 12 | 18 |
| | | **size (ares)** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | **size (ACRES)** | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 | 0.0247 |
| | | **Species count** | 6 | 5 | 3 | 5 | 5 | 5 | 5 | 6 | 6 | 5 | 7 | 5 | 5 | 4 | 5 |
| | | **Stems per ACRE** | 567 | 486 | 567 | 526 | 526 | 486 | 486 | 445 | 526 | 607 | 688 | 647 | 647 | 486 | 728 |

| Current Mobile Vegetation Plot (MP) Data (MY2 2020) Total Stem Counts & Annual Means | | | | | |
|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Species Type** | **MY2 (2020)** | **MY1 (2019)** | **MY0 (2019)** |
| | | | **PnoLS** | **PnoLS** | **PnoLS** |
| *Acer negundo* | Box Elder | Tree | 3 | | |
| *Acer rubrum* | Red Maple | Tree | | 16 | |
| *Betula nigra* | River Birch | Tree | 24 | 28 | 27 |
| *Diospyros virginiana* | American Persimmon | Tree | 3 | | |
| *Fraxinus pennsylvanica* | Green Ash | Tree | 16 | 8 | 18 |
| *Liquidambar styraciflua* | Sweet Gum | Tree | | | |
| *Liriodendron tulipifera* | Tulip Poplar | Tree | 10 | 12 | 47 |
| *Platanus occidentalis* | Sycamore | Tree | 47 | 60 | 43 |
| *Populus deltoides* | Eastern Cottonwood | Tree | 5 | | |
| *Quercus lyrata* | Overcup Oak | Tree | 31 | 26 | 7 |
| *Quercus michauxii* | Swamp Chestnut Oak | Tree | 9 | | 5 |
| *Quercus pagoda* | Cherrybark Oak | Tree | 41 | 19 | 56 |
| *Quercus phellos* | Willow Oak | Tree | 19 | 2 | 13 |
| *Salix nigra* | Black Willow | Tree | | | |
| *Salix sericea* | Silky Willow | Shrub Tree | | | |
| | **Stem count** | | 208 | 171 | 216 |
| | **size (ares)** | | 15 | 15 | 15 |
| | **size (ACRES)** | | 0.3707 | 0.3707 | 0.3707 |
| | **Species count** | | 11 | 8 | 8 |
| | **Stems per ACRE** | | 561 | 461 | 583 |

| Overall Site Annual Means | | |
|---|---|---|
| **MY2 (2020)** | **MY1 (2019)** | **MY0 (2019)** |
| **PnoLS** | **PnoLS** | **PnoLS** |
| 3 | | |
| 1 | 19 | 3 |
| 69 | 71 | 82 |
| 8 | 6 | 6 |
| 37 | 30 | 41 |
| | | |
| 31 | 44 | 105 |
| 119 | 135 | 120 |
| 12 | 8 | 8 |
| 62 | 58 | 40 |
| 25 | 18 | 28 |
| 72 | 55 | 98 |
| 44 | 41 | 59 |
| | | |
| | | |
| 483 | 485 | 590 |
| 40 | 40 | 40 |
| 0.9884 | 0.9884 | 0.9884 |
| 12 | 11 | 11 |
| 489 | 491 | 597 |

**Color for Density**
Exceeds requirements by 10%
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

# APPENDIX 4. Morphological Summary Data and Plots

**Table 11a. Baseline Stream Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**East Side**

| | | Pre-Restoration Condition | | | | | | Design | | | | | | | | As-Built/Baseline | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Gage** | **UT1 Reach 1** | | **UT1 Reach 2** | | **UT1 Reach 3** | | **UT1 Reach 1** | | **UT1 Reach 2A** | | **UT1 Reach 2B** | | **UT1 Reach 3** | | **UT1 Reach 1** | | **UT1 Reach 2A** | | **UT1 Reach 2B** | | **UT1 Reach 3** | |
| | | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| **Dimension and Substrate - Riffle** | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | N/A | 4.8 | | 8.9 | | 10.0 | | 6.5 | | 7.8 | | 10.7 | | 11.8 | | 6.9 | | 7.3 | | 10.3 | 10.5 | 11.3 | 12.5 |
| Floodprone Width (ft) | | 13.1 | | 13.2 | | 31.1 | | 15 | 50 | 15 | 50 | 25 | 100 | 25 | 100 | 29 | | 46 | 65+ | 49+ | 68+ | 60+ | 68+ |
| Bankfull Mean Depth (ft) | | 0.8 | | 0.8 | | 1.3 | | 0.5 | | 0.5 | | 0.8 | | 0.8 | | 0.6 | | 0.6 | | 0.8 | | 0.7 | |
| Bankfull Max Depth (ft) | | 1.4 | | 1.3 | | 1.9 | | 0.6 | | 0.7 | | 1.0 | | 1.0 | | 1.0 | | 0.9 | 1.0 | 1.2 | 1.3 | 1.1 | |
| Bankfull Cross-sectional Area ($ft^2$) | | 3.8 | | 7.2 | | 13.4 | | 3.0 | | 4.2 | | 8.1 | | 9.5 | | 4.2 | | 4.5 | 4.6 | 7.9 | 8.5 | 8.3 | 8.7 |
| Width/Depth Ratio | | 6.2 | | 11.0 | | 7.5 | | 14.2 | | 14.6 | | 14.3 | | 14.6 | | 11.5 | | 11.5 | 11.8 | 12.9 | 13.3 | 15.5 | 18.0 |
| Entrenchment Ratio | | 2.7 | | 1.5 | | 3.1 | | 2.2+ | | 2.2+ | | 2.2+ | | 2.2+ | | 4.2 | | 6.3 | 9.0+ | 4.7+ | 6.6+ | 5.3+ | 5.4+ |
| Bank Height Ratio | | 3.8 | | 2.6 | | 1.7 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | |
| $D_{50}$ (mm) | | 15.1 | | 41.0 | | 19.6 | | --- | | --- | | --- | | --- | | 59.6 | | 37.0 | 37.9 | 35.6 | 45.0 | 41.6 | 47.4 |
| **Profile** | | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | N/A | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | | | | | | | | 0.020 | 0.041 | 0.011 | 0.055 | 0.018 | 0.045 | 0.016 | 0.048 | N/A[1] | N/A[1] | 0.003 | 0.068 | 0.013 | 0.072 | 0.013 | 0.055 |
| Pool Length (ft) | | | | | | | | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | | 1.4 | | 1.4 | | 1.7 | | 1.7 | | 1.8 | | 3.2 | | 2.9 | | 1.1 | 3.0 | 1.3 | 2.8 | 1.8 | 3.1 | 1.8 | 3.7 |
| Pool Spacing (ft) | | 5 | 20 | 29 | 42 | 18 | 32 | 14 | 26 | 16 | 39 | 34 | 109 | 48 | 113 | 5 | 76 | 6 | 51 | 18 | 145 | 41 | 129 |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A | 6 | 12 | --- | | 12 | 14 | N/A[2] | | N/A[2] | | 31 | 67 | 35 | 71 | N/A[2] | | N/A[2] | | 31 | 67 | 35 | 71 |
| Radius of Curvature (ft) | | 3 | 8 | --- | | 5 | 12 | N/A[2] | | N/A[2] | | 20 | 38 | 19 | 38 | N/A[2] | | N/A[2] | | 20 | 38 | 19 | 38 |
| Rc/Bankfull Width (ft/ft) | | 0.6 | 1.7 | --- | | 5 | 12 | N/A[2] | | N/A[2] | | 1.9 | 3.6 | 1.6 | 3.2 | N/A[2] | | N/A[2] | | 1.9 | 3.6 | 1.7 | 3.0 |
| Meander Length (ft) | | 9 | 19 | --- | | 14 | 43 | N/A[2] | | N/A[2] | | 102 | 190 | 102 | 196 | N/A[2] | | N/A[2] | | 102 | 190 | 102 | 196 |
| Meander Width Ratio | | 1.3 | 2.5 | --- | | 1.2 | 1.4 | N/A[2] | | N/A[2] | | 2.9 | 6.3 | 3.0 | 6.0 | N/A[2] | | N/A[2] | | 3.0 | 6.4 | 3.1 | 5.7 |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | N/A | | | | | | | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | | SC/0.37/3.7/54.2/75.9/128 | | 1.35/11.0/38/90/193.1/2048 | | 0.19/0.39/0.73/26.3/52.5/90 | | | | | | | | | | 0.4/1.8/33.9/108/156.5/256 | | 0.3/14.1/21.6/67.2/137/362 | | 0.3/0.4/22.6/59.2/104.7/362 | | 0.3/16/25.6/62.4/113.8/180 | |
| Reach Shear Stress (Competency) $lb/ft^2$ | | --- | | --- | | --- | | 1.74 | | 0.95 | | 0.75 | | 0.76 | | 1.97 | | 1.06 | 1.08 | 0.85 | 0.88 | 0.65 | 0.68 |
| Max part size (mm) mobilized at bankfull | | | | | | | | 228 | | 146 | | 123 | | 125 | | 97 | | 52 | 53 | 42 | 43 | 32 | 33 |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | N/A | 0.07 | | 0.37 | | 0.45 | | 0.07 | | 0.12 | | 0.32 | | 0.44 | | 0.07 | | 0.12 | | 0.32 | | 0.44 | |
| Watershed Impervious Cover Estimate (%) | | 3% | | | | | | 3% | | | | | | | | 3% | | | | | | | |
| Rosgen Classification | | E5b | | G4 | | E4 | | A4 | | B4 | | C4 | | C4 | | A4 | | B4 | | C4 | | C4 | |
| Bankfull Velocity (fps) | | 2.9 | | 4.8 | | 4.1 | | 4.1 | | 3.7 | | 3.8 | | 4.0 | | 4.8 | | 3.9 | 4.0 | 4.1 | 4.2 | 3.7 | 3.8 |
| Bankfull Discharge (cfs) | | 11 | | 35 | | 55 | | 11 | | 15 | | 30 | | 38 | | 20.2 | | 17.7 | 18.3 | 32.7 | 36.2 | 30.4 | 31.0 |
| Q-NFF regression (2-yr) | | --- | | --- | | --- | | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | --- | | --- | | --- | | 11 | | 16 | | 34 | | 42 | | | | | | | | | |
| Max Q-Mannings | | --- | | --- | | --- | | 601 | | 304 | | 304 | | 218 | | | | | | | | | |
| Valley Slope (ft/ft) | | 0.0411 | | 0.0454 | | 0.0049 | | 0.0648 | | 0.0313 | | 0.0225 | | 0.0203 | | --- | | --- | | --- | | --- | |
| Channel Thalweg Length (ft) | | 6,015 | | | | | | 966 | | 1,746 | | 1,368 | | 1,641 | | 966 | | 1,746 | | 1,368 | | 1,641 | |
| Sinuosity | | 1.08 | | 1.04 | | 1.13 | | | | | | 1.25 | | 1.30 | | | | | | 1.25 | | 1.30 | |
| Bankfull/Channel Slope (ft/ft) | | 0.0295 | | 0.0256 | | 0.0101 | | 0.0622 | | 0.0290 | | 0.0180 | | 0.0156 | | 0.0555 | | 0.0292 | | 0.0182 | | 0.0153 | |

1. UT1 Reach 1 riffle slopes were not calculated because this reach is comprised of a series of rock steps and cascades.
2. Pattern data is not applicable for A-type and B-type channels
SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

**Table 11b. Baseline Stream Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**West Side - UT2, UT2A, UT2B**

| | | Pre-Restoration Condition | | | | | | | | | | Design | | | | | | | | As-built/Baseline | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Gage** | **UT2 Reach 1** | | **UT2 Reach 2** | | **UT2 Reach 3** | | **UT2A** | | **UT2B** | | **UT2 Reach 1** | | **UT2 Reach 2** | | **UT2A** | | **UT2B** | | **UT2 Reach 1** | | **UT2 Reach 2** | | **UT2A** | | **UT2B** | |
| | | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| **Dimension and Substrate - Riffle** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | N/A | 8.7 | | 7.7 | | 8.4 | | 3.4 | 4.7 | 3.9 | 4.1 | 6.5 | | 11.0 | | 5.5 | | 7.5 | | 8.3 | | 11.8 | 11.9 | 5.4 | 5.7 | 7.2 | 9.6 |
| Floodprone Width (ft) | | 12.3 | | 10.7 | | 13.0 | | 5.4 | 11.4 | 5.1 | 6.4 | 130+ | | 250+ | | 100+ | | 100+ | | 69+ | | 65+ | 72+ | 51+ | 57+ | 56+ | 66+ |
| Bankfull Mean Depth (ft) | | 0.7 | | 0.8 | | 0.7 | | 0.5 | 0.7 | 0.3 | | 0.5 | | 0.7 | | 0.4 | | 0.5 | | 0.7 | | 0.8 | 0.9 | 0.4 | 0.4 | 0.5 | 0.5 |
| Bankfull Max Depth (ft) | | 0.9 | | 1.2 | | 1.1 | | 0.9 | | 0.5 | 0.6 | 0.8 | | 1.0 | | 0.6 | | 0.9 | | 1.2 | | 1.2 | 1.3 | 0.5 | 0.7 | 0.8 | 0.8 |
| Bankfull Cross-sectional Area ($ft^2$) | | 5.7 | | 6.1 | | 5.7 | | 2.2 | 2.3 | 1.3 | 1.4 | 3.9 | | 7.8 | | 2.1 | | 4.1 | | 6.1 | | 9.1 | 10.2 | 1.9 | 2.4 | 3.9 | 4.3 |
| Width/Depth Ratio | | 13.1 | | 9.8 | | 12.3 | | 5.1 | 9.5 | 11.4 | 13.0 | 14.0 | | 16.0 | | 14.0 | | 14.0 | | 11.3 | | 13.6 | 15.6 | 13.6 | 15.2 | 13.4 | 21.1 |
| Entrenchment Ratio | | 1.4 | | 1.1 | | 1.5 | | 1.6 | 2.4 | 1.2 | 1.6 | 2.2+ | | 2.2+ | | 2.2+ | | 1.4 | 2.2+ | 8.3+ | | 5.5+ | 6.1+ | 9.0+ | 10.5+ | 6.9+ | 7.8+ |
| Bank Height Ratio | | 4.4 | | 2.3 | | 3.1 | | 2.7 | 3.1 | 6.5 | 7.2 | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | |
| $D_{50}$ (mm) | | 34.4 | | 11.4 | | --- | | --- | | --- | | --- | | --- | | --- | | --- | | 26.9 | | 25.4 | 33.4 | 21.0 | 28.1 | 25.1 | 30.6 |
| **Profile** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | | | | | | | | | | | | 0.020 | 0.034 | 0.003 | 0.025 | 0.006 | 0.045 | 0.004 | 0.056 | 0.006 | 0.034 | 0.004 | 0.035 | 0.001 | 0.046 | 0.001 | 0.037 |
| Pool Length (ft) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | | 1.2 | | 1.5 | | 1.5 | | --- | | --- | | 1.1 | 1.8 | 1.1 | 2.5 | 0.6 | 1.4 | 0.8 | 1.9 | 1.2 | 2.5 | 2.1 | 3.2 | 0.9 | 1.3 | 1.5 | 2.7 |
| Pool Spacing (ft) | | 24 | 30 | 22 | 44 | 23 | 68 | --- | | --- | | 8 | 45 | 39 | 77 | 19 | 39 | 26 | 53 | 15 | 78 | 45 | 127 | 18 | 58 | 7 | 58 |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A | --- | | --- | | --- | | --- | | --- | | N/A[1] | | 39 | 88 | 19 | 44 | 26 | 60 | N/A[1] | | 39 | 88 | 19 | 44 | 26 | 60 |
| Radius of Curvature (ft) | | --- | | --- | | --- | | --- | | --- | | N/A[1] | | 20 | 39 | 10 | 19 | 14 | 23 | N/A[1] | | 20 | 39 | 10 | 19 | 14 | 23 |
| Rc/Bankfull Width (ft/ft) | | --- | | --- | | --- | | --- | | --- | | N/A[1] | | 1.8 | 3.5 | 1.8 | 3.5 | 1.8 | 3.0 | N/A[1] | | 1.7 | 3.3 | 1.9 | 3.3 | 1.9 | 2.4 |
| Meander Length (ft) | | --- | | --- | | --- | | --- | | --- | | N/A[1] | | 72 | 154 | 36 | 77 | 49 | 105 | N/A[1] | | 72 | 154 | 36 | 77 | 49 | 105 |
| Meander Width Ratio | | --- | | --- | | --- | | --- | | --- | | N/A[1] | | 3.5 | 8.0 | 3.5 | 8.0 | 3.5 | 8.0 | N/A[1] | | 3.3 | 7.4 | 3.5 | 7.7 | 3.6 | 6.3 |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | | 0.37/1.38/7.1/ 49.5/75.9/128 | | 0.25/0.59/1.1/17.9/35.9/90 | | | | --- | | --- | | --- | | --- | | --- | | --- | | SC/SC/0.5/47.3/ 90/128 | | SC/SC/SC/42/ 71.7/180 | | SC/SC/0.5/42.5/ 90/180 | | SC/SC/0.4/43.3/ 82.6/256 | |
| Reach Shear Stress (Competency) $lb/ft^2$ | | --- | | --- | | --- | | --- | | --- | | 0.66 | | 1.66 | | --- | | --- | | 0.79 | | 0.33 | 0.38 | --- | | --- | |
| Max part size (mm) mobilized at bankfull | | --- | | --- | | --- | | --- | | --- | | 112 | | 221 | | --- | | --- | | 39 | | 16 | 19 | --- | | --- | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | N/A | 0.14 | | 0.26 | | 0.27 | | 0.02 | | 0.04 | | 0.14 | | 0.26 | | 0.02 | | 0.05 | | 0.14 | | 0.26 | | 0.02 | | 0.05 | |
| Watershed Impervious Cover Estimate (%) | | 1% | | | | | | --- | | --- | | 1% | | | | --- | | --- | | 1% | | | | --- | | --- | |
| Rosgen Classification | | G4 | | G5 | | G5 | | G5 | | G5 | | B4 | | C4 | | C4 | | C/Cb4 | | B4 | | C4 | | C4 | | C4 | |
| Bankfull Velocity (fps) | | 3.4 | | 2.3 | | 1.8 | | 1.6 | 1.8 | 1.7 | 1.8 | 3.4 | | 2.6 | | 1.9 | | 2.0 | | 3.9 | | 2.6 | 2.8 | 1.9 | 2.1 | 2.3 | 2.6 |
| Bankfull Discharge (cfs) | | 19 | | 14 | | 10 | | 4 | | 2 | 3 | 14 | | 20 | | 4 | | 8 | | 24.0 | | 23.6 | 28.9 | 3.7 | 5.1 | 10.1 | 10.1 |
| Q-NFF regression (2-yr) | | --- | | --- | | --- | | --- | | --- | | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | --- | | --- | | --- | | --- | | --- | | 18 | | 29 | | 4 | | 9 | | | | | | | | | |
| Max Q-Mannings | | --- | | --- | | --- | | --- | | --- | | 331 | | 75 | | 52 | | 124 | | | | | | | | | |
| Valley Slope (ft/ft) | | 0.0205 | | 0.0123 | | 0.0086 | | 0.0028 | | 0.0027 | | 0.0280 | | 0.0045 | 0.0130 | 0.0057 | 0.0170 | 0.0060 | 0.0400 | --- | | --- | | --- | | --- | |
| Channel Thalweg Length (ft) | | 2,527 | | | | | | 1,184 | | 699 | | 623 | | 1080 | | 655 | | 776 | | 623 | | 1,080 | | 655 | | 776 | |
| Sinuosity | | 1.01 | | 1.02 | | 1.05 | | 1.00 | | 1.00 | | 1.10 | | 1.30 | | 1.20 | | 1.20 | | 1.10 | | 1.30 | | 1.20 | | 1.20 | |
| Bankfull/Channel Slope (ft/ft) | | 0.0154 | | 0.0062 | | 0.0043 | | 0.0052 | | 0.0107 | | 0.0200 | | 0.0030 | 0.0120 | 0.0050 | 0.0140 | 0.0040 | 0.0280 | 0.0180 | | 0.0072 | | 0.0110 | | 0.0115 | |

1. Pattern data is not applicable for B-type channels
SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

**Table 11c. Baseline Stream Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**West Side - UT3**

| | | Pre- Restoration | | | | Design | | | | | | As-Built/Baseline | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Gage** | **UT3 Reach 1** | | **UT3 Reach 2** | | **UT3 Reach 1** | | **UT3 Reach 2** | | **UT3 Reach 3** | | **UT3 Reach 1** | | **UT3 Reach 2** | | **UT3 Reach 3** | |
| | | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| **Dimension and Substrate - Riffle** | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | N/A | 11.2 | | 10.0 | | 13.0 | | 16.2 | | 19.0 | | 13.7 | | 16.7 | | 19.2 | |
| Floodprone Width (ft) | | 17.4 | | 150+ | | 75 | | 100+ | | 42 | 219 | 73+ | | 76+ | | 71+ | |
| Bankfull Mean Depth (ft) | | 1.2 | | 1.0 | | 0.9 | | 1.0 | | 1.1 | | 0.9 | | 1.0 | | 1.0 | |
| Bankfull Max Depth (ft) | | 1.8 | | 2.1 | | 1.4 | | 1.7 | | 2.0 | | 1.5 | | 1.9 | | 1.9 | |
| Bankfull Cross-sectional Area ($ft^2$) | | 13.7 | | 10.2 | | 12.1 | | 16.2 | | 21.1 | | 12.8 | | 16.5 | | 19.5 | |
| Width/Depth Ratio | | 9.1 | | 9.9 | | 14.4 | | 16.2 | | 17.1 | | 14.7 | | 17.0 | | 19.0 | |
| Entrenchment Ratio | | 1.3 | | 14.9+ | | 1.4 | 2.2+ | 2.2+ | | 2.2+ | | 5.3+ | | 4.5+ | | 3.7+ | |
| Bank Height Ratio | | 2.6 | | 1.4 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | |
| $D_{50}$ (mm) | | 12.5 | | 0.9 | | --- | | --- | | --- | | 50.0 | | 31.2 | | 47.0 | |
| **Profile** | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | N/A | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | | | | | | 0.012 | 0.017 | 0.002 | 0.022 | 0.002 | 0.008 | 0.001 | 0.023 | 0.002 | 0.012 | 0.0002 | 0.005 |
| Pool Length (ft) | | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | | 1.9 | | 2.7 | | 1.9 | 3.3 | 1.5 | 3.5 | 1.7 | 3.9 | 2.8 | 3.9 | 2.5 | 4.1 | 3.3 | 3.9 |
| Pool Spacing (ft) | | 12 | 87 | 48 | 185 | 169 | 1014 | 57 | 113 | 67 | 133 | 64 | 163 | 53 | 186 | 83 | 180 |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A | 4 | 10 | --- | | N/A[1] | | 57 | 130 | 67 | 152 | N/A[1] | | 57 | 130 | 67 | 152 |
| Radius of Curvature (ft) | | 4 | 8 | --- | | N/A[1] | | 29 | 57 | 34 | 67 | N/A[1] | | 29 | 57 | 34 | 67 |
| Rc/Bankfull Width (ft/ft) | | 0.4 | 0.7 | --- | | N/A[1] | | 1.8 | 3.5 | 1.8 | 3.5 | N/A[1] | | 1.7 | 3.4 | 1.8 | 3.5 |
| Meander Length (ft) | | 15 | 28 | --- | | N/A[1] | | 105 | 227 | 124 | 266 | N/A[1] | | 105 | 227 | 124 | 266 |
| Meander Width Ratio | | 0.4 | 0.9 | --- | | N/A[1] | | 3.5 | 8.0 | 3.5 | 8.0 | N/A[1] | | 3.4 | 7.8 | 3.5 | 7.9 |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | N/A | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | | 0.22/0.87/2.5/ 22.6/47.7/64 | | SC/0.12/0.24/ 4.63/7.7/16 | | --- | | --- | | --- | | SC/0.2/0.4/ 59.2/107.3/180 | | SC/SC/0.2/41.6/ 61.5/180 | | SC/SC/SC/64/ 151.8/362 | |
| Reach Shear Stress (Competency) $lb/ft^2$ | | --- | | --- | | 0.61 | | --- | | --- | | 0.42 | | --- | | --- | |
| Max part size (mm) mobilized at bankfull | | --- | | --- | | 106 | | --- | | --- | | 21 | | --- | | --- | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | N/A | 0.59 | | 0.65 | | 0.63 | | 0.63 | | 0.88 | | 0.63 | | 0.63 | | 0.88 | |
| Watershed Impervious Cover Estimate (%) | | 2% | | | | 2% | | | | | | 2% | | | | | |
| Rosgen Classification | | G4 | | G5 | | B4c | | C4 | | C4 | | B4c | | C4 | | C4 | |
| Bankfull Velocity (fps) | | 4.0 | | 2.0 | | 3.6 | | 2.7 | | 1.8 | | 3.0 | | 1.9 | | 0.8 | |
| Bankfull Discharge (cfs) | | 54.8 | | 20.4 | | 45 | | 45 | | 55 | | 38.6 | | 31.1 | | 16.0 | |
| Q-NFF regression (2-yr) | | --- | | --- | | --- | | --- | | --- | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | --- | | --- | | 53 | | 56 | | 71 | | | | | | | |
| Max Q-Mannings | | --- | | --- | | 370 | | 39 | | N/A[2] | | | | | | | |
| Valley Slope (ft/ft) | | 0.0145 | | 0.0050 | | 0.0120 | | 0.0030 | 0.0140 | 0.0022 | | --- | | --- | | --- | |
| Channel Thalweg Length (ft) | | 2,008 | | | | 779 | | 1159 | | 764 | | 779 | | 1,159 | | 764 | |
| Sinuosity | | 1.06 | | 1.01 | | 1.10 | | 1.40 | | 1.20 | | 1.10 | | 1.40 | | 1.20 | |
| Bankfull/Channel Slope (ft/ft) | | 0.0107 | | 0.0034 | | 0.0110 | | 0.0020 | 0.0110 | 0.0020 | | 0.0075 | | 0.0027 | | 0.0005 | |

1. Pattern data is not applicable for B-type channels
2. UT3 Reach 3 post-restoration combines flow from the existing conditions UT2 Reach 3 and UT3.
SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

**Table 11d. Reference Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Parameter | Gage | Reference Reach Data | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UT to Kelly Branch | | Pilot Mountain Trib | | Lone Hickory UT3 - Onsite Reference | | UT to South Crowders | | UT to S. Fork Catawba - Vile Preserve | | UT to Lyle Creek | | Deep Creek Mitigation | | Cooleemee Plantation | |
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle** | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | N/A | 6.4 | | 8.6 | | 6.7 | | 6.1 | 8.4 | 6.1 | 6.2 | 7.0 | 8.6 | 12.9 | | 14.7 | 18.1 |
| Floodprone Width (ft) | | 9.1 | | 13.3 | | 20.0 | | 26.0 | 31.0 | 200+ | | 45.0 | 49.0 | 135.0 | | 140+ | |
| Bankfull Mean Depth | | 0.7 | | 0.7 | | 0.5 | | 1.0 | 1.1 | 0.7 | 0.8 | 0.5 | | 1.4 | | 0.8 | 1.0 |
| Bankfull Max Depth | | 0.9 | | 1.0 | | 0.8 | | 1.4 | | 1.3 | 1.4 | 1.0 | 1.1 | 2.3 | | 1.6 | |
| Bankfull Cross-sectional Area ($ft^2$) | | 4.5 | | 6.0 | | 3.6 | | 6.4 | 8.7 | 4.5 | 5.3 | 3.5 | 4.1 | 17.1 | | 13.6 | 14.9 |
| Width/Depth Ratio | | 9.2 | | 12.5 | | 13.4 | | 5.8 | 8.0 | 7.4 | 8.3 | 14.9 | 18.3 | 9.6 | | 14.6 | 24.1 |
| Entrenchment Ratio | | 1.4 | | 1.5 | | 3.0 | | 3.7 | 4.3 | 30+ | | 5.7 | 6.4 | 10.5 | | 8.8+ | |
| Bank Height Ratio | | 1.0 | | 1.0 | | 1.0 | | 1.4 | 2.1 | 1.0 | | 1.0 | | 1.0 | | 1.0 | |
| D50 (mm) | | 9.4 | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| **Profile** | | | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | N/A | --- | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| Riffle Slope (ft/ft) | | --- | | 0.0150 | 0.1200 | 0.0229 | 0.0615 | 0.0202 | 0.0664 | 0.0260 | | 0.0055 | 0.0597 | 0.0019 | 0.009 | 0.0027 | 0.0130 |
| Pool Length (ft) | | --- | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| Pool Max Depth (ft) | | --- | | 1.6 | | 2.0 | | 1.3 | 3 | 1.4 | | 1.3 | | 3.2 | | 2.0 | |
| Pool Spacing (ft) | | --- | | 7 | 52 | 13 | 77 | 28 | 63 | 45 | | 15 | 28 | 29 | 103 | 19 | 35 |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A | 18 | 34 | --- | | 12 | 31 | 81 | | --- | | 21 | | 45 | 71 | 22 | 30 |
| Radius of Curvature (ft) | | 8 | 26 | --- | | --- | | 9 | 20 | --- | | 19 | 32 | 18 | 33 | 14 | 38 |
| Rc/Bankfull Width (ft/ft) | | 1.2 | 4.1 | --- | | --- | | 1.5 | 2.4 | --- | | 2.7 | 3.7 | 1.4 | 2.6 | 0.9 | 2.3 |
| Meander Length (ft) | | 27 | 94 | --- | | 55 | | 45 | 72 | --- | | 39 | 44 | 95 | 130 | 58 | 70 |
| Meander Width Ratio | | 2.8 | 5.3 | --- | | 1.8 | 4.6 | 9.6 | 13.3 | --- | | 2.4 | 3.0 | 3.5 | 5.5 | 1.3 | 1.8 |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | N/A | | | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | | | | |
| d16/d35/d50/d84/d95/d100 | | 0.25/3.2/9.4/45/ 140/--- | | SC/5.6/20.1/128/ 322.5/>2048 | | 0.2/1.5/16.8/69.7/ 115.7/180 | | 0.8/12.1/19.7/49.5/ 75.9/180 | | --- | | NA/0.07/0.17/0.54/ 4.0/8.0 | | SC/0.2/0.2/1.1/ 8.9/22.6 | | --- | |
| Reach Shear Stress (Competency) $lb/ft^2$ | | | | | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | | | | | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | N/A | 0.08 | | 0.27 | | 0.17 | | 0.22 | | 0.94 | | 0.25 | | 0.67 | | 0.68 | |
| Watershed Impervious Cover Estimate (%) | | --- | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| Rosgen Classification | | A4 | | B4 | | C4 | | E4 | | E5 | | C5 | | C5 | | C5 | |
| Bankfull Velocity (fps) | | 4.4 | | 5.3 | | 3.2 | | 2.9 | | 11 | | 4.7 | | 2.4 | | 1.8 | |
| Bankfull Discharge (cfs) | | 19 | | 32 | | 12 | | 22 | | 54 | | 18 | | 41 | | 26 | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | | | | |
| Q-Mannings | | | | | | | | | | | | | | | | | | | |
| Valley Length (ft) | | --- | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| Channel Thalweg Length (ft) | | --- | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| Sinuosity | | 1.2 | | 1.05 | | 1.32 | | 2.20 | | 1.03 | | 1.10 | | 1.60 | | 1.10 | |
| Water Surface Slope (ft/ft) | | --- | | --- | | --- | | --- | | --- | | --- | | --- | | --- | |
| Bankfull/Channel Slope (ft/ft) | | 0.03 - 0.065 | | 0.0378 | | 0.0185 | | 0.0091 | | 0.0068 | | 0.0057 | | 0.0028 | | 0.0027 | |

SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

**Table 12a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

**East Side (UT1 Reach 1 and UT1 Reach 2A)**

| | UT1 Reach 1 Cross-Section 1, Pool | | | | | | | | UT1 Reach 1 Cross-Section 2, Riffle | | | | | | | | UT1 Reach 2A Cross-Section 3, Pool | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 918.84 | 918.82 | 918.82 | | | | | | 918.21 | 918.31 | 918.31 | | | | | | 870.19 | 870.39 | 870.37 | | | | | |
| *low bank height elevation* | 918.84 | 918.82 | 918.82 | | | | | | 918.21 | 918.21 | 918.25 | | | | | | 870.19 | 870.39 | 870.37 | | | | | |
| Bankfull Width (ft) | 8.2 | 8.5 | 8.3 | | | | | | 6.9 | 7.0 | 6.9 | | | | | | 9.2 | 9.9 | 9.4 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | | 29 | 27 | 28 | | | | | | --- | --- | --- | | | | | |
| Bankfull Mean Depth (ft) | 1.0 | 0.9 | 1.0 | | | | | | 0.6 | 0.5 | 0.5 | | | | | | 1.2 | 1.2 | 1.2 | | | | | |
| Bankfull Max Depth (ft) | 1.8 | 1.6 | 1.6 | | | | | | 1.0 | 0.9 | 0.9 | | | | | | 2.1 | 2.5 | 2.4 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 8.5 | 7.3 | 8.0 | | | | | | 4.2 | 3.5 | 3.8 | | | | | | 11.4 | 12.1 | 11.6 | | | | | |
| Bankfull Width/Depth Ratio | 7.8 | 9.9 | 8.6 | | | | | | 11.5 | 13.9 | 12.6 | | | | | | 7.4 | 8.0 | 7.5 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | | 4.2 | 3.8 | 4.1 | | | | | | --- | --- | --- | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | | 1.0 | 0.9 | 0.9 | | | | | | --- | --- | --- | | | | | |
| | **UT1 Reach 2A Cross-Section 4, Riffle** | | | | | | | | **UT1 Reach 2A Cross-Section 5, Riffle** | | | | | | | | **UT1 Reach 2A Cross-Section 6, Pool** | | | | | | | |
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 868.46 | 868.60 | 868.61 | | | | | | 844.23 | 844.17 | 844.12 | | | | | | 843.72 | 843.72 | 843.74 | | | | | |
| *low bank height elevation* | 868.46 | 868.68 | 868.61 | | | | | | 844.23 | 844.26 | 844.24 | | | | | | 843.72 | 843.72 | 843.74 | | | | | |
| Bankfull Width (ft) | 7.3 | 9.2 | 7.5 | | | | | | 7.3 | 8.1 | 7.9 | | | | | | 9.1 | 9.5 | 9.4 | | | | | |
| Floodprone Width (ft) | 46 | 46 | 49 | | | | | | 65+ | 65+ | 65+ | | | | | | --- | --- | --- | | | | | |
| Bankfull Mean Depth (ft) | 0.6 | 0.6 | 0.6 | | | | | | 0.6 | 0.7 | 0.7 | | | | | | 1.2 | 1.4 | 1.5 | | | | | |
| Bankfull Max Depth (ft) | 0.9 | 1.1 | 1.1 | | | | | | 1.0 | 1.2 | 1.4 | | | | | | 1.9 | 2.5 | 2.2 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 4.5 | 5.1 | 4.5 | | | | | | 4.6 | 5.3 | 5.6 | | | | | | 10.5 | 13.6 | 13.9 | | | | | |
| Bankfull Width/Depth Ratio | 11.8 | 16.4 | 12.5 | | | | | | 11.5 | 12.4 | 11.3 | | | | | | 7.9 | 6.6 | 6.3 | | | | | |
| Bankfull Entrenchment Ratio | 6.3 | 5.0 | 6.5 | | | | | | 9.0+ | 8.1+ | 8.2+ | | | | | | --- | --- | --- | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.1 | 1.0 | | | | | | 1.0 | 1.1 | 1.1 | | | | | | --- | --- | --- | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

