# APPENDIX E
# BASELINE INFORMATION

**MODIFICATION DATE:** June 27, 2025

- Resource Mapping
  - USGS Topographic Quadrangle (Appendix E.1)
  - Current and Historic Aerial Imagery (Appendix E.2)
  - NRCS Soils Map (Appendix E.3)
  - FEMA 100-year Floodplain FIRM Map (Appendix E.4)
  - LIDAR imagery (Appendix E.5)
  - National Wetland Inventory (NWI) Map and DNR Wetlands Map (Appendix E.6)
  - Watershed scale map showing location of site relevant to terrestrial and aquatic features (e.g., streams, wetlands, fish passage barriers, FIDS habitat, etc.) and public/private conservation lands (Appendix E.7)
- Photographs of proposed mitigation site (Appendix E.8)
- Existing baseline condition assessment of existing onsite streams and wetlands using current IRT assessment methodology(ies) (Appendix E.9)
- Delineation of all wetlands, other special aquatic sites, and other waters, such as streams, lakes, and ponds on the proposed compensatory mitigation project site. The delineation is performed in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and appropriate regional supplement(s). Include all data point locations on the map and data sheets (Appendix E.10)
- Non-Native and Invasive Species inventory map depicting the location (acres) and extent (coverage) of all individual species of non-native and invasive plants over the entire mitigation site (Appendix E.11)
- Historic, archaeological, and cultural resources mapping, if known and present on site (Appendix E.12)
- Federal and state rare, threatened, and/or endangered species mapping, including USFWS IPaC results (https://ecos.fws.gov/ipac/) and any available state screening information (Appendix E.13)
- Current hydrogeomorphic setting
- Current groundwater levels within proposed wetland Restoration or Establishment

areas (for one year, if possible), with the MWP

- Historic and existing soil conditions, including soil profiles described within proposed wetland Restoration or Establishment areas, with identification of any sulfidic materials

- Descriptions of historic and existing plant communities/cover type, and age

- Stream order and type

- For areas of proposed wetland Restoration, Establishment, or Enhancement, a historical characterization of the area, including historic and existing land use, and reasons and methods for conversion from wetlands (i.e., historic/current ditching, re-contouring, filling, etc. for farming, silvicultural or other land use activities)

- Description of the nature, extent, and probable stressors/causes of degradation of wetlands and streams

- For areas of proposed stream Restoration, provide pre-Restoration aquatic macroinvertebrate surveys and water quality measurements with the MWP

- For areas of proposed stream Preservation downstream of stream Restoration or Enhancement, provide pre-Restoration stream cross sections with the MWP

- For areas of proposed stream Restoration or Enhancement, a survey of existing typical channel cross section, plan view, and profile indicative of each stream type, classification, and order, and existing geomorphological characteristics data with the MWP

- Any other site characteristics appropriate to the type of resource proposed as compensation

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# 01. INTRODUCTION

This document is presented to provide an assessment of the baseline conditions at the Mill Swamp Mitigation Bank, also known as the 'Mitigation Bank' or 'Bank', a proposed commercial stream and wetland mitigation bank located in Charles County, Maryland. The Mill Swamp Mitigation Bank is a turnkey project where Johnson, Mirmiran & Thompson (JMT) is to act as the Sponsor as well as fully design, construct, and monitor the project. JMT will be contracting construction to another firm but will still be providing direct oversight and direction during the construction phase. JMT intends to develop, construct, establish, Sponsor and own the multi-credit mitigation bank.

The tract identified by JMT, also known as the project site, includes parcels owned by three entities: Carol Witter, Suzanne Norris and Kyle Tippett. While two additional parcels were evaluated to be included in the project site, owned by Poplar Branch LLC. and Francis Barnes, it was ultimately determined that the parcels contain a well-established forest that should not be impacted with construction efforts. For this reason, the Poplar Branch LLC. and Francis Barnes parcels are not included in the proposed project, however the evaluation of both properties is still included in this report.

The proposed project limits start at the Witter parcel property line, downstream of Marshall Hall Road and include approximately 2,818 linear feet of existing stream length (total existing stream length does not include Poplar Branch and Francis Barnes parcels). The baseline information was collected from 2023 through 2025 (except where otherwise stated), and consisted of the following:

- Site Background Research
- Visual Assessment
- Geomorphic Assessment
- Bank Erosion Estimate / Sediment and Nutrient Reduction
- Habitat Assessment
- Fishery and Benthic Assessment
- Thermal Data
- Groundwater Monitoring
- Wetland Delineation
- Forest Stand Delineation
- Watershed Hydrology Study

The baseline information was collected in order to develop an understanding of the existing impacts within the stream corridor, current geomorphic processes, and causes of instability to develop restoration recommendations. To make recommendations, specific objectives first had to be met. The specific objectives of this report include:

- Determine impairments and associated potential causes leading to the current state of the project site.
- Determine the principle and secondary sources of habitat impairment.
- Determine sediment sources, morphological conditions, and hydraulic parameters of the existing channels.

These objectives were achieved through the following tasks:

- Determine historic and other anthropogenic influences on the current stability and evaluate those impacts in relation to existing functions and values of the site.
- Determine areas of high-quality habitat as well as those with departure from that reference condition.
- Perform hydrologic / hydraulic data collection and analyses.
- Analyze site specific geomorphic data to characterize bankfull conditions, hydraulic parameters, bedload composition, stream type, and sediment competence.

The overall design and assessment approach for the Mill Swamp Mitigation Bank is based on the Stream Evolution Triangle (SET) (*Figure 1*), as described in The Stream Evolution Triangle: Integrating Geology, Hydrology, and Biology. The SET represents the relative influence of three drivers of stream form and function: geology, hydrology, and biology (Castro et al., 2019). While the form, function and evolution of a stream may be influenced by any number of the three drivers, the SET aims to demonstrate their interaction, as well as explain drivers for restoration. *Figure 1* plots stream planform patterns (Schumm, 1999) on the SET to show where the typical morphologies fall in relation to each of the process drivers.

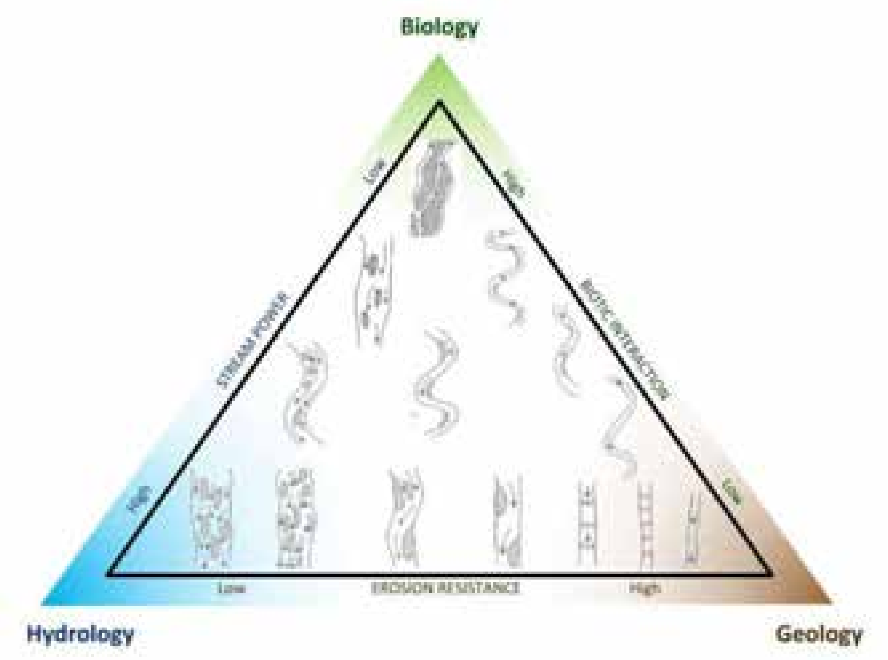

***Figure 1:*** *Stream Evolution Triangle (Castro et al., 2019).*

The overall goal of JMT's approach to ecosystem restoration projects is to design systems to become more biologically dominated and maintained. This has traditionally been expressed as developing functional uplift as a result of restoration activities. JMT aims to create an environmentally diverse and self-sustaining stream and riparian system which is resilient, reestablishes a natural valley bottom ecosystem, promotes improved biological and ecological functions, provides long-term protection to adjacent infrastructure, and provides sediment and nutrient reductions.

Of utmost importance to this project is to provide flood storage to aid in flood risk management at Marshall Hall Rd. Marshall Hall Rd is located at the upstream end of the project site and frequently floods in multiple locations during storm events. The restoration designs will prioritize flood and climate resiliency to promote long-term stability at the project site, in turn providing protection to surrounding communities and infrastructure.

The preferred restoration approach will also prioritize avoidance and minimization of impacts to existing forests within the conservation easement. Unavoidable impacts to existing forests during construction will be replaced in addition to the creation of new forested areas. The project will fully comply with all requirements of Charles County's Forest Conservation Ordinance.

## 02. SITE CHARACTERISTICS

The Bank consists of two Use Class I (nontidal) perennial flow waterways, Mill Swamp and the Unnamed Tributary to Mill Swamp (UNT), both of which are tributaries to the Potomac River. In-stream work is prohibited from March 1 through June 15 inclusive, during any year. The confluence of the UNT with Mill Swamp occurs approximately 250-ft downstream of the downstream limit of the mainstem on the project site.

The project site is located in the Southeastern Plains Level III ecoregion. The Bank's primary Service Area is the Middle Potomac-Anacostia-Occoquan watershed (Hydrologic Unit Code (HUC) 02070010). The secondary Service Area is the Lower Potomac watershed (HUC 02070011). The Bank is located within a rural watershed with an impervious cover of approximately 6.37%, and approximately 78.98% of the drainage area covered in forest. The stream flow is perennial and driven by rainfall and occasionally by snowmelt. Bankfull flows may occur as a result of a variety of rain events, including rain or snow, frontal storm events, and tropical storms. The drainage areas to the downstream most point of Mill Swamp and the UNT are approximately 2.54 and 2.77 square miles, respectively (**Appendix E.7**).

The Bank is located within the Potomac Estuary and Lowlands District of the Atlantic Coastal Plain Physiographic Province. The environmental landscape and topography associated with this area is characterized by flat-lying sedimentary beds formed from lowland deposits consisting of gravel, sand, silt, and clay. The area commonly contains reworked Eocene glauconite, medium to coarse grained sand and gravel, cobbles and boulders near the base, varicolored silts and clays, and estuarine to marine fauna in some areas per the Geologic Map of Charles County (1968).

Mill Swamp and the UNT are listed in the Water Quality Assessment Report per Maryland Department of the Environment (MDE) and include PCBs as a pollutant. The watershed has been prioritized for restoration to reduce sediment and nutrient sources to downstream receiving waters and the Chesapeake Bay.

The online National Resource Conservation Service's (NRCS) Web Soil Survey for Charles County was reviewed for the subject property and identifies four (4) soil types within or directly adjacent to the stream restoration corridor. According to the NRCS Hydric Soils List by State, two of the soil types were listed as hydric soils, Piccowaxen loam and Potobac-Issue complex. The definition created by the National Technical Committee for Hydric Soils (NTCHS) describes Hydric Soils as soils formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

The mapped soil types considered here are taken directly from the USDA including all descriptors, and due to the lack of accuracy and consistency of mapped soils, site specific studies were performed to characterize existing wetland soils and buried hydric soils which do not appear on the USDA survey. Therefore, USDA mapped soils are utilized as a site characteristic screening tool rather than a design tool. **Table 1** below presents the soil types mapped at the site. The NRCS Web Soil Survey maps can be found in **Appendix E.3**.

**Table 1: Mapped Soil Types**

| Soil Series | Symbol | Slopes | Drainage Class | Description |
|---|---|---|---|---|
| Liverpool-Piccowaxen complex | LxD | 5 – 15% | D | Soils have a very slow infiltration rate when thoroughly wet. |
| Marr-Dodon complex | MnD | 10 – 15% | B | Soils have a moderate infiltration rate when thoroughly wet. |
| Piccowaxen loam | PcB | 2 – 5 % | C/D | For drained areas, soils have a slow infiltration rate when thoroughly wet. For undrained areas, soils have a very slow infiltration rate when thoroughly wet. |
| Potobac-Issue complex | Pu | 0 – 2% | B/D | For drained areas, soils have a moderate infiltration rate when thoroughly wet. For undrained areas, soils have a very slow infiltration rate when thoroughly wet. |

## 03. HISTORICAL SITE USES

JMT conducted a historical records search as an initial basis to determine any existing impairments to the stream and wetland systems at the Project Site. This included a detailed analysis of historic aerial photos, historical records, title and deed research, as well as a review of historic maps of the area. Aerials from 2002, 2016 and 2024 were consulted along with historic maps. See **Appendix E.2**, *Figures 1–4*, for historic aerial imagery.

The project site was once an expansive beaver complex / root-step wetland with a small stream channel running through it. Over time, modification of the landscape such as deforestation and agriculture, has caused the floodplain to incise towards earlier geologic materials. Historically, Mill Swamp and the UNT to Mill Swamp likely flowed in a braided system throughout the wetland complex. However, channel straightening and modification of the landscape has directly resulted in coastal plain incision, disconnection from the floodplain and draining of the historic wetlands, thus causing a mass impairment of the entire system. Additionally, the fringe wetlands that have persisted over time, have been mowed and farmed causing habitat disruption, reduced food sources, increased vulnerability to predation, soil compaction, spread of invasive species, altered hydrology / species composition and reduced water purification capacity.

Evidence of channel straightening on the project site dates back to the earliest obtained aerial imagery from April 2002 (*Figure 2*), however it is suspected the straightening occurred prior to that date. The presence of oxbows and channel off-chutes along SR-1 and SR-2 (*Figure 2*) indicate numerous historic floodplain hydrologic influences that are unable to be fully utilized today due to the impairments found at the project site. The narrow riparian corridor along SR-4 (*Figure 8*) is flanked by agricultural fields aiding in the loss of viable habitat and species diversity.

The once stable wetland complex has primarily been drained, due to coastal plain incision, and is left with straightened and relocated stream channels, with near vertical to vertical bare banks, invasive species, and an overall lack of biodiversity.

# 04. VISUAL ASSESSMENT

As part of developing design strategies for the Mill Swamp Mitigation Bank, a visual assessment of the original project site, and further upstream and downstream environments, was conducted on multiple occasions by JMT staff since 2019. The visual assessment serves to characterize existing conditions, habitat, sediment and debris sources, degradation / depositional areas, and regional / localized impacts throughout the stream corridor that may influence long-term stability of the stream and wetland habitats. The assessment of Mill Swamp began at the northeast boundary of the project site, at the Marshall Hall Rd 6’x12’ dual box culvert just south of the intersection with Fenwick Rd. The assessment extended downstream along Mill Swamp to the southwest boundary of the project site, approximately 235-ft upstream of the confluence with the UNT. The assessment of the UNT began at the Marshall Hall Rd 6’x10.5’ dual box culvert, approximately 1,444-ft south of the 6’x12’ dual box culvert of SR-1 and extended downstream to the western boundary of the project site, approximately 1,565-ft upstream of the confluence with Mill Swamp.

The site is broken into two (2) stream channels, Mill Swamp and the UNT to Mill Swamp. Mill Swamp is broken down into three (3) reaches: SR-1, SR-2 and SR-3. The UNT to Mill Swamp is broken down into two (2) reaches: SR-4 and SR-5. All existing stream reaches are classified as Rosgen F4, C4, B4c or G4c streams as differentiated by their slope and sinuosity. The reaches were broken down during the baseline visual assessment, where each reach represents a discrete habitat unit. The reach breakdown can be seen on the Site Assessment Map in **Appendix E.9**. During the visual assessment, it was noted that large portions of the stream channels throughout every reach were dry. The lack of flow within the channels was suspected to be due to lack of rainfall and drought conditions at the time and was not typical for the reaches. The reaches are as follows:

- **SR-1: Mill Swamp (Upstream Reach)** – The straightened and moderately forested upstream reach of Mill Swamp beginning at the Marshall Hall Rd 6’x12’ dual box culvert and extending downstream 905 linear feet to SR-2.
- **SR-2: Mill Swamp (Middle Reach)** – The forested middle reach of Mill Swamp located immediately downstream of SR-1. This reach extends 880.72 linear feet downstream to the 72” RCP private driveway culvert.
- **SR-3: Mill Swamp (Downstream Reach)** – The straightened and moderately forested downstream reach of Mill Swamp beginning at the 72” RCP private driveway culvert and extending 980.74 linear feet downstream, terminating approximately 235-ft upstream of the confluence with the UNT.
- **SR-4: UNT to Mill Swamp (Upstream Reach)** – The straightened and moderately forested upstream reach of the UNT beginning at the Marshall Hall Rd 6’x10.5’ dual box culvert and extending downstream 654.1 linear feet to SR-5.
- **SR-5: UNT to Mill Swamp (Downstream Reach)** – The straightened and forested downstream reach of the UNT beginning at SR-4 and extending downstream 302.65 linear feet, terminating approximately 1,565-ft upstream of the confluence with Mill Swamp.

## 04.01. SR-1: MILL SWAMP (UPSTREAM REACH)

SR-1 (*Figures 1-8*) is the most upstream reach of Mill Swamp beginning at the dual box culvert at Marshall Hall Rd and ending 905 feet downstream at the Witter Property. This reach is moderately forested and extend downstream to SR-2. The flow regime of SR-1 is classified as perennial. The majority of the right bank abuts a forested floodplain while the left bank lies adjacent to maintained lawn for the first approximately 340 linear feet with a narrow strip of trees between. SR-

1 consists of a mostly straight stream channel with subtle meander bends and an average bank height of approximately 4'. Overall, this reach has an average channel slope of 0.15% and a valley slope of 0.17%. Flooding of Marshall Hall Road in times of heavier precipitation is a driving factor in the selection and design parameters of SR-1. Within SR-1 one longitudinal profile, two cross-sections, and one pebble count were surveyed.

Visual observation of the reach confirms the lack of biology as a high-level process driver. Channel shading was moderate throughout the reach with cover percentage measured using a convex densiometer resulting in an average cover throughout the reach of 49.1%. In-channel overhead cover is rare with few viable areas of stable woody debris or overhanging woody vegetation for refugia. Bank erosion is evident throughout the reach which has led to channel incision and little to no floodplain connection as can be seen in **Appendix E.8**, *Figure 2*. Additional survey measures including EPA's Rapid Bioassessment Protocol for Low Gradient Streams with a total score of 95 and BEHI/NBS with an average rating of High/Moderate further reflect the impairment and floodplain disconnection of SR-1. Signs of beaver activity were noted during site field assessments and included gnawing traces, cuttings, decorticated sticks, and entrance/exit trails to the channel. Beaver are known to have colonized upstream of SR-1 and are believed to have historically resided within the proposed mitigation area.

While assessments for SR-1 are included within this report, the reach is not included in the proposed mitigation areas.

See **Appendix E.2**, *Figure 5*, for aerial imagery of reach SR-1.

### 04.02. SR-2: MILL SWAMP (MIDDLE REACH)

SR-2 (*Figures 9-20*) is a continuation of SR-1 and ends at the 72" RCP private driveway culvert. This reach of stream channel falls in the middle of the valley and is moderately forested. The flow regime of SR-2 is classified as perennial. The existing stream channel is approximately 880.72 linear feet with an average channel slope of 0.28% and valley slope of 0.35%. SR-2 has greater sinuosity at approximately 1.25 with banks varying in height from 2-3'. This area of the project site is the location of one pebble count, two cross-sections, and one longitudinal profile.

Visual observation of the reach confirms the lack of biology as a high-level process driver. The reach lacks distinct stream facet features due to the low gradient. Channel shading is common throughout SR-2 with an average overhead cover of 72.0% as measured with a convex densiometer, due to the dense mature forest canopy cover. In-channel cover is rare with few viable areas of stable woody debris or overhanging woody vegetation for refugia. Some depositional features including point bars and mid-channel bars were observed throughout the channel reach. Bank erosion is evident throughout the reach which has led to channel incision and a decreased floodplain connection as can be seen in **Appendix E.8** *Figure 9*. Wetlands as well as oxbows and channel offshoots are present within the floodplain of SR-2, providing intermittent hydrology. Additionally, two channel splits are found within this reach.

See **Appendix E.2**, *Figure 6,* for aerial imagery of reach SR-2.

### 04.03. SR-3: MILL SWAMP (DOWNSTREAM REACH)

SR-3 (*Figures 21-33*) is the most downstream reach of Mill Swamp beginning at the 72" RCP private driveway culvert and extending 980.74 linear feet downstream to approximately 235 feet upstream of the confluence with the UNT. The stream banks run adjacent to maintained lawn and meadow for the first half and is moderately forested through the second half. The flow regime of SR-3 is classified as perennial. The first half of SR-3 has been straightened, most likely coinciding with historical farming practices that took place in the immediate adjacent land. There are two torturous meander bends towards the downstream extent of the reach, both of which have vertical banks over 4-feet tall. There is a significant wetland along the left bank as well as several drainage patterns. This area of the project site is the location of one pebble count, two cross-sections, and one longitudinal profile. During periods of excess precipitation, flooding of Fenwick Road and several structures on the Norris property takes place. Flood relief in these areas is a key factor in the site selection and design parameters. Overall, the average channel slope is 0.29% and valley slope 0.30%.

Visual observation of the reach confirms the lack of biology as a high-level process driver. The reach lacks distinct stream facet features due to historic channel straightening and the low gradient and is only moderately shaded in the latter half of the reach. In-channel overhead cover is rare with few viable areas of stable woody debris or overhanging woody vegetation for refugia. One large debris jam was observed at the approximate midpoint of SR-3, see **Appendix E.8** *Figure 32*. Banks range in height from two to over five feet and mostly vertical exhibiting little floodplain connection. Floodplain drainage can be primarily classified as sheet flow with several shallow drainage features coming from adjacent wetlands. Beavers are active within this stream reach with evidence of recent gnawing, felled trees on the left bank, and a beaver dam present. During site evaluations, it was also noted that beaver dams may be present downstream resulting in backwatering through the lower extent of the project area however this has not been confirmed.

See **Appendix E.2**, *Figure 7*, for aerial imagery of reach SR-3.

### 04.04. SR-4: UNT TO MILL SWAMP (UPSTREAM REACH)

SR-4 (*Figures 34-44*) is the upstream reach of the UNT beginning at the dual box culvert at Marshall Hall Road and extends downstream 654.1 feet to SR-5. The flow regime of SR-4 is classified as perennial. The reach has been straightened with a thin strip of trees between the stream channel and adjacent grass meadow that was historically used for agriculture. Flooding of Marshall Hall Road in times of heavier precipitation is a driving factor in the selection and design parameters of SR-4. This area of the project site is the location of one pebble count, two cross-sections, and one longitudinal profile. Additionally, four groundwater monitoring wells were installed in the grass meadows adjacent to both sides of the stream channel. SR-4 has an average channel slope of 0.37% and valley slope of 0.38% with little to no meanders.

Visual observation of the reach confirms the lack of biology as a high-level process driver. The reach lacks distinct stream facet features due to the straightening and low gradient of the channel. Shading is common throughout the reach with average overhead cover at 77% as measured with a convex densiometer. In-channel overhead cover is uncommon with several debris jams and collapsing trees are present within the reach. Banks are over four feet high on average exhibiting a lack of floodplain connection with bare soil present across the majority of the banks as seen in **Appendix E.8** *Figure 38*. Additionally, multiple scour holes and sandy depositions were noted during site assessments indicating increased movement of material within the UNT. Floodplain drainage can be primarily classified as sheet flow with little to no drainage patterns observed in the floodplain.

See **Appendix E.2**, *Figure 8*, for aerial imagery of reach SR-4.

### 04.05. SR-5: UNT TO MILL SWAMP (DOWNSTREAM REACH)

SR-5 (*Figures 45-53*) is the downstream reach of the UNT starting at SR-4 and extending downstream 302.65 linear feet to approximately 1,565 feet upstream of the confluence with Mill Swamp. The flow regime of SR-5 is classified as perennial. The reach was historically straightened and is fully forested. Banks within this reach vary from three to over five feet in height. SR-5 has an average channel slope of 0.45% and valley slope of 0.47%. This area of the project site is the location of one pebble count, two cross-sections, and one longitudinal profile.

Visual observation of the reach confirms the lack of biology as a high-level process driver. Several depositional point bars were observed however, the reach lacks distinct stream facet features due to the historic straightening and low gradient of the channel. Shading of the stream channel was prevalent with average cover being greater than 80%. In-channel overhead cover and areas of woody debris or overhanging woody vegetation was rare within the reach. Bare and vertical banks seen through the majority of SR-5 along with the incision of the stream channel exhibits a general disconnect from the floodplain as can be seen in **Appendix E.8** *Figure 45*. Small wetland areas are present at the downstream extent of the left bank along with minor drainage features. Floodplain drainage can be primarily classified as sheet flow.

See **Appendix E.2**, *Figure 9,* for aerial imagery of reach SR-5.

## 05. GEOMORPHIC ASSESSMENT

To document existing geomorphic, hydraulic and sediment competence characteristics of Mill Swamp and the UNT to Mill Swamp, detailed channel cross-sections, profiles, and pebble counts were surveyed within the project reaches. This section of the report will characterize the hydraulic parameters of the cross-sections to the top-of-bank and bankfull elevations.

The data presented herein provides a means to assess the existing morphological properties of the project site. The geomorphic assessment of the existing valley conditions contributes to the basis for the proposed restoration design. The design will include a detailed analysis of the upper watershed and contributing sediment sources, along with an understanding of the full range of geomorphic conditions (specifically floodplain width and channel geometry) necessary to convey the full range of flow events through the stream corridor under stable conditions.

During the geomorphic field assessment of the project site, a total of ten (10) existing conditions cross-sections, on riffle (XS-1, XS-4, XS-5, XS-8 and XS-10) and pool features (XS-2, XS-3, XS-6, XS-7, and XS-9), and five (5) longitudinal profiles (LP-1, LP-2, LP-3, LP-4, and LP-5) were surveyed using laser-level equipment to characterize existing channel conditions throughout the project site. The data collected at the cross-sections (**Appendix E.8**) represent existing channel conditions found throughout the project reach. Cross-sections were not selected to depict the most impaired parts of the stream, but portions of the stream with consistent features which could be utilized to evaluate proposed conditions and departure from reference conditions. In addition, five (5) pebble counts were conducted on riffle features (PC-1, PC-2, PC-3, PC-4, and PC-5). The locations of the cross-sections, longitudinal profiles, and pebble counts can be found on the Site Assessment Map located in **Appendix E.9**. The survey of the existing conditions cross-sections will also serve to compute the estimated erosion rates utilizing the BANCS method for potential TMDL credits.

### 05.01. PEBBLE COUNTS

Within the project reach, pebble counts were conducted on riffle sections at XS-1, XS-4, XS-5, XS-8 and XS-10. All field data has been entered into RIVERMorph, and data plots are included in **Appendix E.9**. The representative $D_{35}$, $D_{50}$ and $D_{84}$ sediment sizes are based on the average grain sizes from the pebble counts conducted. The pebble counts are summarized in **Table 2** below.

**Table 2: Summary of Pebble Count Data**

| Size Fraction (mm) | SR-1<br>PC-1 at XS-1<br>100 Count | SR-2<br>PC-2 at XS-4<br>108 Count | SR-3<br>PC-3 at XS-5<br>106 Count | SR-4<br>PC-4 at XS-8<br>100 Count | SR-5<br>PC-5 at XS-10<br>118 Count |
|---|---|---|---|---|---|
| **$D_{35}$** | 10.06 | 6.05 | 12.20 | 7.31 | 13.52 |
| **$D_{50}$** | 13.65 | 8.66 | 20.20 | 12.38 | 20.86 |
| **$D_{84}$** | 30.43 | 14.45 | 54.59 | 23.45 | 43.78 |

The results of the pebble counts will be used to evaluate the mobile particles in the riffle and the bed stability as compared to a 1D HEC-RAS derived shear stress. The purpose of this analysis is to determine what size particles are being routinely transported by the channel in existing conditions. These materials are either delivered to the project site via upstream sources or sourced via bank erosion from within the study reaches.

The size distribution analysis will help define the morphological attributes of the channel design to ensure it will be sustainable based upon the existing sediment regime and sediment supply from the upper watershed. The sizing of this material indicates that larger particles are being retained within riffle features on the reach and smaller particles are becoming part of the bedload delivered through the reach or delivered to that reach.

Sizing of the proposed bankfull channel is based upon analyzing existing hydraulic characteristics of the channel (cross-sectional area, width, and depth) and developing a channel design or low transport channel that will minimize streambed substrate mobility yet maintain the competency to mobilize finer sediments being contributed to the design reach from the upper watershed. Additionally, the analysis of the riffle pebble count data will be used to evaluate the existing, in-situ substrates for their suitability as habitat substrate.

## 05.02. CHANNEL ROUGHNESS

Channel roughness values were determined using the USGS *Guide for selecting Manning's Roughness Coefficients for Natural Channels and Floodplains* and verified from field observations. Channel roughness is caused primarily by the roughness of the channel bed and the shape of the channel. Estimates of Manning roughness coefficient, *n*, are based on the Cowan (1956) relation given here as:

$$n = (n_b + n_1 + n_2 + n_3 + n_4) \circ \mathrm{m}$$

Where:

$n_b$ = a base value of $n$ for a straight, uniform, smooth channel, in natural materials

$n_1$ = a correction factor for the effect of surface irregularities

$n_2$ = a value for variations in shape and size of the channel cross-section

$n_3$ = a value for obstructions

$n_4$ = a value for vegetation and flow conditions

m = a correction factor for meandering of the channel

The pebble counts provided in the geomorphic analysis were used to evaluate the median size of the bed materials and determine the base value of *n* for each reach. Each reach was then evaluated for adjustment factors to calculate the existing conditions Manning's *n*.

## 05.03. BOUNDARY SHEAR STRESS

The average boundary shear stress produced by a discharge over each riffle was computed as:

$$\tau_b = \gamma \; R \; S_f$$

where $\tau_b$ is the cross section average boundary shear stress (psf), R is the hydraulic radius, and $S_f$ is the energy slope. Because backwater effects on the steep riffles were considered to be minor, the average boundary stress was considered to be a conservative approximation for the average stress on the wetted perimeter of the cross-sectional area. To assess the maximum boundary shear stress, which may be asserted on the streambed at any single point within the cross-section, R or hydraulic radius has been approximated using $D_{max}$ or the maximum channel depth. The energy slope (friction slope), $S_f$, for each reach has been estimated from the top-of-bank slope that flood flows would experience at the existing valley flat stage.

## 05.04. EXISTING CROSS-SECTION DATA

The purpose of the following hydraulic analysis is to determine the existing conditions top-of-bank shear stresses within the project reach. The data collected provides a means to assess streambed and bank sediment mobility and in turn the stability of facet features in relation to the top of bank discharges and the estimated frequency of these hydraulic conditions. This has a direct relation to the stability of not only the banks from a TMDL sediment reduction standpoint, but an analysis of the stability of channel bed substrates and the ability to have a temporal availability of channel facet habitats within the stream reach. Many sensitive macroinvertebrate types require more than one year of their life cycle to be spent in in-channel habitats, and the stability of these facet features directly relates to their potential to be present or potential to re-establish following restoration, assuming they are present in a suitably connected habitat to allow for that colonization.

The top-of-bank represents the point of incipient flooding or when flows contained within the channel make a hydraulic connection to the surrounding floodplain or valley flat. This analysis is not performed to determine what flow event correlates to the mobilization of particles under "bankfull" conditions, but rather to understand the largest particles being mobilized in this system when the channel is flowing at full capacity for a peak shear stress, regardless of magnitude of discharge.

For the purposes of this analysis, the five (5) geomorphic cross-sections surveyed on riffle features along Mill Swamp and the UNT have been utilized. The slope at each area has been derived for each section and reach, measured during the laser level survey of the project site conditions, and compared with the surveyed contours. The existing geomorphic channel conditions within the project site for use in identifying the top-of-bank hydraulic parameters without backwater conditions is summarized in **Table 3**.

**Table 3: Summary of Bankfull Hydraulic Data at Representative Cross-Sections**

| Hydraulic Parameters | SR-1 XS-1 | SR-2 XS-4 | SR-3 XS-5 | SR-4 XS-8 | SR-5 XS-10 |
|---|---|---|---|---|---|
| *Bankfull Elevation (ft) | 190.24 | 193.16 | 190.62 | 191.41 | 191.00 |
| Bankfull Width (ft) | 16.06 | 16.27 | 16.27 | 15.79 | 19.64 |
| Mean Depth (ft) | 1.26 | 1.10 | 1.19 | 1.60 | 1.02 |
| Maximum Depth (ft) | 1.70 | 1.80 | 1.85 | 1.97 | 2.07 |
| Bankfull Area (sf) | 20.17 | 17.91 | 19.33 | 25.23 | 20.08 |
| Hydraulic Radius, R (ft) | 1.18 | 1.04 | 1.14 | 1.44 | 0.93 |
| Width/Depth Ratio | 12.75 | 14.79 | 13.67 | 9.87 | 19.25 |
| Slope (ft/ft) | 0.0394 | 0.0022 | 0.0122 | 0.0084 | 0.0084 |
| $D_{50}$ (mm) | 13.65 | 8.66 | 20.20 | 12.38 | 20.86 |
| $D_{84}$ (mm) | 30.43 | 14.45 | 54.59 | 23.45 | 43.78 |
| ‘Manning’s *n* | 0.049 | 0.057 | 0.057 | 0.053 | 0.054 |
| ~Discharge (cfs) | 50.02 | 49.97 | 50.06 | 49.96 | 50.00 |
| Velocity (fps) | 2.48 | 2.79 | 2.59 | 1.98 | 2.49 |
| **Average Boundary Shear Stress (psf) | 0.221 | 0.130 | 0.213 | 0.359 | 0.232 |
| ***Maximum Boundary Shear Stress (psf) | 0.318 | 0.225 | 0.346 | 0.492 | 0.517 |
| +Mobile Particle (mm) at Average Boundary Shear Stress | 2.30 | 2.49 | 3.53 | 1.28 | 3.34 |
| +Mobile Particle (mm) at Maximum Boundary Shear Stress | 1.60 | 1.43 | 2.17 | 0.93 | 1.49 |

* Based on a benchmark elevation of 100 ft
‘ Computed using USGS *Manning’s Roughness Coefficients for Natural Channels and Floodplains*
~ Computed using Manning’s Equation
** Using Hydraulic Radius, R
*** Maximum depth at cross-section
\+ Andrews Methodology

The 1D analysis shows that in existing conditions and real-life, 3D flow conditions, all reaches within the project site are capable of mobilizing non-cohesive sediments below and above the $D_{50}$ of the typical bed substrates found on site, indicating impairment. See **Appendix E.9** for Mobile Particle Analysis. When considering that also secondary shear stresses exceed the 1D modeled stresses, and that debris and other naturally occurring flow obstructions can additionally magnify shear stress, there is enormous potential to mobilize bed substrates and degrade important habitat features derived from the channel geometry and substrate, (i.e. riffle, run, pool and glide facet features of the channel). The channel’s geometry, specifically the high banks and lack of connectivity to the floodplain for small magnitude discharges, produces the hydraulic effect of magnifying shear stress.

## 06. BANK EROSION ESTIMATE / SEDIMENT AND NUTRIENT REDUCTION

A bank erosion estimate was utilized to compute potential Total Maximum Daily Load (TMDL) credits via Protocol 1. TMDL Credits are calculated only for informational purposes for watershed base load – no TMDL crediting is proposed for approval as part of this project, as consistent with state policy for mitigation projects.

Although TMDL credit is not requested for this project, quantifying the sediment and nutrient reduction value of the project is useful for local partners and stakeholders to estimate reductions in base sediment and nutrient loading to the watershed. This aids reviewers in estimating the watershed values of the project, not just the site-specific functions and values discussed in this report. To estimate potential sediment and nutrient reduction, according to the *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* (September 2014), JMT performed a Bank Erosion Hazard Index (BEHI) and Near Bank Shear Stress (NBS) analysis of all stream banks to be restored. The BEHI methodology uses field data to determine expected erosion rates at a specific stream bank. The BEHI is computed on banks by analyzing the following properties: exposed bank height, stratification of materials, root depth, root density and bank angle. Near Bank Shear Stress (NBS) predicts the amount of energy distributed to the streambank which can accelerate erosion. These methods are described by the U.S. Environmental Protection Agency (EPA) in the *Watershed Assessment of River Stability and Sediment Supply* (WARSSS) manual (Rosgen 2006). The NBS values have been obtained from field observations and the riffle cross sections surveyed during the geomorphic site assessment.

These measured properties have been used to predict the amount of lateral bank erosion from empirically derived Stream Bank Erodibility curves produced by the U.S. Fish & Wildlife Service (USFWS) in Maryland (Hickey Run). These predictions provide a quantity of expected mass wasting or surface erosion from the analyzed stream bank. This provides a useful comparison tool to establish a prioritization for stabilization measures based on rates of expected erosion from various stream banks.

Within the limits of the proposed restoration site, 3,950 feet of existing channel will be restored. The BANCS data accounts for all streambanks within the project site limits. Based upon the BANCS data reported in **Appendix E.9**, the erosion rate along the main stem and tributaries through the project reach is as follows:

(563.6 tons/yr) / (5,636.4 ft) = 0.100 tons/yr/ft

The computed total annual stream bank erosion rates from the existing stream bank erosion estimates based on actual length of the existing channel to be restored is as follows:

2,818.2 ft * 0.100 tons/yr/ft = 281.82 tons/yr

**Table 4: Summary of Sediment and Nutrient Reduction**

| | Total Nitrogen, TN (lb/yr) | Total Phosphorus, TP (lb/yr) | Total Suspended Sediment, TSS (lb/yr) |
|---|---|---|---|
| Protocol 1 | 653.4* | 117.9* | 34,400* |
| Protocol 2 | N/A | N/A | N/A |
| Total | 653.4* | 117.9* | 34,400* |

**SR-1 omitted from the sediment and nutrient reduction calculations.*

The estimate of sediment and nutrient reduction demonstrates a reduction of 34,400 lb/year of TSS as estimated at the edge of stream from the project, not the edge of tide. It is important to note that this methodology is an estimate used sediment and nutrient reduction, and that estimate is often not correlated with site-specific monitoring of an impaired site.

For the purposes of this mitigation project, a reduction in erosion is a given for any viable design methodology which uplifts biology, but erosion should not be expected to become zero as typical with healthy streams. This estimate does not significantly contribute to design technique or approach.

## 07. HABITAT ASSESSMENT

In addition to the observation of specific habitats during the Visual Assessment (**Section 04**) and the MBSS Fishery and Benthic Assessment (**Section 08**), two additional assessments were completed to assess the habitat on the site: the Function Based Rapid Stream Assessment (FBRSA) and the EPA Rapid Bioassessment Protocol (RBP). Specific measurements of habitat features are required to develop goals for functional uplift. Qualitative descriptions of the habitat properties of each reach have been built into the individual reach descriptions of the Visual Assessment (**Section 04**).

### 07.01. FUNCTION BASED RAPID STREAM ASSESSMENT (FBRSA)

The Function Based Rapid Stream Assessment (FBRSA) was used to develop a rapid and objective assessment of the functional and conditional quality of the site. The purpose of this assessment is to quickly determine the function-based stream conditions of the site (functioning, functioning-at-risk, or not functioning). The structure is broken into eleven (11) metrics that fall into three (3) functional categories: physiochemical, hydraulic, and / or geomorphology. Each metric furthers falls under a discrete parameter: water quality, riparian vegetation, habitat, flow dynamics and bedform diversity, floodplain connectivity, groundwater / surface water exchange, or lateral migration. The eleven (11) metrics of the FBRSA are as follows:

1. Water Appearance and Nutrient Enrichment – a measure of water quality, which is critical to the growth and survival of aquatic fauna.
2. Channel Shading – a measure of how much of the water surface within the reach is shaded.
3. Riffle / Run Complexity – diverse and abundant submerged structures within the stream provide a variety of cover / substrates that support different life stages of aquatic fauna.
4. Pool / Glide Cover for Aquatic Fauna – diverse and abundant submerged structures within the stream provide a variety of cover / substrates that support different life stages of aquatic fauna.
5. Velocity / Depth Diversity – diverse bed forms create habitat diversity, are symptomatic of local variations in the sediment transport processes and dissipate energy.
6. Vertical Stability Extent – vertical stability extent characterizes the potential of localized or widespread downward streambed adjustments.
7. Bank Height Ratio (BHR) – a metric to determine whether flood events are contained within the channel.
8. Entrenchment Ratio (ER) – a metric to quantify the lateral extent of floodplain connection.

9. Floodplain Soil Drainage – a metric to capture the benefits of floodplain soil saturation and the ecological loss when the valley substrates and riparian community are drained.

10. Streambank Erosion Extend and Magnitude – a metric to determine the extent and magnitude of bank erosion within the reach.

11. Anthropogenic Floodplain Exclusion – a metric to quantify how much of the active valley bottom has been filled or disconnected from the channel by anthropogenic fill such as levees, roads, railroads, or structures.

The 11 metrics are totaled, along with the results of the 2002 MBSS assessment (**Section 08**), to provide an overall rating of the system. The results of the FBRSA are presented in **Table 5**. Abbreviations for quality are (F) Functioning (score of 8-10), (FAR) Functioning-at-Risk (score of 4-7), and (NF) Not Functioning (score of 1-3).

**Table 5: Summary of FBRSA Results**

| Reach | Metric | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **R1** | **R2** | **R3** | **R4** | **R5** | **R6** | **R7** | **R8** | **R9** | **R10** | **R11** | **Total** |
| SR-1 | F | FAR | FAR | FAR | FAR | FAR | NF | NF | NF | NF | F | 50 |
| SR-2 | F | F | FAR | NF | NF | FAR | FAR | F | NF | NF | F | 59 |
| SR-3 | F | F | FAR | FAR | NF | FAR | NF | NF | NF | NF | F | 51 |
| SR-4 | F | F | FAR | FAR | FAR | FAR | NF | NF | NF | NF | NF | 42 |
| SR-5 | F | F | NF | FAR | NF | FAR | NF | NF | NF | NF | NF | 41 |

Results of the FBRSA show general impairment throughout the project reaches. Total scores all fell below 60 out of a possible 110 for the rapid stream assessment (RSA) metrics. All surveyed reaches resulted with a functioning physiochemical regime while the geomorphology and hydraulic regimes were generally categorized as functioning at risk or not functioning.

Floodplain connectivity was the lowest scoring metric across all reaches with BEHI, soil drainage, entrenchment ratios and bank height ratios within 4 out of 5 reaches described as not functioning. SR-2 was the only reach to receive a score rating higher than “NF” due to decreased bank heights and a more natural channel planform.

Riffle pool sequences and in stream habitat were categorized as functioning at risk overall, with some examples of woody debris and exposed roots present. Stream reaches 1-3 exhibited fewer riffles due to the low valley slope with scores reflecting this lack of velocity and depth diversity.

MBSS results are pending completion and will be included in the Final MBI. Data from a 2002 survey (PRMT-201-R-2002) will be utilized for the Draft MBI assessment and crediting until the completion of the 2025 MBSS assessments. The 2002 survey resulted in a “Poor” overall score and a FBRSA score of 5.9 out of a possible 20 indicating the stream reaches are not functioning on a biological level.

The FBRSA data sheets have been provided in **Appendix F.3**.

## 07.02. EPA RAPID BIOASSESSMENT PROTOCOL (RBP)

The *EPA Rapid Bioassessment Protocol Chapter 5 Habitat Assessment Field Data Sheet for Low Gradient Streams* was used to aid in evaluating the quality of habitat on the site. Low gradient perennial streams in Maryland typically fall within Rosgen C4, B4, and B4c classified streams. The purpose of rapidly assessing habitat is to quickly determine the level of health (optimal, suboptimal, marginal, or poor) of the stream system and identify impairments. The habitat structure is broken into ten (10) categories to analyze riparian overbanks, streambanks, and in-stream habitat.

1. Epifaunal Substrate / Available Cover – percentage of natural structures in streams like cobble, large rocks, fallen trees/logs/branches, undercut banks, and areas for fish, macroinvertebrate, and amphibian refuge.
2. Pool Substrate Characterization – rating of how diverse pool substrate is with more diverse substrate (grave, sand, aquatic plant roots, etc.) supporting better habitat than poor mud or bedrock pools.
3. Pool Variability – rating of mixture of pool types that vary in width and depth. Higher diversity of pool types supports higher diversity of habitat and are generally associated with more meandering streams.
4. Sediment Deposition – rating of amount of sediment deposited in stream. High sediment deposition seen through islands or point bars or amount of sediment covering stream bottom. High sediment is indicative of unstable or changing streams and greatly reduces in stream habitat.
5. Channel Flow Status – rating focused on the width of channel. Optimal conditions include water reaching from bank to bank with minimal streambed exposed as opposed to over-widened poor streams.
6. Channel Alteration – degree of which channel sinuosity has been straightened and disrupted. Poor streams also see artificial embankments, riprap, dams, and bridges.
7. Channel Sinuosity – a measure of meandering of the stream compared to a straight line. Optimal meandering length would be 3-4 times longer than a straight line. Higher sinuous streams can dissipate storm surges and create diverse habitat.
8. Bank Stability – rating of individual bank shape and cover with gently sloping banks with vegetation being optimal. Sheer banks with potential to collapse and unvegetated banks are poor and disconnect the habitat.
9. Bank Vegetative Protection – measure of amount of vegetation protection on the bank. Vegetation stabilizes stream bank soils and prevent erosion and instability.
10. Riparian Vegetative Zone Width – measurement of riparian buffer from streambank out through riparian zone. Buffers of 4x the bank-to-bank stream width area optimal for habitat and flood and pollutant buffering.

The 10 categories are totaled to provide an overall rating of the system. The results of the RBP Habitat Assessment (RBP) are presented in **Table 6**. Abbreviations for quality are (O) Optimal, (SO) Suboptimal, (M) Marginal and (P) Poor, (LB) Left Bank, (RB) Right Bank.