**Table 12b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

**East Side (UT1 Reach 2B and UT1 Reach 3)**

| | UT1 Reach 2B Cross-Section 7, Riffle | | | | | | | | UT1 Reach 2B Cross-Section 8, Pool | | | | | | | | UT1 Reach 2B Cross-Section 9, Riffle | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 817.28 | 817.17 | 817.07 | | | | | | 809.31 | 809.23 | 809.38 | | | | | | 804.58 | 804.61 | 804.66 | | | | | |
| *low bank height elevation* | 817.28 | 817.14 | 817.13 | | | | | | 809.31 | 809.23 | 809.38 | | | | | | 804.58 | 804.64 | 804.71 | | | | | |
| Bankfull Width (ft) | 10.3 | 10.1 | 10.1 | | | | | | 12.6 | 13.0 | 13.6 | | | | | | 10.5 | 11.5 | 11.2 | | | | | |
| Floodprone Width (ft) | 68+ | 68+ | 68+ | | | | | | --- | --- | --- | | | | | | 49+ | 49+ | 49+ | | | | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.7 | 0.8 | | | | | | 1.2 | 1.0 | 1.1 | | | | | | 0.8 | 0.8 | 0.8 | | | | | |
| Bankfull Max Depth (ft) | 1.2 | 1.3 | 1.4 | | | | | | 2.6 | 2.1 | 2.3 | | | | | | 1.3 | 1.4 | 1.4 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 7.9 | 7.5 | 8.5 | | | | | | 15.4 | 12.8 | 14.4 | | | | | | 8.5 | 8.9 | 9.0 | | | | | |
| Bankfull Width/Depth Ratio | 13.3 | 13.7 | 12.0 | | | | | | 10.3 | 13.2 | 12.9 | | | | | | 12.9 | 15.0 | 13.9 | | | | | |
| Bankfull Entrenchment Ratio | 6.6+ | 6.7+ | 6.7+ | | | | | | --- | --- | --- | | | | | | 4.7+ | 4.3+ | 4.4+ | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.0 | | | | | | --- | --- | --- | | | | | | 1.0 | 1.0 | 1.0 | | | | | |

| | UT1 Reach 3 Cross-Section 10, Riffle | | | | | | | | UT1 Reach 3 Cross-Section 11, Riffle | | | | | | | | UT1 Reach 3 Cross-Section 12, Pool | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 794.10 | 793.96 | 793.89 | | | | | | 791.15 | 791.14 | 791.33 | | | | | | 787.94 | 787.82 | 787.89 | | | | | |
| *low bank height elevation* | 794.10 | 793.96 | 794.04 | | | | | | 791.15 | 791.06 | 791.10 | | | | | | 787.94 | 787.82 | 787.89 | | | | | |
| Bankfull Width (ft) | 11.3 | 10.8 | 10.7 | | | | | | 12.5 | 11.6 | 10.5 | | | | | | 16.7 | 16.2 | 15.0 | | | | | |
| Floodprone Width (ft) | 60+ | 60+ | 60+ | | | | | | 68+ | 68+ | 68+ | | | | | | --- | --- | --- | | | | | |
| Bankfull Mean Depth (ft) | 0.7 | 0.8 | 0.9 | | | | | | 0.7 | 0.7 | 0.6 | | | | | | 1.1 | 1.1 | 1.0 | | | | | |
| Bankfull Max Depth (ft) | 1.1 | 1.3 | 1.7 | | | | | | 1.1 | 1.1 | 1.1 | | | | | | 2.4 | 2.4 | 2.2 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 8.3 | 8.3 | 9.8 | | | | | | 8.7 | 7.7 | 6.2 | | | | | | 18.7 | 17.8 | 15.5 | | | | | |
| Bankfull Width/Depth Ratio | 15.5 | 14.1 | 11.6 | | | | | | 18.0 | 17.4 | 17.9 | | | | | | 14.8 | 14.7 | 14.5 | | | | | |
| Bankfull Entrenchment Ratio | 5.3+ | 5.5+ | 5.6+ | | | | | | 5.4+ | 5.8+ | 6.4+ | | | | | | --- | --- | --- | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.1 | | | | | | 1.0 | 0.9 | 0.8 | | | | | | --- | --- | --- | | | | | |

| | UT1 Reach 3 Cross-Section 13, Pool | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 783.88 | 783.76 | 783.92 | | | | | |
| *low bank height elevation* | 783.88 | 783.76 | 783.92 | | | | | |
| Bankfull Width (ft) | 15.6 | 16.3 | 16.6 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | |
| Bankfull Mean Depth (ft) | 1.4 | 1.4 | 1.3 | | | | | |
| Bankfull Max Depth (ft) | 2.6 | 3.0 | 3.0 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 22.4 | 22.4 | 20.9 | | | | | |
| Bankfull Width/Depth Ratio | 10.9 | 11.9 | 13.2 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

**Table 12c. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

**West Side (UT2 & UT2A)**

| | UT2 Reach 1 Cross-Section 14, Pool | | | | | | | | UT2 Reach 1 Cross-Section 15, Riffle | | | | | | | | UT2 Reach 2 Cross-Section 16, Riffle | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 772.71 | 772.82 | 772.87 | | | | | | 772.61 | 772.56 | 772.67 | | | | | | 759.49 | 759.41 | 759.60 | | | | | |
| *low bank height elevation* | 772.71 | 772.82 | 772.87 | | | | | | 772.61 | 772.56 | 772.67 | | | | | | 759.49 | 759.31 | 759.54 | | | | | |
| Bankfull Width (ft) | 9.3 | 10.4 | 9.3 | | | | | | 8.3 | 8.3 | 8.5 | | | | | | 11.8 | 12.2 | 12.5 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | | 69+ | 69+ | 69+ | | | | | | 65+ | 65+ | 65+ | | | | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.9 | 0.9 | | | | | | 0.7 | 0.7 | 0.7 | | | | | | 0.9 | 0.7 | 0.7 | | | | | |
| Bankfull Max Depth (ft) | 1.5 | 1.8 | 1.6 | | | | | | 1.2 | 1.3 | 1.5 | | | | | | 1.3 | 1.3 | 1.3 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 7.6 | 8.9 | 8.3 | | | | | | 6.1 | 6.1 | 6.1 | | | | | | 10.2 | 9.0 | 9.3 | | | | | |
| Bankfull Width/Depth Ratio | 11.4 | 12.0 | 10.3 | | | | | | 11.3 | 11.5 | 11.7 | | | | | | 13.6 | 16.4 | 16.6 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | | 8.3+ | 8.2+ | 8.1+ | | | | | | 5.5+ | 5.3+ | 5.2+ | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | | 1.0 | 1.0 | 1.0 | | | | | | 1.0 | 0.9 | 0.9 | | | | | |
| | **UT2 Reach 2 Cross-Section 17, Riffle** | | | | | | | | **UT2 Reach 2 Cross-Section 18, Pool** | | | | | | | | **UT2A Cross-Section 19, Riffle** | | | | | | | |
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 758.87 | 758.79 | 758.82 | | | | | | 758.62 | 758.70 | 758.76 | | | | | | 763.99 | 763.92 | 764.15 | | | | | |
| *low bank height elevation* | 758.87 | 758.82 | 758.93 | | | | | | 758.62 | 758.70 | 758.76 | | | | | | 763.99 | 763.94 | 764.15 | | | | | |
| Bankfull Width (ft) | 11.9 | 13.2 | 13.0 | | | | | | 15.2 | 16.3 | 15.2 | | | | | | 5.4 | 5.5 | 5.3 | | | | | |
| Floodprone Width (ft) | 72+ | 72+ | 72+ | | | | | | --- | --- | --- | | | | | | 57+ | 57+ | 57+ | | | | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.7 | 0.8 | | | | | | 1.4 | 1.5 | 1.5 | | | | | | 0.4 | 0.4 | 0.4 | | | | | |
| Bankfull Max Depth (ft) | 1.2 | 1.4 | 1.4 | | | | | | 2.5 | 2.6 | 2.6 | | | | | | 0.5 | 0.6 | 0.6 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 9.1 | 9.5 | 10.5 | | | | | | 21.8 | 24.0 | 22.8 | | | | | | 1.9 | 2.0 | 1.9 | | | | | |
| Bankfull Width/Depth Ratio | 15.6 | 18.2 | 16.1 | | | | | | 10.6 | 11.1 | 10.1 | | | | | | 15.2 | 15.0 | 15.3 | | | | | |
| Bankfull Entrenchment Ratio | 6.1+ | 5.5+ | 5.5+ | | | | | | --- | --- | --- | | | | | | 10.5+ | 10.4+ | 10.6+ | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 1.1 | | | | | | --- | --- | --- | | | | | | 1.0 | 1.0 | 1.0 | | | | | |
| | **UT2A Cross-Section 20, Pool** | | | | | | | | **UT2A Cross-Section 21, Riffle** | | | | | | | | **UT2A Cross-Section 22, Pool** | | | | | | | |
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 761.60 | 761.65 | 761.73 | | | | | | 760.53 | 760.61 | 760.72 | | | | | | 760.53 | 760.60 | 760.59 | | | | | |
| *low bank height elevation* | 761.60 | 761.65 | 761.73 | | | | | | 760.53 | 760.52 | 760.61 | | | | | | 760.53 | 760.60 | 760.59 | | | | | |
| Bankfull Width (ft) | 6.9 | 6.6 | 6.8 | | | | | | 5.7 | 5.8 | 5.0 | | | | | | 7.2 | 9.3 | 7.4 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | | 51+ | 51+ | 51+ | | | | | | --- | --- | --- | | | | | |
| Bankfull Mean Depth (ft) | 0.6 | 0.6 | 0.5 | | | | | | 0.4 | 0.3 | 0.4 | | | | | | 0.6 | 0.5 | 0.5 | | | | | |
| Bankfull Max Depth (ft) | 1.2 | 1.2 | 1.1 | | | | | | 0.7 | 0.6 | 0.6 | | | | | | 1.1 | 1.1 | 0.9 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 4.1 | 3.7 | 3.5 | | | | | | 2.4 | 2.0 | 1.8 | | | | | | 4.3 | 4.8 | 3.7 | | | | | |
| Bankfull Width/Depth Ratio | 11.6 | 11.7 | 12.9 | | | | | | 13.6 | 17.2 | 13.7 | | | | | | 12.1 | 18.1 | 14.9 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | | 9.0+ | 8.8+ | 10.1+ | | | | | | --- | --- | --- | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | | 1.0 | 0.8 | 0.8 | | | | | | --- | --- | --- | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

**Table 12d. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

**West Side (UT2B & UT3)**

| | UT2B Cross-Section 23, Pool | | | | | | | | UT2B Cross-Section 24, Riffle | | | | | | | | UT2B Cross-Section 25, Riffle | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 761.34 | 761.26 | 761.44 | | | | | | 761.16 | 761.15 | 761.36 | | | | | | 760.67 | 760.65 | 760.77 | | | | | |
| *low bank height elevation* | 761.34 | 761.26 | 761.44 | | | | | | 761.16 | 761.07 | 761.27 | | | | | | 760.67 | 760.61 | 760.79 | | | | | |
| Bankfull Width (ft) | 9.9 | 10.1 | 9.8 | | | | | | 9.6 | 7.9 | 8.3 | | | | | | 7.2 | 6.9 | 7.4 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | | 66+ | 66+ | 66+ | | | | | | 56+ | 56+ | 56+ | | | | | |
| Bankfull Mean Depth (ft) | 0.9 | 0.8 | 0.8 | | | | | | 0.5 | 0.5 | 0.4 | | | | | | 0.5 | 0.5 | 0.5 | | | | | |
| Bankfull Max Depth (ft) | 1.6 | 1.6 | 1.7 | | | | | | 0.8 | 0.7 | 0.8 | | | | | | 0.8 | 0.8 | 0.8 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 8.8 | 8.4 | 8.2 | | | | | | 4.3 | 3.6 | 3.6 | | | | | | 3.9 | 3.7 | 4.0 | | | | | |
| Bankfull Width/Depth Ratio | 11.2 | 12.1 | 11.6 | | | | | | 21.1 | 17.4 | 19.1 | | | | | | 13.4 | 12.9 | 13.9 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | | 6.9+ | 8.3+ | 8.0+ | | | | | | 7.8+ | 8.2+ | 7.6+ | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | | 1.0 | 0.9 | 0.9 | | | | | | 1.0 | 1.0 | 1.0 | | | | | |

| | UT2B Cross-Section 26, Pool | | | | | | | | UT3 Reach 1 Cross-Section 27, Pool | | | | | | | | UT3 Reach 1 Cross-Section 28, Riffle | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 760.71 | 760.69 | 760.88 | | | | | | 766.07 | 766.11 | 766.25 | | | | | | 765.76 | 765.83 | 765.89 | | | | | |
| *low bank height elevation* | 760.71 | 760.69 | 760.88 | | | | | | 766.07 | 766.11 | 766.25 | | | | | | 765.76 | 765.79 | 765.85 | | | | | |
| Bankfull Width (ft) | 12.2 | 12.0 | 12.2 | | | | | | 16.0 | 16.7 | 15.8 | | | | | | 13.7 | 13.3 | 13.2 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | | --- | --- | --- | | | | | | 73+ | 73+ | 73+ | | | | | |
| Bankfull Mean Depth (ft) | 1.3 | 1.2 | 1.2 | | | | | | 1.4 | 1.4 | 1.4 | | | | | | 0.9 | 0.9 | 0.9 | | | | | |
| Bankfull Max Depth (ft) | 2.6 | 2.2 | 2.3 | | | | | | 2.6 | 2.7 | 2.7 | | | | | | 1.5 | 1.5 | 1.6 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 15.8 | 14.0 | 14.4 | | | | | | 21.7 | 23.0 | 22.3 | | | | | | 12.8 | 12.3 | 12.2 | | | | | |
| Bankfull Width/Depth Ratio | 9.4 | 10.3 | 10.4 | | | | | | 11.9 | 12.1 | 11.2 | | | | | | 14.7 | 14.3 | 14.4 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | | --- | --- | --- | | | | | | 5.3+ | 5.5+ | 5.5+ | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | | --- | --- | --- | | | | | | 1.0 | 1.0 | 1.0 | | | | | |

| | UT3 Reach 2 Cross-Section 29, Riffle | | | | | | | | UT3 Reach 2 Cross-Section 30, Pool | | | | | | | | UT3 Reach 3 Cross-Section 31, Riffle | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 759.75 | 759.83 | 759.98 | | | | | | 759.40 | 759.49 | 759.48 | | | | | | 758.39 | 758.19 | 758.41 | | | | | |
| *low bank height elevation* | 759.75 | 759.84 | 759.79 | | | | | | 759.40 | 759.49 | 759.48 | | | | | | 758.39 | 758.19 | 758.43 | | | | | |
| Bankfull Width (ft) | 16.7 | 17.0 | 16.9 | | | | | | 18.7 | 19.0 | 18.8 | | | | | | 19.2 | 19.1 | 19.5 | | | | | |
| Floodprone Width (ft) | 76+ | 76+ | 76+ | | | | | | --- | --- | --- | | | | | | 71+ | 71+ | 71+ | | | | | |
| Bankfull Mean Depth (ft) | 1.0 | 1.0 | 0.8 | | | | | | 1.4 | 1.4 | 1.0 | | | | | | 1.0 | 0.9 | 1.0 | | | | | |
| Bankfull Max Depth (ft) | 1.9 | 1.8 | 1.6 | | | | | | 2.6 | 2.9 | 1.7 | | | | | | 1.9 | 1.9 | 2.1 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 16.5 | 16.7 | 13.4 | | | | | | 26.3 | 26.6 | 18.1 | | | | | | 19.5 | 17.8 | 19.9 | | | | | |
| Bankfull Width/Depth Ratio | 17.0 | 17.2 | 21.5 | | | | | | 13.3 | 13.6 | 19.5 | | | | | | 19.0 | 20.5 | 19.1 | | | | | |
| Bankfull Entrenchment Ratio | 4.5+ | 4.5+ | 4.5+ | | | | | | --- | --- | --- | | | | | | 3.7+ | 3.7+ | 3.6+ | | | | | |
| Bankfull Bank Height Ratio | 1.0 | 1.0 | 0.9 | | | | | | --- | --- | --- | | | | | | 1.0 | 1.0 | 1.0 | | | | | |

| | UT3 Reach 3 Cross-Section 32, Pool | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Dimension and Substrate[1]** | **MY0** | **MY1** | **MY2** | **MY3** | **MY4** | **MY5** | **MY6** | **MY7** |
| *bankfull elevation* | 758.36 | 758.21 | 758.35 | | | | | |
| *low bank height elevation* | 758.36 | 758.21 | 758.35 | | | | | |
| Bankfull Width (ft) | 25.8 | 26.9 | 27.2 | | | | | |
| Floodprone Width (ft) | --- | --- | --- | | | | | |
| Bankfull Mean Depth (ft) | 1.8 | 1.7 | 1.7 | | | | | |
| Bankfull Max Depth (ft) | 3.8 | 3.7 | 3.8 | | | | | |
| Bankfull Cross-Sectional Area ($ft^2$) | 45.8 | 46.1 | 45.8 | | | | | |
| Bankfull Width/Depth Ratio | 14.5 | 15.8 | 16.1 | | | | | |
| Bankfull Entrenchment Ratio | --- | --- | --- | | | | | |
| Bankfull Bank Height Ratio | --- | --- | --- | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

**Table 13a. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT1 Reach 1**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[3]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 6.9 | | 7.0 | | 6.9 | | | | | | | | | | | |
| Floodprone Width (ft) | 29 | | 27 | | 28 | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.6 | | 0.5 | | 0.5 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.0 | | 0.9 | | 0.9 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 4.2 | | 3.5 | | 3.8 | | | | | | | | | | | |
| Width/Depth Ratio | 11.5 | | 13.9 | | 12.6 | | | | | | | | | | | |
| Entrenchment Ratio | 4.2 | | 3.8 | | 4.1 | | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 0.9 | | 0.9 | | | | | | | | | | | |
| $D_{50}$ (mm) | 59.6 | | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | N/A[1] | N/A[1] | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 1.1 | 3.0 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 5 | 76 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A[2] | | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | N/A[2] | | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | N/A[2] | | | | | | | | | | | | | | | |
| Meander Length (ft) | N/A[2] | | | | | | | | | | | | | | | |
| Meander Width Ratio | N/A[2] | | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | 0.4/1.8/33.9/108/ 156.5/256 | | 0.6/9.4/21.3/84.1/ 137.0/256 | | 0.8/28.1/48.4/107/ 140.8/180 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 1.97 | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 97 | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.07 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 3% | | | | | | | | | | | | | | | |
| Rosgen Classification | A4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 4.8 | | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 20.2 | | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 966 | | | | | | | | | | | | | | | |
| Sinuosity | | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0555 | | | | | | | | | | | | | | | |

[1]UT1 Reach 1 riffle slopes were not calculated because this reach is comprised of a series of rock steps and cascades.

[2]Pattern data is not applicable for A-type and B-type channels

[3]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13b. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT1 Reach 2A**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[2]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 7.3 | | 8.1 | 9.2 | 7.5 | 7.9 | | | | | | | | | | |
| Floodprone Width (ft) | 46 | 65+ | 46 | 65+ | 49 | 65+ | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.6 | | 0.6 | 0.7 | 0.6 | 0.7 | | | | | | | | | | |
| Bankfull Max Depth (ft) | 0.9 | 1.0 | 1.1 | 1.2 | 1.1 | 1.4 | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 4.5 | 4.6 | 5.1 | 5.3 | 4.5 | 5.6 | | | | | | | | | | |
| Width/Depth Ratio | 11.5 | 11.8 | 12.4 | 16.4 | 11.3 | 12.5 | | | | | | | | | | |
| Entrenchment Ratio | 6.3 | 9.0+ | 5.0 | 8.1+ | 6.5 | 8.2+ | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 1.1 | | 1.0 | 1.1 | | | | | | | | | | |
| $D_{50}$ (mm) | 37.0 | 37.9 | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.003 | 0.068 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 1.3 | 2.8 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 6 | 51 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | N/A[1] | | | | | | | | | | | | | | | |
| Meander Length (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Meander Width Ratio | N/A[1] | | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | 0.3/14.1/21.6/67.2/ 137/362 | | 0.3/6.7/19.9/75.9/ 128/256 | | 7.1/16.7/20.7/55.0/ 85.0/362 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 1.06 | 1.08 | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 52 | 53 | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.12 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 3% | | | | | | | | | | | | | | | |
| Rosgen Classification | B4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 3.9 | 4.0 | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 17.7 | 18.3 | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 1,746 | | | | | | | | | | | | | | | |
| Sinuosity | | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0292 | | | | | | | | | | | | | | | |

[1]Pattern data is not applicable for A-type and B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13c. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT1 Reach 2B**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[1]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 10.3 | 10.5 | 10.1 | 11.5 | 10.1 | 11.2 | | | | | | | | | | |
| Floodprone Width (ft) | 49+ | 68+ | 49+ | 68+ | 49+ | 68+ | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.8 | | 0.7 | 0.8 | 0.8 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.2 | 1.3 | 1.3 | 1.4 | 1.4 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 7.9 | 8.5 | 7.5 | 8.9 | 8.5 | 9.0 | | | | | | | | | | |
| Width/Depth Ratio | 12.9 | 13.3 | 13.7 | 15.0 | 12.0 | 13.9 | | | | | | | | | | |
| Entrenchment Ratio | 4.7+ | 6.6+ | 4.3+ | 6.7+ | 4.4+ | 6.7+ | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 1.0 | | 1.0 | | | | | | | | | | | |
| $D_{50}$ (mm) | 35.6 | 45.0 | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.013 | 0.072 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 1.8 | 3.1 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 18 | 145 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 31 | 67 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 20 | 38 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.9 | 3.6 | | | | | | | | | | | | | | |
| Meander Length (ft) | 102 | 190 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.0 | 6.4 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | 0.3/0.4/22.6/59.2/ 104.7/362 | | 0.3/1.8/15.2/87/ 190.9/256 | | 8.0/14.6/19.8/49.1/ 75.9/180 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 0.85 | 0.88 | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 42 | 43 | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.32 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 3% | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 4.1 | 4.2 | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 32.7 | 36.2 | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 1,368 | | | | | | | | | | | | | | | |
| Sinuosity | 1.25 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0182 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13d. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT1 Reach 3**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[1]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 11.3 | 12.5 | 10.8 | 11.6 | 10.5 | 10.7 | | | | | | | | | | |
| Floodprone Width (ft) | 60+ | 68+ | 60+ | 68+ | 60+ | 68+ | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.7 | | 0.7 | 0.8 | 0.6 | 0.9 | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.1 | | 1.1 | 1.3 | 1.1 | 1.7 | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 8.3 | 8.7 | 7.7 | 8.3 | 6.2 | 9.8 | | | | | | | | | | |
| Width/Depth Ratio | 15.5 | 18.0 | 14.1 | 17.4 | 11.6 | 17.9 | | | | | | | | | | |
| Entrenchment Ratio | 5.3+ | 5.4+ | 5.5+ | 5.8+ | 5.6+ | 6.4+ | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 0.9 | 1.0 | 0.8 | 1.1 | | | | | | | | | | |
| $D_{50}$ (mm) | 41.6 | 47.4 | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.013 | 0.055 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 1.8 | 3.7 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 41 | 129 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 35 | 71 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 19 | 38 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.7 | 3.0 | | | | | | | | | | | | | | |
| Meander Length (ft) | 102 | 196 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.1 | 5.7 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | 0.3/16/25.6/62.4/ 113.8/180 | | 3.2/18.3/28.2/62.7/ 101.2/256 | | 13.3/26.4/39.1/90/ 128/256 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 0.65 | 0.68 | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 32 | 33 | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.44 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 3% | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 3.7 | 3.8 | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 30.4 | 31.0 | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 1,641 | | | | | | | | | | | | | | | |
| Sinuosity | 1.30 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0153 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13e. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT2 Reach 1**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[2]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 8.3 | | 8.3 | | 8.5 | | | | | | | | | | | |
| Floodprone Width (ft) | 69+ | | 69+ | | 69+ | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.7 | | 0.7 | | 0.7 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.2 | | 1.3 | | 1.5 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 6.1 | | 6.1 | | 6.1 | | | | | | | | | | | |
| Width/Depth Ratio | 11.3 | | 11.5 | | 11.7 | | | | | | | | | | | |
| Entrenchment Ratio | 8.3+ | | 8.2+ | | 8.1+ | | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 1.0 | | 1.0 | | | | | | | | | | | |
| $D_{50}$ (mm) | 26.9 | | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.006 | 0.034 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 1.2 | 2.5 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 15 | 78 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | N/A[1] | | | | | | | | | | | | | | | |
| Meander Length (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Meander Width Ratio | N/A[1] | | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/SC/0.5/47.3/ 90/128 | | 3.2/18.3/28.2/62.7/ 101.2/256 | | 0.2/0.3/1.0/64.0/ 146.7/256 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 0.79 | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 39 | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.14 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 1% | | | | | | | | | | | | | | | |
| Rosgen Classification | B4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 3.9 | | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 24.0 | | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 623 | | | | | | | | | | | | | | | |
| Sinuosity | 1.10 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0180 | | | | | | | | | | | | | | | |

[1]Pattern data is not applicable for B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13f. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT2 Reach 2**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[1]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 11.8 | 11.9 | 12.2 | 13.2 | 12.5 | 13.0 | | | | | | | | | | |
| Floodprone Width (ft) | 65+ | 72+ | 65+ | 72+ | 65+ | 72+ | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.8 | 0.9 | 0.7 | | 0.7 | 0.8 | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.2 | 1.3 | 1.3 | 1.4 | 1.3 | 1.4 | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 9.1 | 10.2 | 9.0 | 9.5 | 9.3 | 10.5 | | | | | | | | | | |
| Width/Depth Ratio | 13.6 | 15.6 | 16.4 | 18.2 | 16.1 | 16.6 | | | | | | | | | | |
| Entrenchment Ratio | 5.5+ | 6.1+ | 5.3+ | 5.5+ | 5.2+ | 5.5+ | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 0.9 | 1.0 | 0.9 | 1.1 | | | | | | | | | | |
| $D_{50}$ (mm) | 25.4 | 33.4 | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.004 | 0.035 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 2.1 | 3.2 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 45 | 127 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 39 | 88 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 20 | 39 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.7 | 3.3 | | | | | | | | | | | | | | |
| Meander Length (ft) | 72 | 154 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.3 | 7.4 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/SC/SC/42/ 71.7/180 | | SC/0.16/9.4/52.7/ 86.3/>2048 | | SC/0.2/0.6/44.7/ 125.8/512 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 0.33 | 0.38 | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 16 | 19 | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.26 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 1% | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 2.6 | 2.8 | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 23.6 | 28.9 | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 1,080 | | | | | | | | | | | | | | | |
| Sinuosity | 1.30 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0072 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13g. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT2A**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[1]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 5.4 | 5.7 | 5.5 | 5.8 | 5.0 | 5.3 | | | | | | | | | | |
| Floodprone Width (ft) | 51+ | 57+ | 51+ | 57+ | 51+ | 57+ | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 0.5 | 0.7 | 0.6 | | 0.6 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 1.9 | 2.4 | 2.0 | | 1.8 | 1.9 | | | | | | | | | | |
| Width/Depth Ratio | 13.6 | 15.2 | 15.0 | 17.2 | 13.7 | 15.3 | | | | | | | | | | |
| Entrenchment Ratio | 9.0+ | 10.5+ | 8.8+ | 10.4+ | 10.1+ | 10.6+ | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 0.8 | 1.0 | 0.8 | 1.0 | | | | | | | | | | |
| $D_{50}$ (mm) | 21.0 | 28.1 | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.001 | 0.046 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 0.9 | 1.3 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 18 | 58 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 19 | 44 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 10 | 19 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.9 | 3.3 | | | | | | | | | | | | | | |
| Meander Length (ft) | 36 | 77 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.5 | 7.7 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/SC/0.5/42.5/ 90/180 | | SC/0.09/5.6/75.9/ 139.4/256 | | SC/SC/SC/35.4/ 64/180 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | --- | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | --- | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.02 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | --- | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 1.9 | 2.1 | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 3.7 | 5.1 | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 655 | | | | | | | | | | | | | | | |
| Sinuosity | 1.20 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0110 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13h. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT2B**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle**[1] | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 7.2 | 9.6 | 6.9 | 7.9 | 7.4 | 8.3 | | | | | | | | | | |
| Floodprone Width (ft) | 56+ | 66+ | 56+ | 66+ | 56+ | 66+ | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.5 | 0.5 | 0.5 | | 0.4 | 0.5 | | | | | | | | | | |
| Bankfull Max Depth (ft) | 0.8 | 0.8 | 0.7 | 0.8 | 0.8 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 3.9 | 4.3 | 3.6 | 3.7 | 3.6 | 4.0 | | | | | | | | | | |
| Width/Depth Ratio | 13.4 | 21.1 | 12.9 | 17.4 | 13.9 | 19.1 | | | | | | | | | | |
| Entrenchment Ratio | 6.9+ | 7.8+ | 8.2+ | 8.3+ | 7.6+ | 8.0+ | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 0.9 | 1.0 | 0.9 | 1.0 | | | | | | | | | | |
| $D_{50}$ (mm) | 25.1 | 30.6 | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.001 | 0.037 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 1.5 | 2.7 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 7 | 58 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 26 | 60 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 14 | 23 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.9 | 2.4 | | | | | | | | | | | | | | |
| Meander Length (ft) | 49 | 105 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.6 | 6.3 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/SC/0.4/43.3/ 82.6/256 | | 0.17/17.58/26.1/59.0/ 86.7/180 | | SC/8.0/21.8/51.8/ 73.4/128 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | --- | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | --- | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.05 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | --- | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 2.3 | 2.6 | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 10.1 | 10.1 | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 776 | | | | | | | | | | | | | | | |
| Sinuosity | 1.20 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0115 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13i. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT3 Reach 1**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[2]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 13.7 | | 13.3 | | 13.2 | | | | | | | | | | | |
| Floodprone Width (ft) | 73+ | | 73+ | | 73+ | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 0.9 | | 0.9 | | 0.9 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.5 | | 1.5 | | 1.6 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 12.8 | | 12.3 | | 12.2 | | | | | | | | | | | |
| Width/Depth Ratio | 14.7 | | 14.3 | | 14.4 | | | | | | | | | | | |
| Entrenchment Ratio | 5.3+ | | 5.5+ | | 5.5+ | | | | | | | | | | | |
| Bank Height Ratio | 1.0 | | 1.0 | | 1.0 | | | | | | | | | | | |
| $D_{50}$ (mm) | 50.0 | | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.001 | 0.023 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 2.8 | 3.9 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 64 | 163 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | N/A[1] | | | | | | | | | | | | | | | |
| Meander Length (ft) | N/A[1] | | | | | | | | | | | | | | | |
| Meander Width Ratio | N/A[1] | | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/0.2/0.4/59.2/ 107.3/180 | | SC/2.8/17.1/74.5/ 117.2/180 | | 0.5/13.3/21.1/80.3/ 168.1/362 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | 0.42 | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | 21 | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.63 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 2% | | | | | | | | | | | | | | | |
| Rosgen Classification | B4c | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 3.0 | | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 38.6 | | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 779 | | | | | | | | | | | | | | | |
| Sinuosity | 1.10 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0075 | | | | | | | | | | | | | | | |

[1]Pattern data is not applicable for B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13j. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT3 Reach 2**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[1]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 16.7 | | 17.0 | | 16.9 | | | | | | | | | | | |
| Floodprone Width (ft) | 76+ | | 76+ | | 76+ | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.0 | | 1.0 | | 0.8 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.9 | | 1.8 | | 1.6 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 16.5 | | 16.7 | | 13.4 | | | | | | | | | | | |
| Width/Depth Ratio | 17.0 | | 17.2 | | 21.5 | | | | | | | | | | | |
| Entrenchment Ratio | 4.5+ | | 4.5+ | | 4.5+ | | | | | | | | | | | |
| Bank Height Ratio[1] | 1.0 | | 1.0 | | 0.9 | | | | | | | | | | | |
| $D_{50}$ (mm) | 31.2 | | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.002 | 0.012 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 2.5 | 4.1 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 53 | 186 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 57 | 130 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 29 | 57 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.7 | 3.4 | | | | | | | | | | | | | | |
| Meander Length (ft) | 105 | 227 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.4 | 7.8 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/SC/0.2/41.6/ 61.5/180 | | SC/SC/0.2/60.4/ 113.8/256 | | SC/0.41/6.7/20.1/ 56.9/128 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | --- | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | --- | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.63 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 2% | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 1.9 | | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 31.1 | | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 1,159 | | | | | | | | | | | | | | | |
| Sinuosity | 1.40 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0027 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

**Table 13k. Monitoring Data - Stream Reach Data Summary**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

**UT3 Reach 3**

| Parameter | As-Built/Baseline | | MY1 | | MY2 | | MY3 | | MY4 | | MY5 | | MY6 | | MY7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Dimension and Substrate - Riffle[1]** | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | 19.2 | | 19.1 | | 19.5 | | | | | | | | | | | |
| Floodprone Width (ft) | 71+ | | 71+ | | 71+ | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.0 | | 0.9 | | 1.0 | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.9 | | 1.9 | | 2.1 | | | | | | | | | | | |
| Bankfull Cross-sectional Area ($ft^2$) | 19.5 | | 17.8 | | 19.9 | | | | | | | | | | | |
| Width/Depth Ratio | 19.0 | | 20.5 | | 19.1 | | | | | | | | | | | |
| Entrenchment Ratio | 3.7+ | | 3.7+ | | 3.6+ | | | | | | | | | | | |
| Bank Height Ratio[1] | 1.0 | | 1.0 | | 1.0 | | | | | | | | | | | |
| $D_{50}$ (mm) | 47.0 | | | | | | | | | | | | | | | |
| **Profile** | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | | | | | | | | | | | | |
| Riffle Slope (ft/ft) | 0.0002 | 0.005 | | | | | | | | | | | | | | |
| Pool Length (ft) | | | | | | | | | | | | | | | | |
| Pool Max Depth (ft) | 3.3 | 3.9 | | | | | | | | | | | | | | |
| Pool Spacing (ft) | 83 | 180 | | | | | | | | | | | | | | |
| Pool Volume ($ft^3$) | | | | | | | | | | | | | | | | |
| **Pattern** | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | 67 | 152 | | | | | | | | | | | | | | |
| Radius of Curvature (ft) | 34 | 67 | | | | | | | | | | | | | | |
| Rc/Bankfull Width (ft/ft) | 1.8 | 3.5 | | | | | | | | | | | | | | |
| Meander Length (ft) | 124 | 266 | | | | | | | | | | | | | | |
| Meander Width Ratio | 3.5 | 7.9 | | | | | | | | | | | | | | |
| **Substrate, Bed and Transport Parameters** | | | | | | | | | | | | | | | | |
| Ri%/Ru%/P%/G%/S% | | | | | | | | | | | | | | | | |
| SC%/Sa%/G%/C%/B%/Be% | | | | | | | | | | | | | | | | |
| $D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$ | SC/SC/SC/64/ 151.8/362 | | SC/SC/SC/32.0/ 151.8/362 | | SC/SC/0.2/61.2/ 90/362 | | | | | | | | | | | |
| Reach Shear Stress (Competency) $lb/ft^2$ | --- | | | | | | | | | | | | | | | |
| Max part size (mm) mobilized at bankfull | --- | | | | | | | | | | | | | | | |
| Stream Power (Capacity) $W/m^2$ | | | | | | | | | | | | | | | | |
| **Additional Reach Parameters** | | | | | | | | | | | | | | | | |
| Drainage Area (SM) | 0.88 | | | | | | | | | | | | | | | |
| Watershed Impervious Cover Estimate (%) | 2% | | | | | | | | | | | | | | | |
| Rosgen Classification | C4 | | | | | | | | | | | | | | | |
| Bankfull Velocity (fps) | 0.8 | | | | | | | | | | | | | | | |
| Bankfull Discharge (cfs) | 16.0 | | | | | | | | | | | | | | | |
| Q-NFF regression (2-yr) | | | | | | | | | | | | | | | | |
| Q-USGS extrapolation (1.2-yr) | | | | | | | | | | | | | | | | |
| Max Q-Mannings | | | | | | | | | | | | | | | | |
| Valley Slope (ft/ft) | --- | | | | | | | | | | | | | | | |
| Channel Thalweg Length (ft) | 764 | | | | | | | | | | | | | | | |
| Sinuosity | 1.20 | | | | | | | | | | | | | | | |
| Bankfull/Channel Slope (ft/ft) | 0.0005 | | | | | | | | | | | | | | | |

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

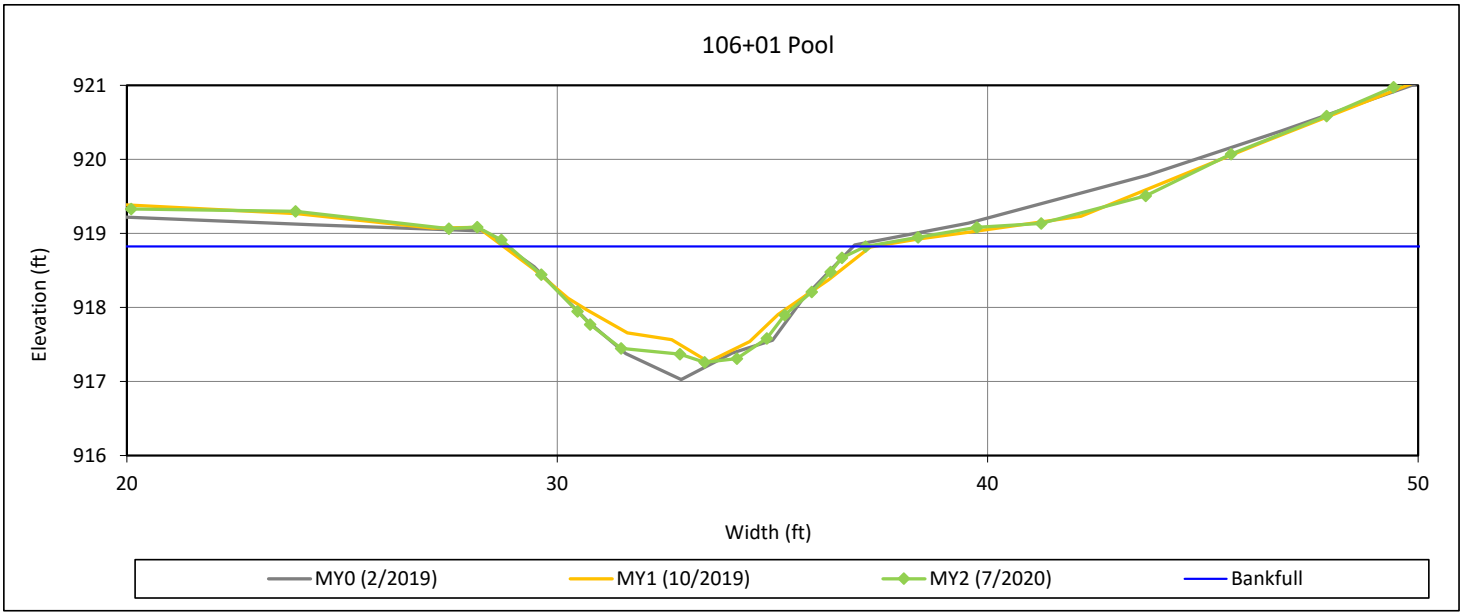
(---): Data was not provided

N/A: Not Applicable

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 1 - UT1 Reach 1**




| Bankfull Dimensions | |
|---|---|
| 8.0 | x-section area (ft.sq.) |
| 8.3 | width (ft) |
| 1.0 | mean depth (ft) |
| 1.6 | max depth (ft) |
| 9.0 | wetted perimeter (ft) |
| 0.9 | hydraulic radius (ft) |
| 8.6 | width-depth ratio |

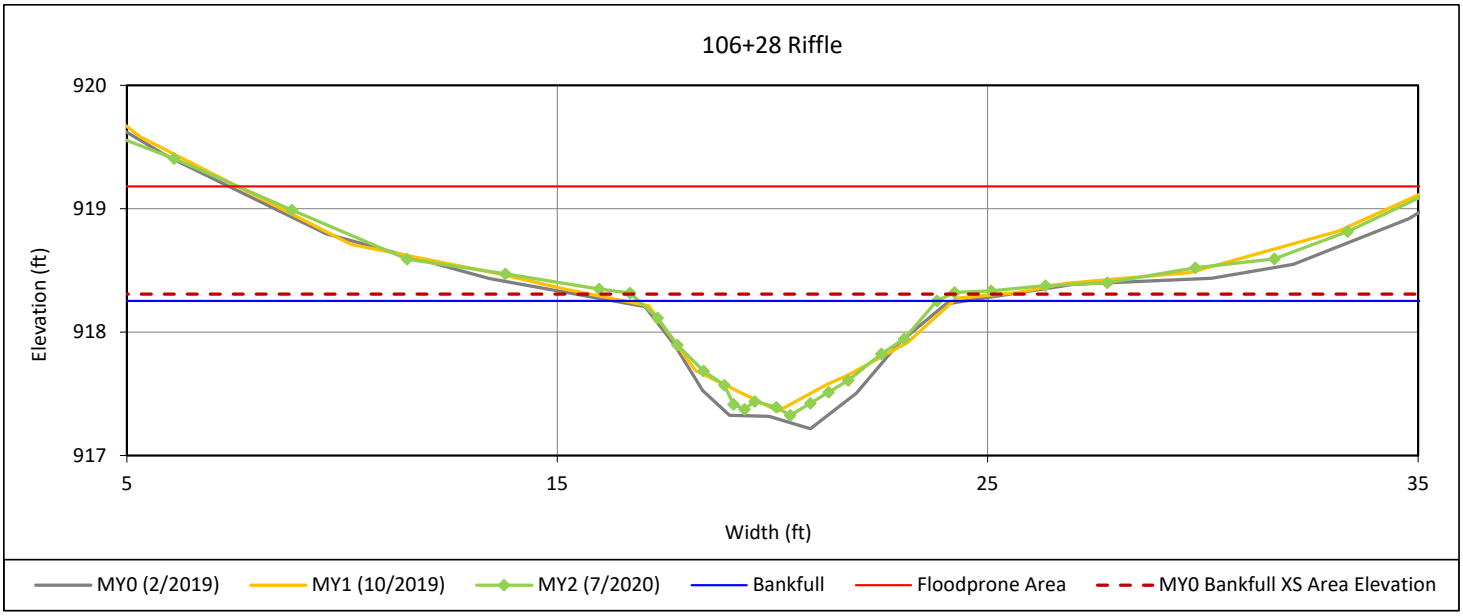
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 2 - UT1 Reach 1**




| Bankfull Dimensions | |
|---|---|
| 3.8 | x-section area (ft.sq.) |
| 6.9 | width (ft) |
| 0.5 | mean depth (ft) |
| 0.9 | max depth (ft) |
| 7.3 | wetted perimeter (ft) |
| 0.5 | hydraulic radius (ft) |
| 12.6 | width-depth ratio |
| 28.1 | W flood prone area (ft) |
| 4.1 | entrenchment ratio |
| 0.9 | low bank height ratio |

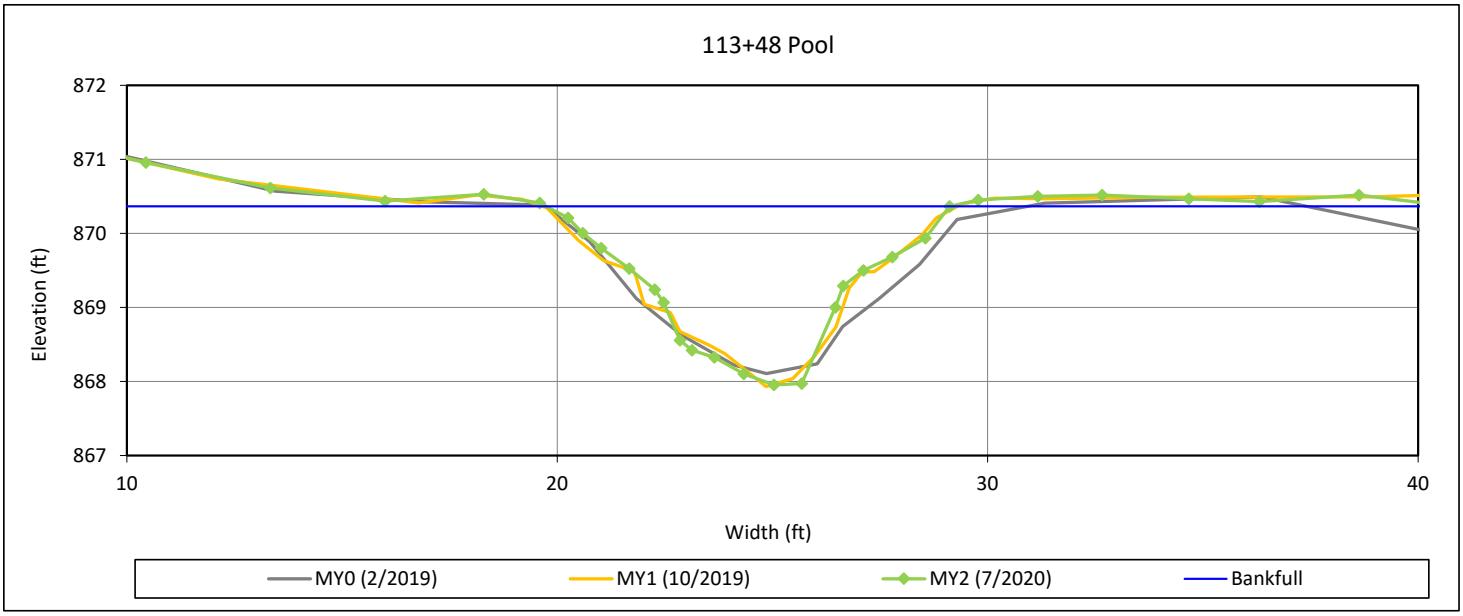
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 3 - UT1 Reach 2A**




| Bankfull Dimensions | |
|---|---|
| 11.6 | x-section area (ft.sq.) |
| 9.4 | width (ft) |
| 1.2 | mean depth (ft) |
| 2.4 | max depth (ft) |
| 11.0 | wetted perimeter (ft) |
| 1.1 | hydraulic radius (ft) |
| 7.5 | width-depth ratio |

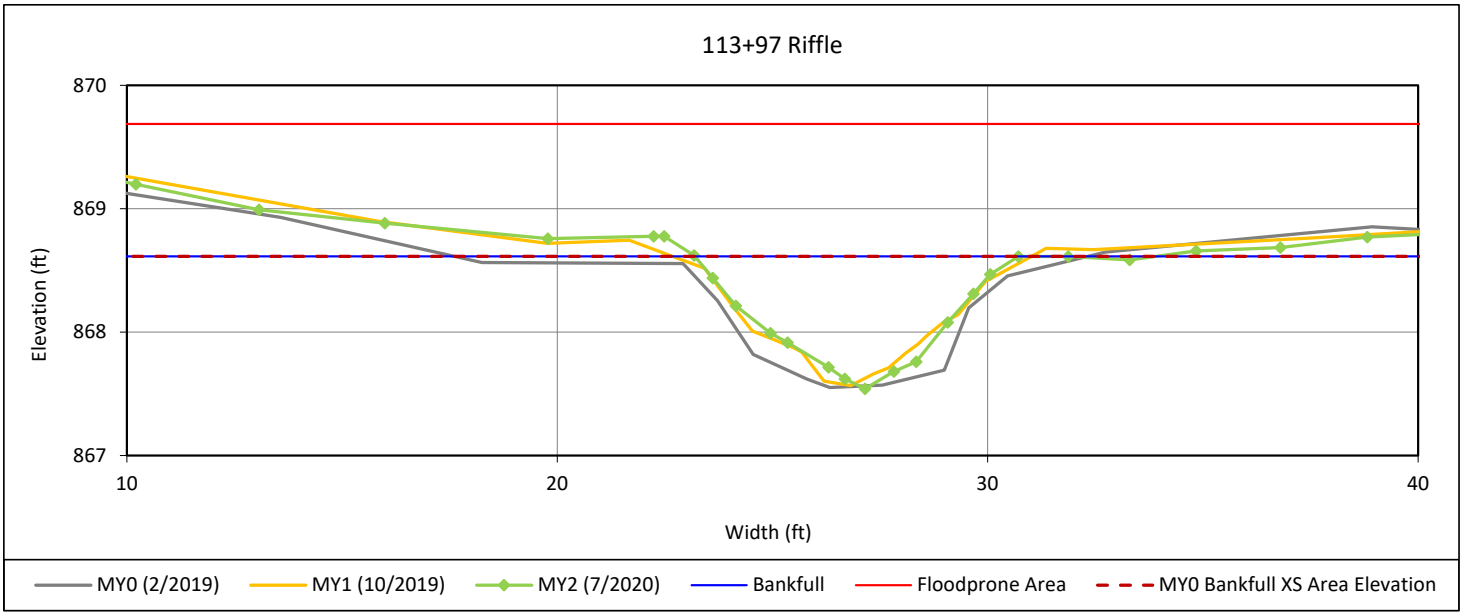
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 4 - UT1 Reach 2A**




| Bankfull Dimensions | |
|---|---|
| 4.5 | x-section area (ft.sq.) |
| 7.5 | width (ft) |
| 0.6 | mean depth (ft) |
| 1.1 | max depth (ft) |
| 7.8 | wetted perimeter (ft) |
| 0.6 | hydraulic radius (ft) |
| 12.5 | width-depth ratio |
| 48.6 | W flood prone area (ft) |
| 6.5 | entrenchment ratio |
| 1.0 | low bank height ratio |

Survey Date: 7/2020
Field Crew: Wildlands Engineering

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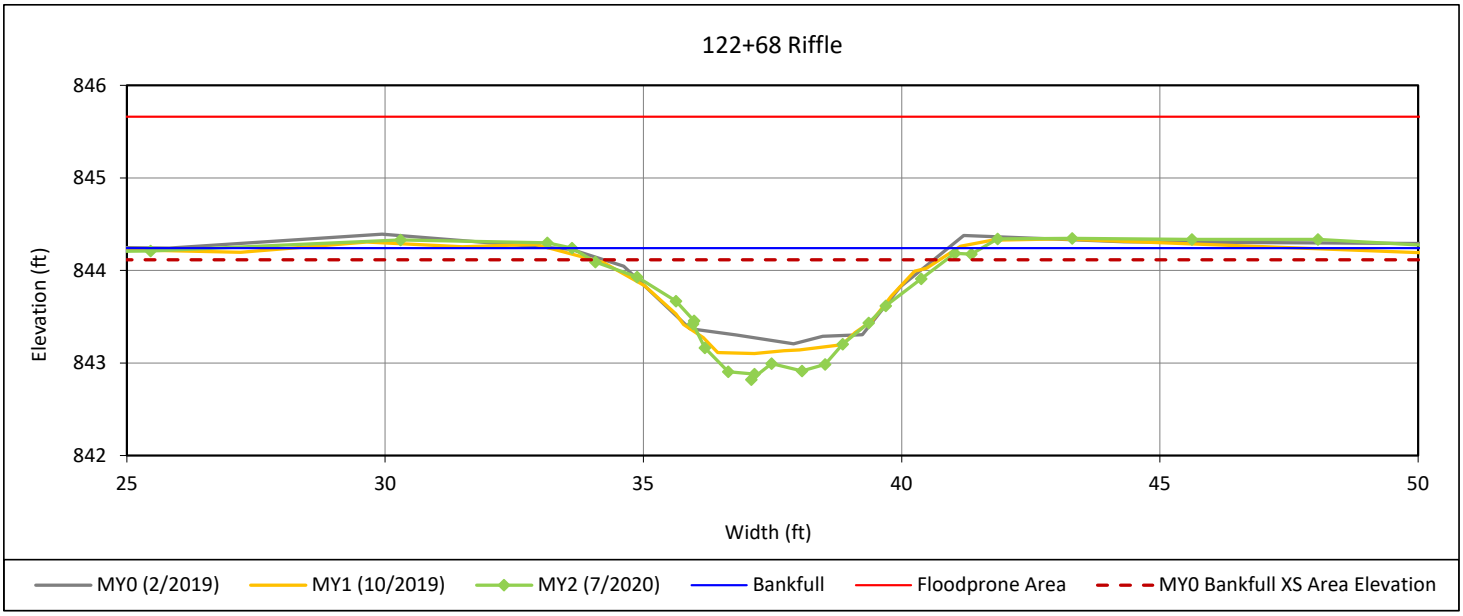
## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 5 - UT1 Reach 2A**




| Bankfull Dimensions | |
|---|---|
| 5.6 | x-section area (ft.sq.) |
| 7.9 | width (ft) |
| 0.7 | mean depth (ft) |
| 1.4 | max depth (ft) |
| 8.8 | wetted perimeter (ft) |
| 0.6 | hydraulic radius (ft) |
| 11.3 | width-depth ratio |
| 65.4 | W flood prone area (ft) |
| 8.2 | entrenchment ratio |
| 1.1 | low bank height ratio |

Survey Date: 7/2020
Field Crew: Wildlands Engineering

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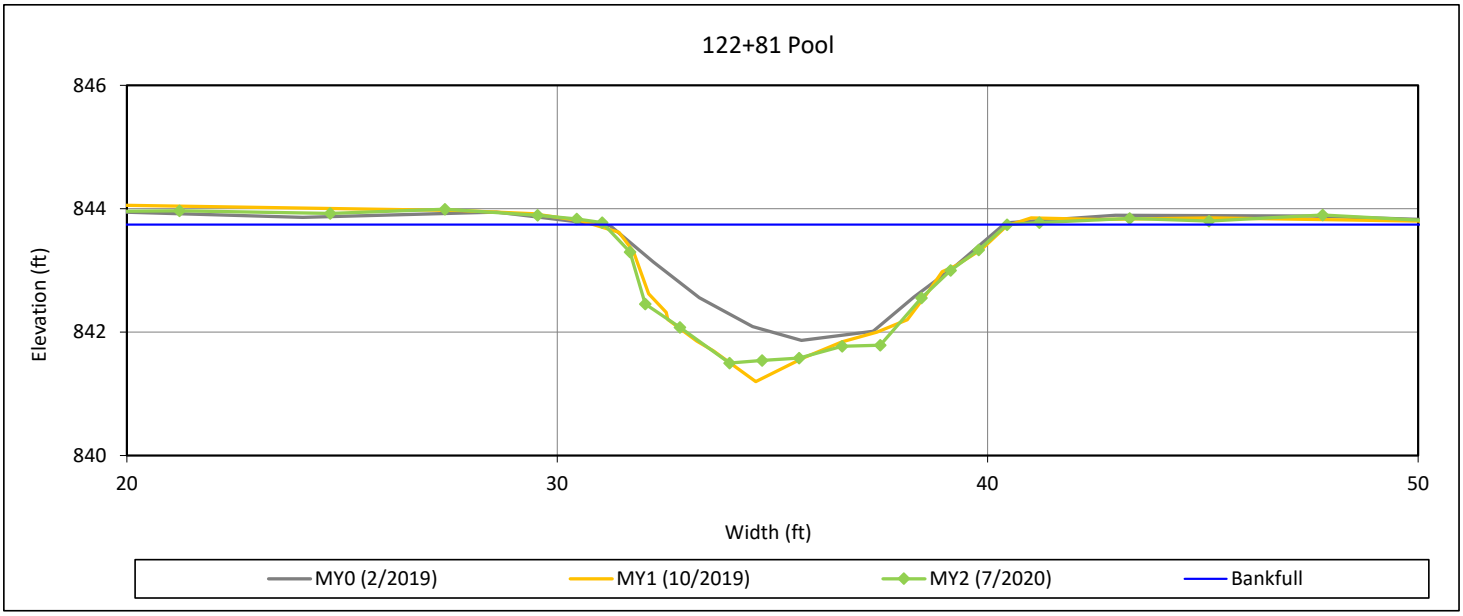
## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 6 - UT1 Reach 2A**




| Bankfull Dimensions | |
|---|---|
| 13.9 | x-section area (ft.sq.) |
| 9.4 | width (ft) |
| 1.5 | mean depth (ft) |
| 2.2 | max depth (ft) |
| 10.9 | wetted perimeter (ft) |
| 1.3 | hydraulic radius (ft) |
| 6.3 | width-depth ratio |

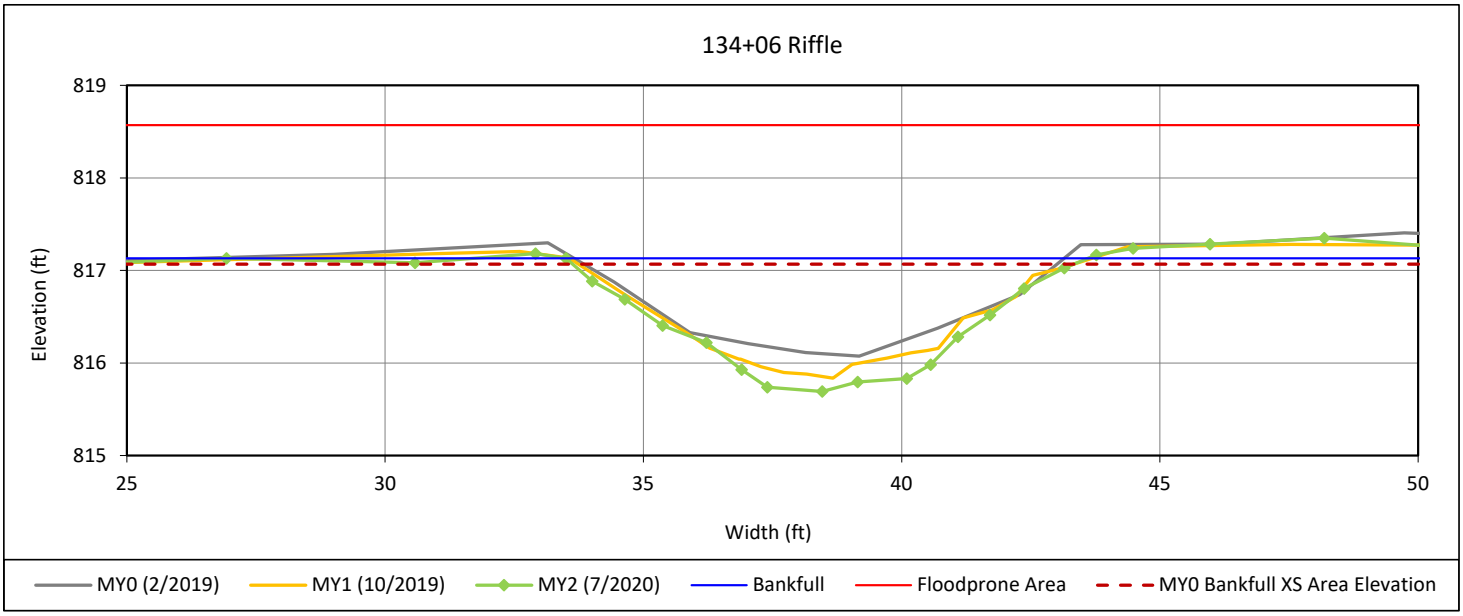
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 7 - UT1 Reach 2B**




| Bankfull Dimensions | |
|---|---|
| 8.5 | x-section area (ft.sq.) |
| 10.1 | width (ft) |
| 0.8 | mean depth (ft) |
| 1.4 | max depth (ft) |
| 10.6 | wetted perimeter (ft) |
| 0.8 | hydraulic radius (ft) |
| 12.0 | width-depth ratio |
| 68.0 | W flood prone area (ft) |
| 6.7 | entrenchment ratio |
| 1.0 | low bank height ratio |

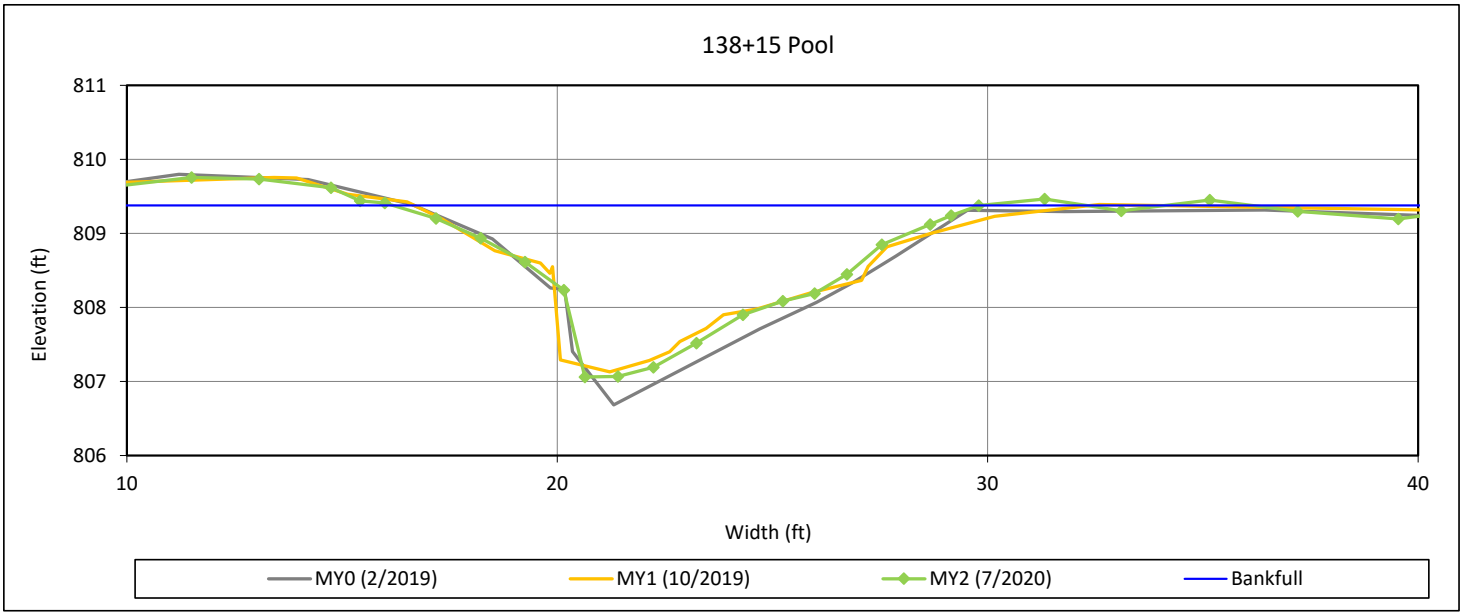
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 8 - UT1 Reach 2B**




| Bankfull Dimensions | |
|---|---|
| 14.4 | x-section area (ft.sq.) |
| 13.6 | width (ft) |
| 1.1 | mean depth (ft) |
| 2.3 | max depth (ft) |
| 14.9 | wetted perimeter (ft) |
| 1.0 | hydraulic radius (ft) |
| 12.9 | width-depth ratio |

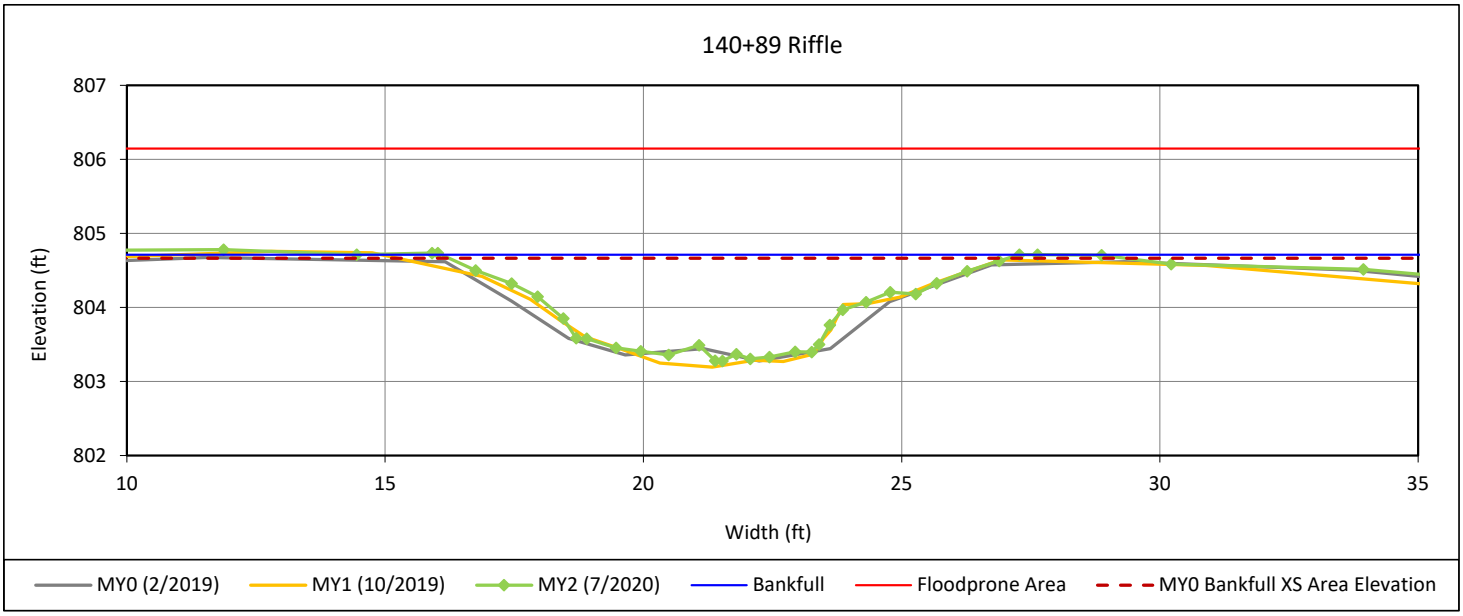
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 9 - UT1 Reach 2B**




| Bankfull Dimensions | |
|---|---|
| 9.0 | x-section area (ft.sq.) |
| 11.2 | width (ft) |
| 0.8 | mean depth (ft) |
| 1.4 | max depth (ft) |
| 11.9 | wetted perimeter (ft) |
| 0.8 | hydraulic radius (ft) |
| 13.9 | width-depth ratio |
| 49.1 | W flood prone area (ft) |
| 4.4 | entrenchment ratio |
| 1.0 | low bank height ratio |

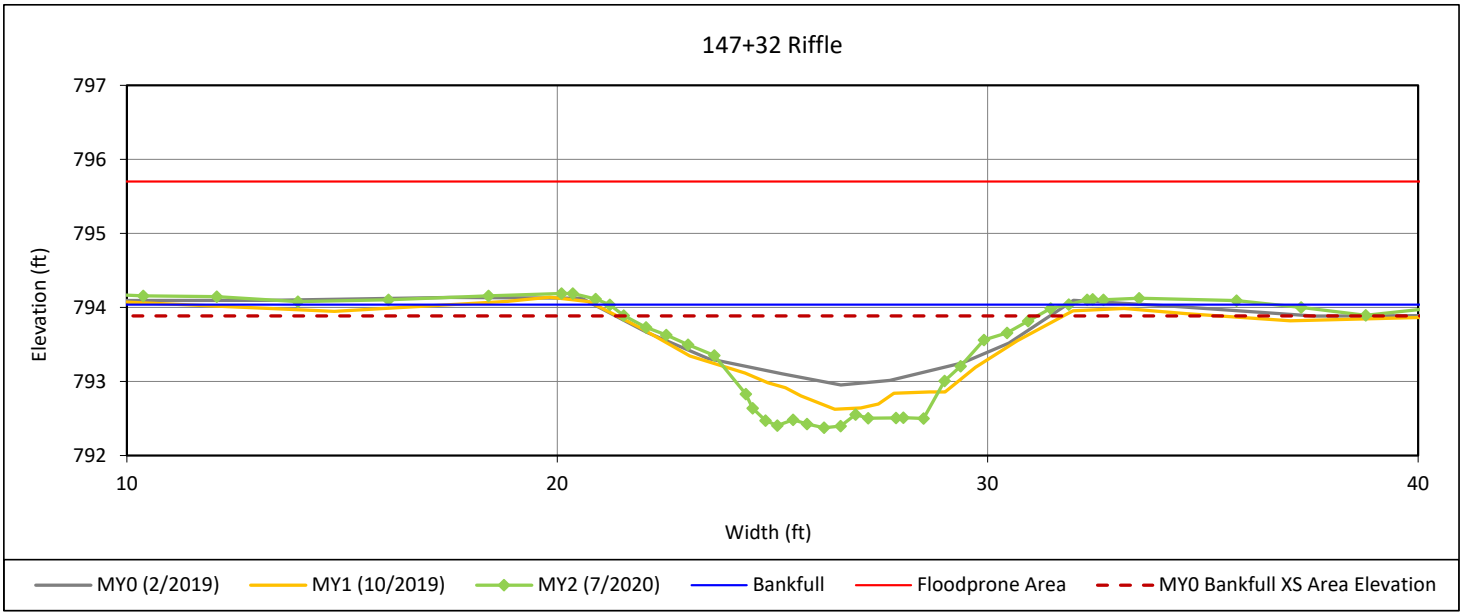
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 10 - UT1 Reach 3**




| Bankfull Dimensions | |
|---|---|
| 9.8 | x-section area (ft.sq.) |
| 10.7 | width (ft) |
| 0.9 | mean depth (ft) |
| 1.7 | max depth (ft) |
| 11.6 | wetted perimeter (ft) |
| 0.9 | hydraulic radius (ft) |
| 11.6 | width-depth ratio |
| 59.7 | W flood prone area (ft) |
| 5.6 | entrenchment ratio |
| 1.1 | low bank height ratio |

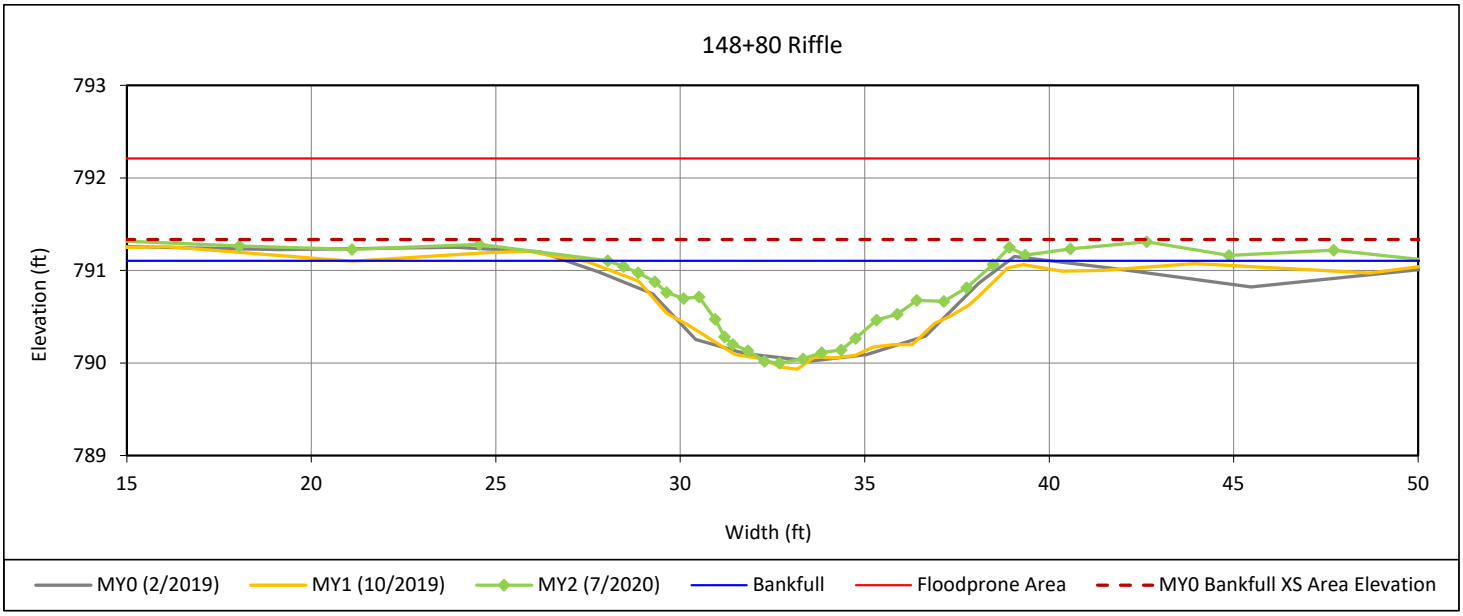
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 11 - UT1 Reach 3**




| Bankfull Dimensions | |
|---|---|
| 6.2 | x-section area (ft.sq.) |
| 10.5 | width (ft) |
| 0.6 | mean depth (ft) |
| 1.1 | max depth (ft) |
| 10.9 | wetted perimeter (ft) |
| 0.6 | hydraulic radius (ft) |
| 17.9 | width-depth ratio |
| 67.5 | W flood prone area (ft) |
| 6.4 | entrenchment ratio |
| 0.8 | low bank height ratio |