**Table 6: Summary of RBP Habitat Assessment Results**

| Reach | Category | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| SR-1 | M | SO | M | SO | P | M | M | LB: P<br>RB: P | LB: M<br>RB: M | LB: O<br>RB:O |
| SR-2 | M | M | M | M | P | O | M | LB: P<br>RB: P | LB: M<br>RB: M | LB: O<br>RB:O |
| SR-3 | SO | SO | SO | SO | M | M | SO | LB: M<br>RB: M | LB: SO<br>RB: SO | LB: O<br>RB: SO |
| SR-4 | P | M | P | M | P | M | P | LB: P<br>RB: P | LB: P<br>RB: P | LB: O<br>RB:O |
| SR-5 | P | M | P | M | P | SO | M | LB: P<br>RB: P | LB: P<br>RB: P | LB: O<br>RB:O |

Overall, all stream reaches showed deficiencies throughout the RBP assessment with the only metric resulting in an optimal performance for the majority of the project area being the riparian buffer zone. SR-3 scored the highest of the five reaches with an overall score of 118 out of a possible 200. No other reach scored above 100, showing a high potential for uplift.

At the time of survey, little to no water was present within the waterway which resulted in a poor score for channel flow status in 4 of the 5 reaches. Additionally, bank stability scored low throughout all stream reaches due to the presence of bare vertical to near vertical banks exhibiting signs of lateral erosion.

Sections of stream channel were noted as being historically straightened resulting in further floodplain disconnection and poor scores for both channel alteration and sinuosity.

These individual assessment categories inform the design and allow JMT to focus on key habitat deficiencies for restoration and allow focus on what elements are suitable for preservation. The RBP data sheets have been provided in **Appendix E.9**.

## 08. FISHERY AND BENTHIC ASSESSMENT

Fishery and benthic assessments, compliant with Maryland Biological Stream Survey (MBSS) stream sampling protocols, are being completed by subconsultant Environmental Systems Analysis, Inc. (ESA). The details of the methodology and specific results will be provided in **Appendix E.9** of the Final MBI. A previous MBSS study conducted in 2002 on the UNT to Mill Swamp (PRMT-201-R-2002) has been utilized for preliminary site assessments and crediting calculations. All assessments and calculations requiring MBSS scores will be updated for the Final MBI submission.

Overall, the fishery and benthos scored “Poor” in the 2002 survey with scores of 2.3 and 1.6 out of a possible 5 for a combined score of 1.95. The 2002 study also includes assessments of physical stream habitat and stream water quality.

JMT encourages the reader to read the attached report (**Appendix E.9**) for a more in depth analysis of the surveyed resources.

As part of the FBRSA (**Section 07.01**), four (4) metrics from the MBSS are assessed and contribute to the overall FBRSA score. The four (4) metrics of the MBSS that are utilized in the FBRSA are as follows:

1. Benthic IBI – an index of biological integrity (IBI), which is a quantitative method to measure the health of the benthic community within a stream system.
2. Number of EPT Taxa – the total number of distinct taxa within the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), which are used as bioindicators of water quality.
3. Fish IBI – an index of biological integrity (IBI), which is a quantitative method to measure the health of the fishery within a stream system.
4. Abundance / Square Mile – the number of fish present in a given area, often expressed as the number of fish per square mile.

The results of the MBSS conducted by ESA will be utilized in the overall score of the FBRSA at the Final MBI stage, however **Appendix F.1** utilizes the data obtained from the MBSS 2002 study conducted on the UNT to Mill Swamp. **Table 7** below summarizes the results of the MBSS conducted by ESA and, for comparison, a previous study conducted on the UNT in 2002 (Biological Stream Survey Site: PRMT-201-R-2002).

**Table 7: Summary of MBSS Results**

| Reach | Metric | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| SR-1 | * | * | * | * |
| SR-2 | * | * | * | * |
| SR-3 | * | * | * | * |
| SR-4 | * | * | * | * |
| SR-5 | * | * | * | * |
| UNT (2002) | 1.57 | 1 | 2.33 | 1 |

**Data will be provided at Final MBI once MBSS assessments are complete.*

Overall, the results of the 2002 biological assessment and the habitat assessments, conducted by JMT, bring forth the following conclusions (results to be updated as needed upon finalization of 2025 MBSS data analysis):

- Fish relocation is unnecessary due to limited populations within the project area and no presence of sensitive taxa. Short-term impacts to available existing resources are expected. Recovery and expansion of resources are anticipated through the monitoring period with increasing habitat.
- Taxa diversity and abundance is lacking, leading JMT to the believe that biological uplift within the proposed areas is possible.

- Available in-stream habitat is limited. Inclusion of woody material in conjunction with clean gravel substrate and other habitat features will encourage increased biodiversity and will be advantageous to uplift within the system.

## 09. THERMAL DATA

JMT monitored thermal conditions in four (4) locations, as seen in **Appendix E.9** on the Site Assessment Map. Two (2) loggers were located on Mill Swamp and two (2) loggers were located on the UNT to Mill Swamp. HOBO U020 devices were installed, which are an optically read data logger with capacity to read temperature and absolute pressure. The absolute pressure function of these devices is recorded, however not used for our analysis. The temperature gauge information is included in **Appendix E.9**.

Thermal data was collected from April through November of 2023 and January through August of 2024. No data was available for HOBO logger 4 during the 2024 monitoring timeframe due to an inability to locate the data logger. It is assumed that it, as well as the metal T-Post that it was attached to, became dislodged during a storm event.

Average temperatures within Mill Swamp showed an increase from the upstream to downstream data logger locations while the UNT to Mill Swamp showed little change in average temperatures during the 2023 monitoring period.

## 10. GROUNDWATER MONITORING

JMT is presently monitoring groundwater conditions in four (4) locations, as seen in **Appendix E.9** on the Site Assessment Map. Groundwater wells were installed at strategic locations to measure groundwater levels in proposed wetlands adjacent to existing stream reaches SR-4 and SR-5. An ambient logger was deployed on site in order to compare data from the groundwater monitoring wells and determine the existing groundwater elevation for use in the design of the proposed wetlands. The groundwater monitoring data is included in **Appendix E.9**.

## 11. WETLAND DELINEATION

The wetland delineation map and data sheets are included in **Appendix E.10**.

## 12. WATERSHED HYDROLOGY STUDY

To determine peak discharge rates, a hydrologic analysis was performed using WinTR-20 methodologies. The peak discharge rates were determined for the Points of Interest (POIs). The locations of the POIs, along with soil type and land use, are shown on the Drainage Area Map provided in **Appendix E.7**.

Two (2) TR-20 models were utilized, one for Mill Swamp (Mainstem) and one for the UNT, as the confluence does not occur until downstream of the project site. The Mainstem TR-20 model is comprised of four (4) drainage areas (DAs) flowing to the outlet, located at the Norris property boundary. The UNT TR-20 model is comprised of two (2) drainage areas (DAs) flowing to the outlet, located at the Tippett southern property boundary. There are six (6) POIs of importance to the design and analysis.

- **POI 1** is located along the main stem at the downstream limit of SR-1, just upstream of where the floodplain begins to widen. POI 1 will be used for the design of SR-1. In the TR-20 Main Stem output file this POI is displayed as CON-1.
- **POI 2** is located along the main stem, at the upstream side of the 72” RCP driveway culvert. POI 2 will be used for the design of SR-2. In the TR-20 Main Stem output file this POI is displayed as CON-2.

- **POI 3** is located along the main stem, at the downstream side of the 72” RCP driveway culvert. POI 3 will be used for the design of SR-2. In the TR-20 Main Stem output file this POI is displayed as CON-3.
- **POI 4** is located along the main stem, at the downstream limit of the main stem on the project site. POI 4 will be used for the design of SR-3. In the TR-20 Main Stem output file this POI is displayed as OUTLET.
- **POI 5** is located along the UNT, just downstream of the agricultural fields adjacent to SR-4. POI 5 will be used for the design of SR-4. In the TR-20 UNT output file this POI is displayed as CON-4.
- **POI 6** is located along the UNT, at the downstream limit of the UNT on the project site. The UNT flows approximately 1,565-ft downstream to the confluence with the main stem, which occurs downstream of the downstream limit of the project site. POI 6 will be used for the design of SR-5. In the TR-20 UNT output file this POI is displayed as OUTLET.

JMT modified the TR-20 output from GISHydro2000 to compute discharge values at the various areas of interest using the existing condition land use. Curve Numbers generated from GISHydro2000 were utilized in conjunction with WinTR-55 to compute the Time of Concentration (Tc paths) for each subbasin, based on individual land uses and soil types. The 2021 Charles County Land Use Data and Zoning shows that the drainage area is not zoned for future development, as the area is zoned as a RC-PL (Rural Conservation District and Protected Lands). Therefore, the existing conditions land use was determined to be equivalent to the ultimate land use for the drainage area, requiring only one hydrologic model. Since no significant difference is expected in the drainage area, existing discharge values were selected to be used in the proposed design.

The discharge value expectation per the *Introduction to GISHydro2000 Training Manual, November 2007* is as follows: “Calibration of TR-20 is expected for the [Fixed Region Regression Equation] between the best estimate and the best estimate plus one standard deviation” (Moglen, 24). The Fixed Region Regression Equation discharge values as well as the lower and upper standard deviations were output from GISHydro. The TR-20 Main Stem output discharge values for the 2-year, 5-year and 10-year storms were higher than the upper limit standard deviation, and the TR-20 UNT output discharge values for the 2-year storm was higher than the upper limit standard deviation. Per the *Applications of Hydrologic Methods in Maryland, Fifth Edition 2020:* “if the flood estimates using the 24-hour storm do not lie between the regression estimate and the upper prediction limit, the analyst should use….6-hour storm for the 2-, 5- and 10-year events provided that the Tc to the design point is not greater than 6 hours”. The Main Stem TR-20 was calibrated for the 2-year, 5-year and 10-year storm events, and the UNT TR-20 was calibrated using the 2-year storm event, by using a 6-hour storm distribution as the design storm rather than the 24-hour storm. After calibration, the 2-year, 5-year and 10-year discharge values are within the lower and upper limit of standard deviation.

The peak discharges can be seen in **Table 8** below:

**Table 8: Baseline Peak Discharges ($Q_2$, $Q_{10}$, $Q_{100}$)**

| Location | Drainage Area* (mi$^2$) | $Q_2$ (cfs) | $Q_{10}$ (cfs) | $Q_{100}$ (cfs) |
|---|---|---|---|---|
| POI-1 | 2.42 | 294.0 | 719.9 | 2230.7 |
| POI-2 | 2.45 | 294.4 | 722.1 | 2236.4 |
| POI-3 | 2.46 | 294.4 | 722.0 | 2236.6 |
| POI-4 | 2.54 | 298.3 | 735.4 | 2285.1 |
| POI-5 | 2.76 | 321.4 | 1257.6 | 2684.5 |
| POI-6 | 2.77 | 320.4 | 1256.5 | 2682.3 |

*Drainage area values denote cumulative totals.

The existing condition discharge values, for the furthest downstream POI of the mainstem (POI-4) and the UNT (POI-6), were compared to the Fixed Region Regression Equation for the Western Coastal Plain Region. The discharge values for this analysis can be seen in **Tables 9** and **10** below:

**Table 9: Mainstem Outlet (POI-4) Discharge Analysis**

| Storm Event | Lower Limit Standard Deviation Discharge (cfs) | Fixed Regression Equation Discharge (cfs) | Upper Limit Standard Deviation Discharge (cfs) | Outlet WinTR-20 Baseline Conditions Discharge (cfs) |
|---|---|---|---|---|
| 2-year (6-hour) | 109 | 181 | 300 | 298.3 |
| 5-year (6-hour) | 259 | 399 | 615 | 525.7 |
| 10-year (6-hour) | 439 | 637 | 925 | 735.4 |
| 25-year (24-hour) | 791 | 1085 | 1488 | 1521.7 |
| 50-year (24-hour) | 1159 | 1554 | 2084 | 1890.6 |
| 100-year (24-hour) | 1601 | 2170 | 2940 | 2285.1 |

**Table 10: UNT Outlet (POI-6) Discharge Analysis**

| Storm Event | Lower Limit Standard Deviation Discharge (cfs) | Fixed Regression Equation Discharge (cfs) | Upper Limit Standard Deviation Discharge (cfs) | Outlet WinTR-20 Baseline Conditions Discharge (cfs) |
|---|---|---|---|---|
| 2-year (6-hour) | 187 | 305 | 498 | 320.4 |
| 5-year (24-hour) | 418 | 635 | 964 | 909.7 |
| 10-year (24-hour) | 687 | 984 | 1411 | 1256.5 |
| 25-year (24-hour) | 1186 | 1609 | 2184 | 1768.6 |
| 50-year (24-hour) | 1690 | 2244 | 2978 | 2207.6 |
| 100-year (24-hour) | 2282 | 3060 | 4103 | 2682.3 |

Additional information on the WinTR-20 model hydrologic input and output data and WinTR-55 output data are provided in **Appendix E.7**.

## 13. THE PROCESS DRIVERS CONTRIBUTING TO IMPAIRMENT AT THE SITE

Investigation of the site has revealed geology as the primary process driver and hydrology as the secondary process driver for the impairments to the wetlands and waterways on the site. The impairments are largely due to colonization and anthropogenic processes as described below:

- Degradation of Streams
    - In many locations, the stream is incised with high banks which limit the channel's capacity to adjust its geometry.
    - The streams at the project site have lost their connection to the floodplain due to channel incision, eliminating the stream's capacity to attenuate high flow events yielding an increase in flood events on adjacent roadways.
- Straightening of Streams
    - Historic aerial investigation reveals many streams on the site were channelized. Streams are low sinuosity.
- Impairment of Stream Substrates
    - Channelization has disrupted the natural sediment transport processes. In many locations, the stream has incised towards earlier geologic materials due to modification of the landscape.
- Agriculture
    - Historic aerial investigation reveals previously forested areas adjacent to streams have likely been cleared for agricultural purposes.

These impacts are in addition to the principal historic watershed impacts of deforestation, urbanization, and climate change, which imperil resources throughout the state. Current zoning and county codes permit incremental increases in impervious area, which contribute to urbanization. Climate change contributes to destabilization of the precipitation regime and more extreme wet and / or dry events. Forest impacts include deforestation and logging, all permissible activities despite Forest Conservation Act protections, which may or may not reforest the same watershed as implemented on a county basis.

The Mill Swamp Mitigation Bank is a headwater alluvial system. When impairments are introduced to a system, the stream's inherent process-response mechanisms are distorted. The impairments at Mill Swamp and the UNT, specifically straightened and incised channels, have caused the system to morphologically mimic geological confinement. Streams with geology as the primary process driver resist channel adjustments that are generally more feasible when hydrology and biology are the primary drivers.

The influence of the impaired geology on the system limits the process-response mechanisms that the other process drivers typically use to respond to disturbances. Geological confinement is a limiting factor that facilitates the impairments associated with the site's secondary process driver, hydrology. All streams at this project site have a disconnected floodplain yielding it inaccessible to attenuate sediment and high flows, as well as exchange surface and groundwater discharge.

The geological and hydrological impairments present on the site diminish the ability for biology, specifically suitable native plants, to be an active process driver. In restoration, it is of the utmost importance to address the impaired geological confinement of the reach to develop biology as a primary process driver. Biological impacts to the site resulting from the primary and secondary process driver's impacts include the following:

- Loss of Water Quality/Decreased Resilience to Thermal Inputs
    - Historic regional trends in water quality, from a variety of causes, have increased conductivity, decreased pH, and increased water temperature / decreased resilience from solar inputs from pre-colonial conditions. Loss of connectivity to groundwater aquifers and perching due to trenching, fill, and draining of floodplain wetlands.
- Loss of Physical Habitats
    - Loss of small gravel substrates and lack of stable woody debris materials in riffles, straightening of stream channels, lack of connectivity to wetland habitats.
- TMDL Pollution Sources
    - Ongoing loss of sediment from erosion causing various impairments within the project reach and downstream.
    - Trophic impacts / ecosystem simplification
    - Dominance of invasive species
    - Loss of surface soil carbon and loss of topsoil and associated biology

The Mitigation Work Plan (MWP) and supporting data are geared toward examining the relationships between the three process drivers, seen on the Stream Evolution Triangle (Castro et al., 2019), and how they rely on one another to develop a stable stream system. The Mill Swamp Mitigation Bank is primarily influenced by the geological and hydrological impairments found on the site. With this information, a restoration plan and respective restoration potential can be evaluated, as well as an approach which avoids and minimizes impacts to existing resources and compensates for temporal losses of those resources. The MWP, which discusses the proposed design of the site, is included in **Appendix G**.

## 14. REFERENCES

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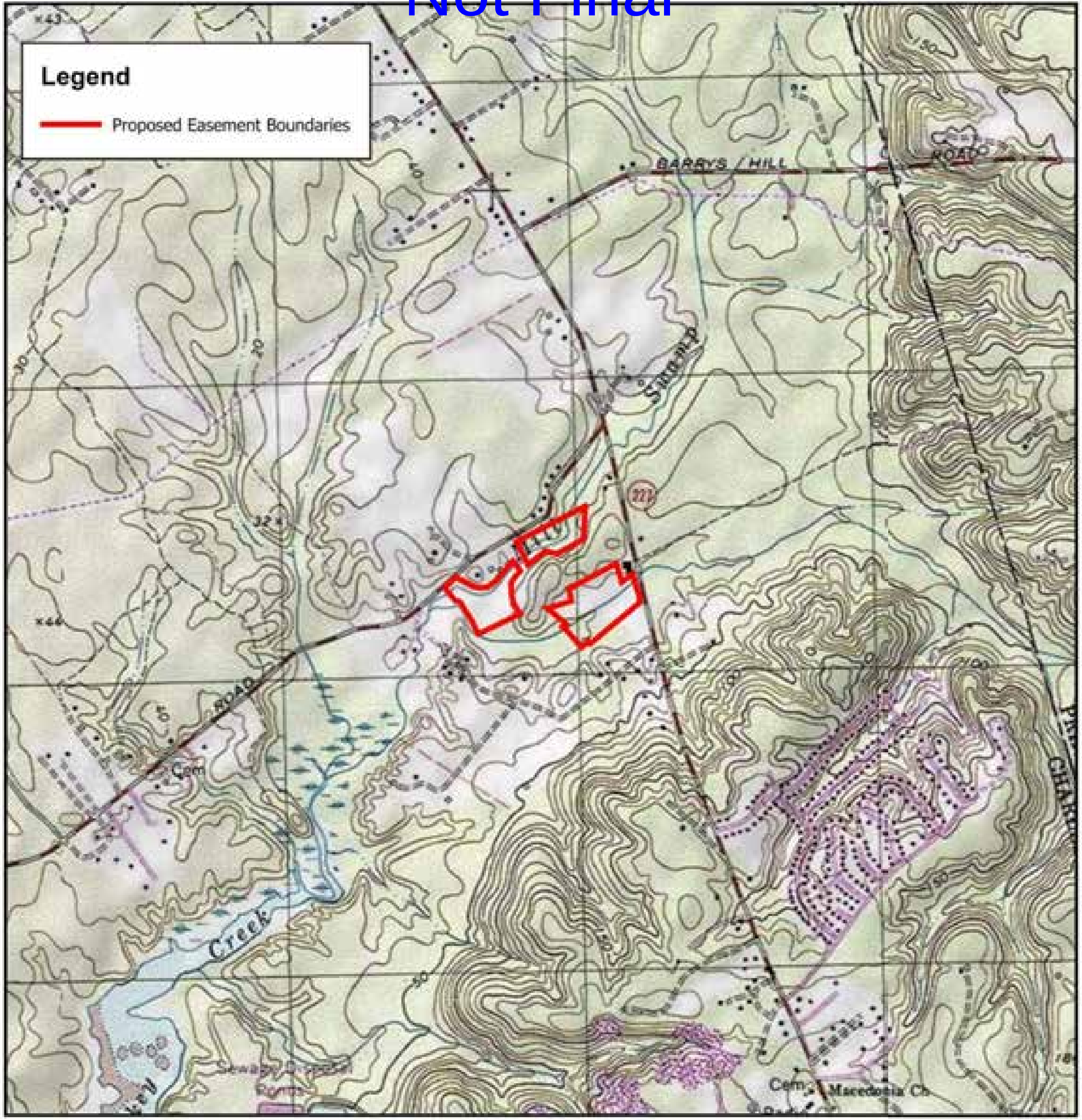
# APPENDIX E.1
# USGS TOPOGRAPHIC QUADRANGLE



JMT

0 1,250 2,500
Feet
1:18,000
77.0811028°W 38.6554411°N

N

## Proposed Mill Swamp Mitigation Bank
## APPENDIX E.1
## USGS 7.5' Topographic Map

Charles County, Maryland

Date: July 2025

Source: USGS

# APPENDIX E.2
# CURRENT AND HISTORIC AERIAL IMAGERY

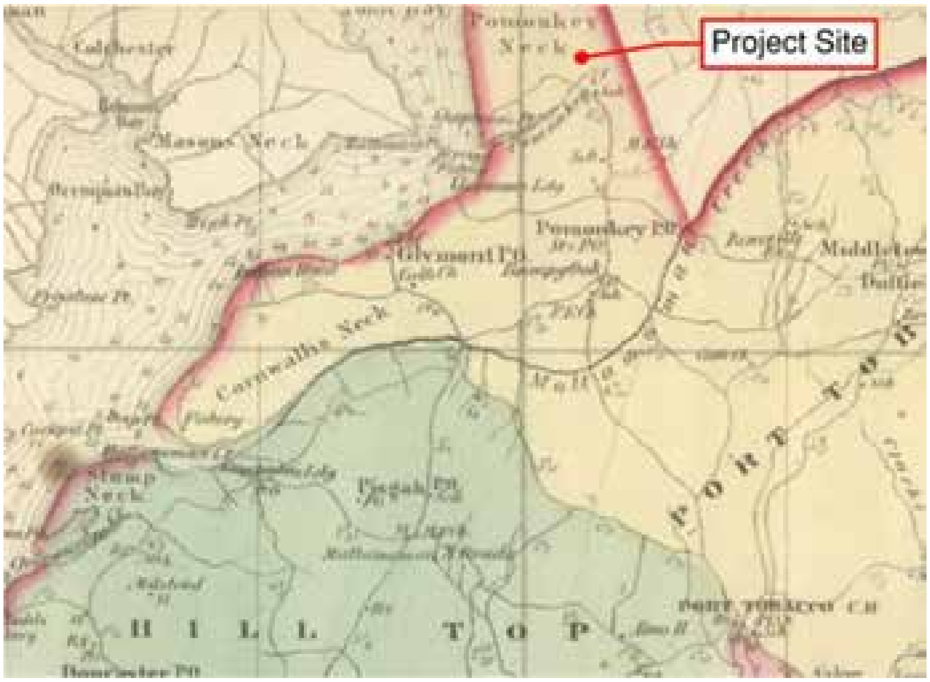


***Figure 1:*** *Map of Charles County by Simon J. Martenet, 1866. The project site consists of tributaries to Pomonkey Creek which ultimately flows to the Potomac River.*