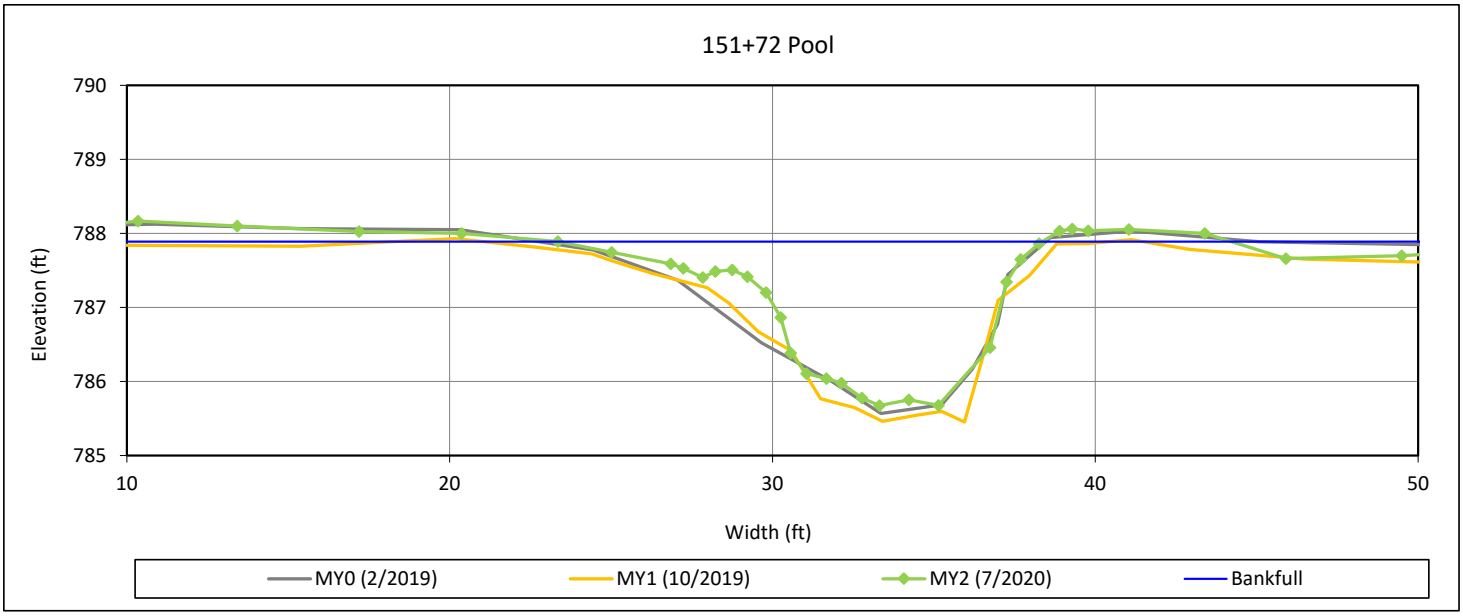
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 12 - UT1 Reach 3**




| Bankfull Dimensions | |
|---|---|
| 15.5 | x-section area (ft.sq.) |
| 15.0 | width (ft) |
| 1.0 | mean depth (ft) |
| 2.2 | max depth (ft) |
| 16.4 | wetted perimeter (ft) |
| 0.9 | hydraulic radius (ft) |
| 14.5 | width-depth ratio |

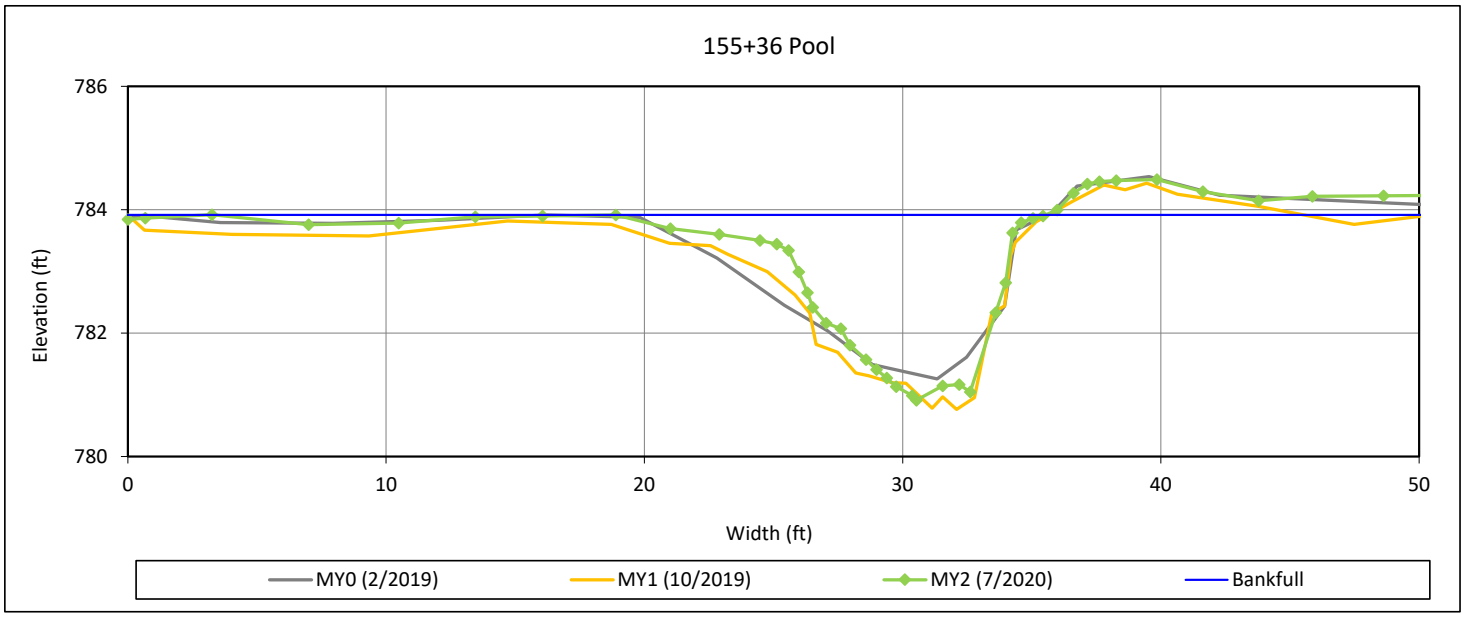
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 13 - UT1 Reach 3**




| Bankfull Dimensions | |
|---|---|
| 20.9 | x-section area (ft.sq.) |
| 16.6 | width (ft) |
| 1.3 | mean depth (ft) |
| 3.0 | max depth (ft) |
| 18.9 | wetted perimeter (ft) |
| 1.1 | hydraulic radius (ft) |
| 13.2 | width-depth ratio |

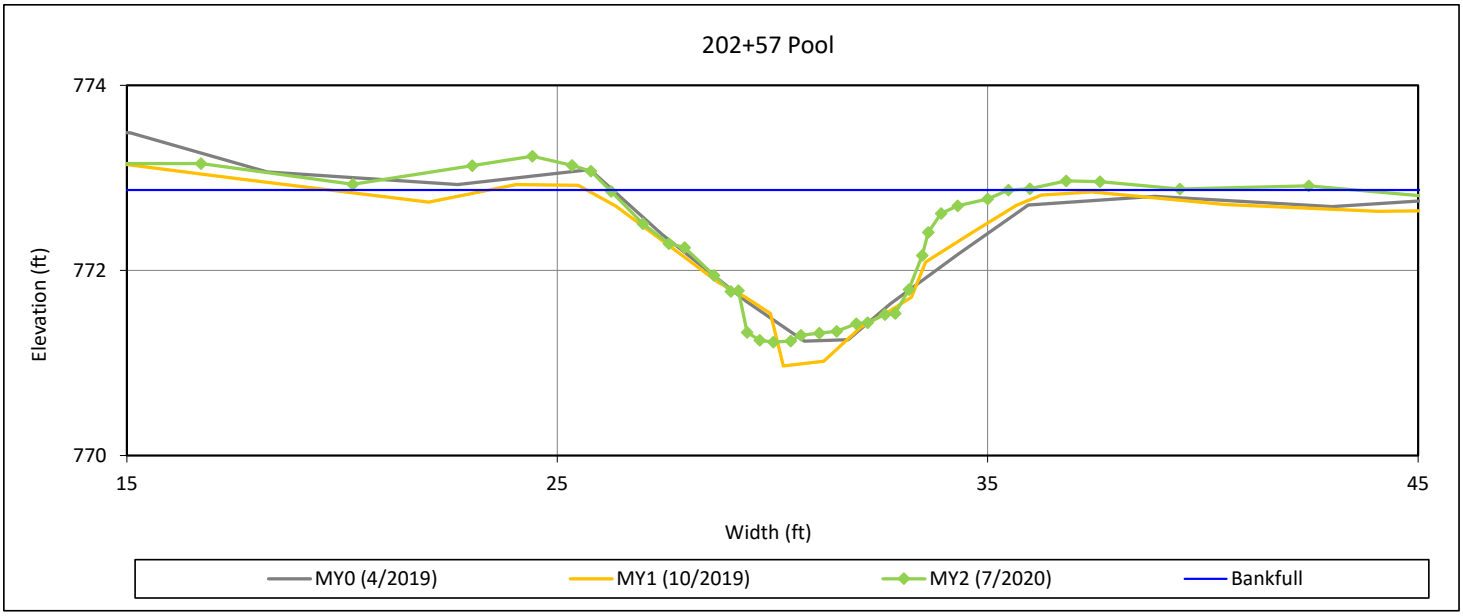
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 14 - UT2 Reach 1**




| Bankfull Dimensions | |
|---|---|
| 8.3 | x-section area (ft.sq.) |
| 9.3 | width (ft) |
| 0.9 | mean depth (ft) |
| 1.6 | max depth (ft) |
| 10.3 | wetted perimeter (ft) |
| 0.8 | hydraulic radius (ft) |
| 10.3 | width-depth ratio |

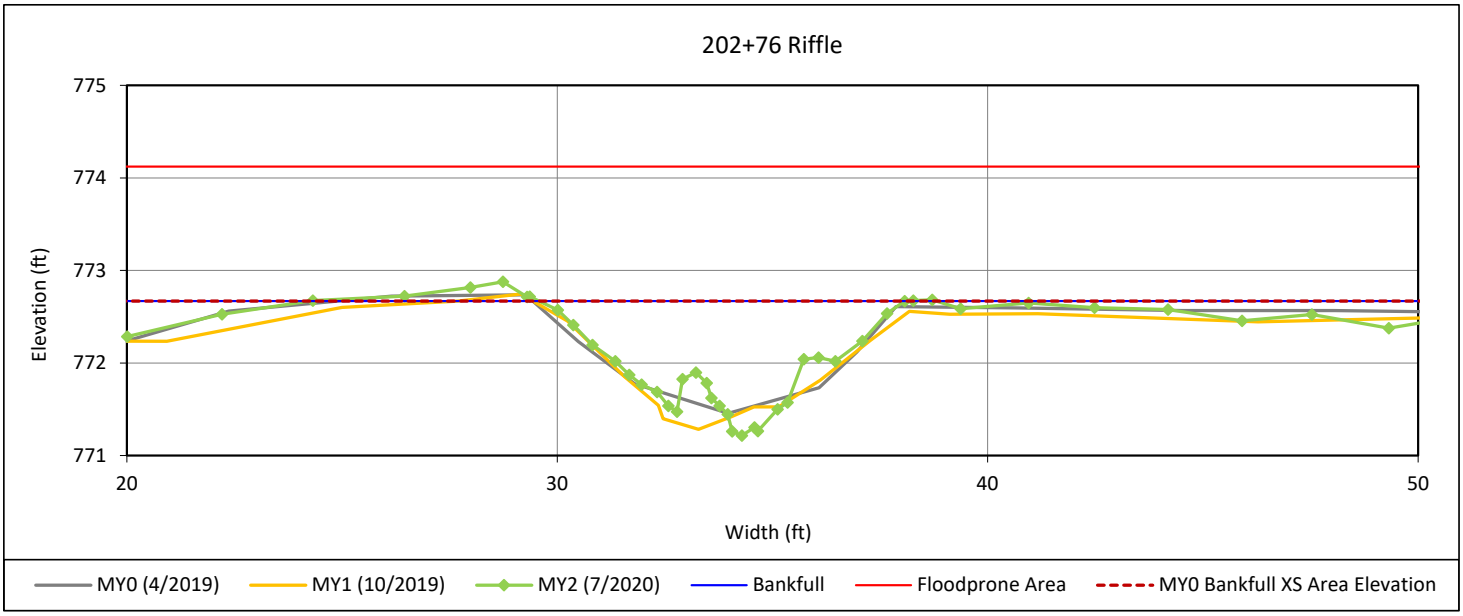
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 15 - UT2 Reach 1**




| Bankfull Dimensions | |
|---|---|
| 6.1 | x-section area (ft.sq.) |
| 8.5 | width (ft) |
| 0.7 | mean depth (ft) |
| 1.5 | max depth (ft) |
| 9.7 | wetted perimeter (ft) |
| 0.6 | hydraulic radius (ft) |
| 11.7 | width-depth ratio |
| 68.7 | W flood prone area (ft) |
| 8.1 | entrenchment ratio |
| 1.0 | low bank height ratio |

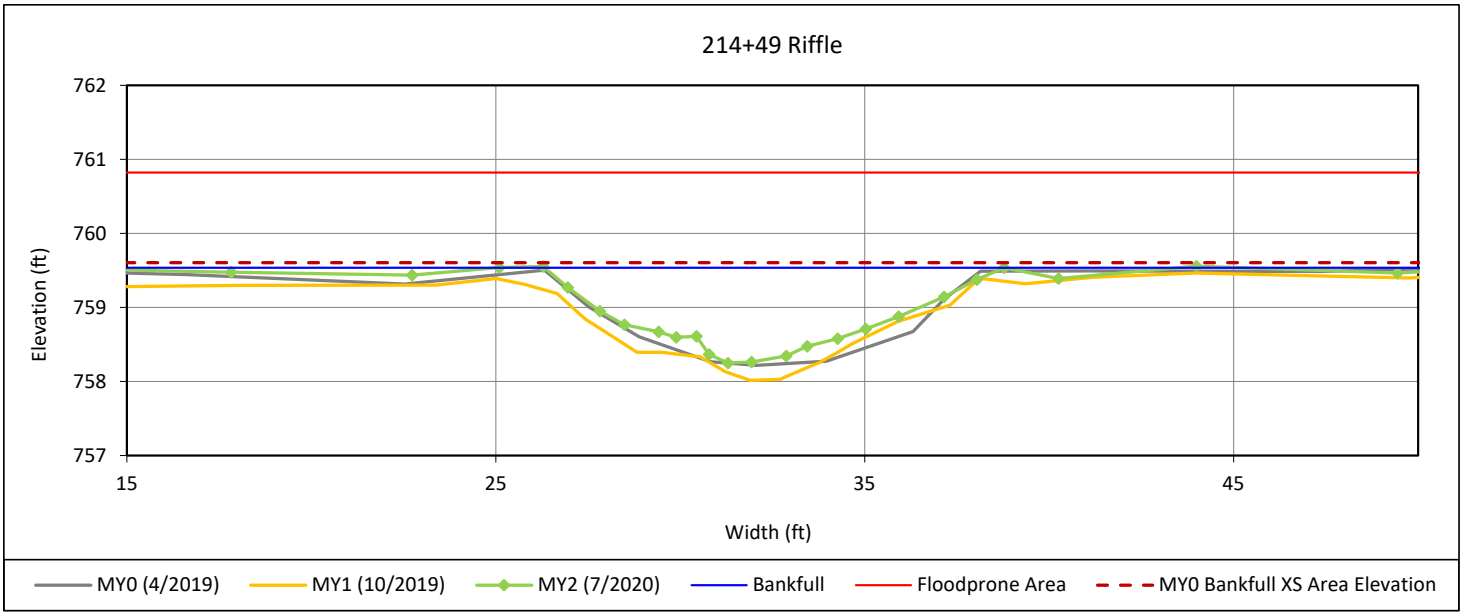
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 16 - UT2 Reach 2**




| Bankfull Dimensions | |
|---|---|
| 9.3 | x-section area (ft.sq.) |
| 12.5 | width (ft) |
| 0.7 | mean depth (ft) |
| 1.3 | max depth (ft) |
| 12.8 | wetted perimeter (ft) |
| 0.7 | hydraulic radius (ft) |
| 16.6 | width-depth ratio |
| 64.6 | W flood prone area (ft) |
| 5.2 | entrenchment ratio |
| 0.9 | low bank height ratio |

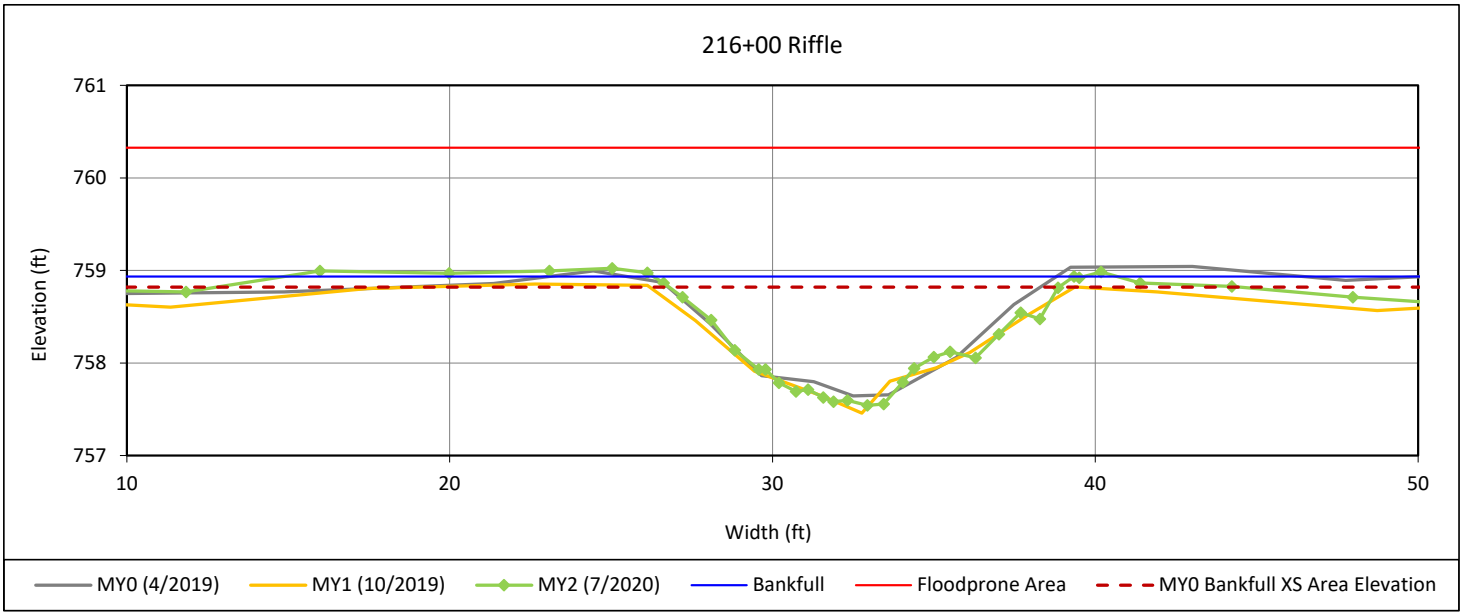
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 17 - UT2 Reach 2**




| Bankfull Dimensions | |
|---|---|
| 10.5 | x-section area (ft.sq.) |
| 13.0 | width (ft) |
| 0.8 | mean depth (ft) |
| 1.4 | max depth (ft) |
| 13.5 | wetted perimeter (ft) |
| 0.8 | hydraulic radius (ft) |
| 16.1 | width-depth ratio |
| 72.1 | W flood prone area (ft) |
| 5.5 | entrenchment ratio |
| 1.1 | low bank height ratio |

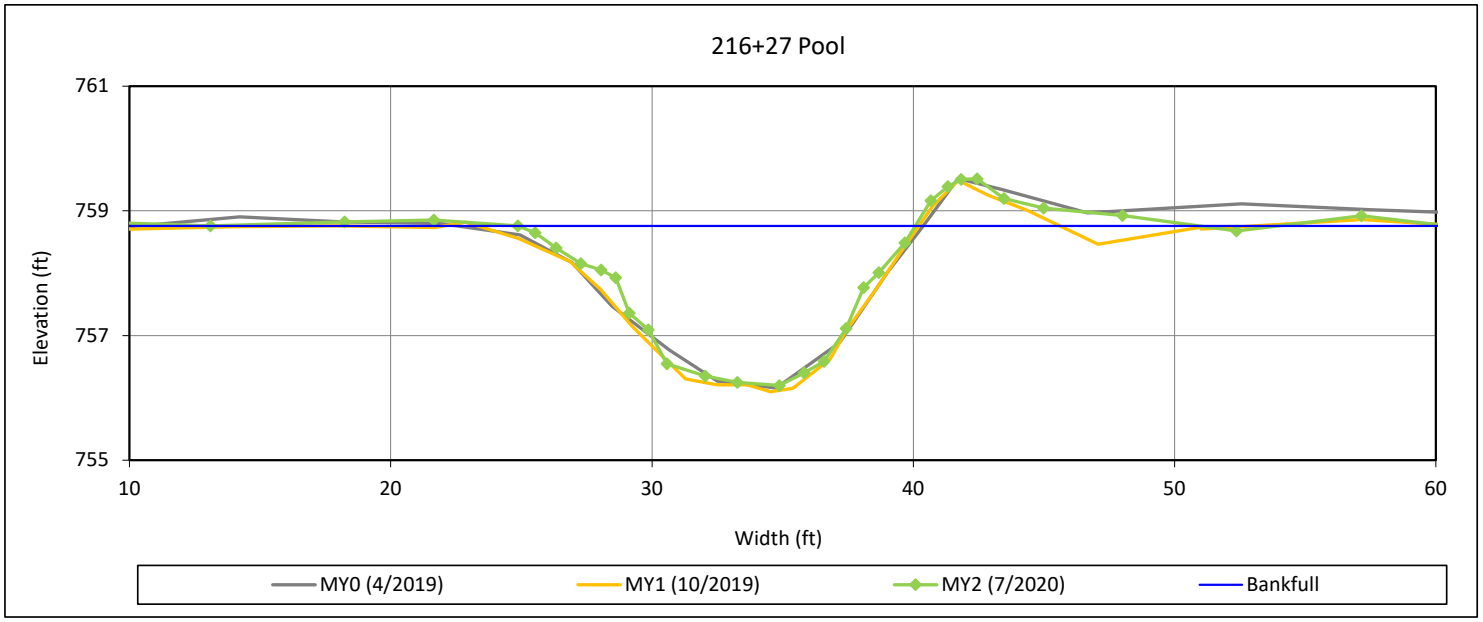
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 18 - UT2 Reach 2**




| Bankfull Dimensions | |
|---|---|
| 22.8 | x-section area (ft.sq.) |
| 15.2 | width (ft) |
| 1.5 | mean depth (ft) |
| 2.6 | max depth (ft) |
| 16.5 | wetted perimeter (ft) |
| 1.4 | hydraulic radius (ft) |
| 10.1 | width-depth ratio |

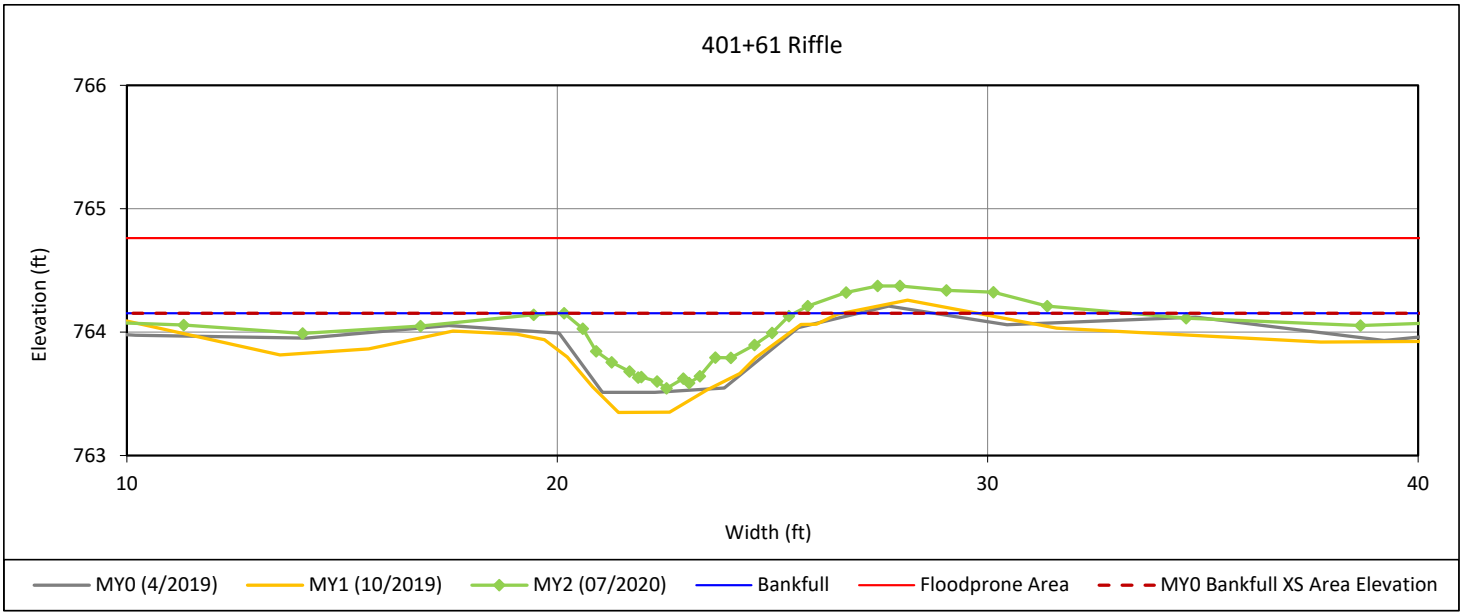
View Downstream

Survey Date: 7/2020
Field Crew: Wildlands Engineering

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 19 - UT2A**




| Bankfull Dimensions | |
|---|---|
| 1.9 | x-section area (ft.sq.) |
| 5.3 | width (ft) |
| 0.4 | mean depth (ft) |
| 0.6 | max depth (ft) |
| 5.5 | wetted perimeter (ft) |
| 0.3 | hydraulic radius (ft) |
| 15.3 | width-depth ratio |
| 56.8 | W flood prone area (ft) |
| 10.6 | entrenchment ratio |
| 1.0 | low bank height ratio |

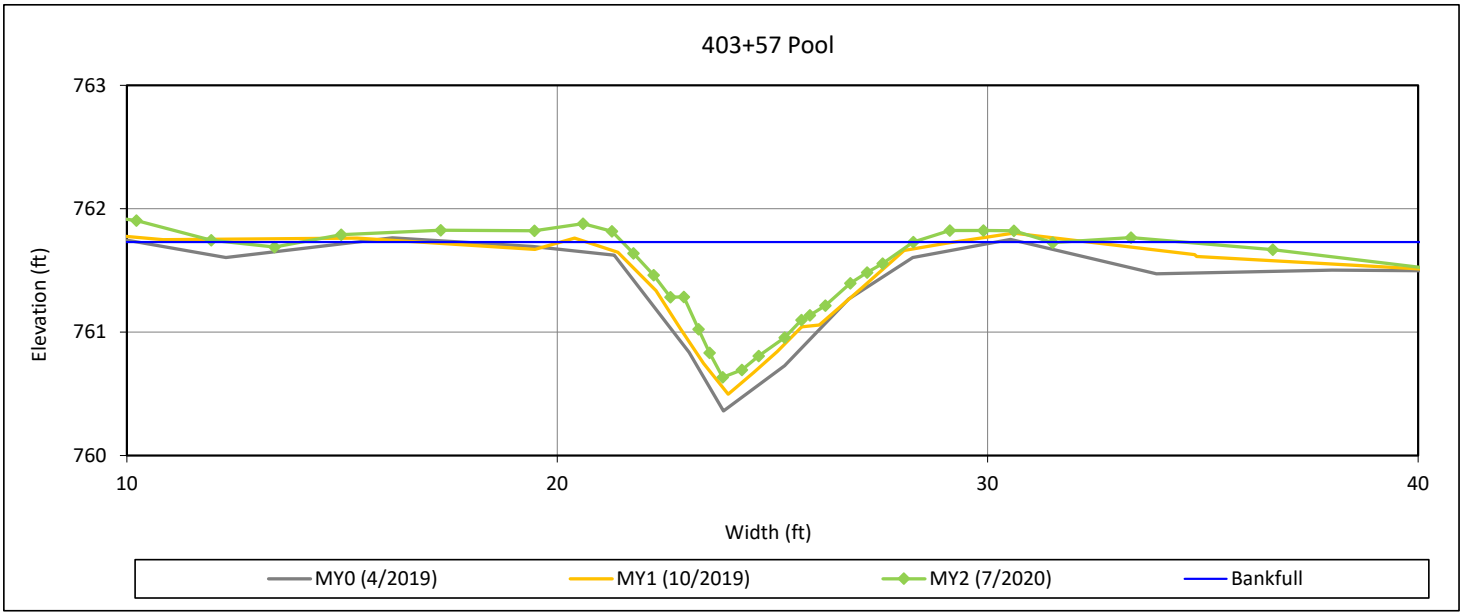
Survey Date: 07/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 20 - UT2A**




| Bankfull Dimensions | |
|---|---|
| 3.5 | x-section area (ft.sq.) |
| 6.8 | width (ft) |
| 0.5 | mean depth (ft) |
| 1.1 | max depth (ft) |
| 7.2 | wetted perimeter (ft) |
| 0.5 | hydraulic radius (ft) |
| 12.9 | width-depth ratio |

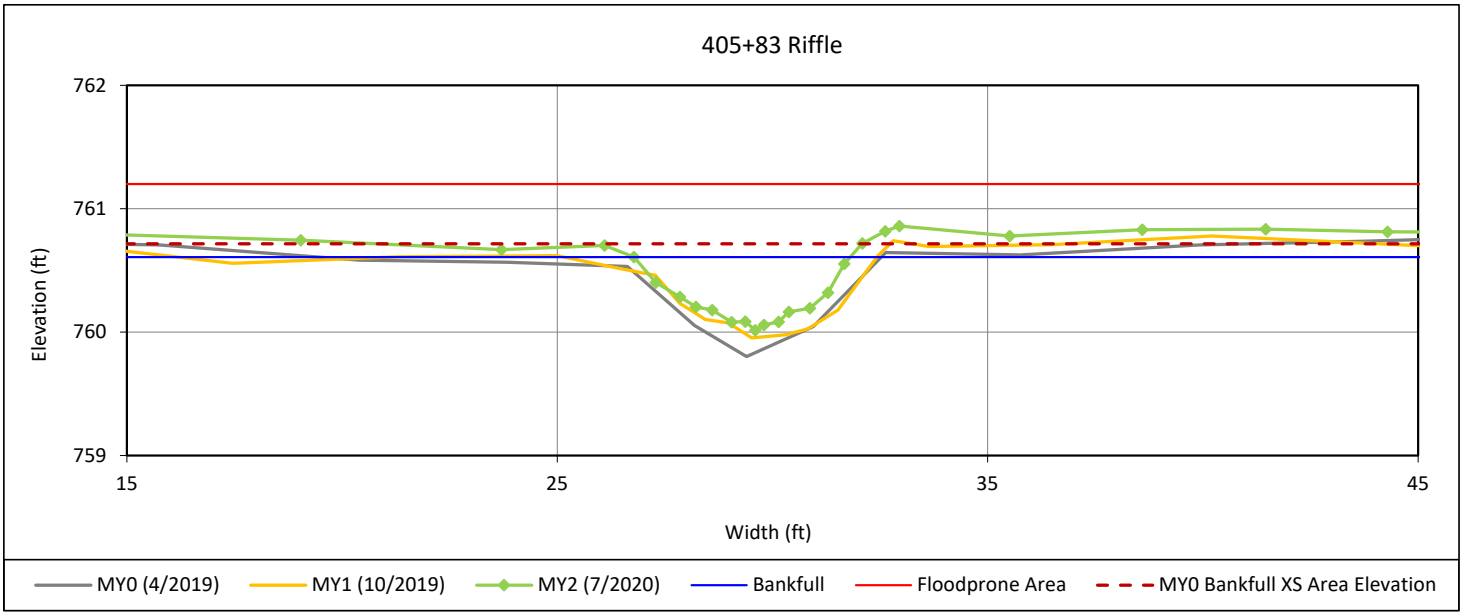
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 21 - UT2A**




| Bankfull Dimensions | |
|---|---|
| 1.8 | x-section area (ft.sq.) |
| 5.0 | width (ft) |
| 0.4 | mean depth (ft) |
| 0.6 | max depth (ft) |
| 5.2 | wetted perimeter (ft) |
| 0.4 | hydraulic radius (ft) |
| 13.7 | width-depth ratio |
| 51.0 | W flood prone area (ft) |
| 10.1 | entrenchment ratio |
| 0.8 | low bank height ratio |

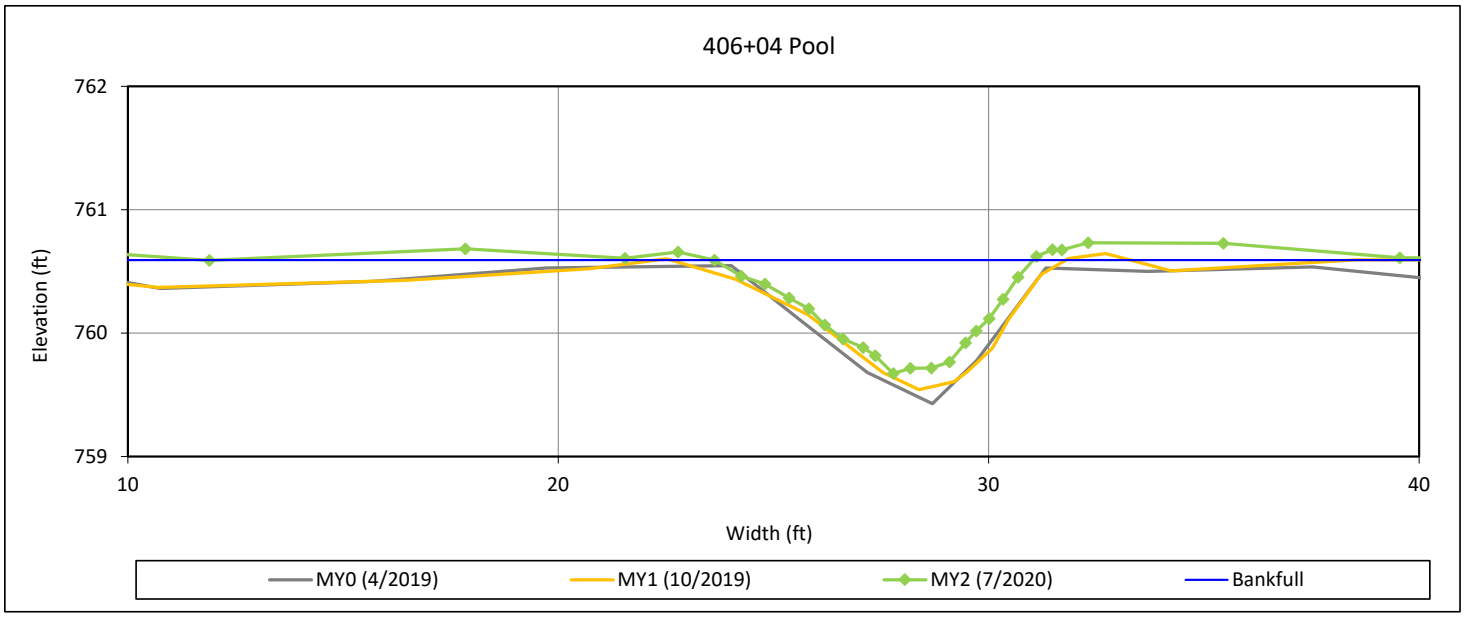
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 22 - UT2A**




| Bankfull Dimensions | |
|---|---|
| 3.7 | x-section area (ft.sq.) |
| 7.4 | width (ft) |
| 0.5 | mean depth (ft) |
| 0.9 | max depth (ft) |
| 7.7 | wetted perimeter (ft) |
| 0.5 | hydraulic radius (ft) |
| 14.9 | width-depth ratio |

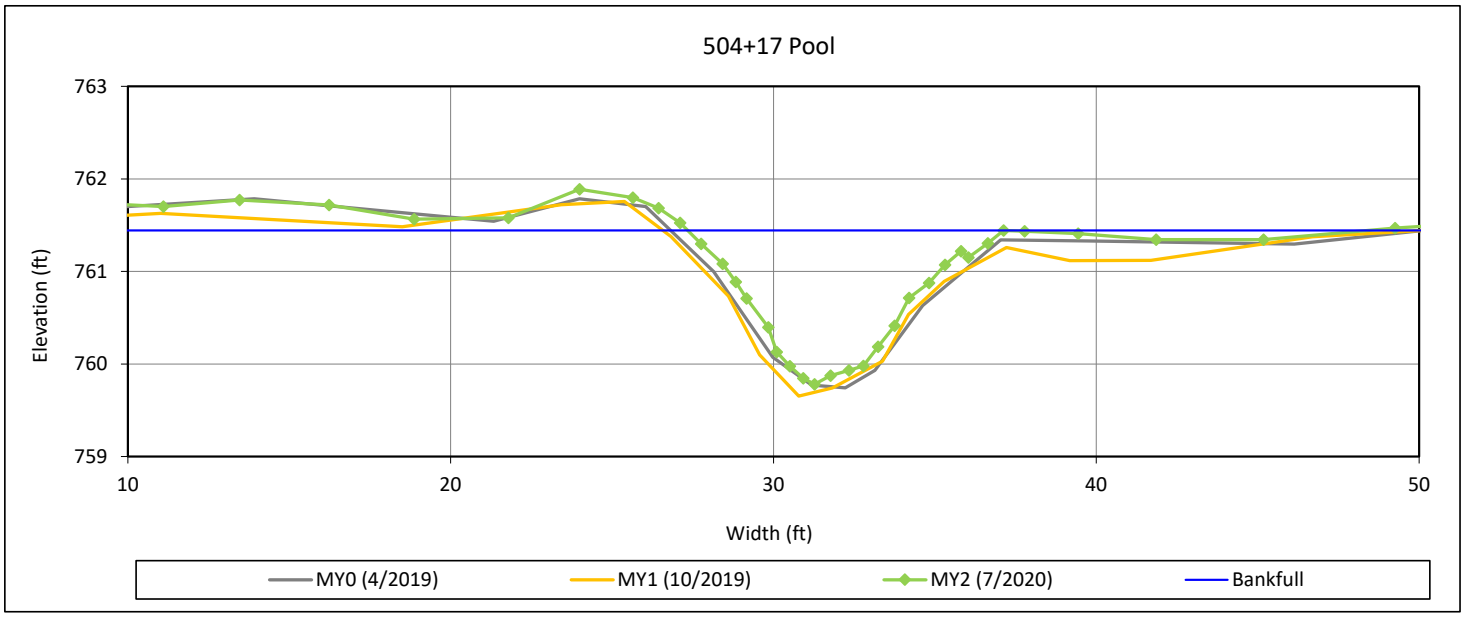
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 23 - UT2B**




| Bankfull Dimensions | |
|---|---|
| 8.2 | x-section area (ft.sq.) |
| 9.8 | width (ft) |
| 0.8 | mean depth (ft) |
| 1.7 | max depth (ft) |
| 10.5 | wetted perimeter (ft) |
| 0.8 | hydraulic radius (ft) |
| 11.6 | width-depth ratio |

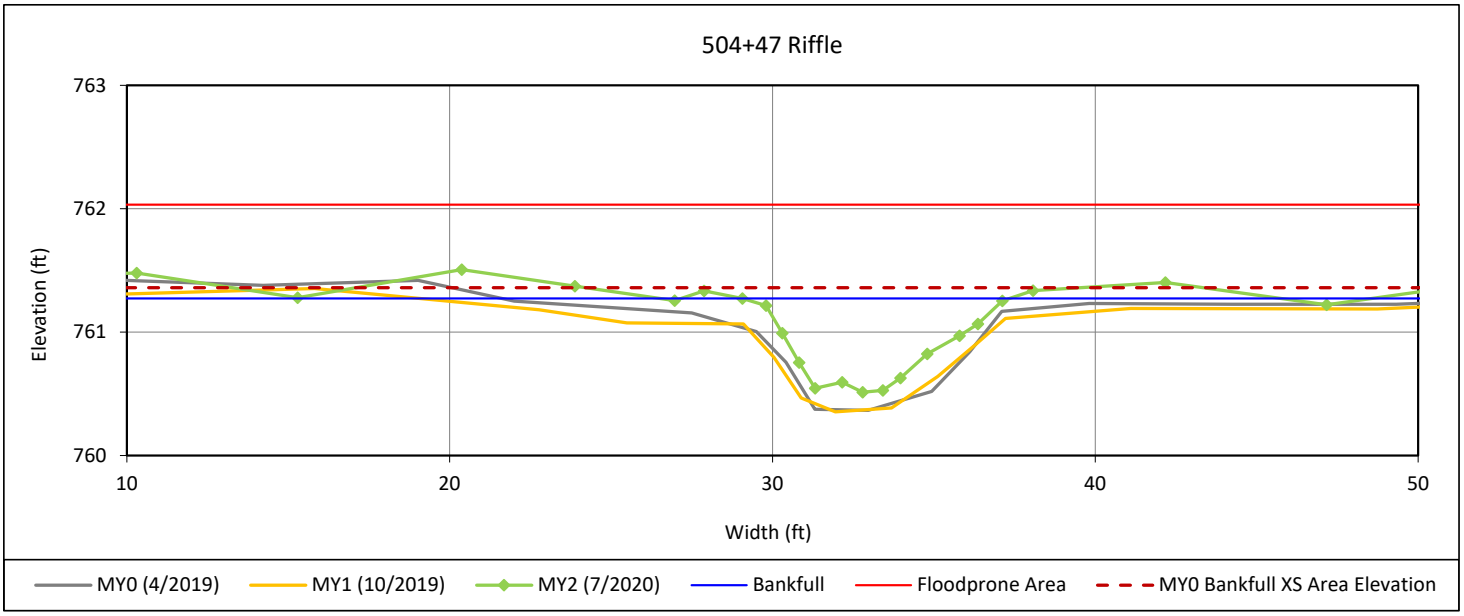
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 24 - UT2B**




| Bankfull Dimensions | |
|---|---|
| 3.6 | x-section area (ft.sq.) |
| 8.3 | width (ft) |
| 0.4 | mean depth (ft) |
| 0.8 | max depth (ft) |
| 8.5 | wetted perimeter (ft) |
| 0.4 | hydraulic radius (ft) |
| 19.1 | width-depth ratio |
| 65.8 | W flood prone area (ft) |
| 8.0 | entrenchment ratio |
| 0.9 | low bank height ratio |

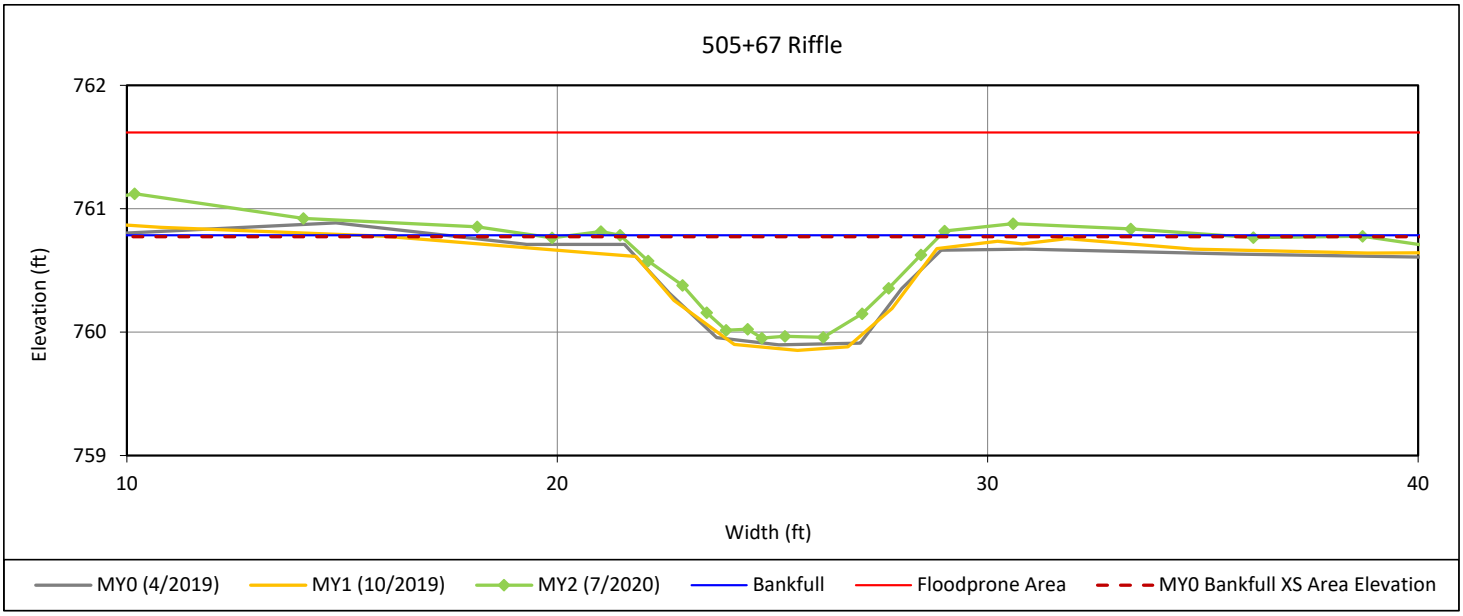
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 25 - UT2B**




| Bankfull Dimensions | |
|---|---|
| 4.0 | x-section area (ft.sq.) |
| 7.4 | width (ft) |
| 0.5 | mean depth (ft) |
| 0.8 | max depth (ft) |
| 7.7 | wetted perimeter (ft) |
| 0.5 | hydraulic radius (ft) |
| 13.9 | width-depth ratio |
| 56.4 | W flood prone area (ft) |
| 7.6 | entrenchment ratio |
| 1.0 | low bank height ratio |

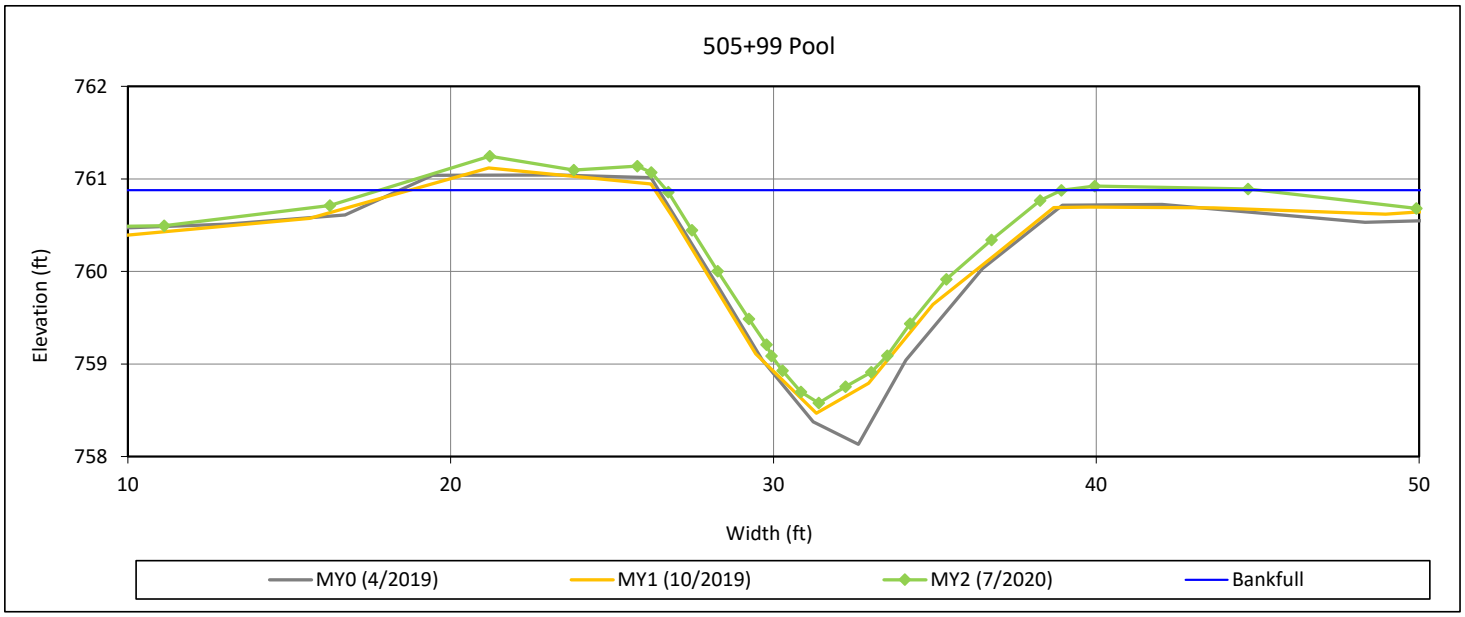
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 26 - UT2B**




| Bankfull Dimensions | |
|---|---|
| 14.4 | x-section area (ft.sq.) |
| 12.2 | width (ft) |
| 1.2 | mean depth (ft) |
| 2.3 | max depth (ft) |
| 13.2 | wetted perimeter (ft) |
| 1.1 | hydraulic radius (ft) |
| 10.4 | width-depth ratio |

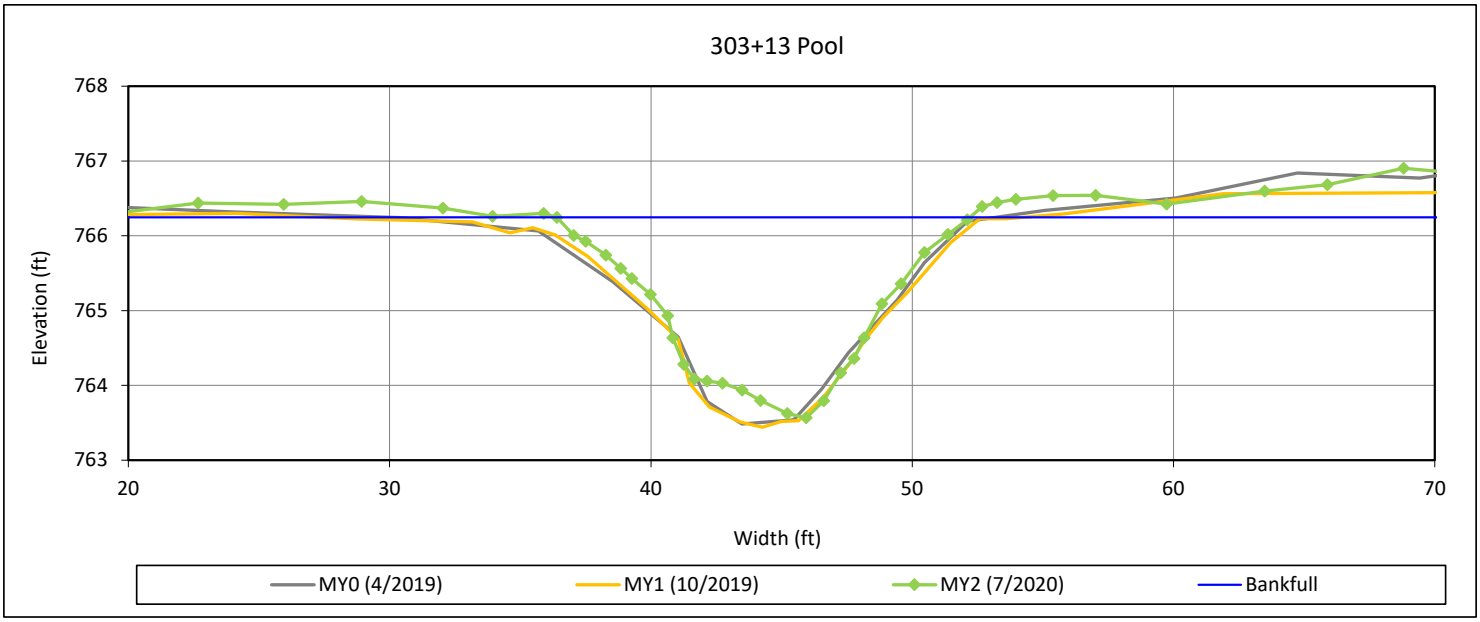
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 27 - UT3 Reach 1**




| Bankfull Dimensions | |
|---|---|
| 22.3 | x-section area (ft.sq.) |
| 15.8 | width (ft) |
| 1.4 | mean depth (ft) |
| 2.7 | max depth (ft) |
| 17.0 | wetted perimeter (ft) |
| 1.3 | hydraulic radius (ft) |
| 11.2 | width-depth ratio |

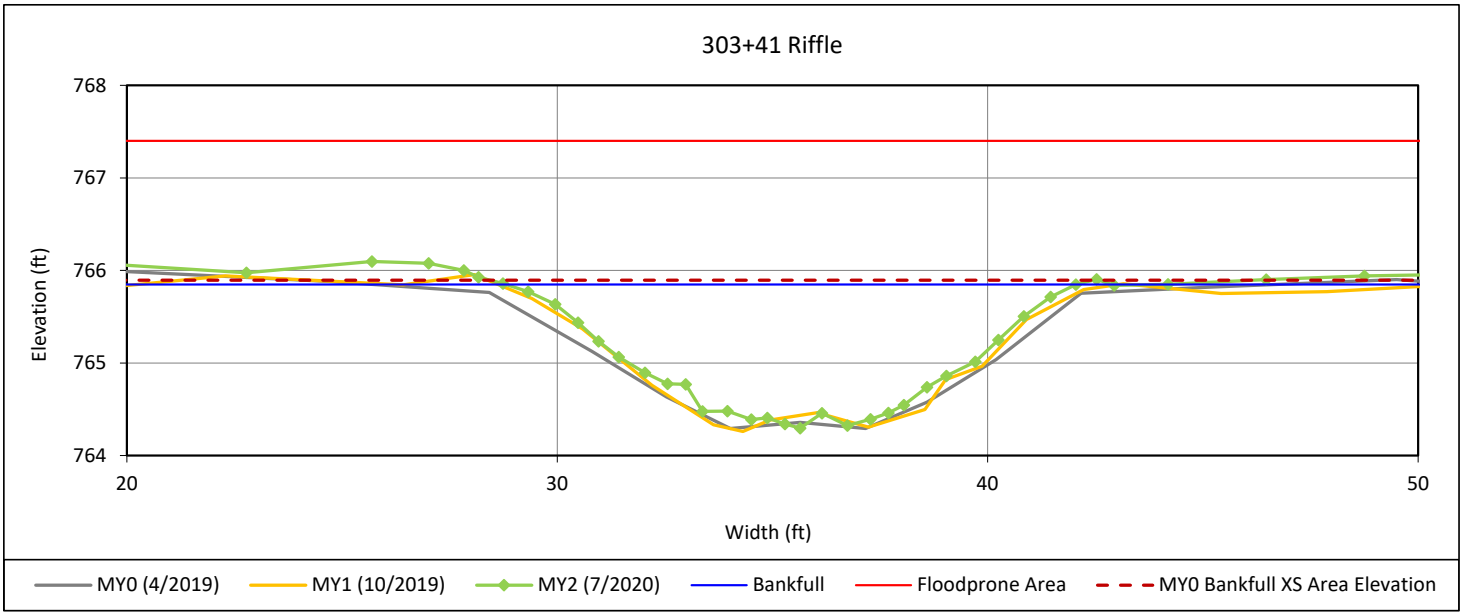
View Downstream

Survey Date: 7/2020
Field Crew: Wildlands Engineering

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 28 - UT3 Reach 1**




| Bankfull Dimensions | |
|---|---|
| 12.2 | x-section area (ft.sq.) |
| 13.2 | width (ft) |
| 0.9 | mean depth (ft) |
| 1.6 | max depth (ft) |
| 13.8 | wetted perimeter (ft) |
| 0.9 | hydraulic radius (ft) |
| 14.4 | width-depth ratio |
| 73.4 | W flood prone area (ft) |
| 5.5 | entrenchment ratio |
| 1.0 | low bank height ratio |

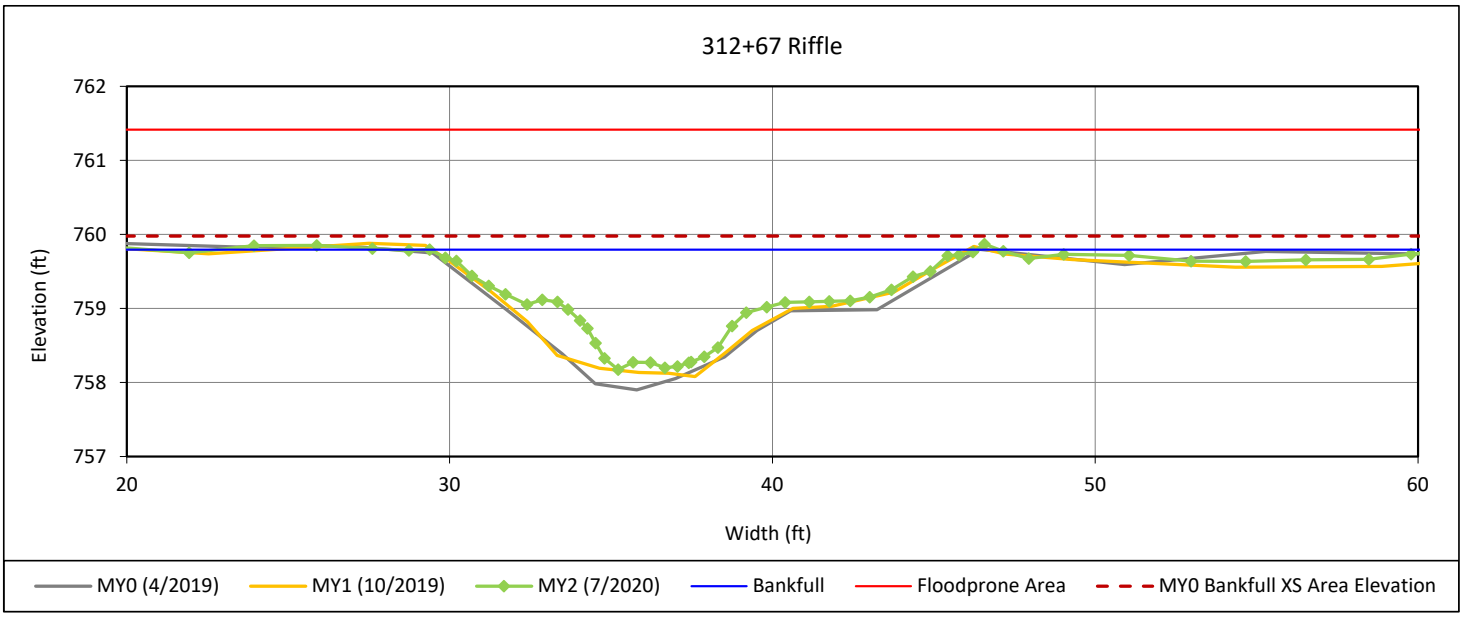
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 29 - UT3 Reach 2**




| Bankfull Dimensions | |
|---|---|
| 13.4 | x-section area (ft.sq.) |
| 16.9 | width (ft) |
| 0.8 | mean depth (ft) |
| 1.6 | max depth (ft) |
| 17.5 | wetted perimeter (ft) |
| 0.8 | hydraulic radius (ft) |
| 21.5 | width-depth ratio |
| 75.6 | W flood prone area (ft) |
| 4.5 | entrenchment ratio |
| 0.9 | low bank height ratio |

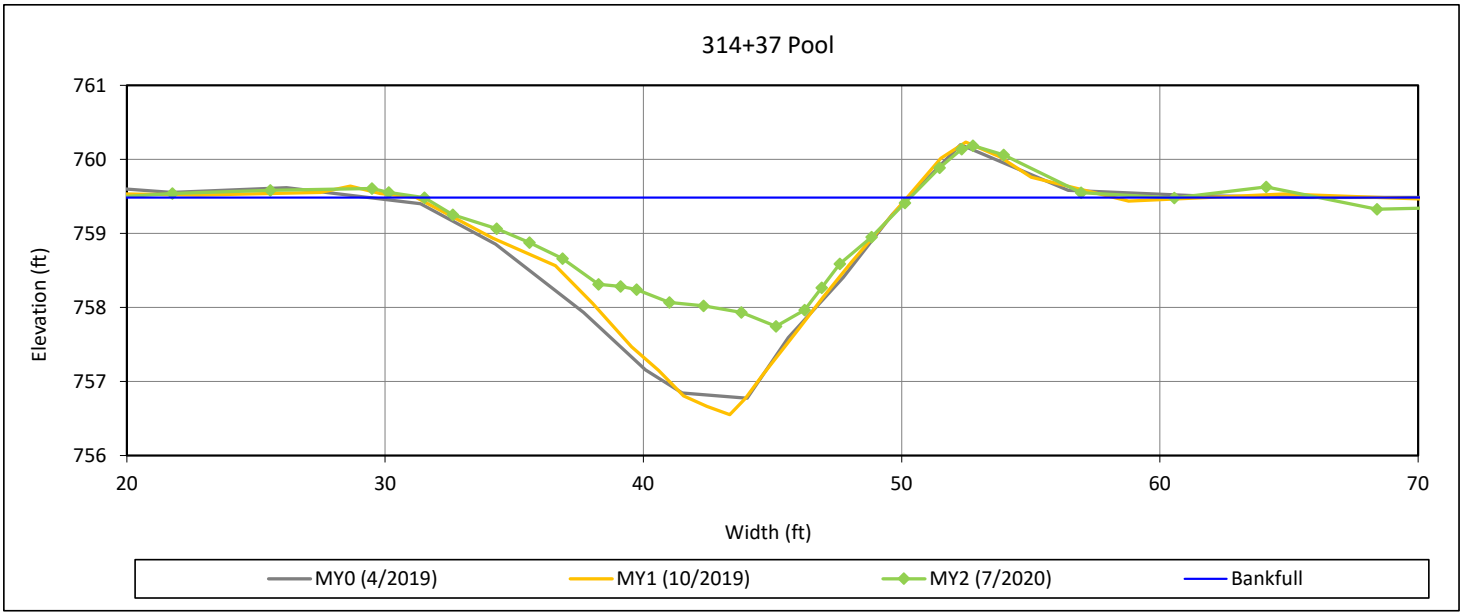
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 30 - UT3 Reach 2**




| Bankfull Dimensions | |
|---|---|
| 18.1 | x-section area (ft.sq.) |
| 18.8 | width (ft) |
| 1.0 | mean depth (ft) |
| 1.7 | max depth (ft) |
| 19.3 | wetted perimeter (ft) |
| 0.9 | hydraulic radius (ft) |
| 19.5 | width-depth ratio |

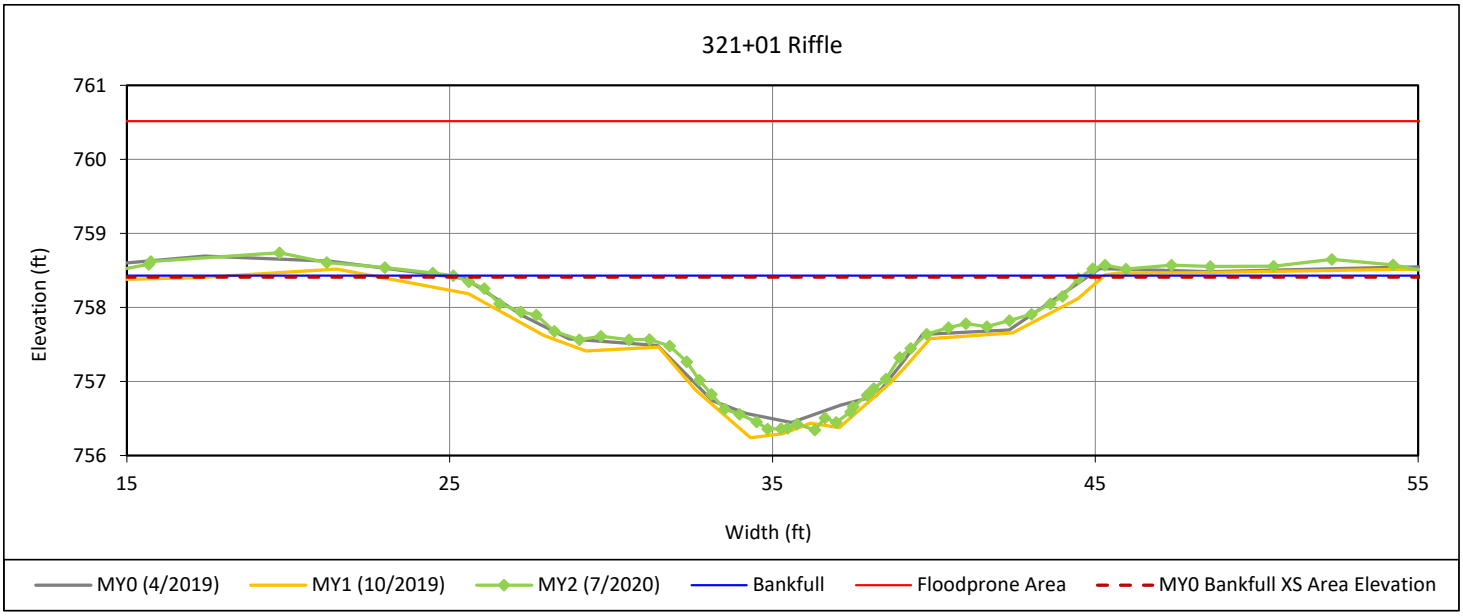
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 31 - UT3 Reach 3**




| Bankfull Dimensions | |
|---|---|
| 19.9 | x-section area (ft.sq.) |
| 19.5 | width (ft) |
| 1.0 | mean depth (ft) |
| 2.1 | max depth (ft) |
| 20.3 | wetted perimeter (ft) |
| 1.0 | hydraulic radius (ft) |
| 19.1 | width-depth ratio |
| 70.8 | W flood prone area (ft) |
| 3.6 | entrenchment ratio |
| 1.01 | low bank height ratio |

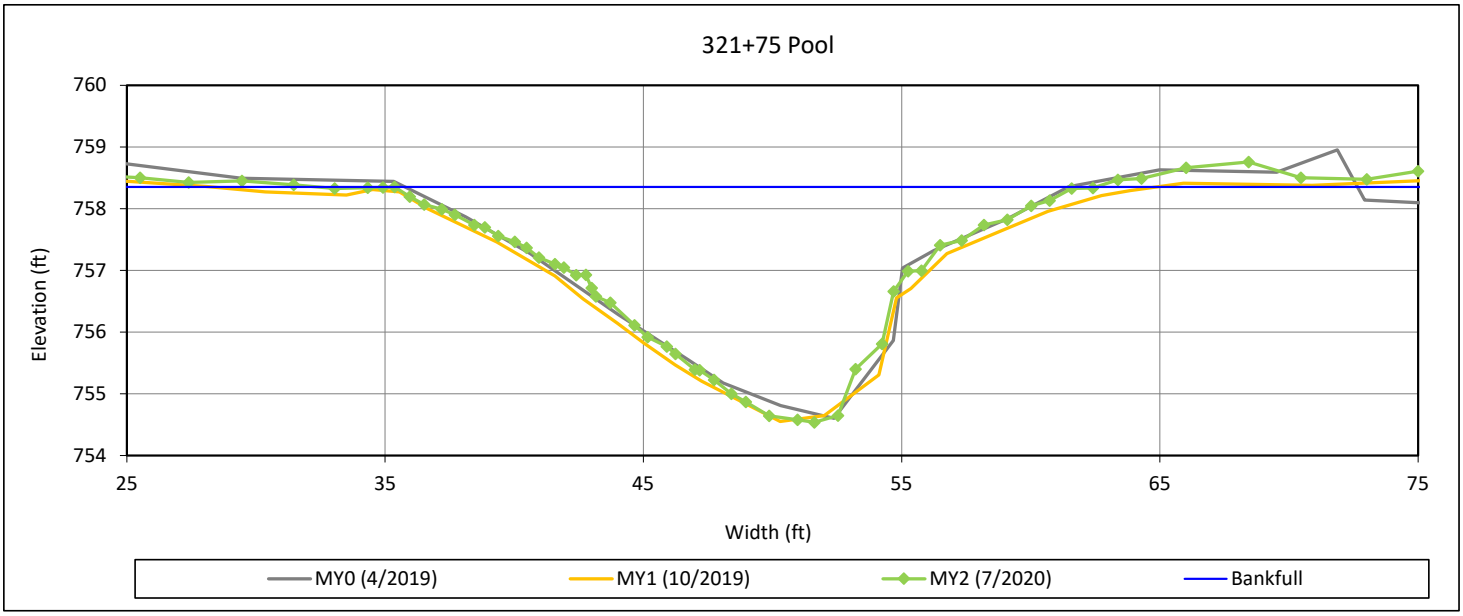
Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

## Cross-Section Plots

Lone Hickory Mitigation Site
NCDMS Project No. 97135
**Monitoring Year 2 - 2020**

**Cross-Section 32 - UT3 Reach 3**




| Bankfull Dimensions | |
|---|---|
| 45.8 | x-section area (ft.sq.) |
| 27.2 | width (ft) |
| 1.7 | mean depth (ft) |
| 3.8 | max depth (ft) |
| 29.0 | wetted perimeter (ft) |
| 1.6 | hydraulic radius (ft) |
| 16.1 | width-depth ratio |

Survey Date: 7/2020
Field Crew: Wildlands Engineering

View Downstream

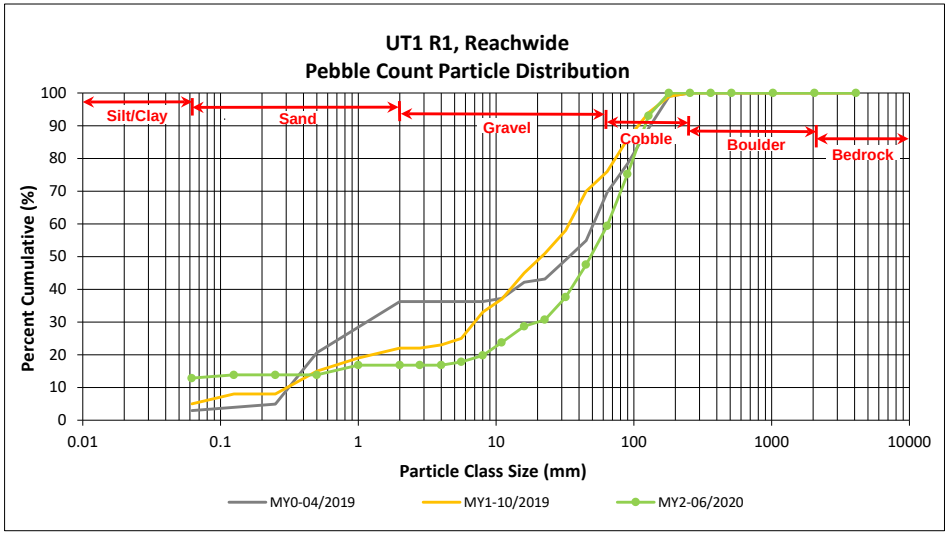
## Reachwide Pebble Count Plots

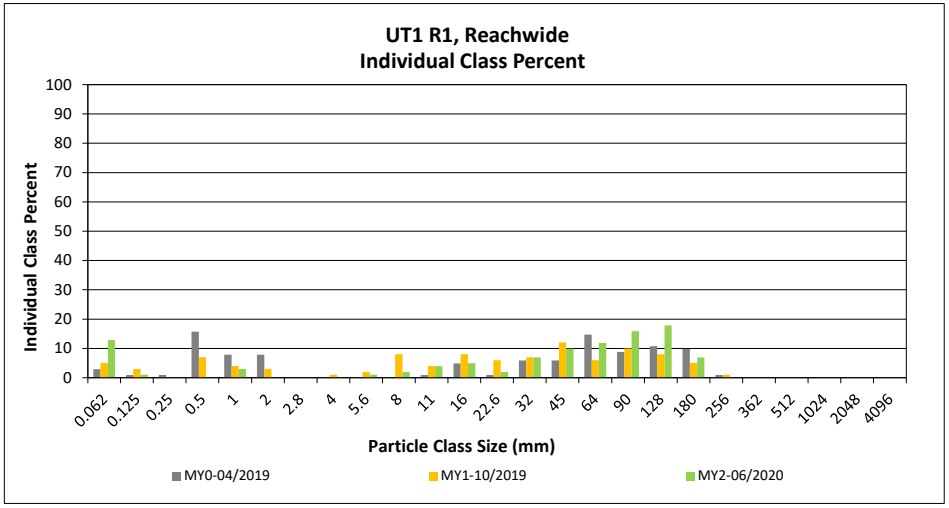
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT1 R1, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 4 | 9 | 13 | 13 | 13 |
| *SAND* | Very fine | 0.062 | 0.125 | 1 | | 1 | 1 | 14 |
| | Fine | 0.125 | 0.250 | | | | | 14 |
| | Medium | 0.25 | 0.50 | | | | | 14 |
| | Coarse | 0.5 | 1.0 | 1 | 2 | 3 | 3 | 17 |
| | Very Coarse | 1.0 | 2.0 | | | | | 17 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 17 |
| | Very Fine | 2.8 | 4.0 | | | | | 17 |
| | Fine | 4.0 | 5.6 | 1 | | 1 | 1 | 18 |
| | Fine | 5.6 | 8.0 | 2 | | 2 | 2 | 20 |
| | Medium | 8.0 | 11.0 | 2 | 2 | 4 | 4 | 24 |
| | Medium | 11.0 | 16.0 | 2 | 3 | 5 | 5 | 29 |
| | Coarse | 16.0 | 22.6 | 1 | 1 | 2 | 2 | 31 |
| | Coarse | 22.6 | 32 | 6 | 1 | 7 | 7 | 38 |
| | Very Coarse | 32 | 45 | 6 | 4 | 10 | 10 | 48 |
| | Very Coarse | 45 | 64 | 5 | 7 | 12 | 12 | 59 |
| *COBBLE* | Small | 64 | 90 | 5 | 11 | 16 | 16 | 75 |
| | Small | 90 | 128 | 11 | 7 | 18 | 18 | 93 |
| | Large | 128 | 180 | 4 | 3 | 7 | 7 | 100 |
| | Large | 180 | 256 | | | | | 100 |
| *BOULDER* | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **51** | **50** | **101** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | 0.8 |
| $D_{35}$ = | 28.1 |
| $D_{50}$ = | 48.4 |
| $D_{84}$ = | 107.0 |
| $D_{95}$ = | 140.8 |
| $D_{100}$ = | 180.0 |