***Figure 2:*** *Aerial image from April 2002 shows impairments to Mill Swamp and the UNT, including ditching and channel straightening due to anthropogenic influences. A portion of Mill Swamp exhibits oxbows and channel off-chutes, indicating numerous historic floodplain hydrologic influences.*

***Figure 3:*** *Aerial image from April 2016 shows reduction in floodplain hydrologic influences, indicating a decrease in floodplain connection likely due to an incised stream channel.*

***Figure 4:*** *Aerial image from March 2024 shows further reduction in floodplain hydrologic influences, indicating active vertical erosion contributing to decreased floodplain connection.*

***Figure 5:*** *Aerial image (February 2025) of SR-1: Mill Swamp (Upstream Reach) beginning at the Marshall Hall Rd 6'x12' dual box culvert and extending downstream 905 linear feet to SR-2.*

***Figure 6:*** *Aerial image (February 2025) of SR-2: Mill Swamp (Middle Reach) located immediately downstream of SR-1 and extending downstream 1,022 linear feet to the 72" RCP private driveway culvert.*

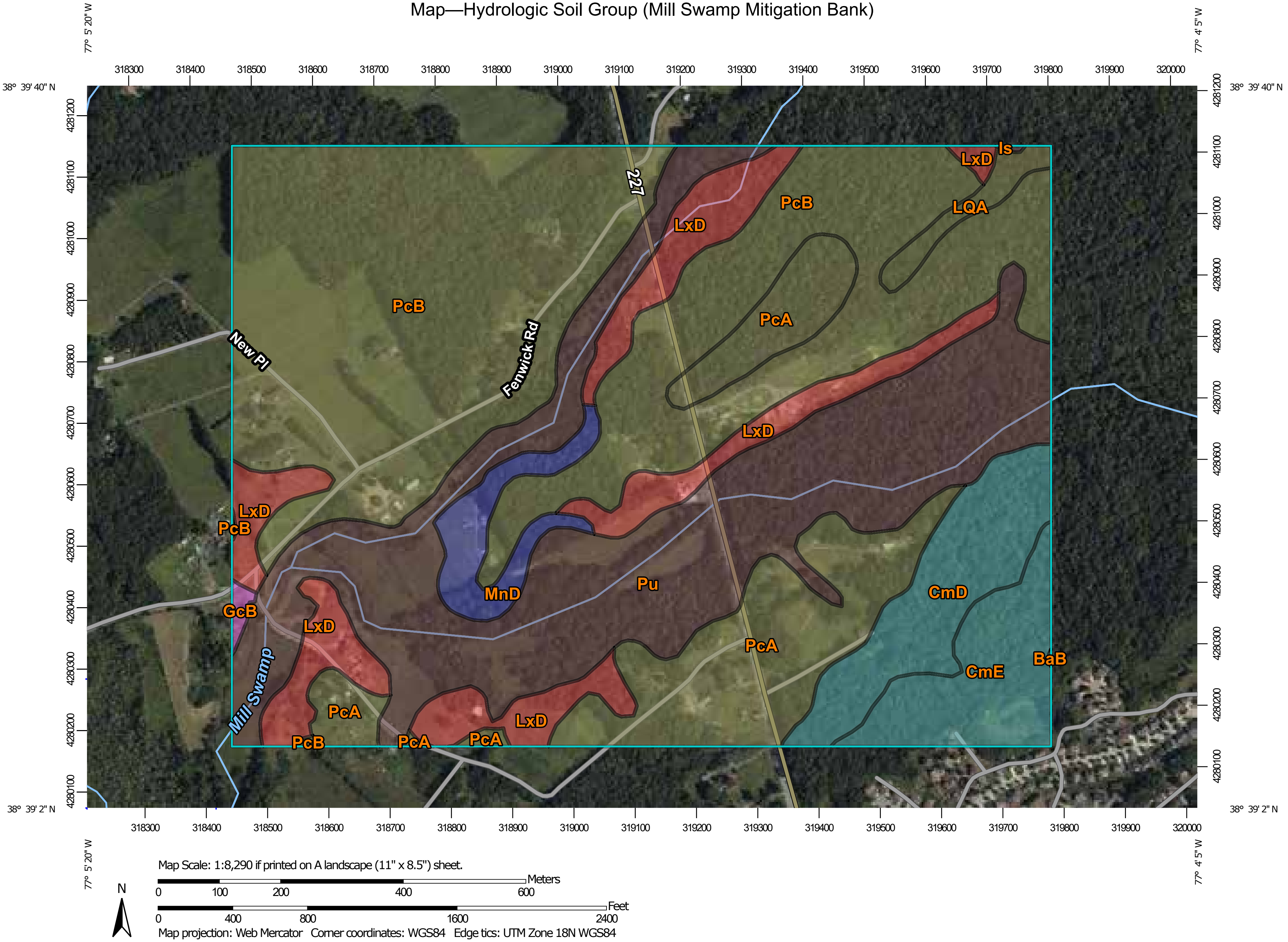
***Figure 7:*** *Aerial image (February 2025) of SR-3: Mill Swamp (Downstream Reach) beginning at the 72" RCP private driveway culvert and extending downstream 977 linear feet, terminating approximately 235-ft upstream of the confluence with the UNT.*

***Figure 8:*** *Aerial image (February 2025) of SR-4: UNT to Mill Swamp (Upstream Reach beginning at the Marshall Hall Rd 6'x10.5' dual box culvert and extending downstream 682 linear feet to SR-5.*

***Figure 9:*** *Aerial image (February 2025) of SR-5: UNT to Mill Swamp (Downstream Reach) beginning at SR-4 and extending downstream 364 linear feet, terminating approximately 1,565-ft upstream of the confluence with Mill Swamp.*

# APPENDIX E.3
# NRCS SOILS MAP

# Map—Hydrologic Soil Group (Mill Swamp Mitigation Bank)



## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Lines**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Points**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Charles County, Maryland
Survey Area Data: Version 18, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 13, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Table—Hydrologic Soil Group (Mill Swamp Mitigation Bank)

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| BaB | Beltsville silt loam, 2 to 5 percent slopes | C | 0.0 | 0.0% |
| CmD | Croom-Marr complex, 10 to 15 percent slopes | C | 17.2 | 5.3% |
| CmE | Croom-Marr complex, 15 to 25 percent slopes | C | 14.5 | 4.5% |
| GcB | Galestown-Hammonton complex, 0 to 5 percent slopes | A | 0.6 | 0.2% |
| Is | Issue silt loam, occasionally flooded | B/D | 0.1 | 0.0% |
| LQA | Lenni and Quindocqua soils, 0 to 2 percent slopes | C/D | 3.3 | 1.0% |
| LxD | Liverpool-Piccowaxen complex, 5 to 15 percent slopes | D | 31.3 | 9.6% |
| MnD | Marr-Dodon complex, 10 to 15 percent slopes | B | 7.6 | 2.3% |
| PcA | Piccowaxen loam, 0 to 2 percent slopes | C/D | 38.0 | 11.7% |
| PcB | Piccowaxen loam, 2 to 5 percent slopes | C/D | 129.8 | 40.0% |
| Pu | Potobac-Issue complex, frequently flooded | B/D | 81.9 | 25.3% |
| **Totals for Area of Interest** | | | **324.2** | **100.0%** |

## Rating Options—Hydrologic Soil Group (Mill Swamp Mitigation Bank)

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

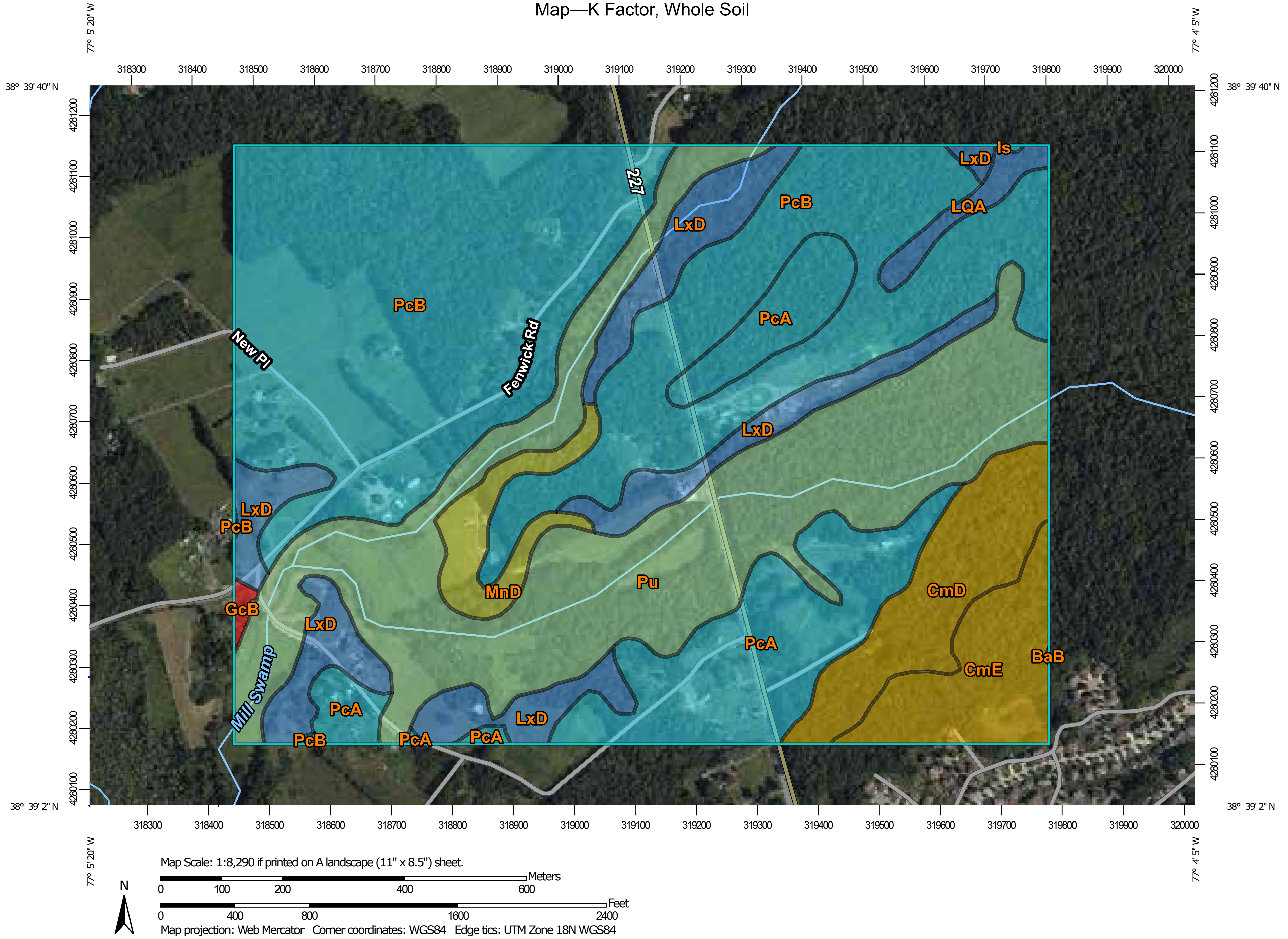
## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

## Map—K Factor, Whole Soil



Map Scale: 1:8,290 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

**Soil Rating Lines**

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

**Soil Rating Points**

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Charles County, Maryland
Survey Area Data: Version 18, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 13, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

### Table—K Factor, Whole Soil

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| BaB | Beltsville silt loam, 2 to 5 percent slopes | .37 | 0.0 | 0.0% |
| CmD | Croom-Marr complex, 10 to 15 percent slopes | .15 | 17.2 | 5.3% |
| CmE | Croom-Marr complex, 15 to 25 percent slopes | .15 | 14.5 | 4.5% |
| GcB | Galestown-Hammonton complex, 0 to 5 percent slopes | .02 | 0.6 | 0.2% |
| Is | Issue silt loam, occasionally flooded | .37 | 0.1 | 0.0% |
| LQA | Lenni and Quindocqua soils, 0 to 2 percent slopes | .43 | 3.3 | 1.0% |
| LxD | Liverpool-Piccowaxen complex, 5 to 15 percent slopes | .43 | 31.3 | 9.6% |
| MnD | Marr-Dodon complex, 10 to 15 percent slopes | .20 | 7.6 | 2.3% |
| PcA | Piccowaxen loam, 0 to 2 percent slopes | .37 | 38.0 | 11.7% |
| PcB | Piccowaxen loam, 2 to 5 percent slopes | .37 | 129.8 | 40.0% |
| Pu | Potobac-Issue complex, frequently flooded | .28 | 81.9 | 25.3% |
| **Totals for Area of Interest** | | | **324.2** | **100.0%** |

### Rating Options—K Factor, Whole Soil

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

*Layer Options (Horizon Aggregation Method):* Surface Layer (Not applicable)

## Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

## Hydrologic Soil Group (Mill Swamp Mitigation Bank)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

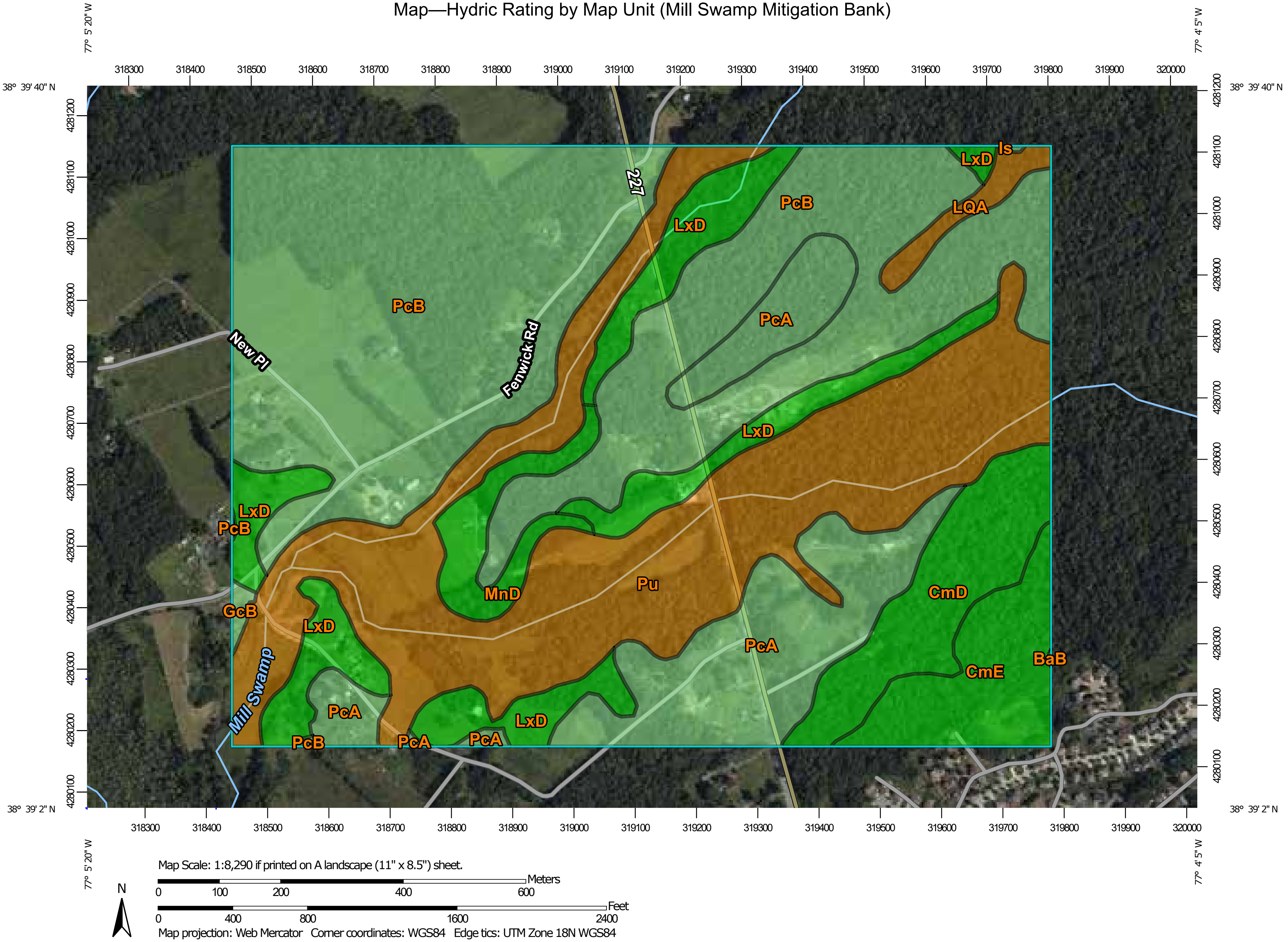
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

# Map—Hydric Rating by Map Unit (Mill Swamp Mitigation Bank)



Map Scale: 1:8,290 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

- ⬜ Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

- 🟥 Hydric (100%)
- 🟧 Hydric (66 to 99%)
- 🟨 Hydric (33 to 65%)
- 🟩 Hydric (1 to 32%)
- 🟩 Not Hydric (0%)
- ⬜ Not rated or not available

**Soil Rating Lines**

- ~ Hydric (100%)
- ~ Hydric (66 to 99%)
- ~ Hydric (33 to 65%)
- ~ Hydric (1 to 32%)
- ~ Not Hydric (0%)
- ~ Not rated or not available

**Soil Rating Points**

- ■ Hydric (100%)
- ■ Hydric (66 to 99%)
- ■ Hydric (33 to 65%)
- ■ Hydric (1 to 32%)
- ■ Not Hydric (0%)
- ■ Not rated or not available

**Water Features**

- ~ Streams and Canals

**Transportation**

- ┼┼┼ Rails
- ~ Interstate Highways
- ~ US Routes
- ~ Major Roads
- ~ Local Roads

**Background**

- ▨ Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Charles County, Maryland
Survey Area Data: Version 18, Sep 6, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 13, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Table—Hydric Rating by Map Unit (Mill Swamp Mitigation Bank)

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| BaB | Beltsville silt loam, 2 to 5 percent slopes | 5 | 0.0 | 0.0% |
| CmD | Croom-Marr complex, 10 to 15 percent slopes | 0 | 17.2 | 5.3% |
| CmE | Croom-Marr complex, 15 to 25 percent slopes | 0 | 14.5 | 4.5% |
| GcB | Galestown-Hammonton complex, 0 to 5 percent slopes | 5 | 0.6 | 0.2% |
| Is | Issue silt loam, occasionally flooded | 10 | 0.1 | 0.0% |
| LQA | Lenni and Quindocqua soils, 0 to 2 percent slopes | 80 | 3.3 | 1.0% |
| LxD | Liverpool-Piccowaxen complex, 5 to 15 percent slopes | 0 | 31.3 | 9.6% |
| MnD | Marr-Dodon complex, 10 to 15 percent slopes | 0 | 7.6 | 2.3% |
| PcA | Piccowaxen loam, 0 to 2 percent slopes | 10 | 38.0 | 11.7% |
| PcB | Piccowaxen loam, 2 to 5 percent slopes | 10 | 129.8 | 40.0% |
| Pu | Potobac-Issue complex, frequently flooded | 75 | 81.9 | 25.3% |
| **Totals for Area of Interest** | | | **324.2** | **100.0%** |

## Rating Options—Hydric Rating by Map Unit (Mill Swamp Mitigation Bank)

*Aggregation Method:* Percent Present

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Lower

# Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

## Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

### K Factor, Whole Soil

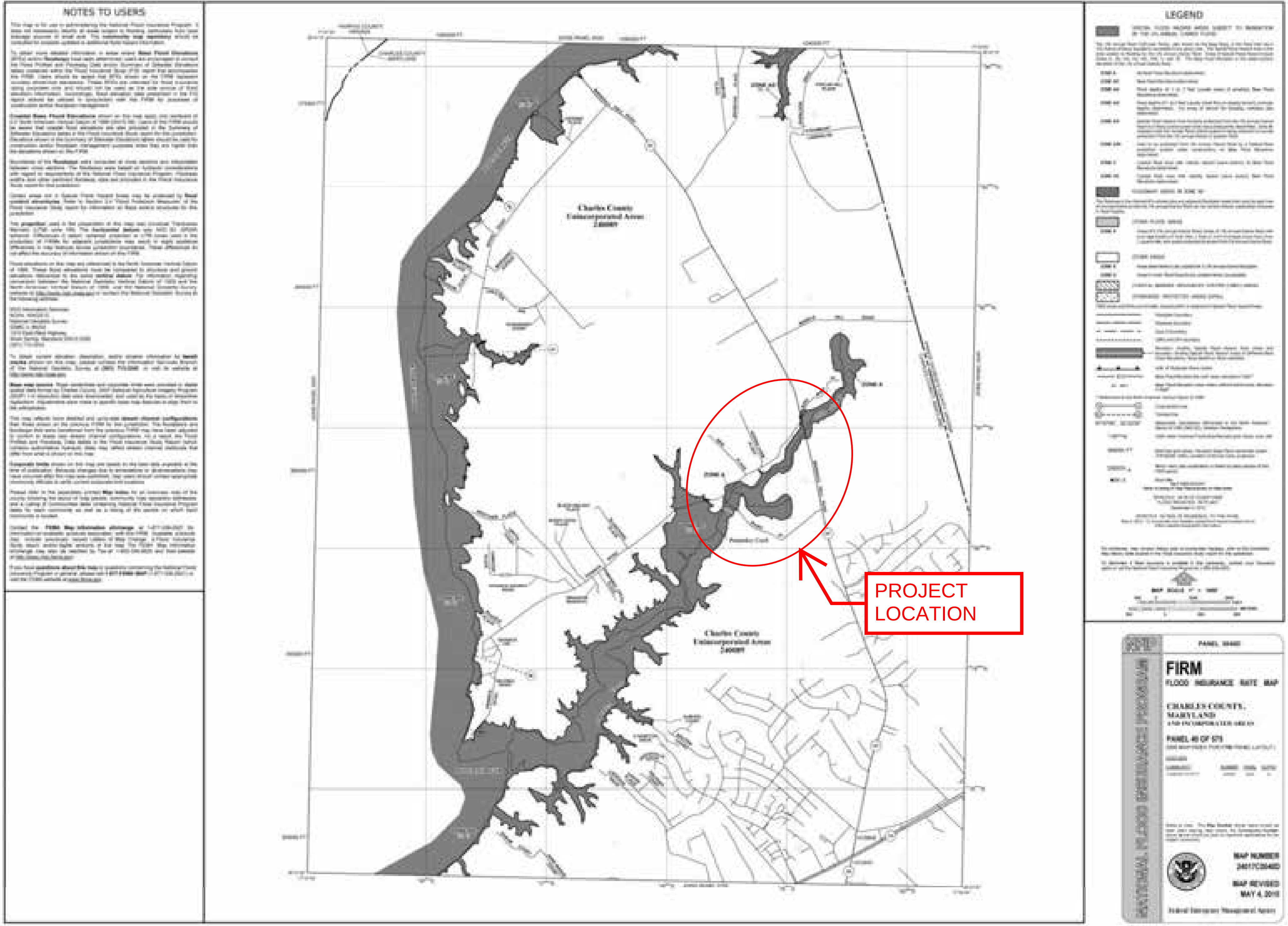
Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

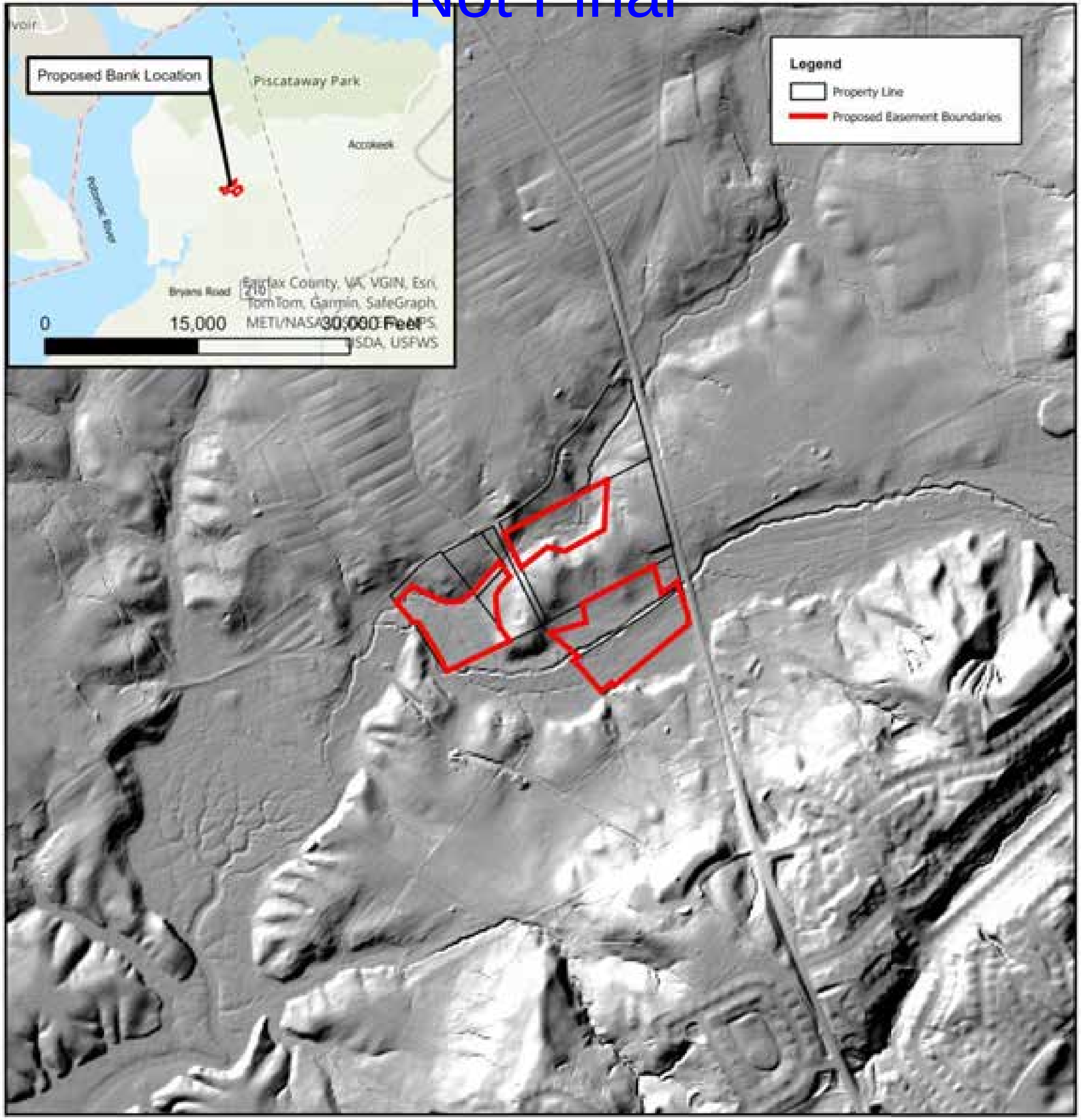
Factor K does not apply to organic horizons and is not reported for those layers.

# APPENDIX E.4
# FEMA 100-YEAR FLOODPLAIN FIRM MAP

Not Final


NOTES TO USERS
LEGEND
Charles County Unincorporated Areas
PROJECT LOCATION
FIRM
FLOOD INSURANCE RATE MAP
CHARLES COUNTY, MARYLAND
AND INCORPORATED AREAS
MAP NUMBER
MAP REVISED
Federal Emergency Management Agency

# APPENDIX E.5
# LIDAR IMAGERY



# Proposed Mill Swamp Mitigation Bank
## APPENDIX E.5 LIDAR Imagery

Charles County, Maryland

0 500 1,000
Feet
1:12,000

N

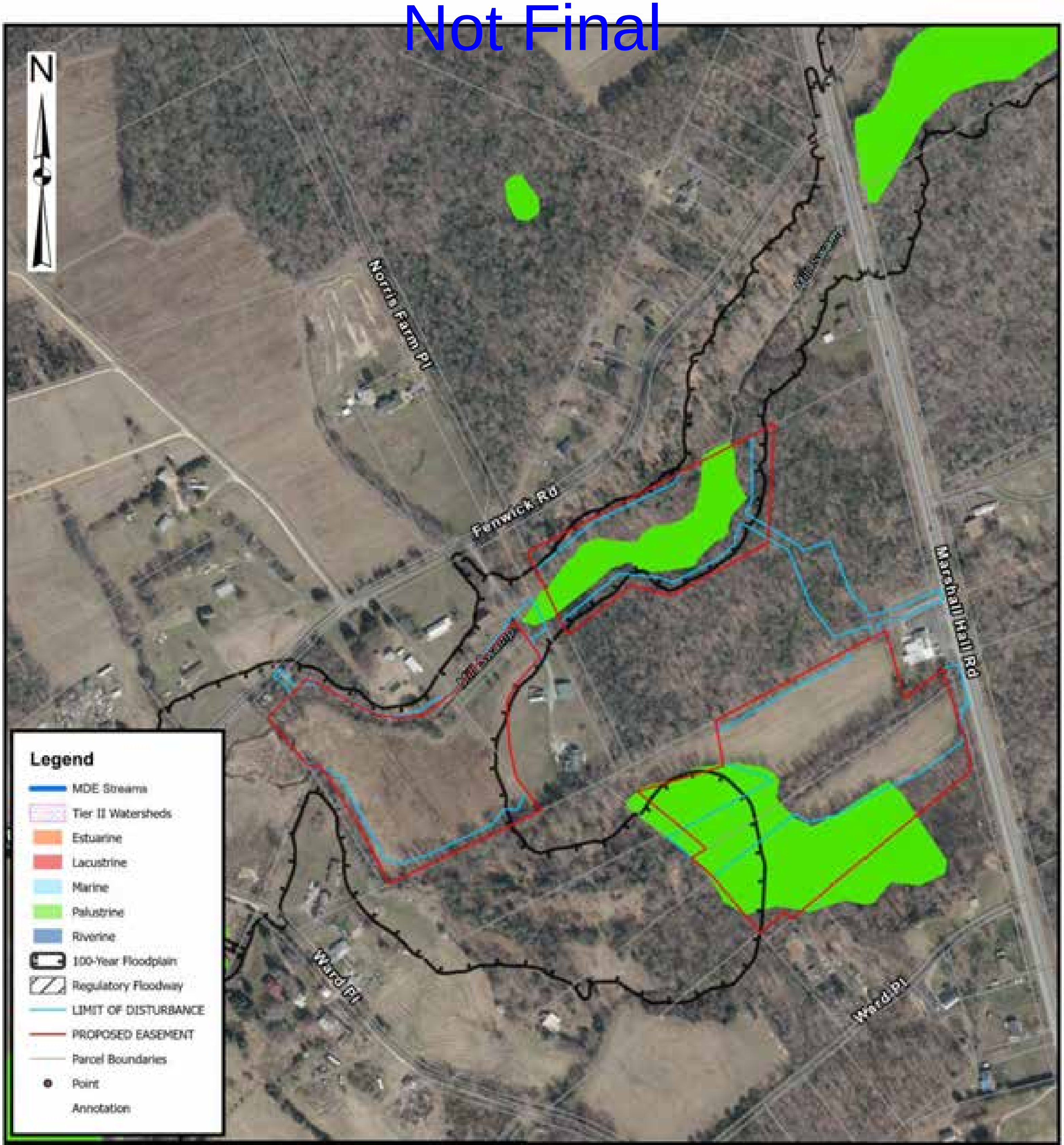
77.0811028°W 38.6554411°N

Date: July 2025

Source: ESRI, iMAP

# APPENDIX E.6

# NATIONAL WETLAND INVENTORY (NWI) MAP AND DNR WETLANDS MAP



0 200 400 800 Feet

1" = 400'

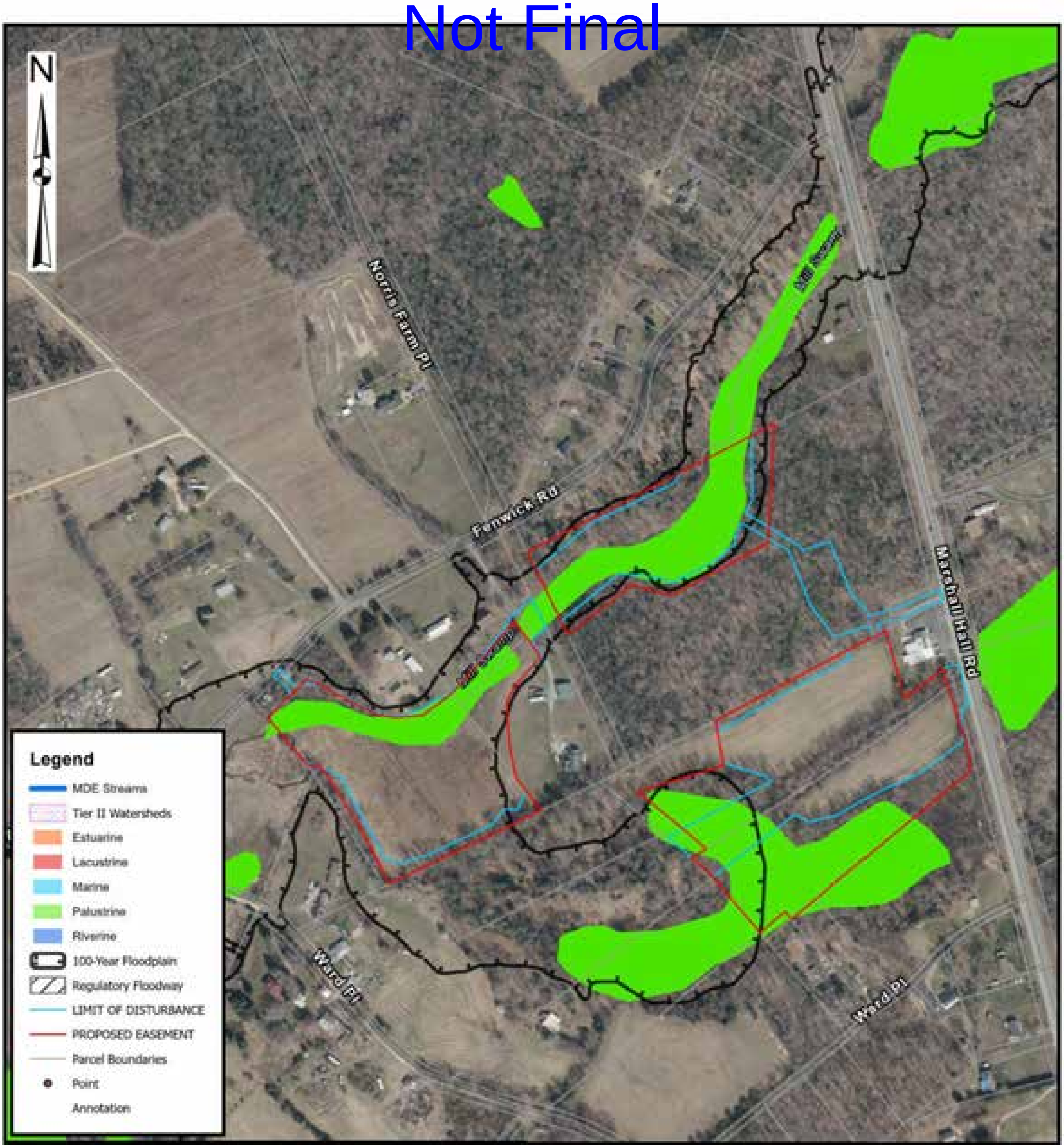
SOURCE: MD IMAP, FEMA, DNR, USFWS NWI,
MDE, ESRI
CREATED BY: ERM/GLZ

# APPENDIX E.6
# DNR WETLANDS

## MILL SWAMP
## MITIGATION BANK

CHARLES COUNTY, MD

DATE: July 2025



0 200 400 800 Feet

1" = 400'

SOURCE: MD IMAP, FEMA, DNR, USFWS NWI, MDE, ESRI

CREATED BY: ERM/GLZ

JMT

# APPENDIX E.6
# NWI WETLANDS

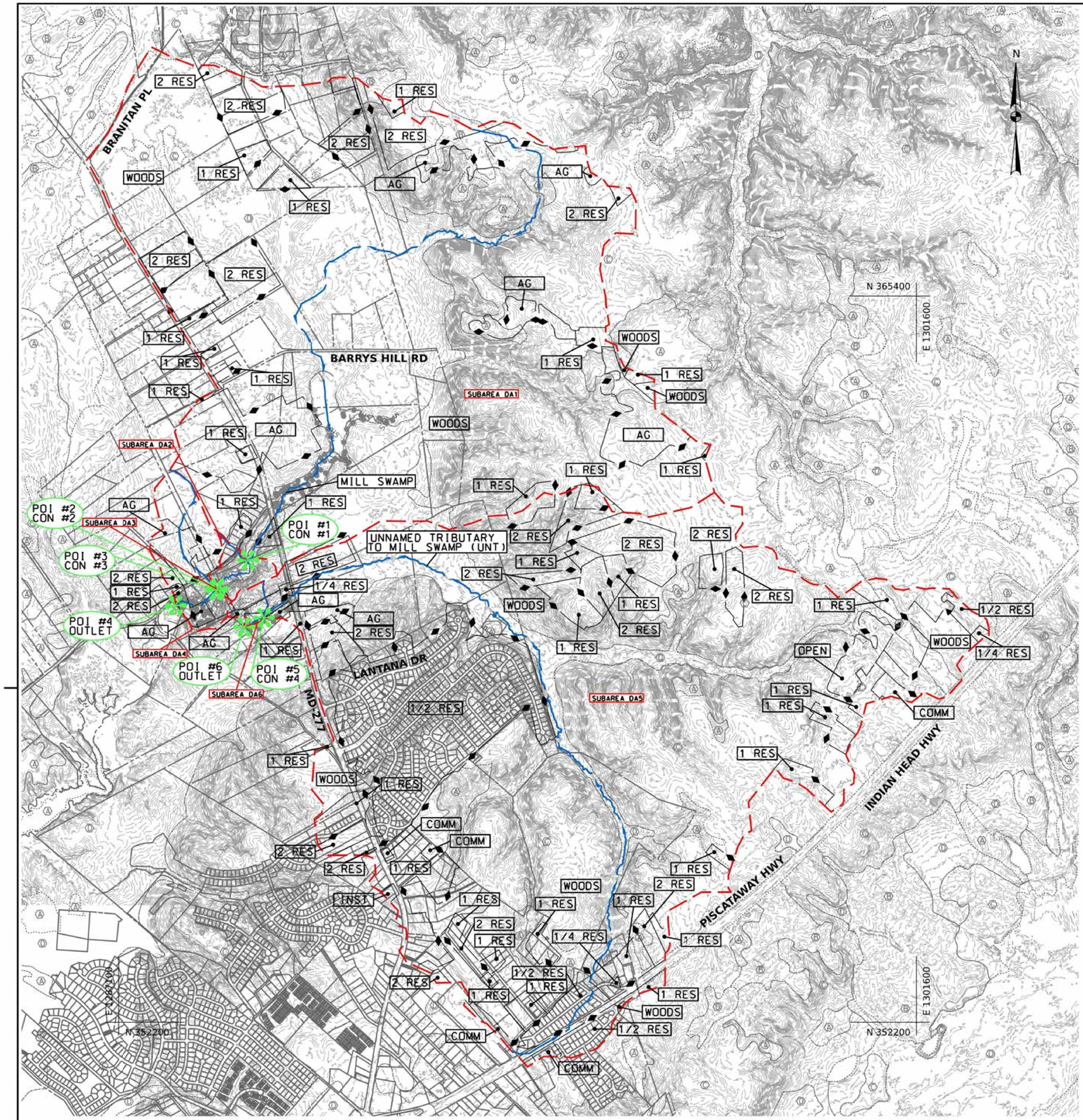
## MILL SWAMP MITIGATION BANK

CHARLES COUNTY, MD

DATE: July 2025

# APPENDIX E.7
# WATERSHED SCALE MAP

Not Final



| DISCHARGE SUMMARY TABLE (CFS) | | | |
|---|---|---|---|
| POI | Q2 | Q10 | Q100 |
| 1 | 294.0 | 719.9 | 2230.7 |
| 2 | 294.4 | 722.1 | 2236.4 |
| 3 | 294.4 | 722.0 | 2236.6 |
| 4 | 298.3 | 735.4 | 2285.1 |
| 5 | 321.4 | 1257.6 | 2684.5 |
| 6 | 320.4 | 1256.5 | 2682.3 |

| SUB AREA SUMMARY TABLE | | | |
|---|---|---|---|
| SUB DA | D.A. (SQ. MI.) | TcPATH | RCN |
| DA 1 | 2.42 | 2.123 | 74.4 |
| DA 2 | 0.03 | 1.336 | 74.4 |
| DA 3 | 0.01 | 0.100 | 74.4 |
| DA 4 | 0.08 | 1.718 | 74.4 |
| DA 5 | 2.76 | 1.872 | 72.7 |
| DA 6 | 0.01 | 0.573 | 72.7 |

*DA & Tc PATH DENOTE SUB AREA AND TRAVEL TIME WITHIN SUBAREA TO POI RESPECTIVELY

| DRAINAGE AREA SUMMARY TABLE | | |
|---|---|---|
| POI | D.A. (SQ. MI.) | RCN |
| 1 | 2.42 | 74.4 |
| 2 | 2.45 | 74.4 |
| 3 | 2.46 | 74.4 |
| 4 | 2.54 | 74.4 |
| 5 | 2.76 | 72.7 |
| 6 | 2.77 | 72.7 |

*DA DENOTES CUMULATIVE TOTAL OF DRAINAGE AREA

LEGEND

| | |
|---|---|
| — 380 — | EXISTING CONTOUR |
| ········ | SOIL BOUNDARY |
| Ⓐ | SOIL TYPE |
| ✳ | POINT OF INVESTIGATION (POI) |
| → → | TcPATH (TIME OF CONCENTRATION) |
| — — — | DRAINAGE AREA BOUNDARY |
| —◆— | LAND USE BOUNDARY |
| WOODS | WOODS |
| OPEN | OPEN SPACE |
| 1 RES | RESIDENTIAL 1 ACRE |
| 2 RES | RESIDENTIAL 2 ACRE |
| 1/2 RES | RESIDENTIAL 1/2 ACRE |
| 1/4 RES | RESIDENTIAL 1/4 ACRE |
| AG | AGRICULTURE |
| COMM | COMMERCIAL |
| INST | INSTITUTIONAL |
| POI #1 | POINT OF INTEREST |

1000' 0 1000' 2000'

SCALE: 1" = 1000'

BY: GZeigler –

JMT

PROFESSIONAL CERTIFICATION

"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 31183, EXPIRATION DATE: 1/13/2027."

DESIGN PROFESSIONAL /CONTACT

JEREMY KOSER
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40 WIGHT AVENUE
HUNT VALLEY, MD 21030
TELEPHONE: 410-316-2360
EMAIL: JKOSER@JMT.COM

# MILL SWAMP MITIGATION BANK

BRYANS ROAD MD 20616

CHARLES COUNTY ELECTION DISTRICT 07 CONGRESSIONAL DISTRICT 05

MARYLAND COORDINATE SYSTEM
HOR. NAD 83/91 MD STATE PLANE VERT NAVD 88

OWNER /DEVELOPER INFORMATION:
JOHNSON, MIRMIRAN & THOMPSON
40 WIGHT AVENUE
HUNT VALLEY, MD 21030

CONTACT INFORMATION
JEREMY KOSER
JOHNSON MIRMIRAN & THOMPSON
TELEPHONE 410-316-2360
EMAIL JKOSER@JMT.COM

REVISIONS

CONCEPT DESIGN

NOT FOR CONSTRUCTION

## DRAINAGE AREA MAP

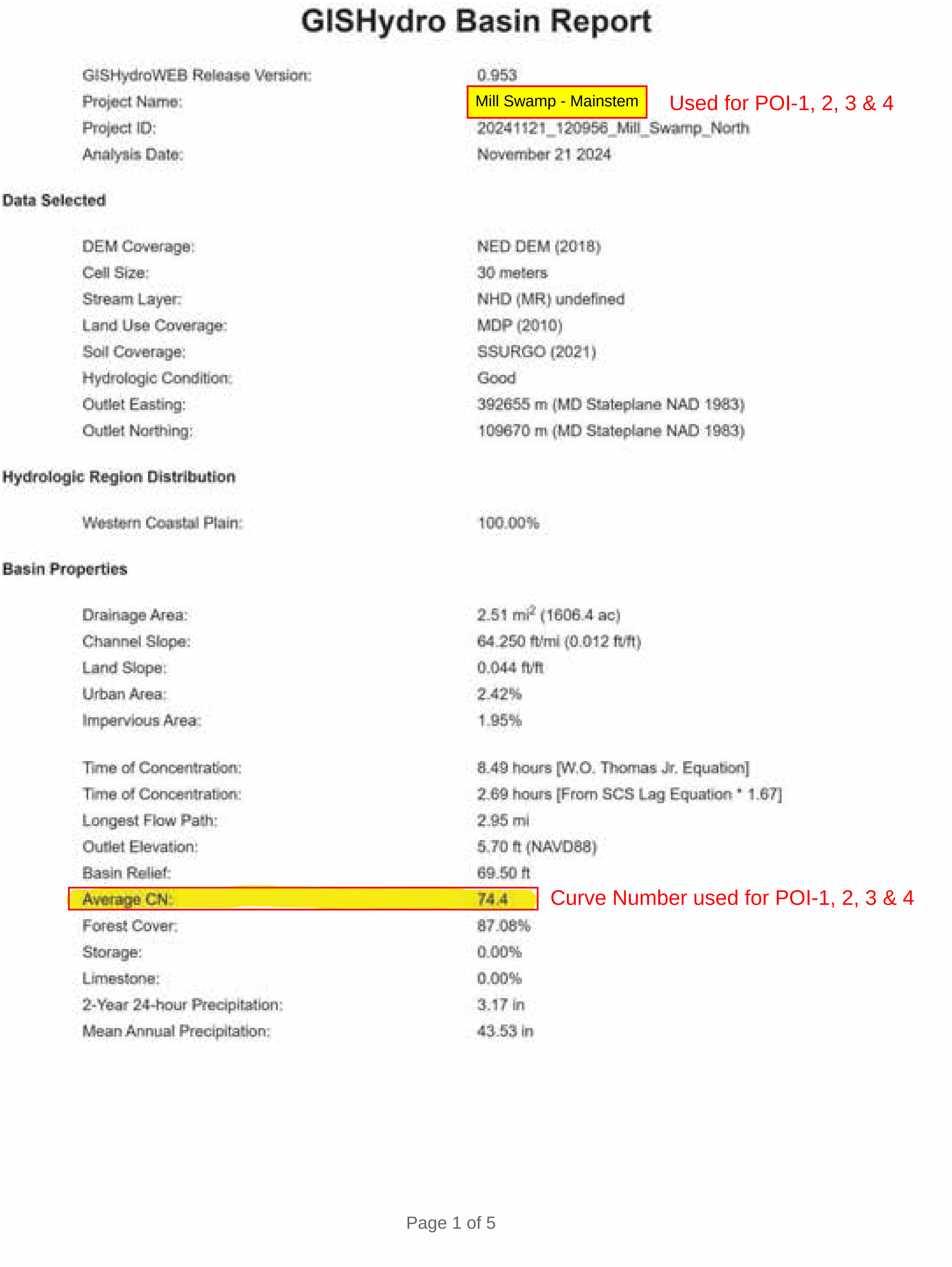
SCALE AS SHOWN DATE JULY 2024 PROJECT NO 25 0075 007