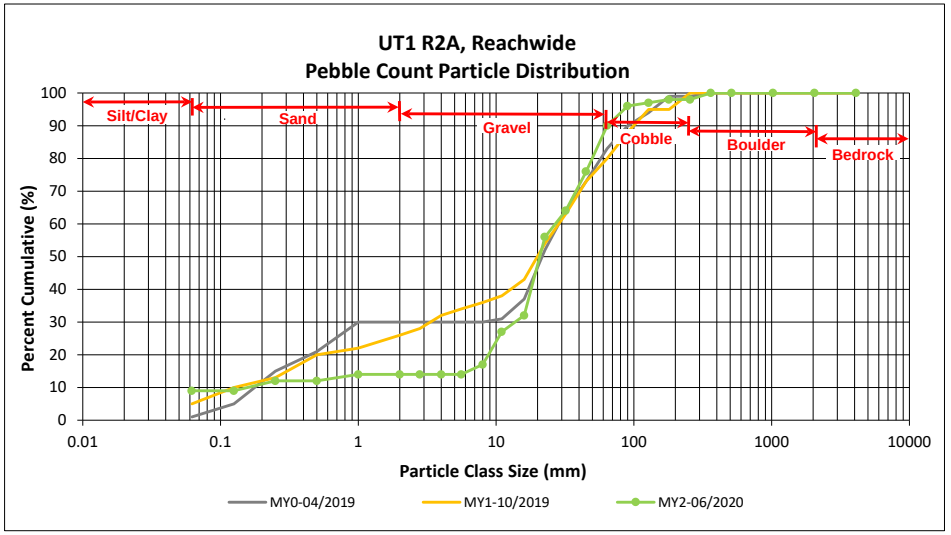
## Reachwide Pebble Count Plots

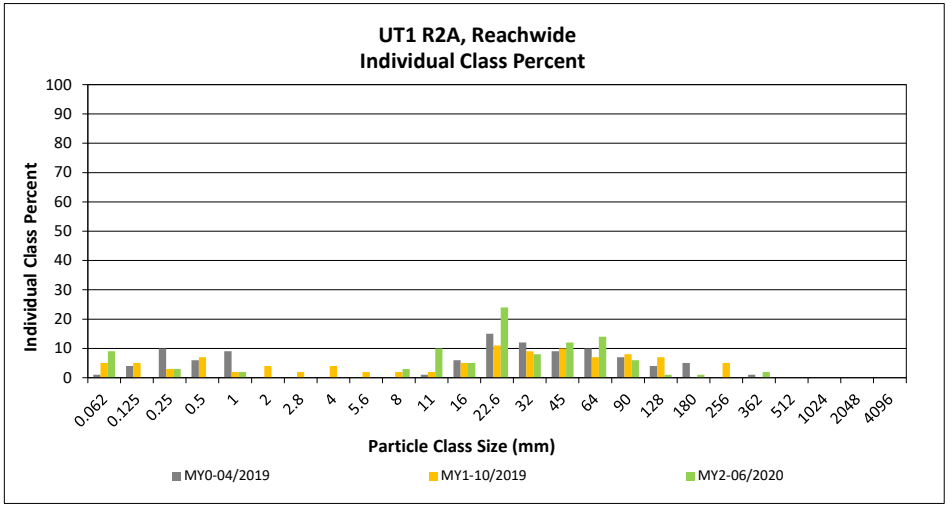
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT1 R2A, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 1 | 8 | 9 | 9 | 9 |
| *SAND* | Very fine | 0.062 | 0.125 | | | | | 9 |
| | Fine | 0.125 | 0.250 | | 3 | 3 | 3 | 12 |
| | Medium | 0.25 | 0.50 | | | | | 12 |
| | Coarse | 0.5 | 1.0 | | 2 | 2 | 2 | 14 |
| | Very Coarse | 1.0 | 2.0 | | | | | 14 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 14 |
| | Very Fine | 2.8 | 4.0 | | | | | 14 |
| | Fine | 4.0 | 5.6 | | | | | 14 |
| | Fine | 5.6 | 8.0 | | 3 | 3 | 3 | 17 |
| | Medium | 8.0 | 11.0 | 3 | 7 | 10 | 10 | 27 |
| | Medium | 11.0 | 16.0 | 2 | 3 | 5 | 5 | 32 |
| | Coarse | 16.0 | 22.6 | 10 | 14 | 24 | 24 | 56 |
| | Coarse | 22.6 | 32 | 5 | 3 | 8 | 8 | 64 |
| | Very Coarse | 32 | 45 | 9 | 3 | 12 | 12 | 76 |
| | Very Coarse | 45 | 64 | 12 | 2 | 14 | 14 | 90 |
| *COBBLE* | Small | 64 | 90 | 5 | 1 | 6 | 6 | 96 |
| | Small | 90 | 128 | 1 | | 1 | 1 | 97 |
| | Large | 128 | 180 | | 1 | 1 | 1 | 98 |
| | Large | 180 | 256 | | | | | 98 |
| *BOULDER* | Small | 256 | 362 | 2 | | 2 | 2 | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | 7.1 |
| $D_{35}$ = | 16.7 |
| $D_{50}$ = | 20.7 |
| $D_{84}$ = | 55.0 |
| $D_{95}$ = | 85.0 |
| $D_{100}$ = | 362.0 |



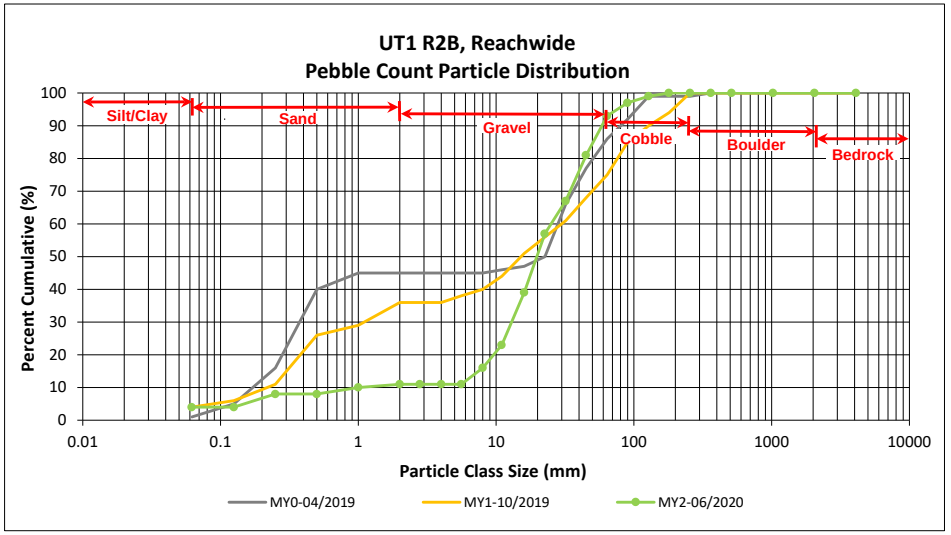
## Reachwide Pebble Count Plots

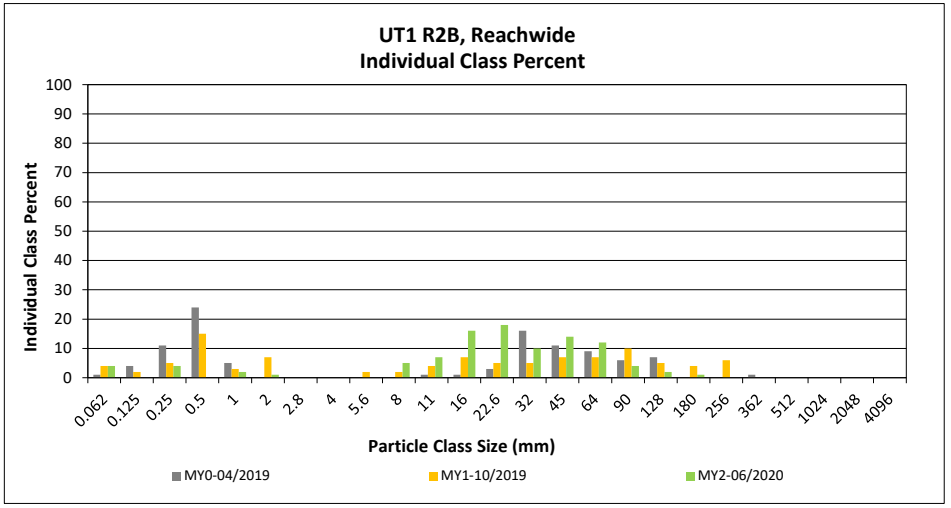
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT1 R2B, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 2 | 2 | 4 | 4 | 4 |
| *SAND* | Very fine | 0.062 | 0.125 | | | | | 4 |
| | Fine | 0.125 | 0.250 | 1 | 3 | 4 | 4 | 8 |
| | Medium | 0.25 | 0.50 | | | | | 8 |
| | Coarse | 0.5 | 1.0 | 2 | | 2 | 2 | 10 |
| | Very Coarse | 1.0 | 2.0 | | 1 | 1 | 1 | 11 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 11 |
| | Very Fine | 2.8 | 4.0 | | | | | 11 |
| | Fine | 4.0 | 5.6 | | | | | 11 |
| | Fine | 5.6 | 8.0 | 2 | 3 | 5 | 5 | 16 |
| | Medium | 8.0 | 11.0 | 1 | 6 | 7 | 7 | 23 |
| | Medium | 11.0 | 16.0 | 6 | 10 | 16 | 16 | 39 |
| | Coarse | 16.0 | 22.6 | 7 | 11 | 18 | 18 | 57 |
| | Coarse | 22.6 | 32 | 3 | 7 | 10 | 10 | 67 |
| | Very Coarse | 32 | 45 | 10 | 4 | 14 | 14 | 81 |
| | Very Coarse | 45 | 64 | 10 | 2 | 12 | 12 | 93 |
| *COBBLE* | Small | 64 | 90 | 4 | | 4 | 4 | 97 |
| | Small | 90 | 128 | 1 | 1 | 2 | 2 | 99 |
| | Large | 128 | 180 | 1 | | 1 | 1 | 100 |
| | Large | 180 | 256 | | | | | 100 |
| *BOULDER* | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | 8.0 |
| $D_{35}$ = | 14.6 |
| $D_{50}$ = | 19.8 |
| $D_{84}$ = | 49.1 |
| $D_{95}$ = | 75.9 |
| $D_{100}$ = | 180.0 |



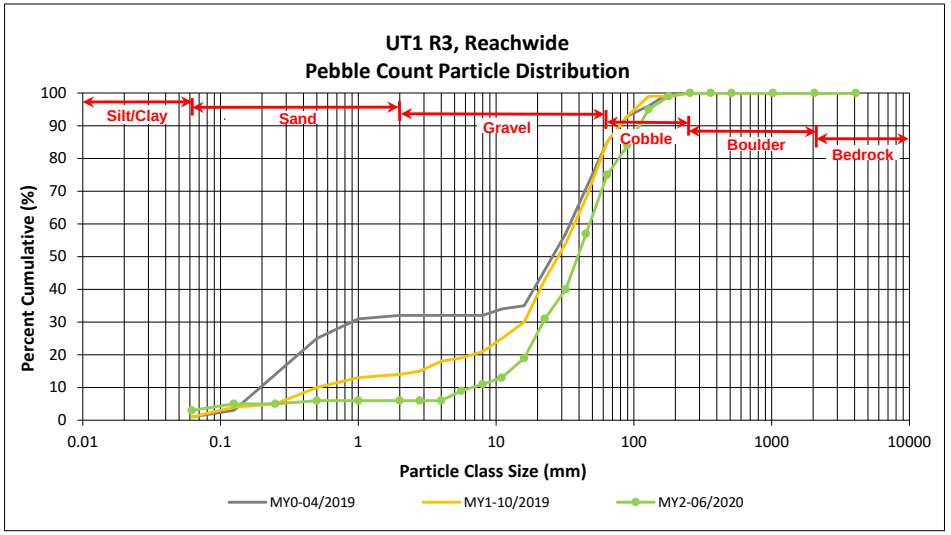
## Reachwide Pebble Count Plots

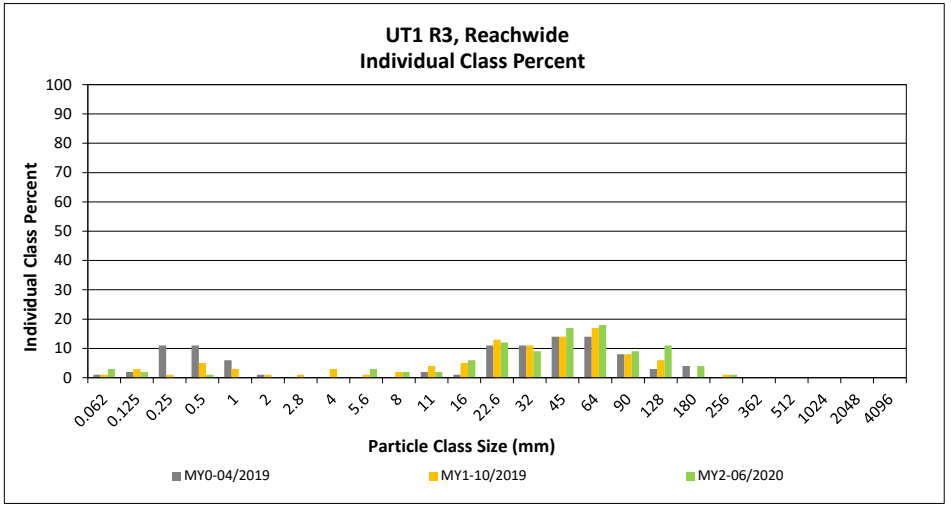
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT1 R3, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 1 | 2 | 3 | 3 | 3 |
| *SAND* | Very fine | 0.062 | 0.125 | | 2 | 2 | 2 | 5 |
| | Fine | 0.125 | 0.250 | | | | | 5 |
| | Medium | 0.25 | 0.50 | | 1 | 1 | 1 | 6 |
| | Coarse | 0.5 | 1.0 | | | | | 6 |
| | Very Coarse | 1.0 | 2.0 | | | | | 6 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 6 |
| | Very Fine | 2.8 | 4.0 | | | | | 6 |
| | Fine | 4.0 | 5.6 | | 3 | 3 | 3 | 9 |
| | Fine | 5.6 | 8.0 | 1 | 1 | 2 | 2 | 11 |
| | Medium | 8.0 | 11.0 | | 2 | 2 | 2 | 13 |
| | Medium | 11.0 | 16.0 | 2 | 4 | 6 | 6 | 19 |
| | Coarse | 16.0 | 22.6 | 3 | 9 | 12 | 12 | 31 |
| | Coarse | 22.6 | 32 | 4 | 5 | 9 | 9 | 40 |
| | Very Coarse | 32 | 45 | 8 | 9 | 17 | 17 | 57 |
| | Very Coarse | 45 | 64 | 12 | 6 | 18 | 18 | 75 |
| *COBBLE* | Small | 64 | 90 | 7 | 2 | 9 | 9 | 84 |
| | Small | 90 | 128 | 8 | 3 | 11 | 11 | 95 |
| | Large | 128 | 180 | 3 | 1 | 4 | 4 | 99 |
| | Large | 180 | 256 | 1 | | 1 | 1 | 100 |
| *BOULDER* | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | 13.3 |
| $D_{35}$ = | 26.4 |
| $D_{50}$ = | 39.1 |
| $D_{84}$ = | 90.0 |
| $D_{95}$ = | 128.0 |
| $D_{100}$ = | 256.0 |



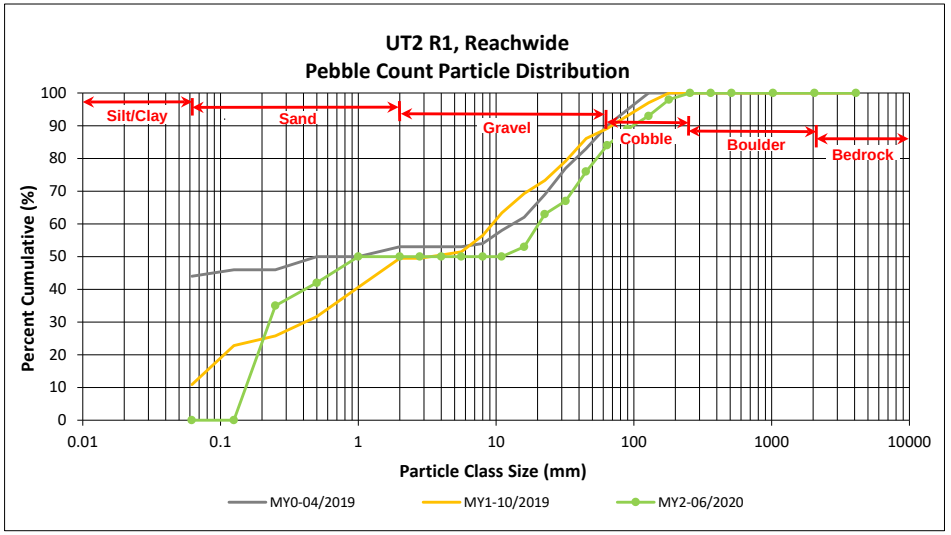
## Reachwide Pebble Count Plots

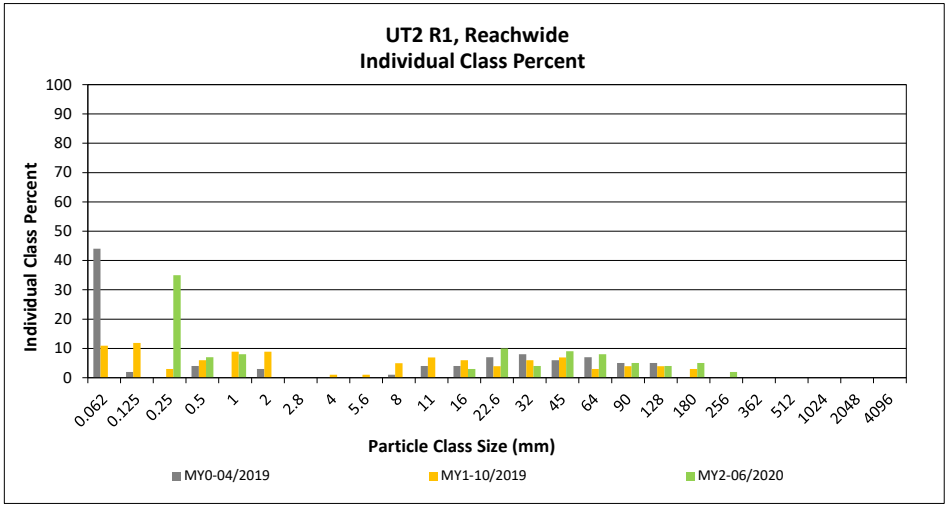
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT2 R1, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | | | | | 0 |
| *SAND* | Very fine | 0.062 | 0.125 | | | | | 0 |
| | Fine | 0.125 | 0.250 | | 35 | 35 | 35 | 35 |
| | Medium | 0.25 | 0.50 | | 7 | 7 | 7 | 42 |
| | Coarse | 0.5 | 1.0 | | 8 | 8 | 8 | 50 |
| | Very Coarse | 1.0 | 2.0 | | | | | 50 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 50 |
| | Very Fine | 2.8 | 4.0 | | | | | 50 |
| | Fine | 4.0 | 5.6 | | | | | 50 |
| | Fine | 5.6 | 8.0 | | | | | 50 |
| | Medium | 8.0 | 11.0 | | | | | 50 |
| | Medium | 11.0 | 16.0 | 3 | | 3 | 3 | 53 |
| | Coarse | 16.0 | 22.6 | 10 | | 10 | 10 | 63 |
| | Coarse | 22.6 | 32 | 4 | | 4 | 4 | 67 |
| | Very Coarse | 32 | 45 | 9 | | 9 | 9 | 76 |
| | Very Coarse | 45 | 64 | 8 | | 8 | 8 | 84 |
| *COBBLE* | Small | 64 | 90 | 5 | | 5 | 5 | 89 |
| | Small | 90 | 128 | 4 | | 4 | 4 | 93 |
| | Large | 128 | 180 | 5 | | 5 | 5 | 98 |
| | Large | 180 | 256 | 2 | | 2 | 2 | 100 |
| *BOULDER* | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | 0.2 |
| $D_{35}$ = | 0.3 |
| $D_{50}$ = | 1.0 |
| $D_{84}$ = | 64.0 |
| $D_{95}$ = | 146.7 |
| $D_{100}$ = | 256.0 |



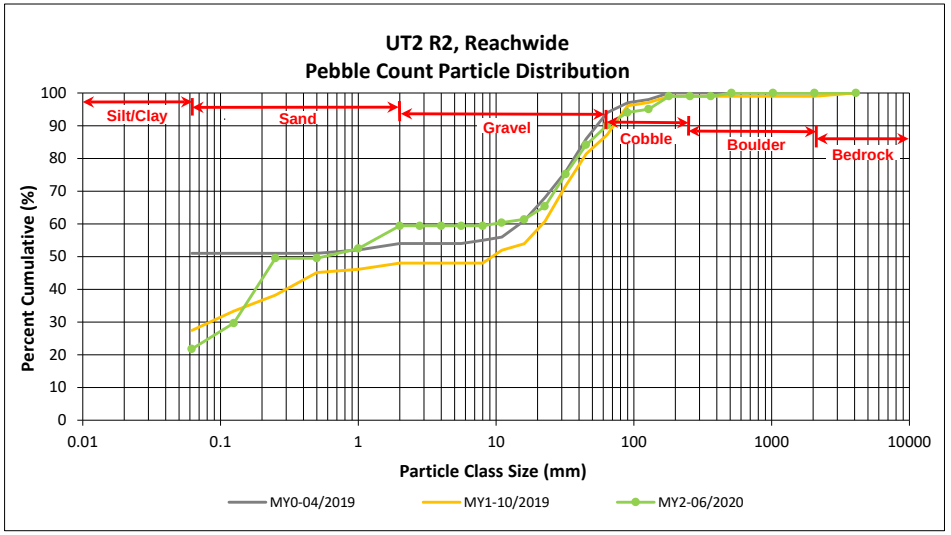
## Reachwide Pebble Count Plots

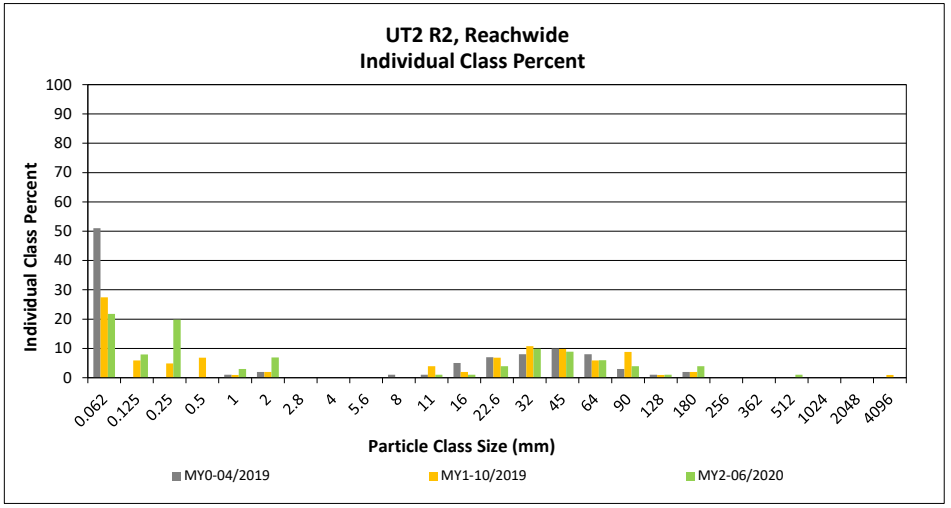
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT2 R2, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | | 22 | 22 | 22 | 22 |
| *SAND* | Very fine | 0.062 | 0.125 | | 8 | 8 | 8 | 30 |
| | Fine | 0.125 | 0.250 | | 20 | 20 | 20 | 50 |
| | Medium | 0.25 | 0.50 | | | | | 50 |
| | Coarse | 0.5 | 1.0 | 3 | | 3 | 3 | 52 |
| | Very Coarse | 1.0 | 2.0 | 7 | | 7 | 7 | 59 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 59 |
| | Very Fine | 2.8 | 4.0 | | | | | 59 |
| | Fine | 4.0 | 5.6 | | | | | 59 |
| | Fine | 5.6 | 8.0 | | | | | 59 |
| | Medium | 8.0 | 11.0 | 1 | | 1 | 1 | 60 |
| | Medium | 11.0 | 16.0 | 1 | | 1 | 1 | 61 |
| | Coarse | 16.0 | 22.6 | 4 | | 4 | 4 | 65 |
| | Coarse | 22.6 | 32 | 10 | | 10 | 10 | 75 |
| | Very Coarse | 32 | 45 | 9 | | 9 | 9 | 84 |
| | Very Coarse | 45 | 64 | 6 | | 6 | 6 | 90 |
| *COBBLE* | Small | 64 | 90 | 4 | | 4 | 4 | 94 |
| | Small | 90 | 128 | 1 | | 1 | 1 | 95 |
| | Large | 128 | 180 | 4 | | 4 | 4 | 99 |
| | Large | 180 | 256 | | | | | 99 |
| *BOULDER* | Small | 256 | 362 | | | | | 99 |
| | Small | 362 | 512 | 1 | | 1 | 1 | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **51** | **50** | **101** | **100** | **100** |

| Reachwide | |
|---|---|
| **Channel materials (mm)** | |
| $D_{16}$ = | Silt/Clay |
| $D_{35}$ = | 0.2 |
| $D_{50}$ = | 0.6 |
| $D_{84}$ = | 44.7 |
| $D_{95}$ = | 125.8 |
| $D_{100}$ = | 512.0 |



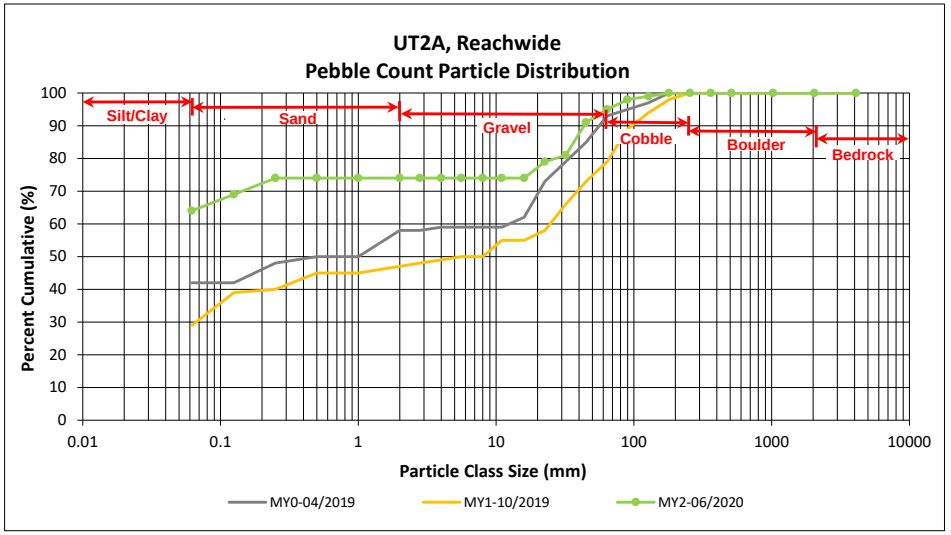
## Reachwide Pebble Count Plots

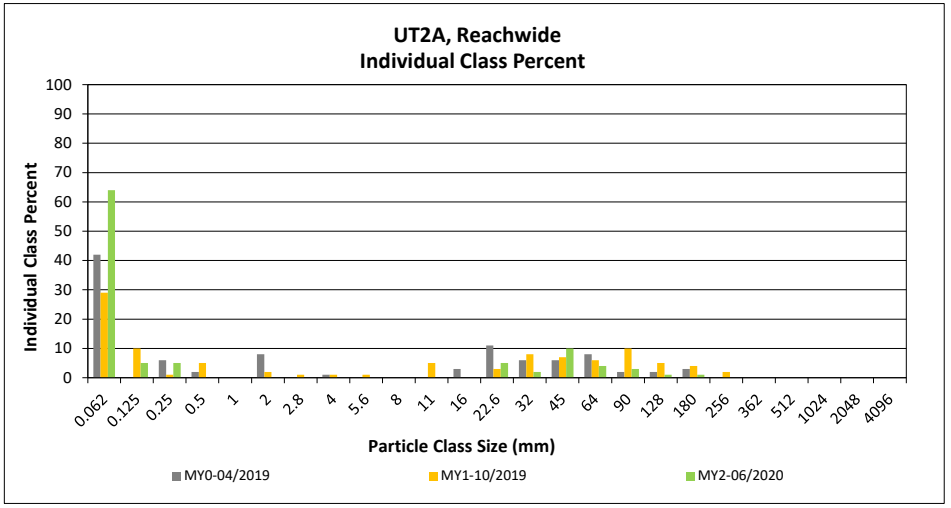
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT2A, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 24 | 40 | 64 | 64 | 64 |
| *SAND* | Very fine | 0.062 | 0.125 | | 5 | 5 | 5 | 69 |
| | Fine | 0.125 | 0.250 | | 5 | 5 | 5 | 74 |
| | Medium | 0.25 | 0.50 | | | | | 74 |
| | Coarse | 0.5 | 1.0 | | | | | 74 |
| | Very Coarse | 1.0 | 2.0 | | | | | 74 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 74 |
| | Very Fine | 2.8 | 4.0 | | | | | 74 |
| | Fine | 4.0 | 5.6 | | | | | 74 |
| | Fine | 5.6 | 8.0 | | | | | 74 |
| | Medium | 8.0 | 11.0 | | | | | 74 |
| | Medium | 11.0 | 16.0 | | | | | 74 |
| | Coarse | 16.0 | 22.6 | 5 | | 5 | 5 | 79 |
| | Coarse | 22.6 | 32 | 2 | | 2 | 2 | 81 |
| | Very Coarse | 32 | 45 | 10 | | 10 | 10 | 91 |
| | Very Coarse | 45 | 64 | 4 | | 4 | 4 | 95 |
| *COBBLE* | Small | 64 | 90 | 3 | | 3 | 3 | 98 |
| | Small | 90 | 128 | 1 | | 1 | 1 | 99 |
| | Large | 128 | 180 | 1 | | 1 | 1 | 100 |
| | Large | 180 | 256 | | | | | 100 |
| *BOULDER* | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| **Channel materials (mm)** | |
| $D_{16}$ = | Silt/Clay |
| $D_{35}$ = | Silt/Clay |
| $D_{50}$ = | Silt/Clay |
| $D_{84}$ = | 35.4 |
| $D_{95}$ = | 64.0 |
| $D_{100}$ = | 180.0 |



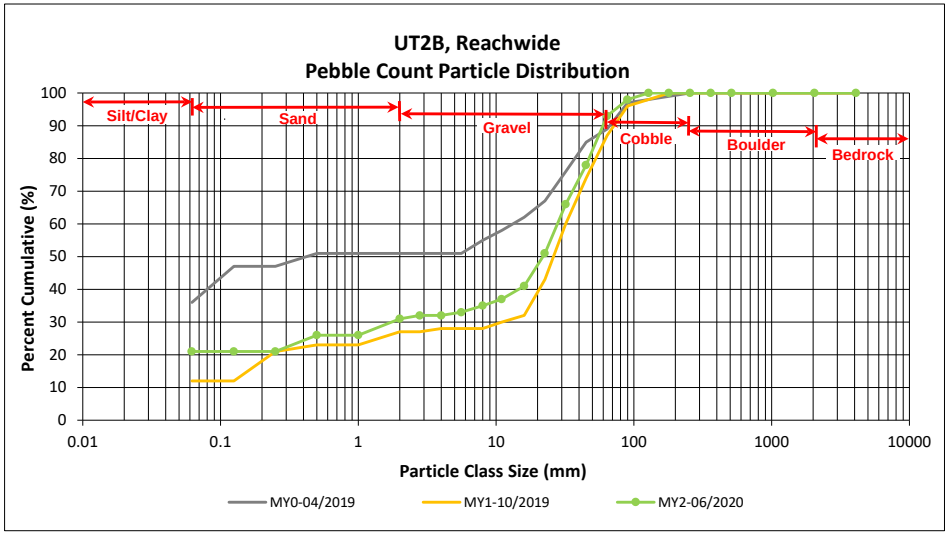
## Reachwide Pebble Count Plots

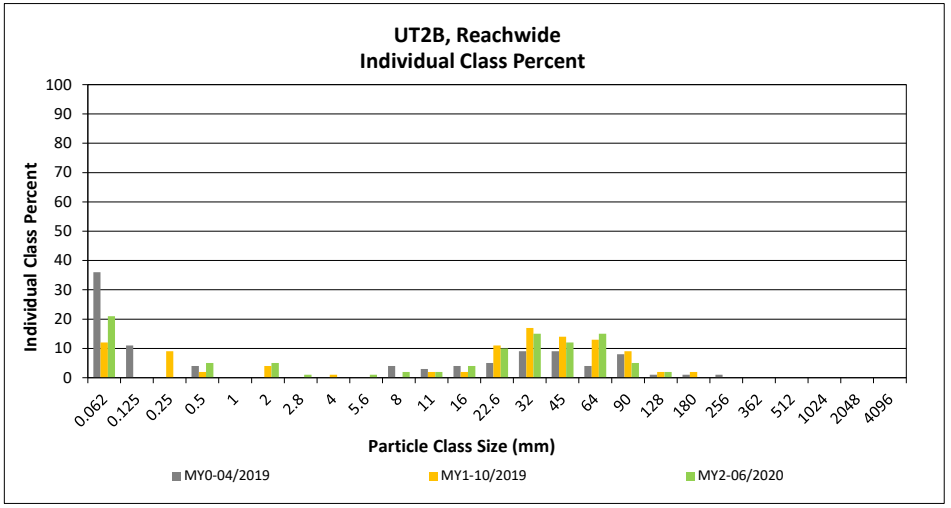
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT2B, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| SILT/CLAY | Silt/Clay | 0.000 | 0.062 | | 21 | 21 | 21 | 21 |
| SAND | Very fine | 0.062 | 0.125 | | | | | 21 |
| | Fine | 0.125 | 0.250 | | | | | 21 |
| | Medium | 0.25 | 0.50 | | 5 | 5 | 5 | 26 |
| | Coarse | 0.5 | 1.0 | | | | | 26 |
| | Very Coarse | 1.0 | 2.0 | | 5 | 5 | 5 | 31 |
| GRAVEL | Very Fine | 2.0 | 2.8 | 1 | | 1 | 1 | 32 |
| | Very Fine | 2.8 | 4.0 | | | | | 32 |
| | Fine | 4.0 | 5.6 | | 1 | 1 | 1 | 33 |
| | Fine | 5.6 | 8.0 | | 2 | 2 | 2 | 35 |
| | Medium | 8.0 | 11.0 | | 2 | 2 | 2 | 37 |
| | Medium | 11.0 | 16.0 | 4 | | 4 | 4 | 41 |
| | Coarse | 16.0 | 22.6 | 4 | 6 | 10 | 10 | 51 |
| | Coarse | 22.6 | 32 | 11 | 4 | 15 | 15 | 66 |
| | Very Coarse | 32 | 45 | 10 | 2 | 12 | 12 | 78 |
| | Very Coarse | 45 | 64 | 13 | 2 | 15 | 15 | 93 |
| COBBLE | Small | 64 | 90 | 5 | | 5 | 5 | 98 |
| | Small | 90 | 128 | 2 | | 2 | 2 | 100 |
| | Large | 128 | 180 | | | | | 100 |
| | Large | 180 | 256 | | | | | 100 |
| BOULDER | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| BEDROCK | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | Total | 50 | 50 | 100 | 100 | 100 |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | Silt/Clay |
| $D_{35}$ = | 8.0 |
| $D_{50}$ = | 21.8 |
| $D_{84}$ = | 51.8 |
| $D_{95}$ = | 73.4 |
| $D_{100}$ = | 128.0 |