DESIGNED BY KNH
DRAWN BY CLZ
CHECKED BY JLM
F.A.P. NO. N/A
COUNTY CHARLES COUNTY
TOPO FILE N/A
HORIZONTAL SCALE N/A
VERTICAL SCALE N/A

DRAWING NO DA–01 OF 01 SHEET NO 1 OF 1

# GISHYDRO OUTPUT DATA

Not Final



# GISHydro Basin Report

| | |
|---|---|
| GISHydroWEB Release Version: | 0.953 |
| Project Name: | Mill Swamp - Mainstem |
| Project ID: | 20241121_120956_Mill_Swamp_North |
| Analysis Date: | November 21 2024 |

Used for POI-1, 2, 3 & 4

## Data Selected

| | |
|---|---|
| DEM Coverage: | NED DEM (2018) |
| Cell Size: | 30 meters |
| Stream Layer: | NHD (MR) undefined |
| Land Use Coverage: | MDP (2010) |
| Soil Coverage: | SSURGO (2021) |
| Hydrologic Condition: | Good |
| Outlet Easting: | 392655 m (MD Stateplane NAD 1983) |
| Outlet Northing: | 109670 m (MD Stateplane NAD 1983) |

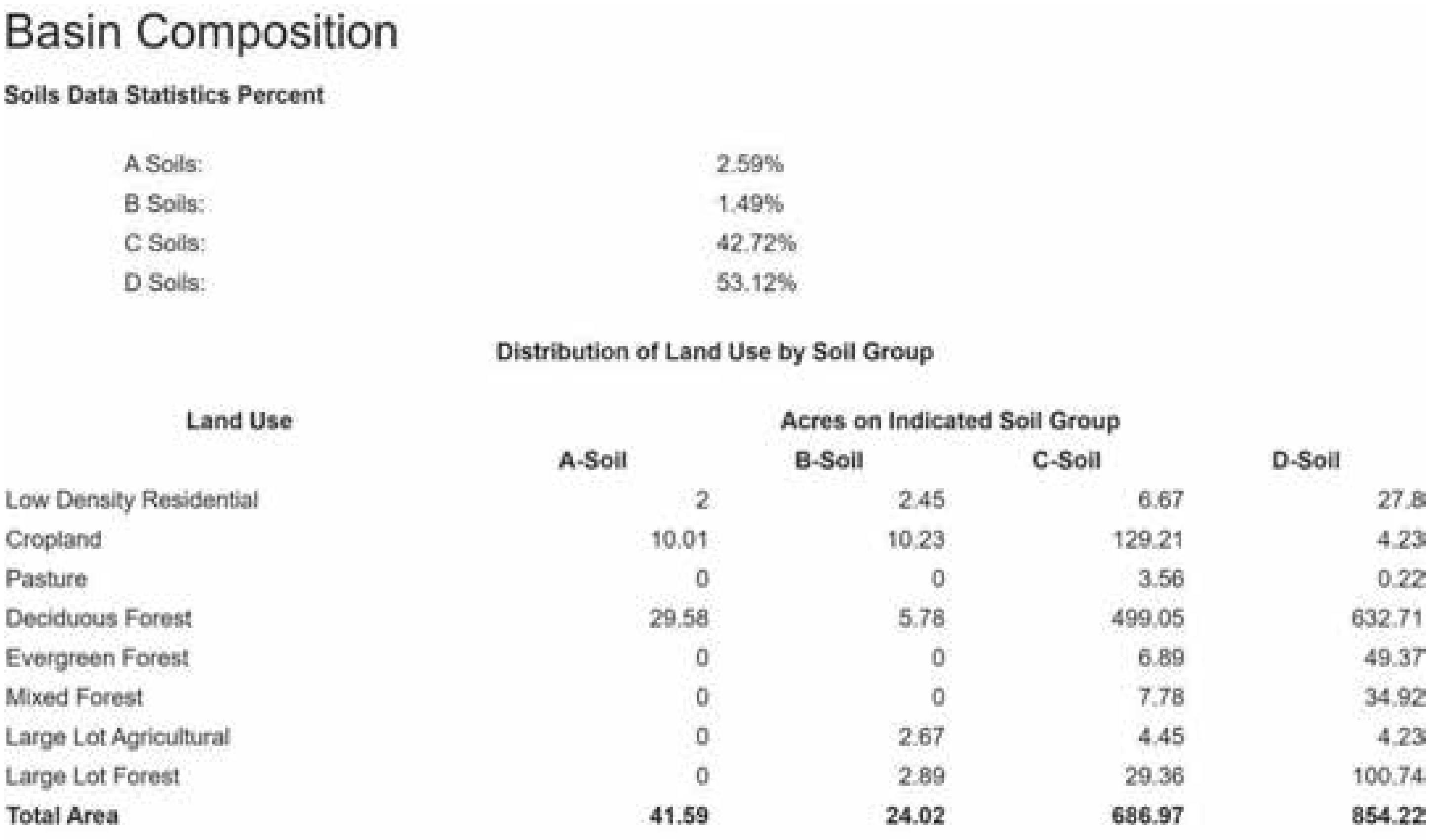
## Hydrologic Region Distribution

| | |
|---|---|
| Western Coastal Plain: | 100.00% |

## Basin Properties

| | |
|---|---|
| Drainage Area: | 2.51 mi$^2$ (1606.4 ac) |
| Channel Slope: | 64.250 ft/mi (0.012 ft/ft) |
| Land Slope: | 0.044 ft/ft |
| Urban Area: | 2.42% |
| Impervious Area: | 1.95% |
| Time of Concentration: | 8.49 hours [W.O. Thomas Jr. Equation] |
| Time of Concentration: | 2.69 hours [From SCS Lag Equation * 1.67] |
| Longest Flow Path: | 2.95 mi |
| Outlet Elevation: | 5.70 ft (NAVD88) |
| Basin Relief: | 69.50 ft |
| Average CN: | 74.4 |
| Forest Cover: | 87.08% |
| Storage: | 0.00% |
| Limestone: | 0.00% |
| 2-Year 24-hour Precipitation: | 3.17 in |
| Mean Annual Precipitation: | 43.53 in |

Curve Number used for POI-1, 2, 3 & 4



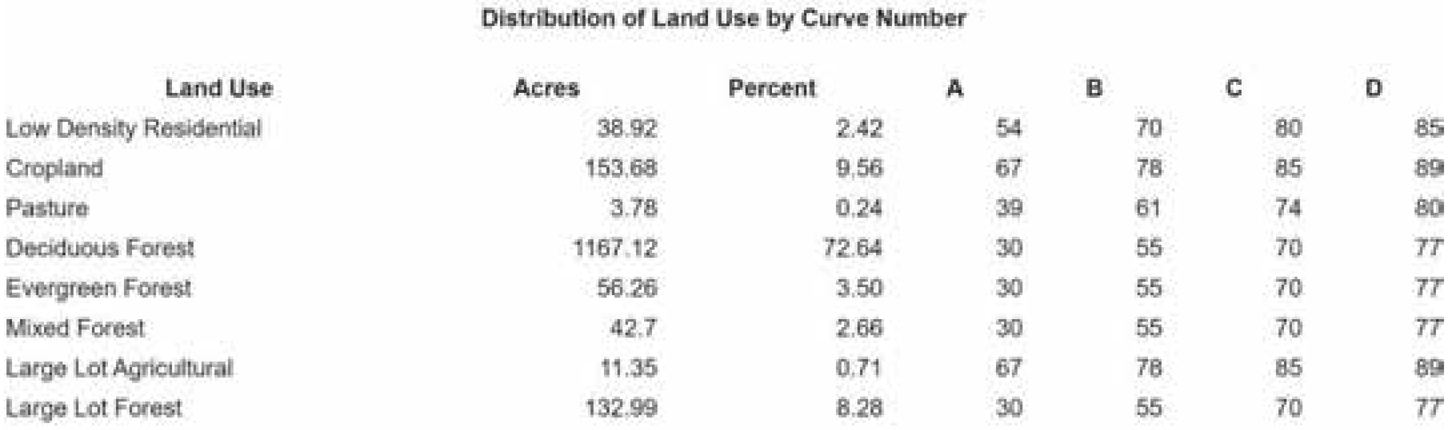
# Basin Composition

**Soils Data Statistics Percent**

| | |
|---|---|
| A Soils: | 2.59% |
| B Soils: | 1.49% |
| C Soils: | 42.72% |
| D Soils: | 53.12% |

**Distribution of Land Use by Soil Group**

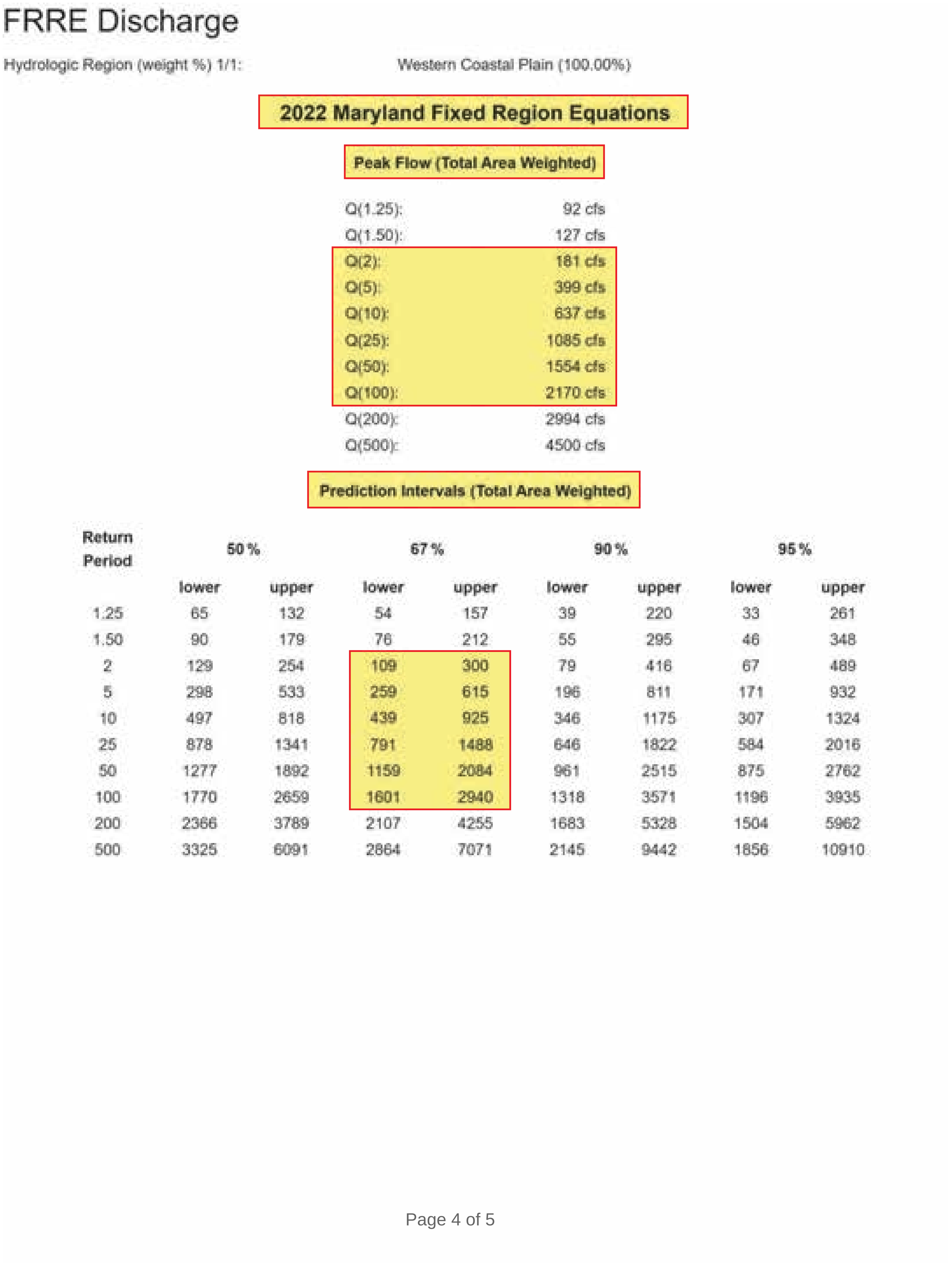
| Land Use | Acres on Indicated Soil Group | | | |
|---|---|---|---|---|
| | A-Soil | B-Soil | C-Soil | D-Soil |
| Low Density Residential | 2 | 2.45 | 6.67 | 27.8 |
| Cropland | 10.01 | 10.23 | 129.21 | 4.23 |
| Pasture | 0 | 0 | 3.56 | 0.22 |
| Deciduous Forest | 29.58 | 5.78 | 499.05 | 632.71 |
| Evergreen Forest | 0 | 0 | 6.89 | 49.37 |
| Mixed Forest | 0 | 0 | 7.78 | 34.92 |
| Large Lot Agricultural | 0 | 2.67 | 4.45 | 4.23 |
| Large Lot Forest | 0 | 2.89 | 29.36 | 100.74 |
| **Total Area** | **41.59** | **24.02** | **686.97** | **854.22** |



## Distribution of Land Use by Curve Number

| Land Use | Acres | Percent | A | B | C | D |
|---|---|---|---|---|---|---|
| Low Density Residential | 38.92 | 2.42 | 54 | 70 | 80 | 85 |
| Cropland | 153.68 | 9.56 | 67 | 78 | 85 | 89 |
| Pasture | 3.78 | 0.24 | 39 | 61 | 74 | 80 |
| Deciduous Forest | 1167.12 | 72.64 | 30 | 55 | 70 | 77 |
| Evergreen Forest | 56.26 | 3.50 | 30 | 55 | 70 | 77 |
| Mixed Forest | 42.7 | 2.66 | 30 | 55 | 70 | 77 |
| Large Lot Agricultural | 11.35 | 0.71 | 67 | 78 | 85 | 89 |
| Large Lot Forest | 132.99 | 8.28 | 30 | 55 | 70 | 77 |

Not Final



## FRRE Discharge

Hydrologic Region (weight %) 1/1: Western Coastal Plain (100.00%)

### 2022 Maryland Fixed Region Equations

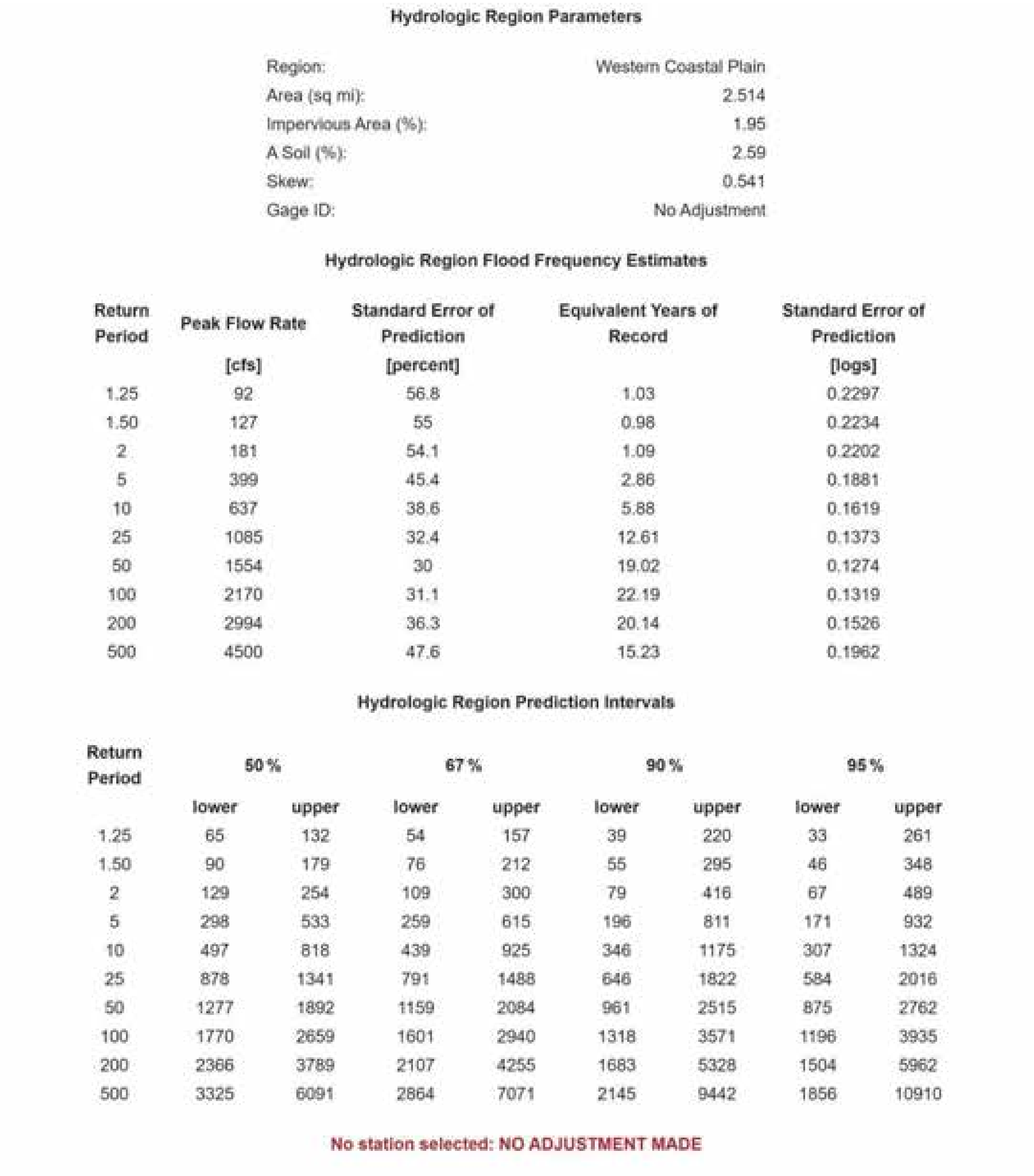
**Peak Flow (Total Area Weighted)**

| | |
|---|---|
| Q(1.25): | 92 cfs |
| Q(1.50): | 127 cfs |
| Q(2): | 181 cfs |
| Q(5): | 399 cfs |
| Q(10): | 637 cfs |
| Q(25): | 1085 cfs |
| Q(50): | 1554 cfs |
| Q(100): | 2170 cfs |
| Q(200): | 2994 cfs |
| Q(500): | 4500 cfs |

**Prediction Intervals (Total Area Weighted)**

| Return Period | 50 % | | 67 % | | 90 % | | 95 % | |
|---|---|---|---|---|---|---|---|---|
| | lower | upper | lower | upper | lower | upper | lower | upper |
| 1.25 | 65 | 132 | 54 | 157 | 39 | 220 | 33 | 261 |
| 1.50 | 90 | 179 | 76 | 212 | 55 | 295 | 46 | 348 |
| 2 | 129 | 254 | 109 | 300 | 79 | 416 | 67 | 489 |
| 5 | 298 | 533 | 259 | 615 | 196 | 811 | 171 | 932 |
| 10 | 497 | 818 | 439 | 925 | 346 | 1175 | 307 | 1324 |
| 25 | 878 | 1341 | 791 | 1488 | 646 | 1822 | 584 | 2016 |
| 50 | 1277 | 1892 | 1159 | 2084 | 961 | 2515 | 875 | 2762 |
| 100 | 1770 | 2659 | 1601 | 2940 | 1318 | 3571 | 1196 | 3935 |
| 200 | 2366 | 3789 | 2107 | 4255 | 1683 | 5328 | 1504 | 5962 |
| 500 | 3325 | 6091 | 2864 | 7071 | 2145 | 9442 | 1856 | 10910 |

# Not Final



## Hydrologic Region Parameters

| | |
|---|---|
| Region: | Western Coastal Plain |
| Area (sq mi): | 2.514 |
| Impervious Area (%): | 1.95 |
| A Soil (%): | 2.59 |
| Skew: | 0.541 |
| Gage ID: | No Adjustment |

## Hydrologic Region Flood Frequency Estimates

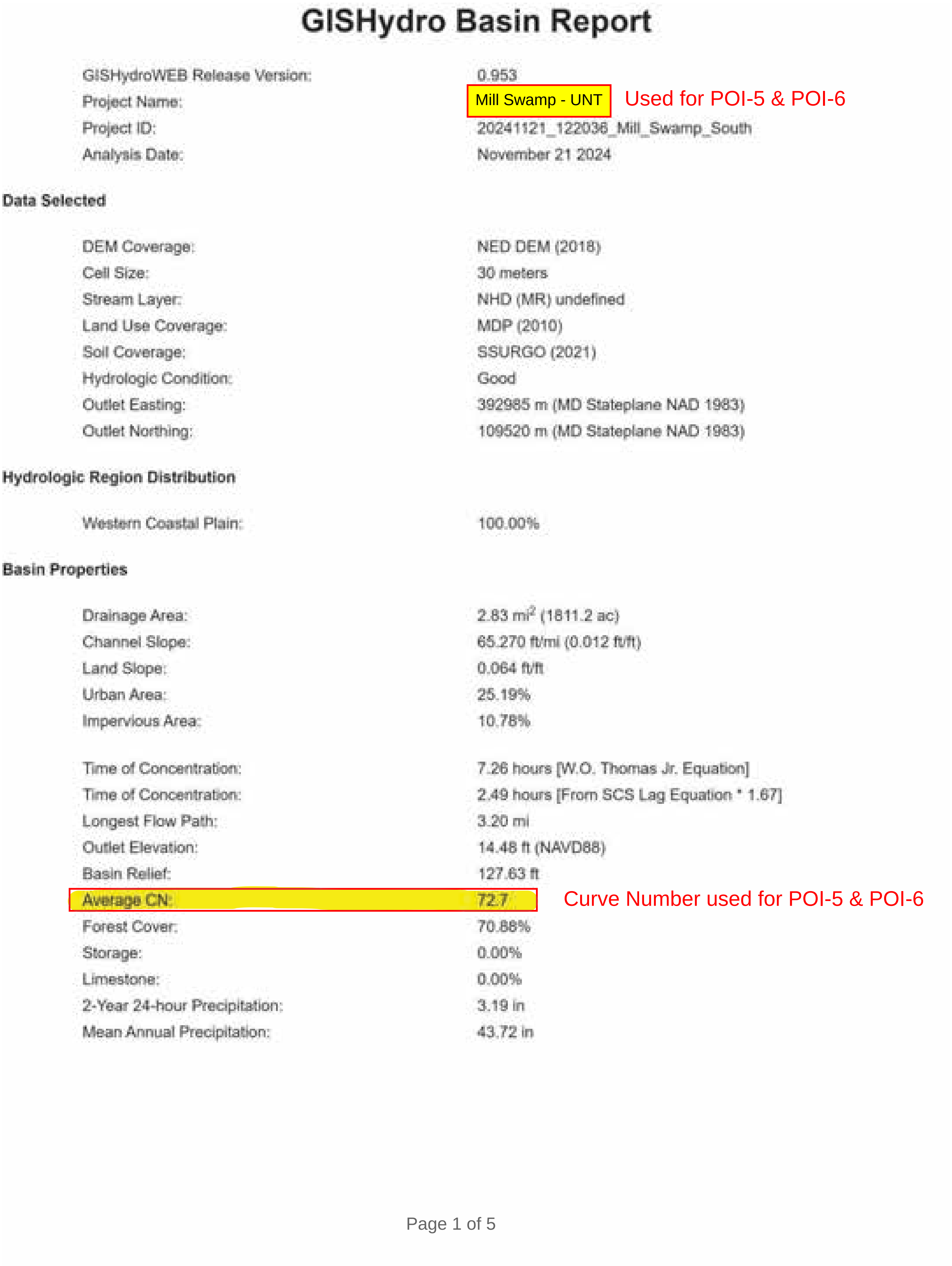
| Return Period | Peak Flow Rate [cfs] | Standard Error of Prediction [percent] | Equivalent Years of Record | Standard Error of Prediction [logs] |
|---|---|---|---|---|
| 1.25 | 92 | 56.8 | 1.03 | 0.2297 |
| 1.50 | 127 | 55 | 0.98 | 0.2234 |
| 2 | 181 | 54.1 | 1.09 | 0.2202 |
| 5 | 399 | 45.4 | 2.86 | 0.1881 |
| 10 | 637 | 38.6 | 5.88 | 0.1619 |
| 25 | 1085 | 32.4 | 12.61 | 0.1373 |
| 50 | 1554 | 30 | 19.02 | 0.1274 |
| 100 | 2170 | 31.1 | 22.19 | 0.1319 |
| 200 | 2994 | 36.3 | 20.14 | 0.1526 |
| 500 | 4500 | 47.6 | 15.23 | 0.1962 |

## Hydrologic Region Prediction Intervals

| Return Period | 50 % | | 67 % | | 90 % | | 95 % | |
|---|---|---|---|---|---|---|---|---|
| | lower | upper | lower | upper | lower | upper | lower | upper |
| 1.25 | 65 | 132 | 54 | 157 | 39 | 220 | 33 | 261 |
| 1.50 | 90 | 179 | 76 | 212 | 55 | 295 | 46 | 348 |
| 2 | 129 | 254 | 109 | 300 | 79 | 416 | 67 | 489 |
| 5 | 298 | 533 | 259 | 615 | 196 | 811 | 171 | 932 |
| 10 | 497 | 818 | 439 | 925 | 346 | 1175 | 307 | 1324 |
| 25 | 878 | 1341 | 791 | 1488 | 646 | 1822 | 584 | 2016 |
| 50 | 1277 | 1892 | 1159 | 2084 | 961 | 2515 | 875 | 2762 |
| 100 | 1770 | 2659 | 1601 | 2940 | 1318 | 3571 | 1196 | 3935 |
| 200 | 2366 | 3789 | 2107 | 4255 | 1683 | 5328 | 1504 | 5962 |
| 500 | 3325 | 6091 | 2864 | 7071 | 2145 | 9442 | 1856 | 10910 |

**No station selected: NO ADJUSTMENT MADE**

Not Final



# GISHydro Basin Report

| | |
|---|---|
| GISHydroWEB Release Version: | 0.953 |
| Project Name: | Mill Swamp - UNT |
| Project ID: | 20241121_122036_Mill_Swamp_South |
| Analysis Date: | November 21 2024 |

Used for POI-5 & POI-6

**Data Selected**

| | |
|---|---|
| DEM Coverage: | NED DEM (2018) |
| Cell Size: | 30 meters |
| Stream Layer: | NHD (MR) undefined |
| Land Use Coverage: | MDP (2010) |
| Soil Coverage: | SSURGO (2021) |
| Hydrologic Condition: | Good |
| Outlet Easting: | 392985 m (MD Stateplane NAD 1983) |
| Outlet Northing: | 109520 m (MD Stateplane NAD 1983) |

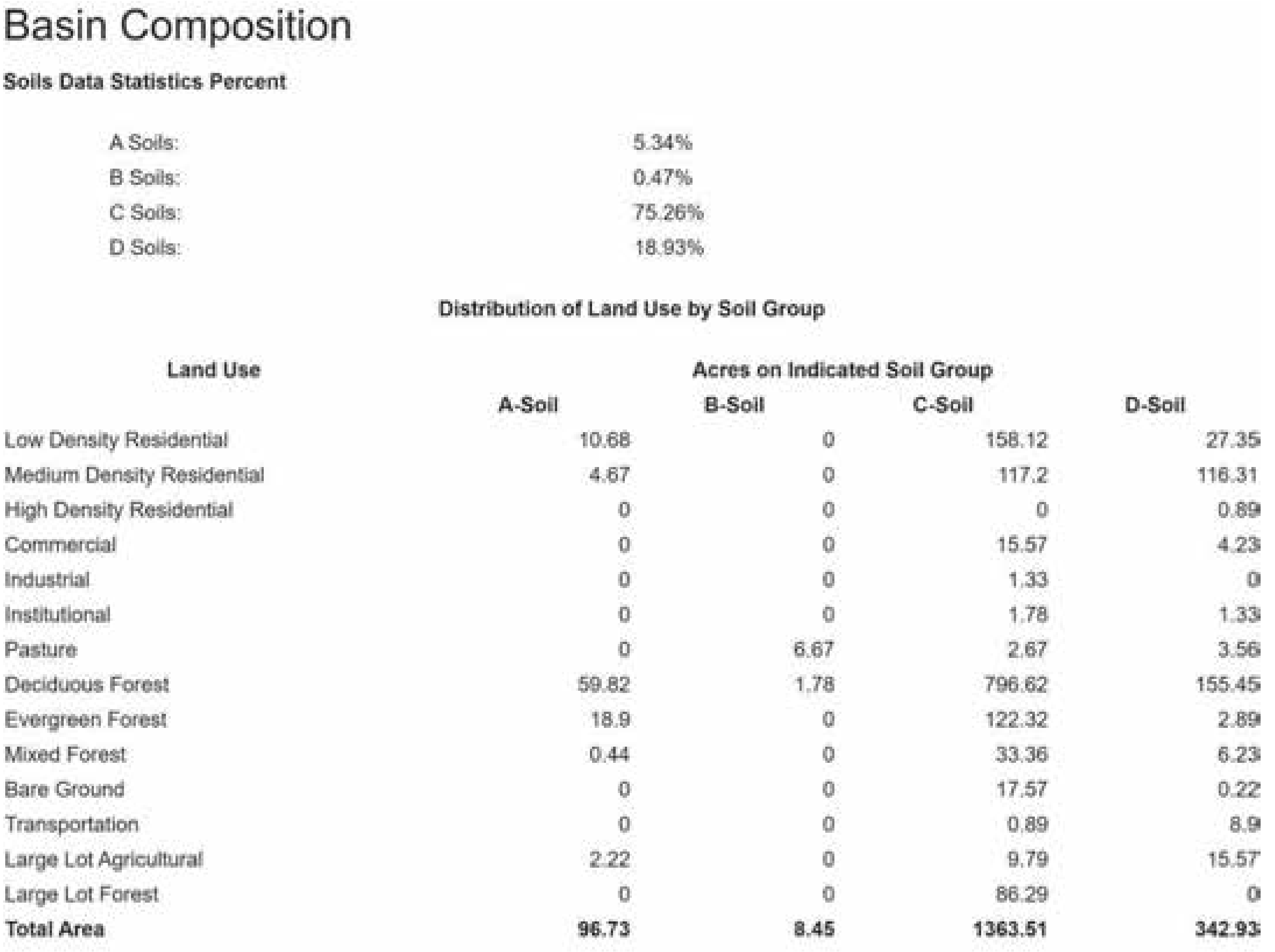
**Hydrologic Region Distribution**

| | |
|---|---|
| Western Coastal Plain: | 100.00% |

**Basin Properties**

| | |
|---|---|
| Drainage Area: | 2.83 mi$^2$ (1811.2 ac) |
| Channel Slope: | 65.270 ft/mi (0.012 ft/ft) |
| Land Slope: | 0.064 ft/ft |
| Urban Area: | 25.19% |
| Impervious Area: | 10.78% |
| Time of Concentration: | 7.26 hours [W.O. Thomas Jr. Equation] |
| Time of Concentration: | 2.49 hours [From SCS Lag Equation * 1.67] |
| Longest Flow Path: | 3.20 mi |
| Outlet Elevation: | 14.48 ft (NAVD88) |
| Basin Relief: | 127.63 ft |
| Average CN: | 72.7 |
| Forest Cover: | 70.88% |
| Storage: | 0.00% |
| Limestone: | 0.00% |
| 2-Year 24-hour Precipitation: | 3.19 in |
| Mean Annual Precipitation: | 43.72 in |

Curve Number used for POI-5 & POI-6



# Basin Composition

**Soils Data Statistics Percent**

| | |
|---|---|
| A Soils: | 5.34% |
| B Soils: | 0.47% |
| C Soils: | 75.26% |
| D Soils: | 18.93% |

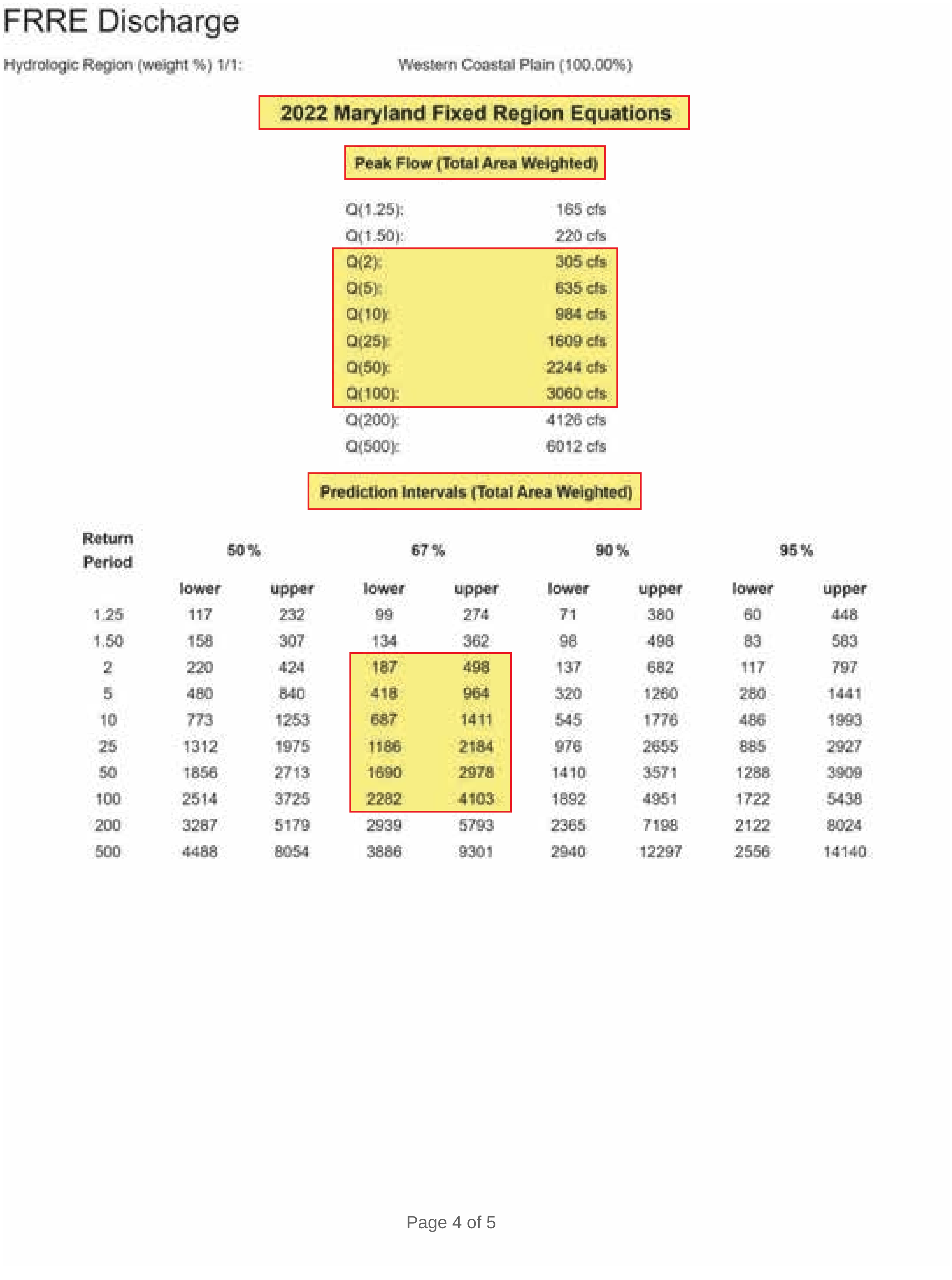
**Distribution of Land Use by Soil Group**

| Land Use | Acres on Indicated Soil Group | | | |
|---|---|---|---|---|
| | A-Soil | B-Soil | C-Soil | D-Soil |
| Low Density Residential | 10.68 | 0 | 158.12 | 27.35 |
| Medium Density Residential | 4.67 | 0 | 117.2 | 116.31 |
| High Density Residential | 0 | 0 | 0 | 0.89 |
| Commercial | 0 | 0 | 15.57 | 4.23 |
| Industrial | 0 | 0 | 1.33 | 0 |
| Institutional | 0 | 0 | 1.78 | 1.33 |
| Pasture | 0 | 6.67 | 2.67 | 3.56 |
| Deciduous Forest | 59.82 | 1.78 | 796.62 | 155.45 |
| Evergreen Forest | 18.9 | 0 | 122.32 | 2.89 |
| Mixed Forest | 0.44 | 0 | 33.36 | 6.23 |
| Bare Ground | 0 | 0 | 17.57 | 0.22 |
| Transportation | 0 | 0 | 0.89 | 8.9 |
| Large Lot Agricultural | 2.22 | 0 | 9.79 | 15.57 |
| Large Lot Forest | 0 | 0 | 86.29 | 0 |
| **Total Area** | **96.73** | **8.45** | **1363.51** | **342.93** |

## Distribution of Land Use by Curve Number

| Land Use | Acres | Percent | A | B | C | D |
|---|---|---|---|---|---|---|
| Low Density Residential | 196.15 | 10.83 | 54 | 70 | 80 | 85 |
| Medium Density Residential | 238.18 | 13.15 | 61 | 75 | 83 | 87 |
| High Density Residential | 0.89 | 0.05 | 77 | 85 | 90 | 92 |
| Commercial | 19.8 | 1.09 | 89 | 92 | 94 | 95 |
| Industrial | 1.33 | 0.07 | 81 | 88 | 91 | 93 |
| Institutional | 3.11 | 0.17 | 69 | 80 | 86 | 89 |
| Pasture | 12.9 | 0.71 | 39 | 61 | 74 | 80 |
| Deciduous Forest | 1013.67 | 55.95 | 30 | 55 | 70 | 77 |
| Evergreen Forest | 144.11 | 7.95 | 30 | 55 | 70 | 77 |
| Mixed Forest | 40.03 | 2.21 | 30 | 55 | 70 | 77 |
| Bare Ground | 17.79 | 0.98 | 77 | 86 | 91 | 94 |
| Transportation | 9.79 | 0.54 | 83 | 89 | 92 | 94 |
| Large Lot Agricultural | 27.58 | 1.52 | 67 | 78 | 85 | 89 |
| Large Lot Forest | 86.29 | 4.76 | 30 | 55 | 70 | 77 |

# Not Final



## FRRE Discharge

| | |
|---|---|
| Hydrologic Region (weight %) 1/1: | Western Coastal Plain (100.00%) |

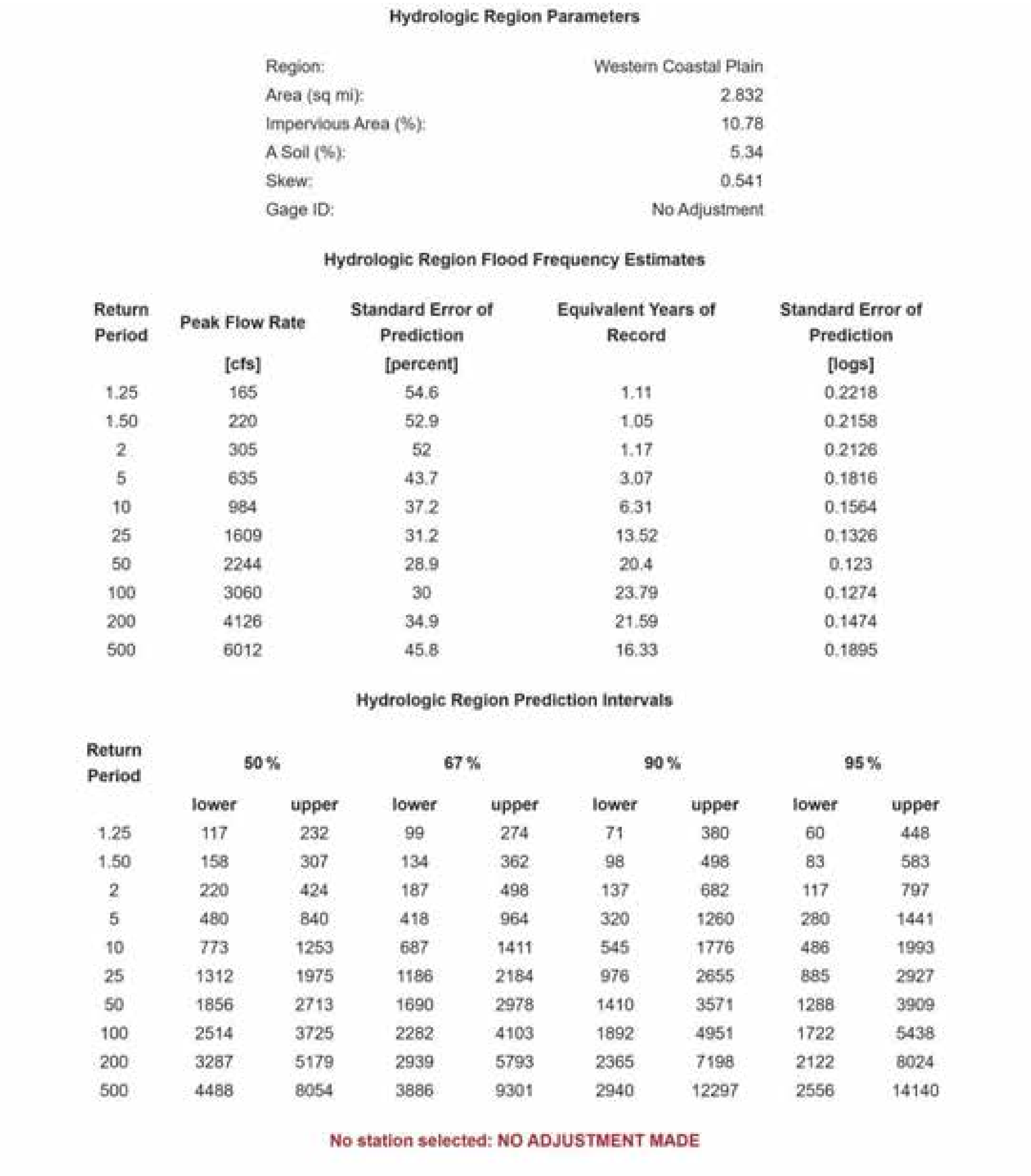
### 2022 Maryland Fixed Region Equations

**Peak Flow (Total Area Weighted)**

| | |
|---|---|
| Q(1.25): | 165 cfs |
| Q(1.50): | 220 cfs |
| Q(2): | 305 cfs |
| Q(5): | 635 cfs |
| Q(10): | 984 cfs |
| Q(25): | 1609 cfs |
| Q(50): | 2244 cfs |
| Q(100): | 3060 cfs |
| Q(200): | 4126 cfs |
| Q(500): | 6012 cfs |

**Prediction Intervals (Total Area Weighted)**

| **Return Period** | **50 %** | | **67 %** | | **90 %** | | **95 %** | |
|---|---|---|---|---|---|---|---|---|
| | **lower** | **upper** | **lower** | **upper** | **lower** | **upper** | **lower** | **upper** |
| 1.25 | 117 | 232 | 99 | 274 | 71 | 380 | 60 | 448 |
| 1.50 | 158 | 307 | 134 | 362 | 98 | 498 | 83 | 583 |
| 2 | 220 | 424 | 187 | 498 | 137 | 682 | 117 | 797 |
| 5 | 480 | 840 | 418 | 964 | 320 | 1260 | 280 | 1441 |
| 10 | 773 | 1253 | 687 | 1411 | 545 | 1776 | 486 | 1993 |
| 25 | 1312 | 1975 | 1186 | 2184 | 976 | 2655 | 885 | 2927 |
| 50 | 1856 | 2713 | 1690 | 2978 | 1410 | 3571 | 1288 | 3909 |
| 100 | 2514 | 3725 | 2282 | 4103 | 1892 | 4951 | 1722 | 5438 |
| 200 | 3287 | 5179 | 2939 | 5793 | 2365 | 7198 | 2122 | 8024 |
| 500 | 4488 | 8054 | 3886 | 9301 | 2940 | 12297 | 2556 | 14140 |



### Hydrologic Region Parameters

| | |
|---|---|
| Region: | Western Coastal Plain |
| Area (sq mi): | 2.832 |
| Impervious Area (%): | 10.78 |
| A Soil (%): | 5.34 |
| Skew: | 0.541 |
| Gage ID: | No Adjustment |

### Hydrologic Region Flood Frequency Estimates

| Return Period | Peak Flow Rate [cfs] | Standard Error of Prediction [percent] | Equivalent Years of Record | Standard Error of Prediction [logs] |
|---|---|---|---|---|
| 1.25 | 165 | 54.6 | 1.11 | 0.2218 |
| 1.50 | 220 | 52.9 | 1.05 | 0.2158 |
| 2 | 305 | 52 | 1.17 | 0.2126 |
| 5 | 635 | 43.7 | 3.07 | 0.1816 |
| 10 | 984 | 37.2 | 6.31 | 0.1564 |
| 25 | 1609 | 31.2 | 13.52 | 0.1326 |
| 50 | 2244 | 28.9 | 20.4 | 0.123 |
| 100 | 3060 | 30 | 23.79 | 0.1274 |
| 200 | 4126 | 34.9 | 21.59 | 0.1474 |
| 500 | 6012 | 45.8 | 16.33 | 0.1895 |