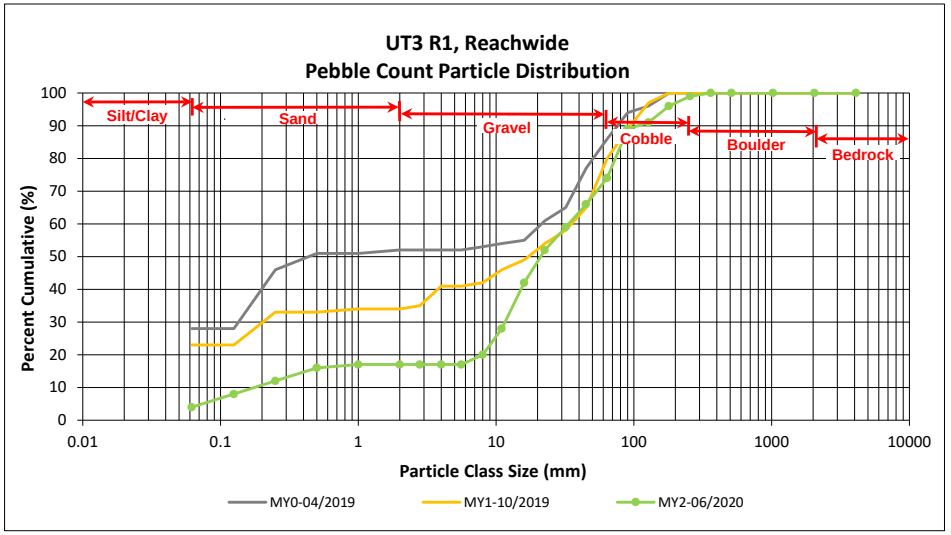
## Reachwide Pebble Count Plots

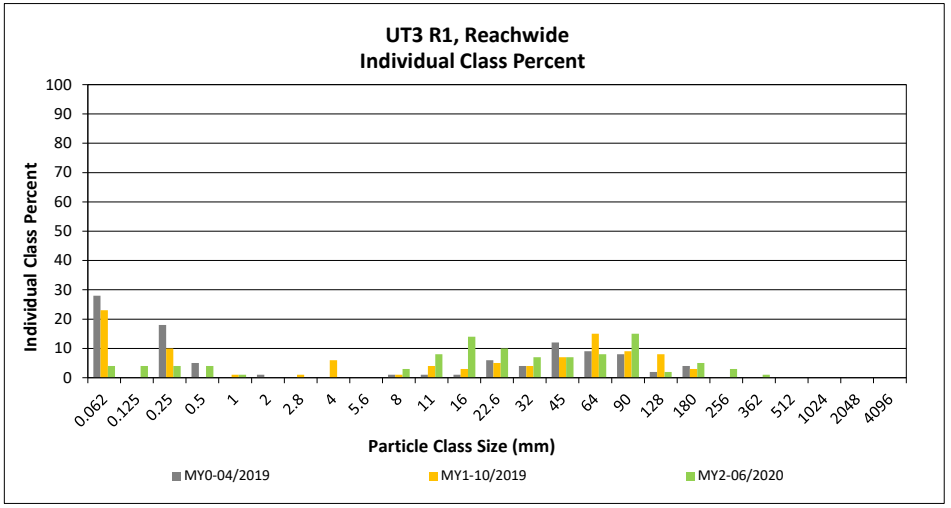
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT3 R1, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | | 4 | 4 | 4 | 4 |
| *SAND* | Very fine | 0.062 | 0.125 | | 4 | 4 | 4 | 8 |
| | Fine | 0.125 | 0.250 | | 4 | 4 | 4 | 12 |
| | Medium | 0.25 | 0.50 | | 4 | 4 | 4 | 16 |
| | Coarse | 0.5 | 1.0 | | 1 | 1 | 1 | 17 |
| | Very Coarse | 1.0 | 2.0 | | | | | 17 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 17 |
| | Very Fine | 2.8 | 4.0 | | | | | 17 |
| | Fine | 4.0 | 5.6 | | | | | 17 |
| | Fine | 5.6 | 8.0 | 1 | 2 | 3 | 3 | 20 |
| | Medium | 8.0 | 11.0 | 1 | 7 | 8 | 8 | 28 |
| | Medium | 11.0 | 16.0 | 4 | 10 | 14 | 14 | 42 |
| | Coarse | 16.0 | 22.6 | 2 | 8 | 10 | 10 | 52 |
| | Coarse | 22.6 | 32 | 3 | 4 | 7 | 7 | 59 |
| | Very Coarse | 32 | 45 | 7 | | 7 | 7 | 66 |
| | Very Coarse | 45 | 64 | 8 | | 8 | 8 | 74 |
| *COBBLE* | Small | 64 | 90 | 14 | 1 | 15 | 15 | 89 |
| | Small | 90 | 128 | 2 | | 2 | 2 | 91 |
| | Large | 128 | 180 | 4 | 1 | 5 | 5 | 96 |
| | Large | 180 | 256 | 3 | | 3 | 3 | 99 |
| *BOULDER* | Small | 256 | 362 | 1 | | 1 | 1 | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | 0.50 |
| $D_{35}$ = | 13.3 |
| $D_{50}$ = | 21.1 |
| $D_{84}$ = | 80.3 |
| $D_{95}$ = | 168.1 |
| $D_{100}$ = | 362.0 |



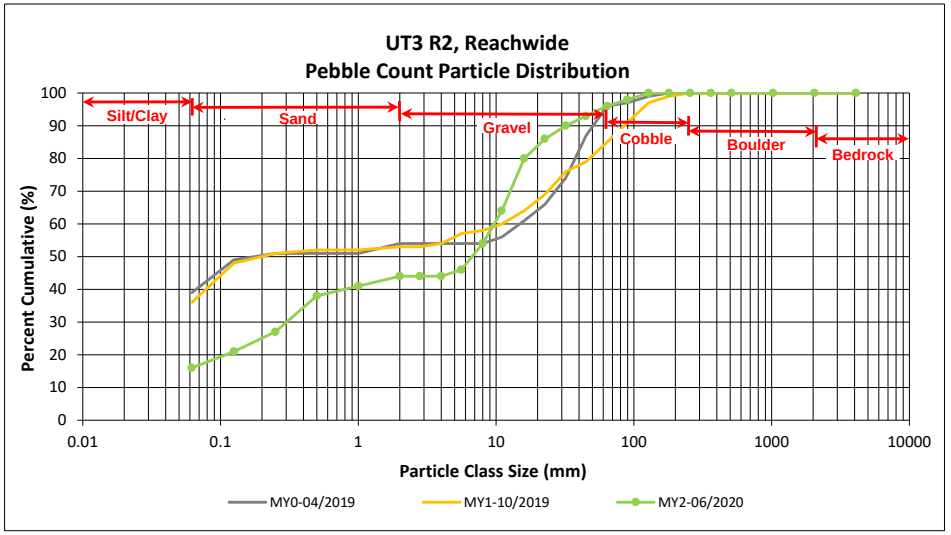
## Reachwide Pebble Count Plots

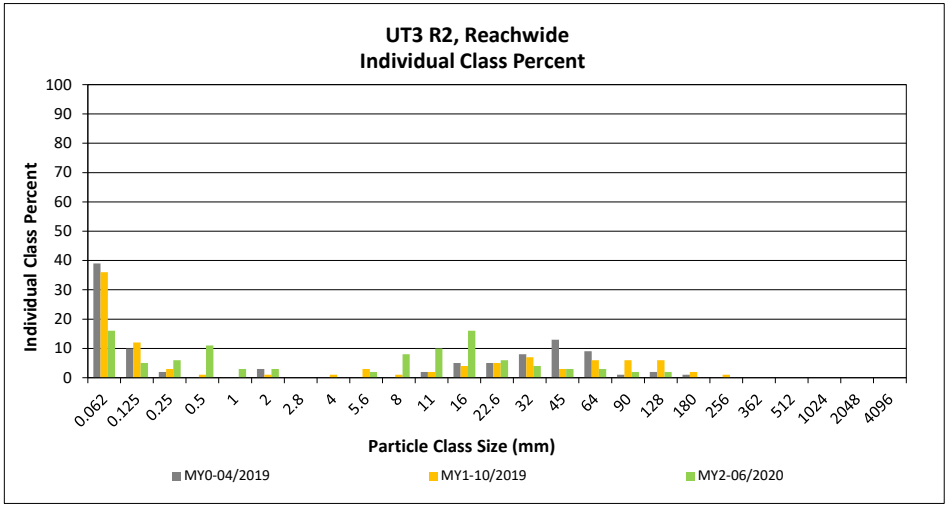
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT3 R2, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 2 | 14 | 16 | 16 | 16 |
| *SAND* | Very fine | 0.062 | 0.125 | | 5 | 5 | 5 | 21 |
| | Fine | 0.125 | 0.250 | | 6 | 6 | 6 | 27 |
| | Medium | 0.25 | 0.50 | 3 | 8 | 11 | 11 | 38 |
| | Coarse | 0.5 | 1.0 | 2 | 1 | 3 | 3 | 41 |
| | Very Coarse | 1.0 | 2.0 | 1 | 2 | 3 | 3 | 44 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 44 |
| | Very Fine | 2.8 | 4.0 | | | | | 44 |
| | Fine | 4.0 | 5.6 | 1 | 1 | 2 | 2 | 46 |
| | Fine | 5.6 | 8.0 | 4 | 4 | 8 | 8 | 54 |
| | Medium | 8.0 | 11.0 | 5 | 5 | 10 | 10 | 64 |
| | Medium | 11.0 | 16.0 | 13 | 3 | 16 | 16 | 80 |
| | Coarse | 16.0 | 22.6 | 5 | 1 | 6 | 6 | 86 |
| | Coarse | 22.6 | 32 | 4 | | 4 | 4 | 90 |
| | Very Coarse | 32 | 45 | 3 | | 3 | 3 | 93 |
| | Very Coarse | 45 | 64 | 3 | | 3 | 3 | 96 |
| *COBBLE* | Small | 64 | 90 | 2 | | 2 | 2 | 98 |
| | Small | 90 | 128 | 2 | | 2 | 2 | 100 |
| | Large | 128 | 180 | | | | | 100 |
| | Large | 180 | 256 | | | | | 100 |
| *BOULDER* | Small | 256 | 362 | | | | | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| Channel materials (mm) | |
| $D_{16}$ = | Silt/Clay |
| $D_{35}$ = | 0.41 |
| $D_{50}$ = | 6.7 |
| $D_{84}$ = | 20.1 |
| $D_{95}$ = | 56.9 |
| $D_{100}$ = | 128.0 |



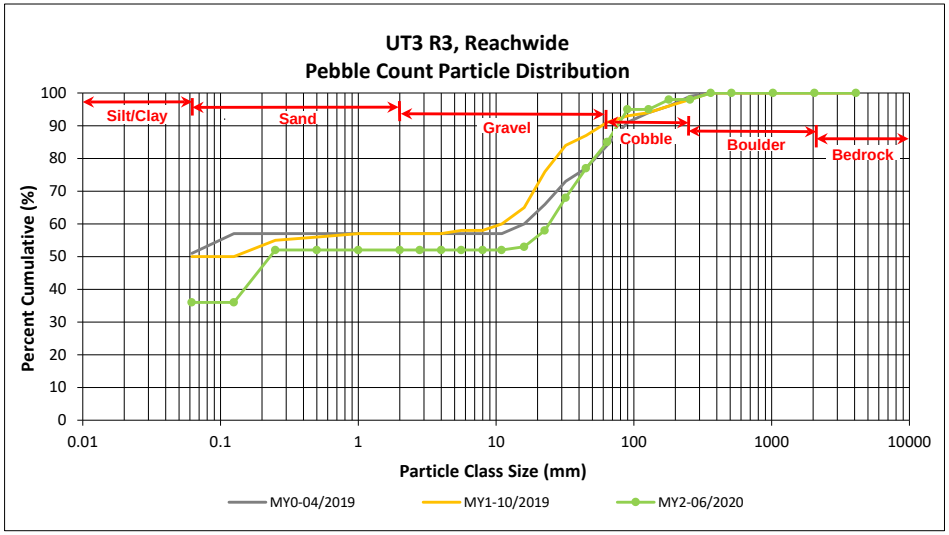
## Reachwide Pebble Count Plots

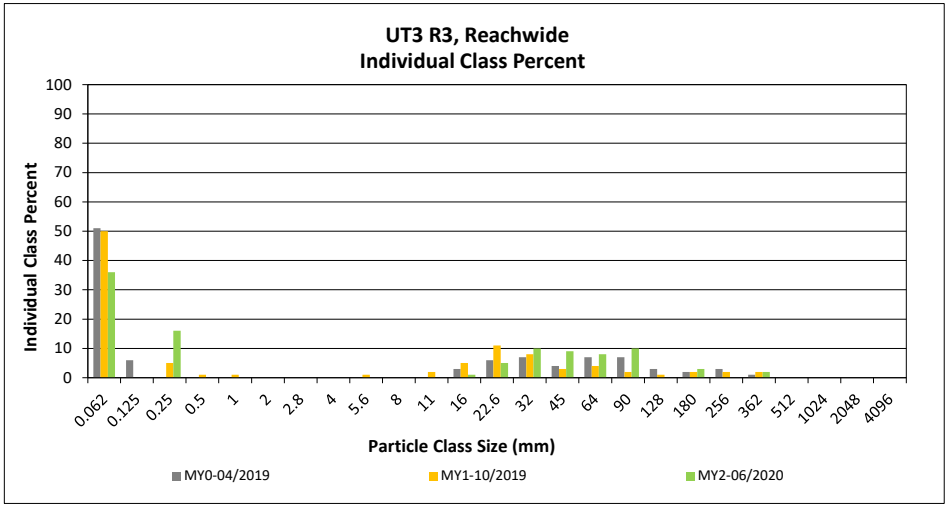
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

UT3 R3, Reachwide

| Particle Class | | Diameter (mm) | | Particle Count | | | Reach Summary | |
|---|---|---|---|---|---|---|---|---|
| | | min | max | Riffle | Pool | Total | Class Percentage | Percent Cumulative |
| *SILT/CLAY* | Silt/Clay | 0.000 | 0.062 | 2 | 34 | 36 | 36 | 36 |
| *SAND* | Very fine | 0.062 | 0.125 | | | | | 36 |
| | Fine | 0.125 | 0.250 | | 16 | 16 | 16 | 52 |
| | Medium | 0.25 | 0.50 | | | | | 52 |
| | Coarse | 0.5 | 1.0 | | | | | 52 |
| | Very Coarse | 1.0 | 2.0 | | | | | 52 |
| *GRAVEL* | Very Fine | 2.0 | 2.8 | | | | | 52 |
| | Very Fine | 2.8 | 4.0 | | | | | 52 |
| | Fine | 4.0 | 5.6 | | | | | 52 |
| | Fine | 5.6 | 8.0 | | | | | 52 |
| | Medium | 8.0 | 11.0 | | | | | 52 |
| | Medium | 11.0 | 16.0 | 1 | | 1 | 1 | 53 |
| | Coarse | 16.0 | 22.6 | 5 | | 5 | 5 | 58 |
| | Coarse | 22.6 | 32 | 10 | | 10 | 10 | 68 |
| | Very Coarse | 32 | 45 | 9 | | 9 | 9 | 77 |
| | Very Coarse | 45 | 64 | 8 | | 8 | 8 | 85 |
| *COBBLE* | Small | 64 | 90 | 10 | | 10 | 10 | 95 |
| | Small | 90 | 128 | | | | | 95 |
| | Large | 128 | 180 | 3 | | 3 | 3 | 98 |
| | Large | 180 | 256 | | | | | 98 |
| *BOULDER* | Small | 256 | 362 | 2 | | 2 | 2 | 100 |
| | Small | 362 | 512 | | | | | 100 |
| | Medium | 512 | 1024 | | | | | 100 |
| | Large/Very Large | 1024 | 2048 | | | | | 100 |
| *BEDROCK* | Bedrock | 2048 | >2048 | | | | | 100 |
| | | | **Total** | **50** | **50** | **100** | **100** | **100** |

| Reachwide | |
|---|---|
| **Channel materials (mm)** | |
| $D_{16}$ = | Silt/Clay |
| $D_{35}$ = | Silt/Clay |
| $D_{50}$ = | 0.2 |
| $D_{84}$ = | 61.2 |
| $D_{95}$ = | 90.0 |
| $D_{100}$ = | 362.0 |



# APPENDIX 5. Hydrology Summary Data and Plots

**Table 14a. Verification of Bankfull Events**
Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

| Reach | MY | Date of Occurrence | Date of Data Collection | Method |
|---|---|---|---|---|
| UT1 Reach 3 | MY2 | 2/6/2020 | 2/6/2020 | Stream Gage |
| | | 5/27/2020 | 5/27/2020 | |
| | | 8/6/2020 | 8/6/2020 | |
| UT2 Reach 2 | MY2 | 2/6/2020 | 2/6/2020 | |
| | | 5/21/2020 | 5/21/2020 | |
| | | 5/27/2020 | 5/27/2020 | |
| | | 7/24/2020 | 7/24/2020 | |
| | | 8/6/2020 | 8/6/2020 | |
| | | 10/11/2020 | 10/11/2020 | |
| UT2A | MY2 | 2/6/2020 | 2/6/2020 | |
| | | 5/27/2020 | 5/27/2020 | |
| | | 8/6/2020 | 8/6/2020 | |
| | | 10/11/2020 | 10/11/2020 | |
| UT2B | MY1 | 6/8/2019 | 6/8/2019 | |
| | MY2 | 2/6/2020 | 2/6/2020 | |
| | | 5/27/2020 | 5/27/2020 | |
| UT3 Reach 3 | MY1 | 6/8/2019 - 6/9/2019 | 6/8/2019 - 6/9/2019 | |
| | | 6/23/2019 | 6/23/2019 | |
| | MY2 | 1/11/2020 | 1/11/2020 | |
| | | 1/24/2020 | 1/24/2020 | |
| | | 2/6/2020 - 2/13/2020[1] | 2/6/2020 - 2/13/2020 | |
| | | 4/13/2020 | 4/13/2020 | |
| | | 4/30/2020 | 4/30/2020 | |
| | | 5/22/2020 | 5/22/2020 | |
| | | 5/27/2020 | 5/27/2020 | |
| | | 7/24/2020 | 7/24/2020 | |
| | | 8/6/2020 | 8/6/2020 | |
| | | 8/13/2020 - 8/15/2020[1] | 8/13/2020 - 8/15/2020 | |
| | | 8/21/2020 | 8/21/2020 | |
| | | 9/17/2020 | 9/17/2020 | |
| | | 9/25/2020 | 9/25/2020 | |
| | | 10/11/2020 | 10/11/2020 | |
| | | 10/29/2020 | 10/29/2020 | |

[1] Multiple bankfull events occurred within these date ranges.

**Table 14b. Verification of Consecutive Flow Days**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

| Reach | MY | Dates of Occurrence | Maximum Consecutive Days of Stream Flow | Method |
|---|---|---|---|---|
| UT1 Reach 1 | MY1 | 3/27/2019 - 10/22/2019 | 209 days | Stream Gage |
| | MY2 | 3/8/2020 - 11/3/2020 | 241 days | |
| UT2A | MY1 | 3/25/2019 - 5/28/2019 | 64 days | |
| | MY2 | 2/22/2020 - 7/14/2020 | 143 days | |
| UT2B | MY1 | 4/5/2019 - 4/28/2019 | 23 days | |
| | MY2 | 2/5/2020 - 3/5/2020 | 29 days | |

**Table 15. Wetland Gage Attainment Summary**

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

| Summary of Groundwater Gage Results for Monitoring Years 1 through 7 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gage | Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage) | | | | | | |
| | MY1 | MY2 | MY3 | MY4 | MY5 | MY6 | MY7 |
| Reference | Yes/25 days (12.1%) | Yes/97 days (46.9%) | | | | | |
| 1 | Yes/25 days (12.1%) | Yes/46 days (22.2%) | | | | | |
| 2 | Yes/23 days (11.1%) | Yes/46 days (22.2%) | | | | | |
| 3 | Yes/24 days (11.6%) | Yes/46 days (22.2%) | | | | | |
| 4 [1] | Yes/109 days (52.7%) | N/A | | | | | |
| 5 | Yes/48 days (23.2%) | Yes/86 days (41.5%) | | | | | |
| 6 | Yes/23 days (11.1%) | Yes/26 days (12.6%) | | | | | |
| 7 | Yes/24 days (11.6%) | No/16 days (7.7%) | | | | | |
| 8 | Yes/48 days (23.2%) | Yes/46 days (22.2%) | | | | | |
| 9 | Yes/26 days (12.6%) | Yes/46 days (22.2%) | | | | | |
| 10 [1] | N/A | Yes/46 days (22.2%) | | | | | |

[1] GWG 10 was installed adjacent to GWG 4 but outside of the former ditch location at the end of October 2019. Reporting for GWG 10 begins in MY2 and GWG 4 will be omitted from future monitoring reports.

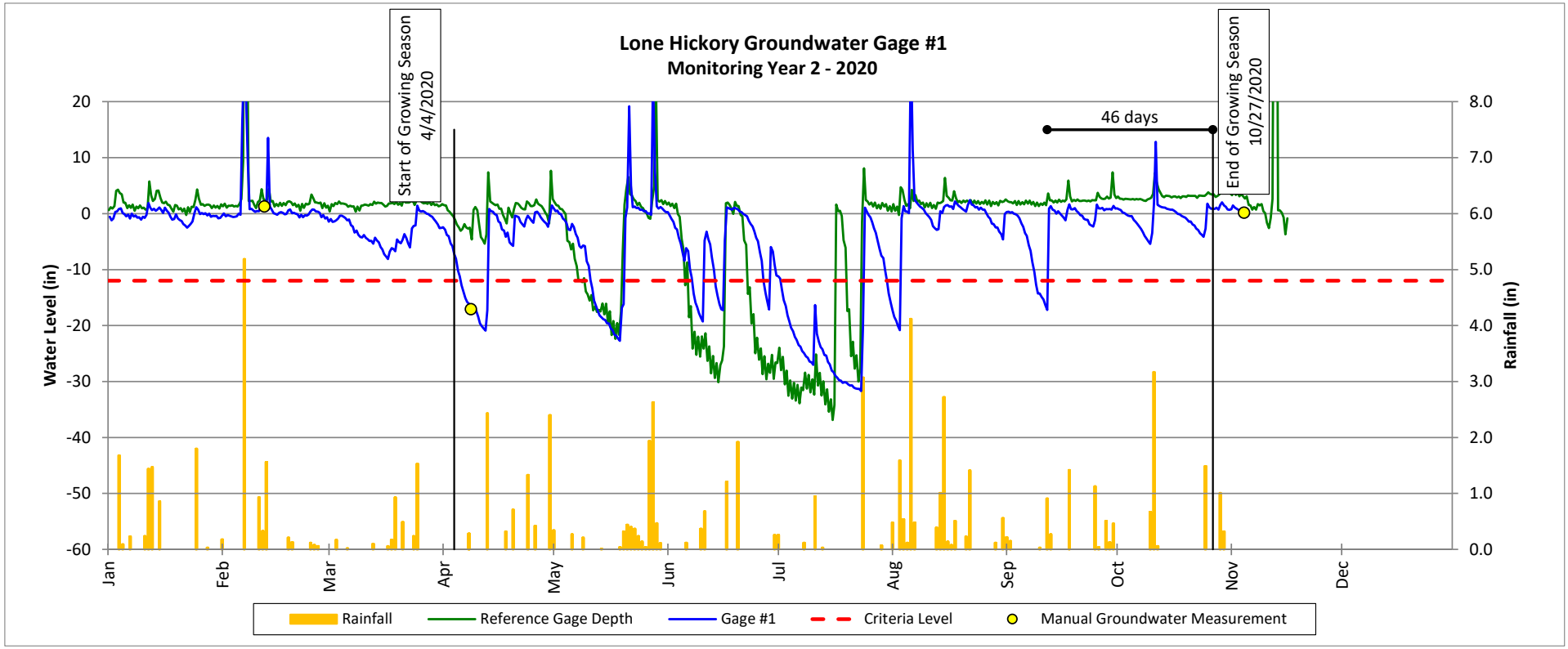
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



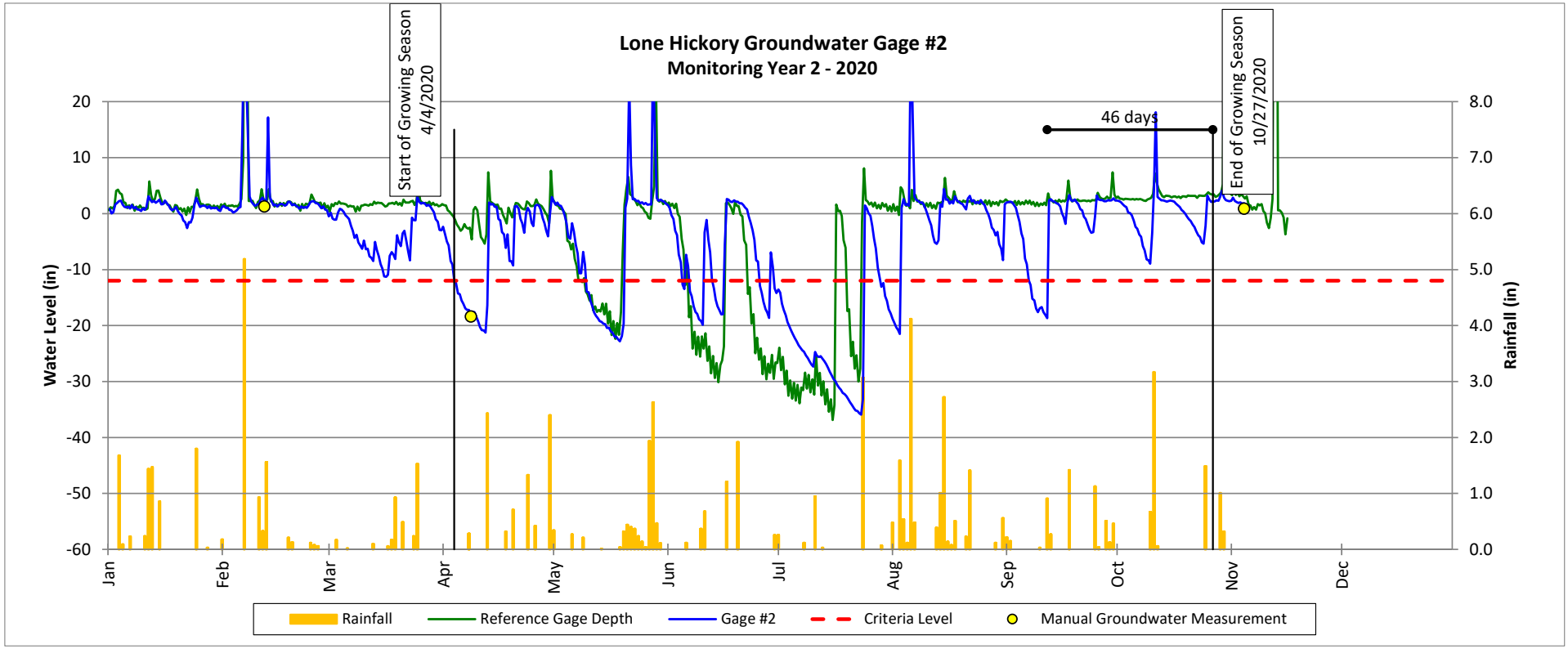
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



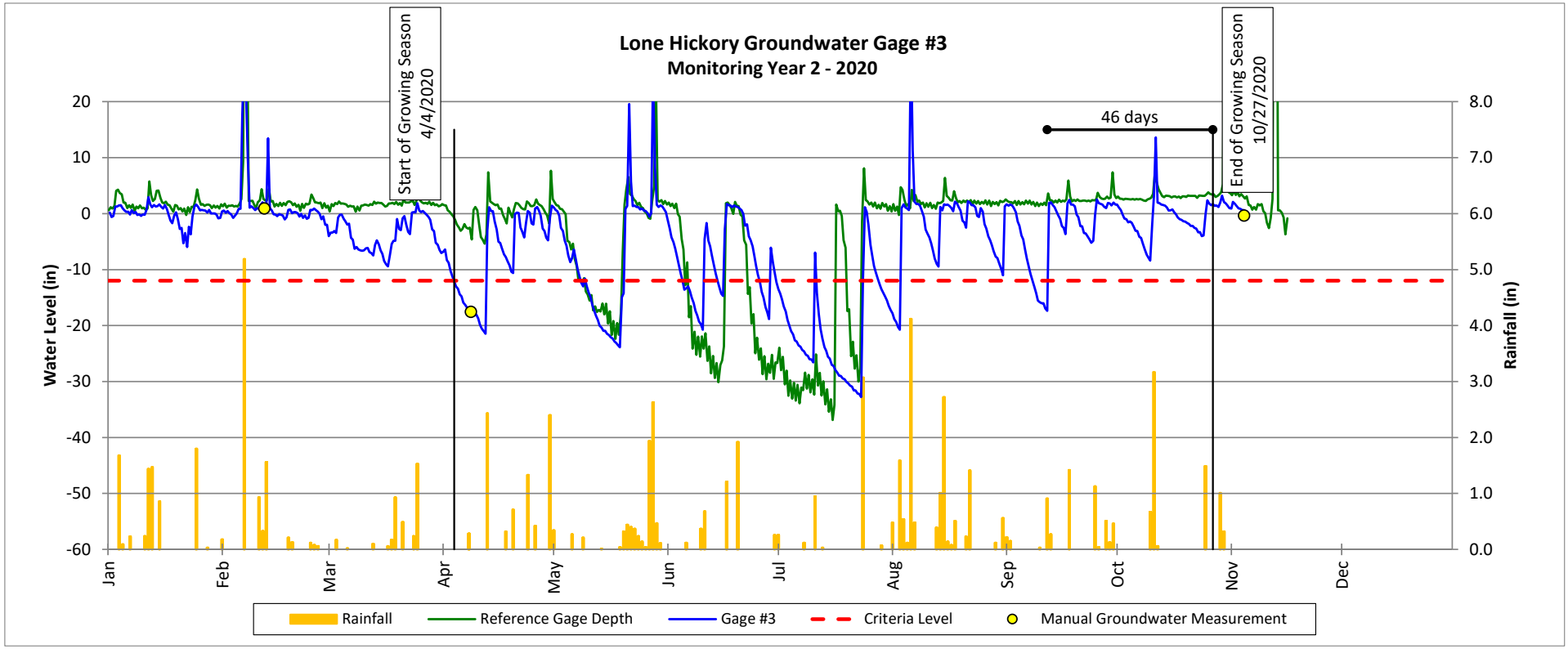
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



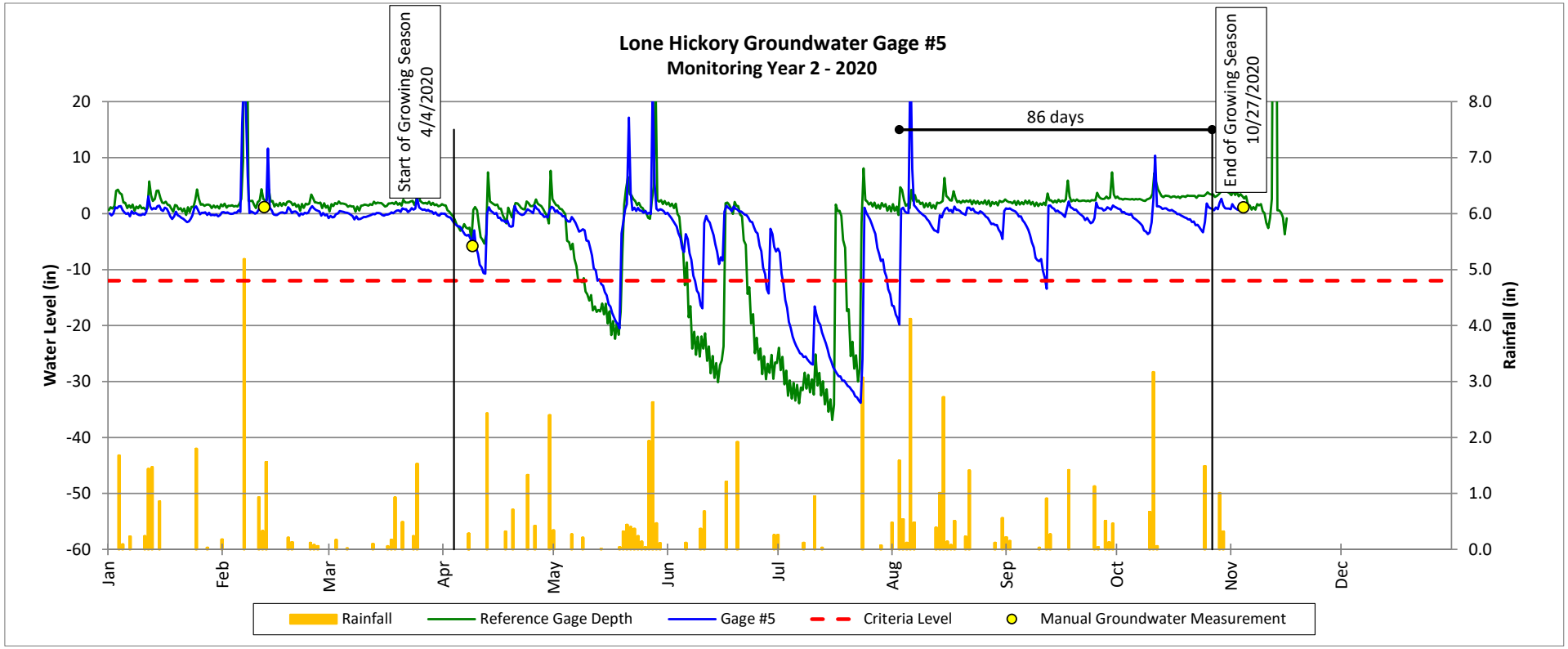
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



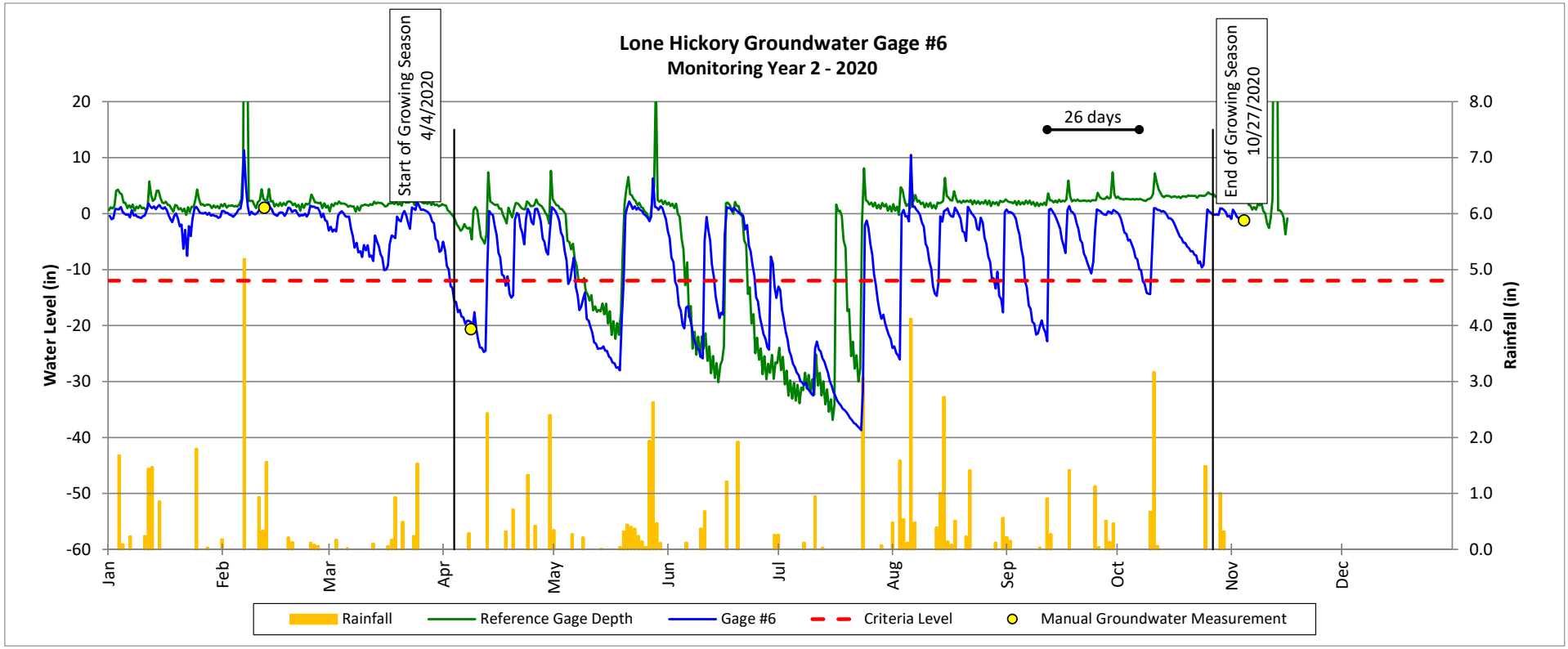
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



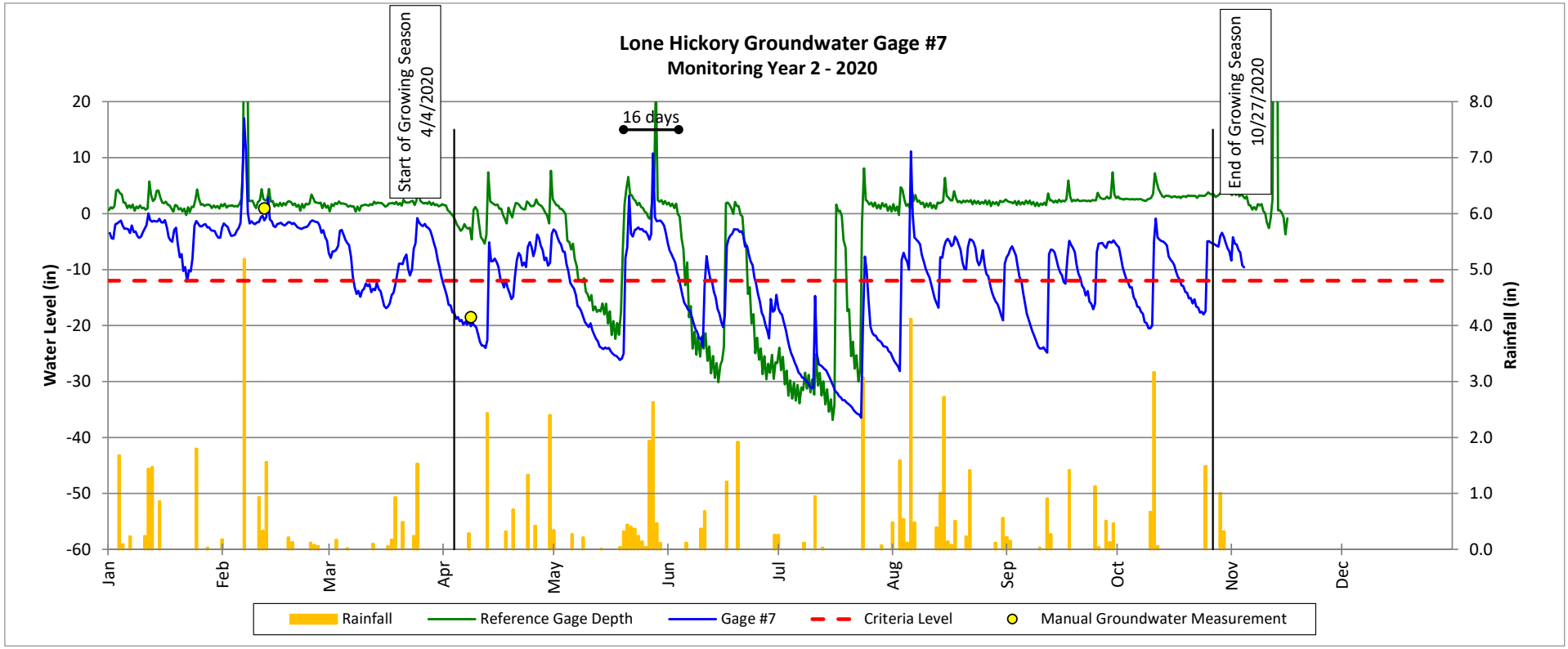
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



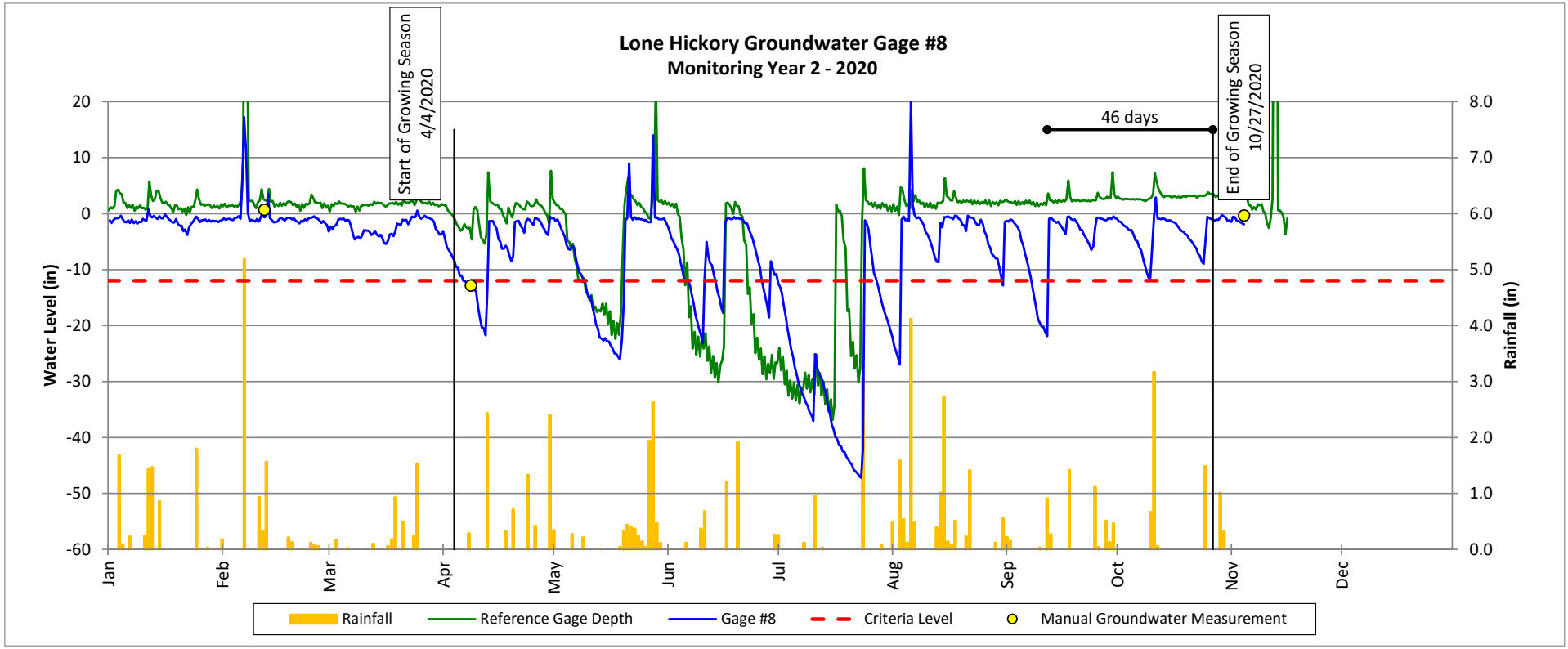
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



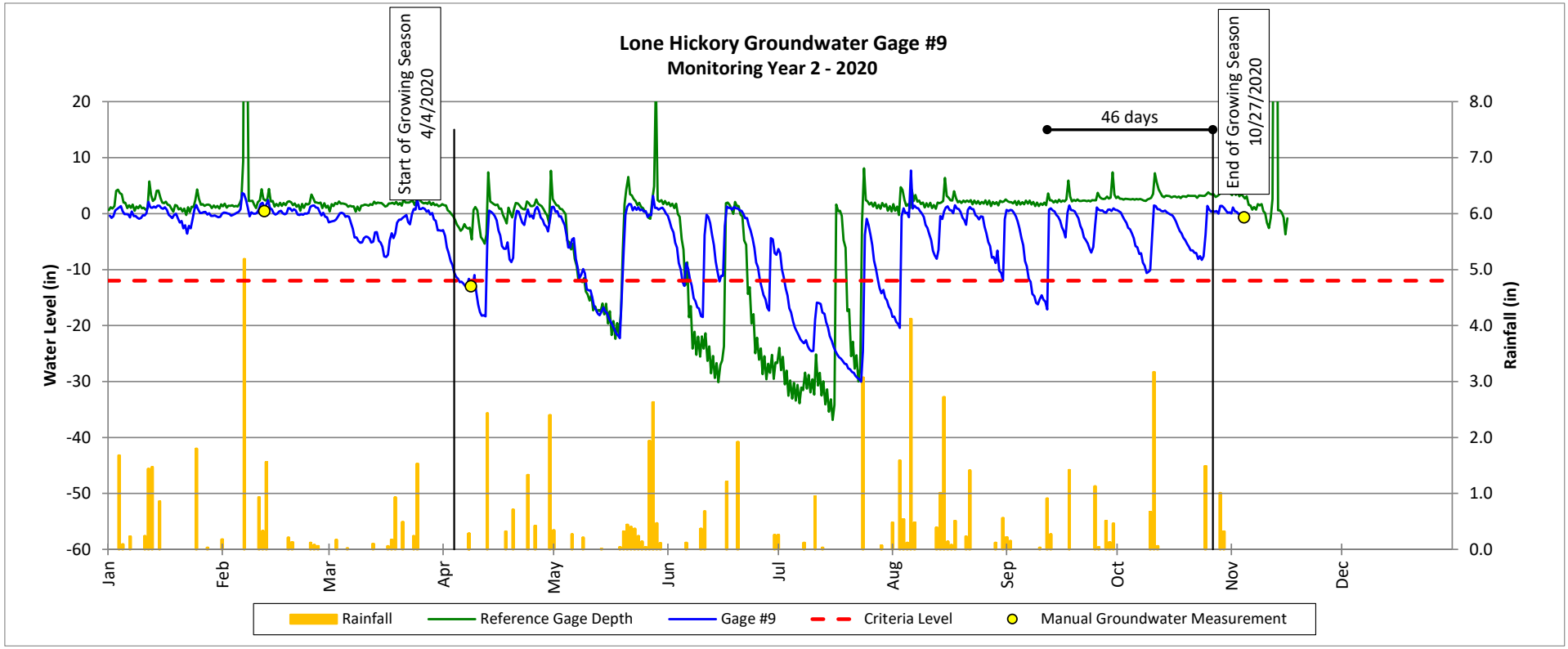
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**

Wetland Re-est



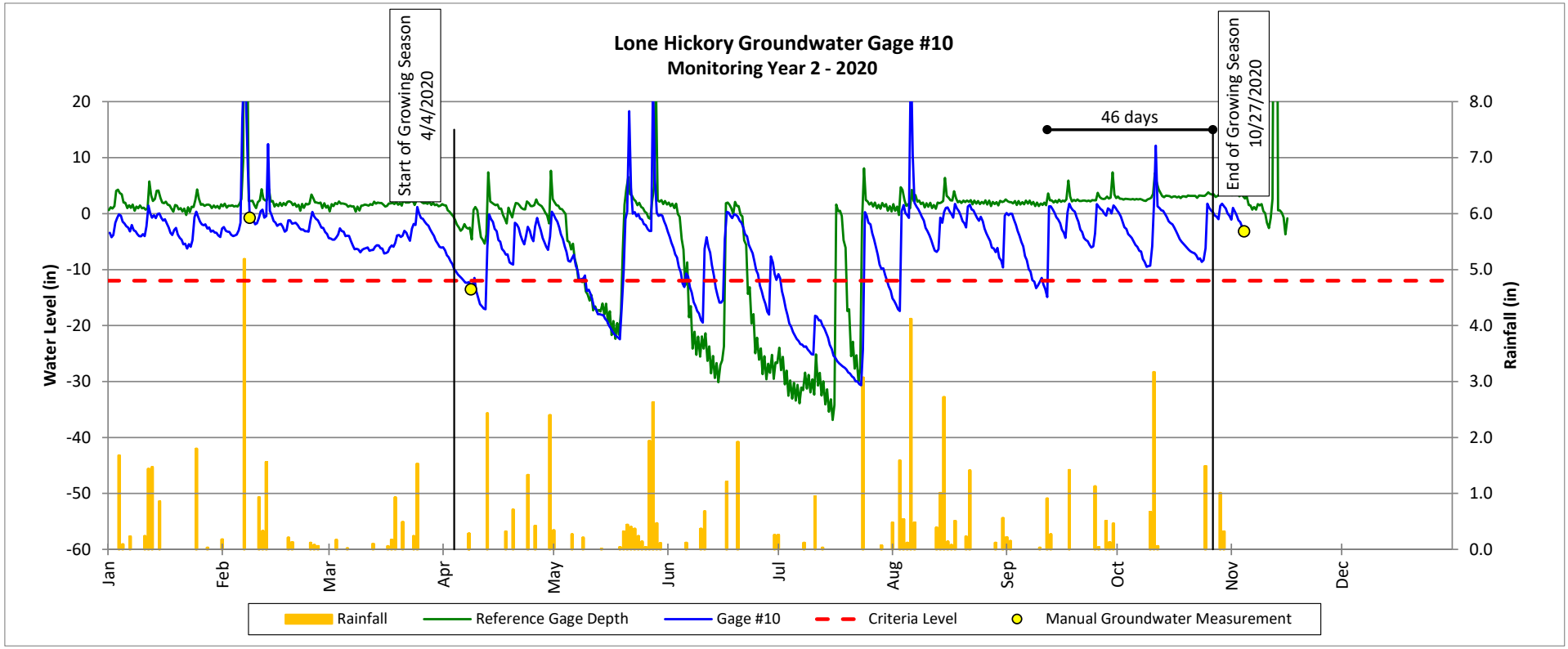
## Groundwater Gage Plots

Lone Hickory Mitigation Site

DMS Project No. 97135

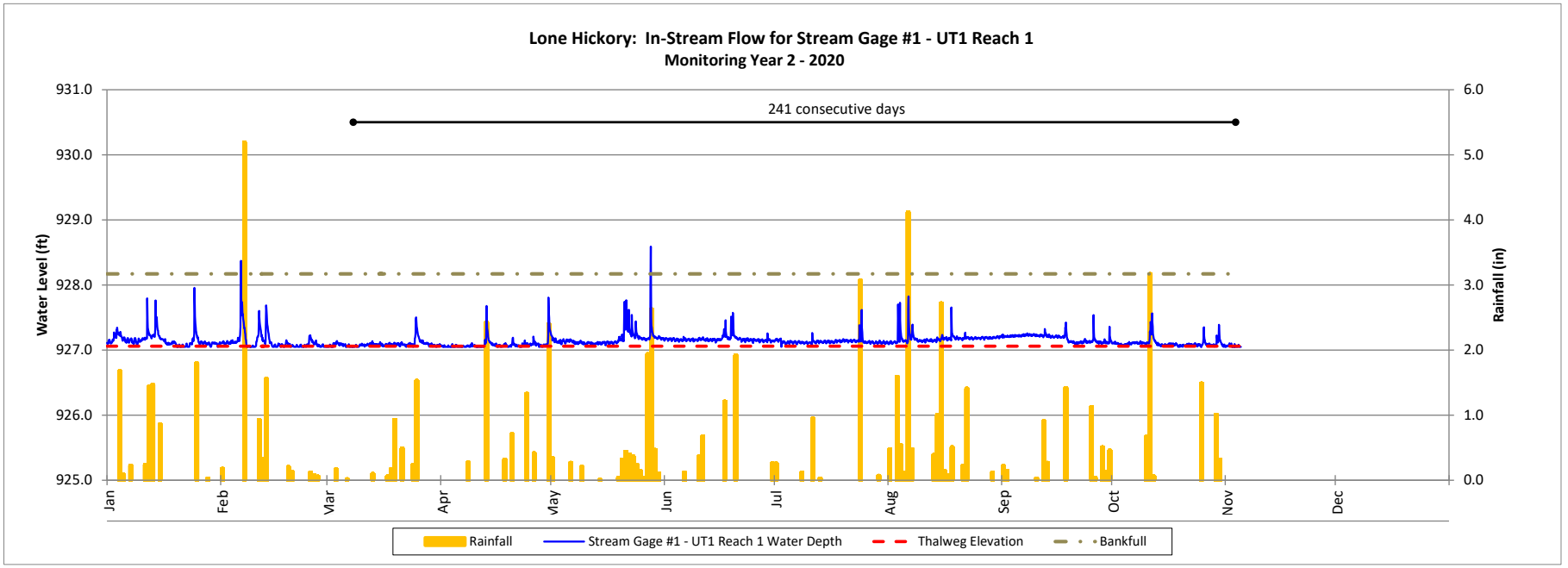
**Monitoring Year 2 - 2020**

Wetland Re-est



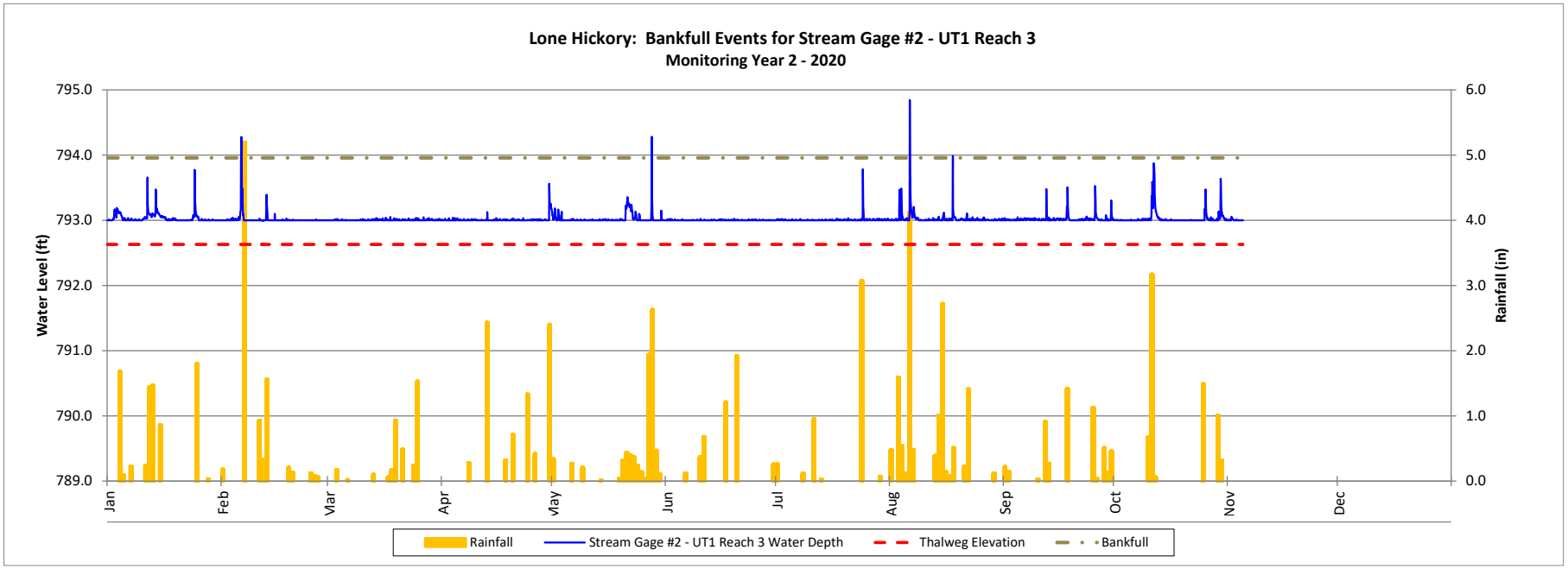
## Stream Gage Plots

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**



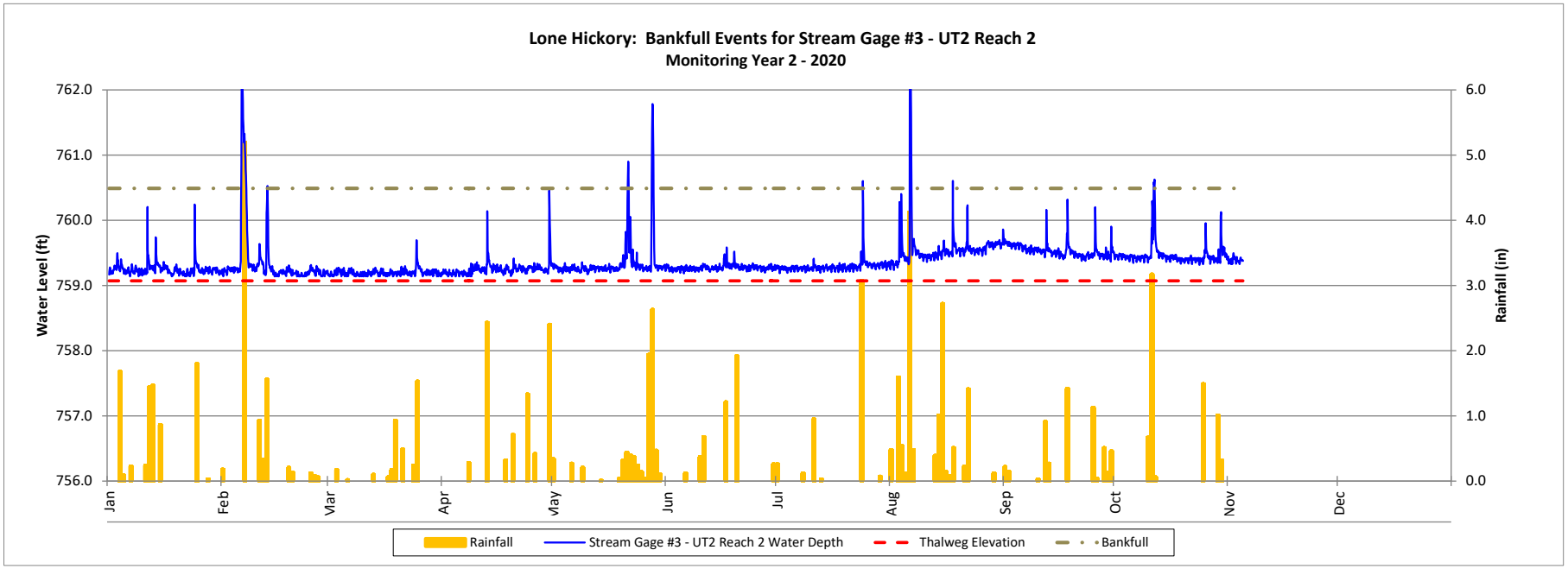
## Stream Gage Plots

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**



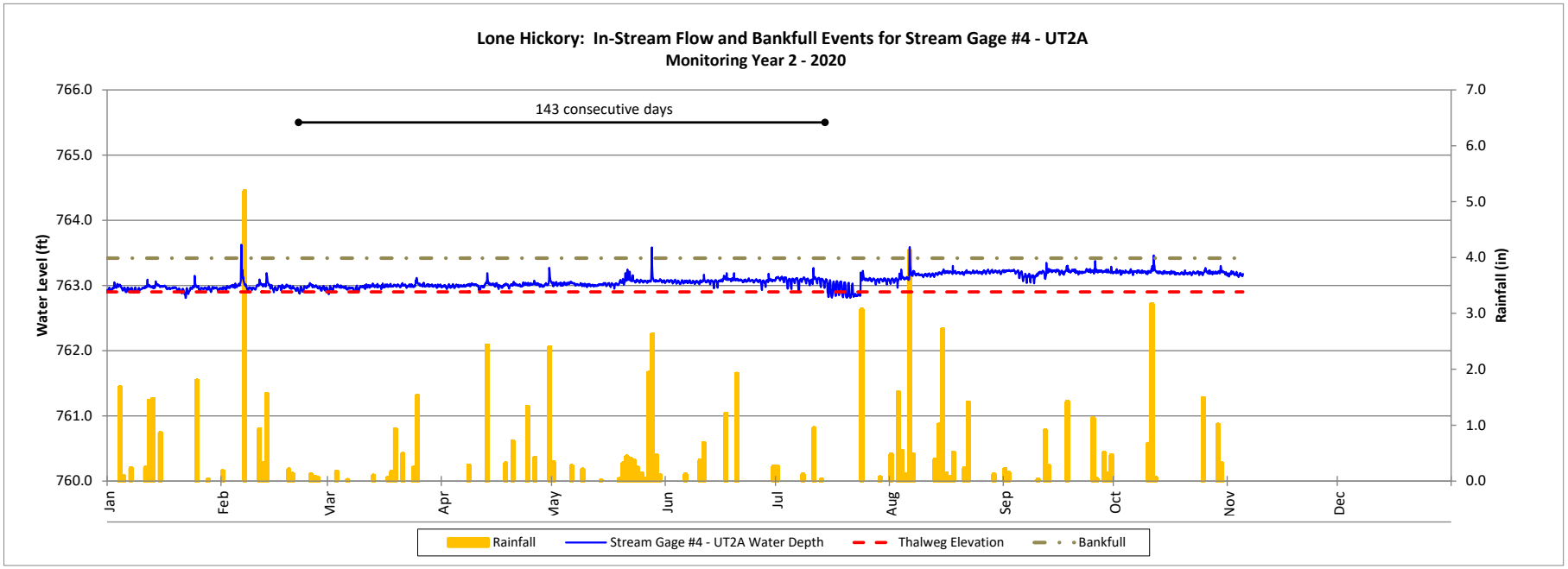
## Stream Gage Plots

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**



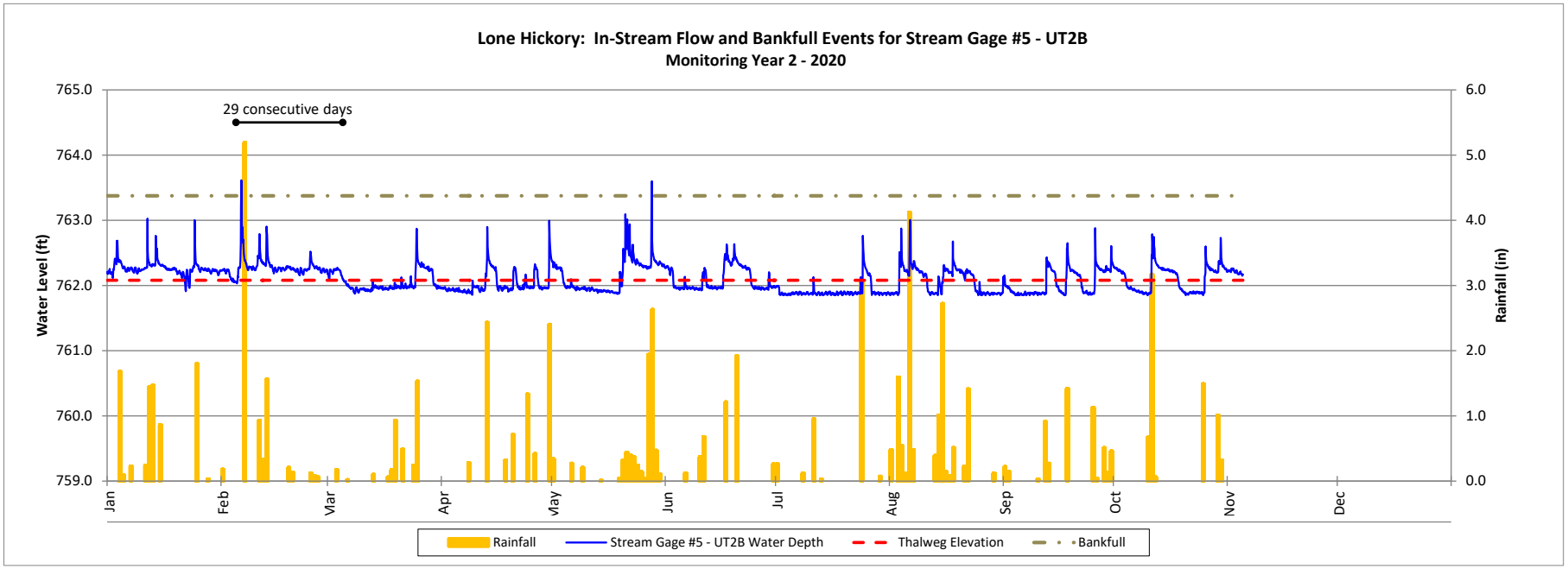
## Stream Gage Plots

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**



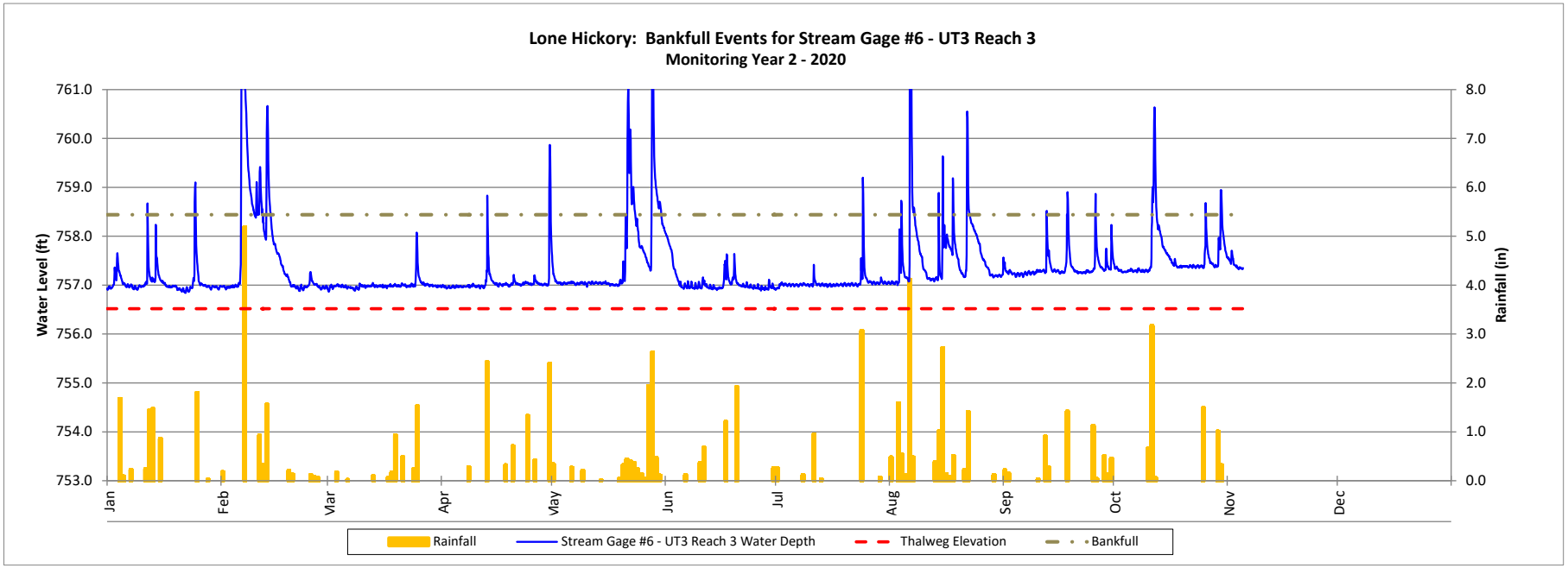
## Stream Gage Plots

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**



## Stream Gage Plots

Lone Hickory Mitigation Site
DMS Project No. 97135
**Monitoring Year 2 - 2020**

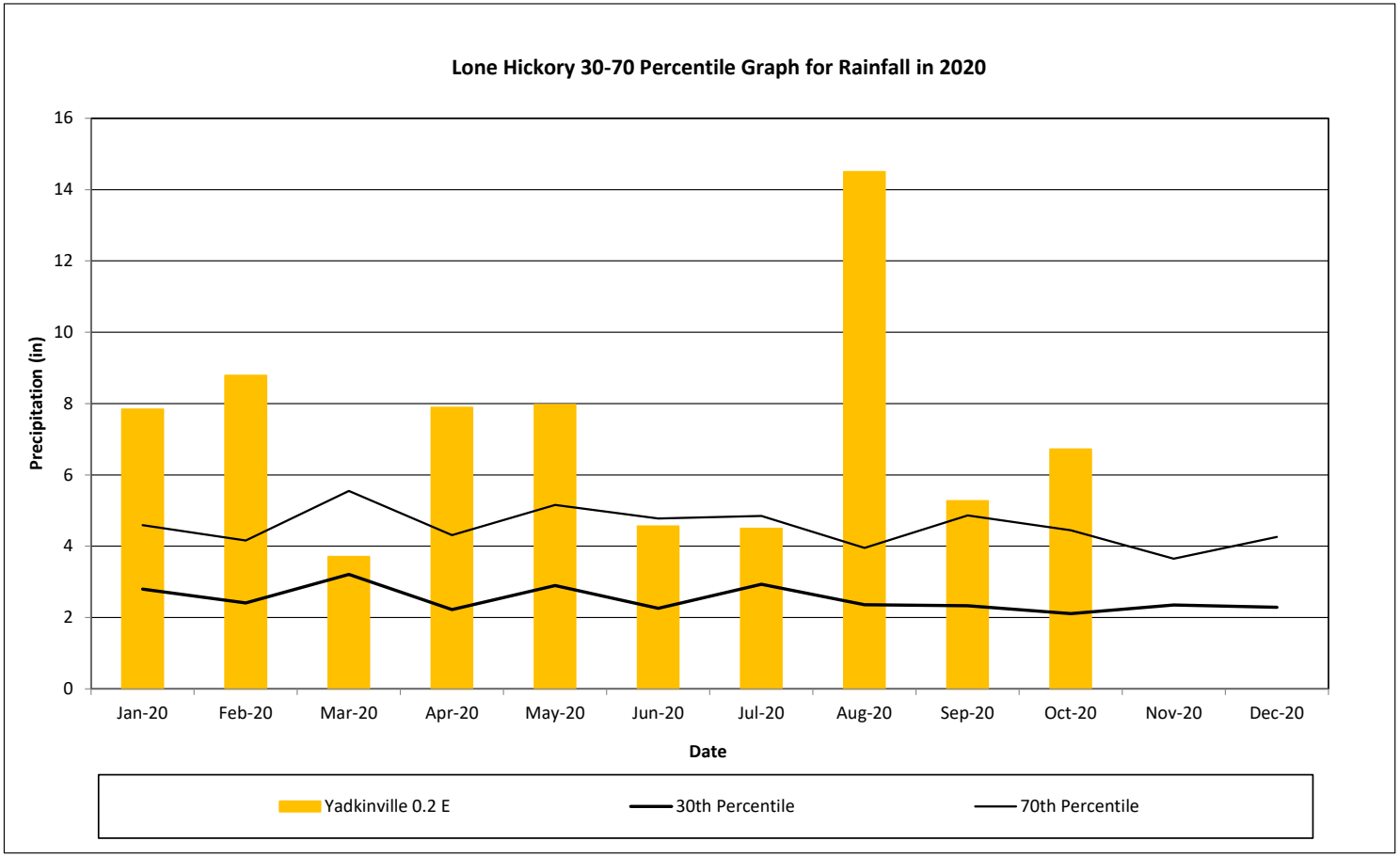


## Monthly Rainfall Data

Lone Hickory Mitigation Site

DMS Project No. 97135

**Monitoring Year 2 - 2020**




2020 rainfall collected by NC CRONOS Station, Yadkinville 0.2 E, NC

30th and 70th percentile rainfall data collected from WETS station Yadkinville 6E