### Hydrologic Region Prediction Intervals

| Return Period | 50 % | | 67 % | | 90 % | | 95 % | |
|---|---|---|---|---|---|---|---|---|
| | lower | upper | lower | upper | lower | upper | lower | upper |
| 1.25 | 117 | 232 | 99 | 274 | 71 | 380 | 60 | 448 |
| 1.50 | 158 | 307 | 134 | 362 | 98 | 498 | 83 | 583 |
| 2 | 220 | 424 | 187 | 498 | 137 | 682 | 117 | 797 |
| 5 | 480 | 840 | 418 | 964 | 320 | 1260 | 280 | 1441 |
| 10 | 773 | 1253 | 687 | 1411 | 545 | 1776 | 486 | 1993 |
| 25 | 1312 | 1975 | 1186 | 2184 | 976 | 2655 | 885 | 2927 |
| 50 | 1856 | 2713 | 1690 | 2978 | 1410 | 3571 | 1288 | 3909 |
| 100 | 2514 | 3725 | 2282 | 4103 | 1892 | 4951 | 1722 | 5438 |
| 200 | 3287 | 5179 | 2939 | 5793 | 2365 | 7198 | 2122 | 8024 |
| 500 | 4488 | 8054 | 3886 | 9301 | 2940 | 12297 | 2556 | 14140 |

**No station selected: NO ADJUSTMENT MADE**

# WINTR-55 ANALYSIS OUTPUT DATA

Not Final

TR-55 for POI-1, 2, 3, 4, 5 & 6

```
GZeigler                          Mill Swamp
                                 25-00175-001
                       Charles NOAA-C County, Maryland

                            Sub-Area Summary Table

 Sub-Area    Drainage     Time of      Curve   Receiving     Sub-Area
Identifier     Area    Concentration  Number     Reach       Description
              (mi²)        (hr)
--------------------------------------------------------------------------------
DA 1              2.42      2.123        74
DA 2               .03      1.336        74       Mill Swamp - Mainstem
DA 3               .01      0.100        74
DA 4               .08      1.718        74
DA 5              2.76      1.872        73       Mill Swamp - UNT
DA 6               .01      0.573        73

Total Area:    5.31  (mi²)
```

```
GZeigler                             Mill Swamp
                                    25-00175-001
                          Charles NOAA-C County, Maryland

                       Sub-Area Time of Concentration Details


 Sub-Area       Flow             Mannings's    End     Wetted                Travel
Identifier/    Length    Slope       n         Area    Perimeter   Velocity   Time
                (ft)    (ft/ft)              (sq ft)     (ft)      (ft/sec)   (hr)
--------------------------------------------------------------------------------
DA 1
  SHEET          100   0.0025     0.400                                       0.824
  SHALLOW       1012   0.0059     0.050                                       0.227
  SHALLOW       1005   0.0299     0.050                                       0.100
  CHANNEL      11940                                             3.413        0.972

                                                Time of Concentration         2.123
                                                                           ========

DA 2
  SHEET          100   0.0010     0.400                                       1.188
  SHALLOW        708   0.0424     0.050                                       0.059
  CHANNEL       1012                                             3.143        0.089

                                                Time of Concentration         1.336
                                                                           ========

DA 3
  CHANNEL         20                                             3.143        0.002

                                                Time of Concentration           0.1
                                                                           ========

DA 4
  SHEET          100   0.0010     0.400                                       1.188
  SHALLOW       1842   0.0076     0.050                                       0.364
  CHANNEL       1879                                             3.143        0.166

                                                Time of Concentration         1.718
                                                                           ========

DA 5
  SHEET          100   0.0500     0.410                                       0.253
  SHALLOW       1954   0.0087     0.050                                       0.361
  SHALLOW       1011   0.0198     0.050                                       0.124
  CHANNEL      12830                                             3.143        1.134

                                                Time of Concentration         1.872
                                                                           ========

DA 6
  SHEET          100   0.0100     0.410                                       0.482
  SHALLOW        604   0.0373     0.050                                       0.054
  CHANNEL        413                                             3.143        0.037

                                                Time of Concentration          .573
                                                                           ========
```

# WINTR-20 ANALYSIS OUTPUT DATA

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WinTR-20 Printed Page File      Beginning of Input Data List
C:\TR-20\Mill Swamp TR-20 Mainstem.inp

WinTR-20: Version 3.20                            0         0         1.0       0
MILL SWAMP MAINSTEM

SUB-AREA:
          DA-1      CON-1     GAGE      2.42      74.4      2.123     Y
          DA-2      CON-2     GAGE      0.03      74.4      1.336     Y
          DA-3      CON-3     GAGE      0.01      74.4      0.1       Y
          DA-4      Outlet    GAGE      0.08      74.4      1.718     Y


STREAM REACH:
          CON-1     CON-2     XS1                 1012.               Y
          CON-2     CON-3     XS2                 20.                 Y
          CON-3     Outlet    XS3                 946.                Y


STORM ANALYSIS:
          p2-24     GAGE                3.12      rtp2-24   2
          p5-24     GAGE                4.04      rtp5-24   2
          p10-24    GAGE                4.84      rtp10-24  2
          p25-24    GAGE                6.05      rtp25-24  2
          p50-24    GAGE                7.13      rtp50-24  2
          p100-24   GAGE                8.34      rtp100-24 2
          p200-24   GAGE                9.72      rtp200-24 2
          p500-24   GAGE                11.84     rtp500-24 2
          p2-06     GAGE                2.26      rtp2-06   2
          p5-06     GAGE                2.85      rtp5-06   2
          p10-06    GAGE                3.34      rtp10-06  2

STREAM CROSS SECTION:
          XS1       10.21
                    8.9       0.        0.        0.        0.03
                    10.2      2.5       11.4      14.4      0.03
                    10.8      9.        67.2      176.1     0.03
                    11.4      42.6      184.4     214.6     0.03
                    11.9      99.1      308.3     218.1     0.03
                    12.5      173.5     434.3     221.7     0.03
                    13.1      263.9     562.3     225.2     0.03
                    13.6      369.2     692.4     228.8     0.03
                    14.2      488.6     824.5     232.4     0.03
                    14.8      621.6     958.6     235.9     0.03
                    15.4      767.5     1094.8    239.5     0.03
                    15.9      768.5     1249.     339.6     0.03
                    16.5      959.5     1444.6    343.1     0.03
                    17.1      1179.6    1642.2    346.7     0.03
                    17.7      1418.     1841.9    350.3     0.03
                    18.2      1674.2    2043.6    353.8     0.03
                    18.8      1947.9    2247.3    357.4     0.03
                    19.4      2238.6    2453.1    361.      0.03
                    19.9      2239.6    2668.4    461.1     0.03
                    20.5      2459.8    2933.7    465.      0.03
                    21.1      2931.7    3201.3    469.3     0.03
                    21.7      3333.6    3471.4    473.6     0.03
                    22.2      3757.9    3743.9    477.8     0.03
                    22.8      4203.4    4018.9    482.1     0.03
                    23.4      4669.8    4296.3    486.4     0.03
                    24.       5156.7    4576.1    490.6     0.03
                    24.5      5664.1    4858.4    494.9     0.03
                    25.1      6205.9    5142.8    497.4     0.03
                    25.7      6775.     5428.2    499.      0.03
                    26.2      7364.3    5714.6    500.6     0.03
                    26.8      7971.4    6001.9    502.4     0.03
          XS2       8.13
                    6.8       0.        0.        0.        0.03
                    8.1       2.5       11.5      14.4      0.03
                    8.7       10.       51.2      76.9      0.03
                    9.2       26.4      97.1      87.9      0.03
                    9.8       49.7      168.6     135.8     0.03
                    10.4      77.       247.3     183.4     0.03
                    10.9      135.4     350.6     188.2     0.03
                    11.5      206.8     456.6     193.      0.03
                    12.       290.2     565.3     197.8     0.03
                    12.6      336.7     691.4     262.1     0.03
                    13.1      457.5     838.9     268.2     0.03
                    13.7      593.5     989.7     274.3     0.03
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USED FOR POI-1, 2, 3 & 4

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                    14.2        744.3       1144.       280.4       0.03
                    14.8        817.2       1315.6      345.        0.03
                    15.4        1013.4      15[illegible]0.1      353.6       0.03
                    15.9        1227.6      1708.9      361.2       0.03
                    16.5        1411.1      1915.7      389.9       0.03
                    17.         1657.       2136.       402.2       0.03
                    17.6        1717.4      2389.5      505.1       0.03
                    18.1        1850.1      2726.6      628.4       0.03
                    18.7        2251.       3077.       633.7       0.03
                    19.3        2543.6      3441.7      698.2       0.03
                    20.4        3285.       4272.4      817.1       0.03
                    20.9        3808.1      4741.1      849.2       0.03
                    21.5        4424.6      5216.7      861.        0.03
                    22.         5080.2      5699.       872.9       0.03
                    22.6        5806.2      6186.       876.9       0.03
                    23.1        6578.5      6674.4      879.2       0.03
                    23.7        7389.4      7164.       881.4       0.03
                    24.3        8032.4      7669.3      922.3       0.03
          XS3       8.14
                    6.8         0.          0.          0.          0.03
                    8.1         2.5         11.7        14.6        0.03
                    8.7         13.2        67.9        101.9       0.03
                    9.3         37.9        141.5       131.4       0.03
                    9.9         77.9        223.        139.        0.03
                    10.5        129.5       309.        146.5       0.03
                    11.2        163.2       410.5       211.        0.03
                    11.8        253.6       538.8       214.8       0.03
                    12.4        333.9       683.7       257.9       0.03
                    13.         465.3       840.6       262.7       0.03
                    13.6        615.1       1000.3      267.5       0.03
                    14.2        779.9       1163.       272.3       0.03
                    14.8        962.        1328.5      277.1       0.03
                    15.4        1160.1      1496.9      281.9       0.03
                    16.         1373.8      1668.2      286.6       0.03
                    16.6        1504.3      1863.6      330.2       0.03
                    17.2        1544.7      2070.2      413.2       0.03
                    17.8        1839.1      2322.5      423.9       0.03
                    18.4        2156.8      2581.2      434.7       0.03
                    19.         2512.8      2845.5      440.9       0.03
                    19.6        2899.4      3112.4      445.        0.03
                    20.2        2922.       3392.5      546.        0.03
                    20.8        3389.8      3723.1      551.2       0.03
                    21.4        3886.2      4056.8      556.4       0.03
                    22.         4410.6      4393.7      561.6       0.03
                    22.6        4962.6      4733.7      566.8       0.03
                    23.2        5001.       5099.2      675.3       0.03
                    23.8        5441.8      5522.8      726.5       0.03
                    24.4        6172.9      5961.       727.7       0.03
                    25.         6940.5      6399.9      728.8       0.03
                    25.6        7743.9      6839.5      730.        0.03



RAINFALL DISTRIBUTION:
          rtp1-24               0.1
                    0.0000      0.0011      0.0021      0.0032      0.0043
                    0.0053      0.0064      0.0075      0.0086      0.0096
                    0.0107      0.0118      0.0128      0.0139      0.0150
                    0.0160      0.0171      0.0182      0.0193      0.0203
                    0.0214      0.0225      0.0235      0.0246      0.0257
                    0.0267      0.0278      0.0289      0.0300      0.0310
                    0.0321      0.0332      0.0342      0.0353      0.0364
                    0.0374      0.0385      0.0396      0.0406      0.0417
                    0.0428      0.0439      0.0449      0.0460      0.0471
                    0.0481      0.0492      0.0503      0.0513      0.0524
                    0.0535      0.0546      0.0556      0.0567      0.0578
                    0.0588      0.0599      0.0610      0.0620      0.0631
                    0.0642      0.0667      0.0692      0.0717      0.0742
                    0.0767      0.0792      0.0817      0.0842      0.0867
                    0.0892      0.0917      0.0942      0.0968      0.0993
                    0.1018      0.1043      0.1068      0.1093      0.1118
                    0.1143      0.1168      0.1193      0.1218      0.1243
                    0.1268      0.1293      0.1318      0.1343      0.1368
                    0.1393      0.1438      0.1482      0.1526      0.1570
                    0.1615      0.1659      0.1703      0.1747      0.1792
                    0.1836      0.1880      0.1924      0.1968      0.2013
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          0.2057    0.2098    0.2140    0.2181    0.2223
          0.2264    0.2341    0.2417    0.2494    0.2570
          0.2647    0.2833    0.3020    0.3317    0.3789
          0.5000    0.6211    0.6683    0.6980    0.7167
          0.7353    0.7430    0.7506    0.7583    0.7659
          0.7736    0.7777    0.7819    0.7860    0.7902
          0.7943    0.7987    0.8032    0.8076    0.8120
          0.8164    0.8208    0.8253    0.8297    0.8341
          0.8385    0.8430    0.8474    0.8518    0.8562
          0.8607    0.8632    0.8657    0.8682    0.8707
          0.8732    0.8757    0.8782    0.8807    0.8832
          0.8857    0.8882    0.8907    0.8932    0.8957
          0.8982    0.9007    0.9032    0.9058    0.9083
          0.9108    0.9133    0.9158    0.9183    0.9208
          0.9233    0.9258    0.9283    0.9308    0.9333
          0.9358    0.9369    0.9380    0.9390    0.9401
          0.9412    0.9422    0.9433    0.9444    0.9454
          0.9465    0.9476    0.9487    0.9497    0.9508
          0.9519    0.9529    0.9540    0.9551    0.9561
          0.9572    0.9583    0.9594    0.9604    0.9615
          0.9626    0.9636    0.9647    0.9658    0.9668
          0.9679    0.9690    0.9700    0.9711    0.9722
          0.9733    0.9743    0.9754    0.9765    0.9775
          0.9786    0.9797    0.9807    0.9818    0.9829
          0.9840    0.9850    0.9861    0.9872    0.9882
          0.9893    0.9904    0.9914    0.9925    0.9936
          0.9947    0.9957    0.9968    0.9979    0.9989
          1.0000
rtp2-24             0.1
          0.0000    0.0011    0.0022    0.0033    0.0044
          0.0055    0.0066    0.0077    0.0088    0.0099
          0.0110    0.0121    0.0131    0.0142    0.0153
          0.0164    0.0175    0.0186    0.0197    0.0208
          0.0219    0.0230    0.0241    0.0252    0.0263
          0.0274    0.0285    0.0296    0.0307    0.0318
          0.0329    0.0340    0.0351    0.0362    0.0372
          0.0383    0.0394    0.0405    0.0416    0.0427
          0.0438    0.0449    0.0460    0.0471    0.0482
          0.0493    0.0504    0.0515    0.0526    0.0537
          0.0548    0.0559    0.0570    0.0581    0.0592
          0.0603    0.0614    0.0624    0.0635    0.0646
          0.0657    0.0682    0.0706    0.0731    0.0756
          0.0780    0.0805    0.0829    0.0854    0.0878
          0.0903    0.0928    0.0952    0.0977    0.1001
          0.1026    0.1050    0.1075    0.1099    0.1124
          0.1149    0.1173    0.1198    0.1222    0.1247
          0.1271    0.1296    0.1321    0.1345    0.1370
          0.1394    0.1438    0.1481    0.1524    0.1568
          0.1611    0.1654    0.1698    0.1741    0.1784
          0.1828    0.1871    0.1914    0.1958    0.2001
          0.2044    0.2085    0.2125    0.2166    0.2206
          0.2247    0.2322    0.2397    0.2472    0.2548
          0.2623    0.2816    0.3009    0.3314    0.3796
          0.5000    0.6204    0.6686    0.6991    0.7184
          0.7377    0.7452    0.7528    0.7603    0.7678
          0.7753    0.7794    0.7834    0.7875    0.7915
          0.7956    0.7999    0.8042    0.8086    0.8129
          0.8172    0.8216    0.8259    0.8302    0.8346
          0.8389    0.8432    0.8476    0.8519    0.8562
          0.8606    0.8630    0.8655    0.8679    0.8704
          0.8729    0.8753    0.8778    0.8802    0.8827
          0.8851    0.8876    0.8901    0.8925    0.8950
          0.8974    0.8999    0.9023    0.9048    0.9072
          0.9097    0.9122    0.9146    0.9171    0.9195
          0.9220    0.9244    0.9269    0.9294    0.9318
          0.9343    0.9354    0.9365    0.9376    0.9386
          0.9397    0.9408    0.9419    0.9430    0.9441
          0.9452    0.9463    0.9474    0.9485    0.9496
          0.9507    0.9518    0.9529    0.9540    0.9551
          0.9562    0.9573    0.9584    0.9595    0.9606
          0.9617    0.9628    0.9638    0.9649    0.9660
          0.9671    0.9682    0.9693    0.9704    0.9715
          0.9726    0.9737    0.9748    0.9759    0.9770
          0.9781    0.9792    0.9803    0.9814    0.9825
          0.9836    0.9847    0.9858    0.9869    0.9879
          0.9890    0.9901    0.9912    0.9923    0.9934
          0.9945    0.9956    0.9967    0.9978    0.9989
          1.0000
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rtp5-24             0.1
          0.0000    0.0012    0.0024    0.0036    0.0048
          0.0061    0.0073    0.0085    0.0097    0.0109
          0.0121    0.0133    0.0145    0.0157    0.0169
          0.0182    0.0194    0.0206    0.0218    0.0230
          0.0242    0.0254    0.0266    0.0278    0.0290
          0.0303    0.0315    0.0327    0.0339    0.0351
          0.0363    0.0375    0.0387    0.0399    0.0411
          0.0424    0.0436    0.0448    0.0460    0.0472
          0.0484    0.0496    0.0508    0.0520    0.0532
          0.0545    0.0557    0.0569    0.0581    0.0593
          0.0605    0.0617    0.0629    0.0641    0.0653
          0.0666    0.0678    0.0690    0.0702    0.0714
          0.0726    0.0751    0.0776    0.0800    0.0825
          0.0850    0.0875    0.0900    0.0924    0.0949
          0.0974    0.0999    0.1024    0.1048    0.1073
          0.1098    0.1123    0.1147    0.1172    0.1197
          0.1222    0.1247    0.1271    0.1296    0.1321
          0.1346    0.1371    0.1395    0.1420    0.1445
          0.1470    0.1511    0.1553    0.1595    0.1637
          0.1678    0.1720    0.1762    0.1803    0.1845
          0.1887    0.1928    0.1970    0.2012    0.2053
          0.2095    0.2136    0.2176    0.2217    0.2257
          0.2298    0.2375    0.2452    0.2529    0.2606
          0.2684    0.2887    0.3091    0.3407    0.3888
          0.5000    0.6112    0.6593    0.6909    0.7113
          0.7316    0.7394    0.7471    0.7548    0.7625
          0.7702    0.7743    0.7783    0.7824    0.7864
          0.7905    0.7947    0.7988    0.8030    0.8072
          0.8113    0.8155    0.8197    0.8238    0.8280
          0.8322    0.8363    0.8405    0.8447    0.8489
          0.8530    0.8555    0.8580    0.8605    0.8629
          0.8654    0.8679    0.8704    0.8729    0.8753
          0.8778    0.8803    0.8828    0.8853    0.8877
          0.8902    0.8927    0.8952    0.8976    0.9001
          0.9026    0.9051    0.9076    0.9100    0.9125
          0.9150    0.9175    0.9200    0.9224    0.9249
          0.9274    0.9286    0.9298    0.9310    0.9322
          0.9334    0.9347    0.9359    0.9371    0.9383
          0.9395    0.9407    0.9419    0.9431    0.9443
          0.9455    0.9468    0.9480    0.9492    0.9504
          0.9516    0.9528    0.9540    0.9552    0.9564
          0.9576    0.9589    0.9601    0.9613    0.9625
          0.9637    0.9649    0.9661    0.9673    0.9685
          0.9697    0.9710    0.9722    0.9734    0.9746
          0.9758    0.9770    0.9782    0.9794    0.9806
          0.9818    0.9831    0.9843    0.9855    0.9867
          0.9879    0.9891    0.9903    0.9915    0.9927
          0.9939    0.9952    0.9964    0.9976    0.9988
          1.0000
rtp10-24            0.1
          0.0000    0.0013    0.0026    0.0039    0.0052
          0.0065    0.0078    0.0091    0.0104    0.0117
          0.0130    0.0143    0.0156    0.0169    0.0182
          0.0195    0.0208    0.0221    0.0234    0.0247
          0.0260    0.0273    0.0286    0.0299    0.0312
          0.0325    0.0338    0.0351    0.0364    0.0377
          0.0390    0.0403    0.0416    0.0429    0.0442
          0.0456    0.0469    0.0482    0.0495    0.0508
          0.0521    0.0534    0.0547    0.0560    0.0573
          0.0586    0.0599    0.0612    0.0625    0.0638
          0.0651    0.0664    0.0677    0.0690    0.0703
          0.0716    0.0729    0.0742    0.0755    0.0768
          0.0781    0.0806    0.0832    0.0858    0.0883
          0.0909    0.0934    0.0960    0.0985    0.1011
          0.1036    0.1062    0.1087    0.1113    0.1139
          0.1164    0.1190    0.1215    0.1241    0.1266
          0.1292    0.1317    0.1343    0.1369    0.1394
          0.1420    0.1445    0.1471    0.1496    0.1522
          0.1547    0.1589    0.1630    0.1671    0.1713
          0.1754    0.1795    0.1837    0.1878    0.1919
          0.1961    0.2002    0.2043    0.2085    0.2126
          0.2167    0.2208    0.2250    0.2291    0.2332
          0.2373    0.2452    0.2530    0.2609    0.2687
          0.2766    0.2973    0.3180    0.3497    0.3965
          0.5000    0.6035    0.6503    0.6820    0.7027
          0.7234    0.7313    0.7391    0.7470    0.7548
          0.7627    0.7668    0.7709    0.7750    0.7792
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               0.7833     0.7874     0.7915     0.7957     0.7998
               0.8039     0.8081     0.8122     0.8163     0.8205
               0.8246     0.8287     0.8329     0.8370     0.8411
               0.8453     0.8478     0.8504     0.8529     0.8555
               0.8580     0.8606     0.8631     0.8657     0.8683
               0.8708     0.8734     0.8759     0.8785     0.8810
               0.8836     0.8861     0.8887     0.8913     0.8938
               0.8964     0.8989     0.9015     0.9040     0.9066
               0.9091     0.9117     0.9142     0.9168     0.9194
               0.9219     0.9232     0.9245     0.9258     0.9271
               0.9284     0.9297     0.9310     0.9323     0.9336
               0.9349     0.9362     0.9375     0.9388     0.9401
               0.9414     0.9427     0.9440     0.9453     0.9466
               0.9479     0.9492     0.9505     0.9518     0.9531
               0.9544     0.9558     0.9571     0.9584     0.9597
               0.9610     0.9623     0.9636     0.9649     0.9662
               0.9675     0.9688     0.9701     0.9714     0.9727
               0.9740     0.9753     0.9766     0.9779     0.9792
               0.9805     0.9818     0.9831     0.9844     0.9857
               0.9870     0.9883     0.9896     0.9909     0.9922
               0.9935     0.9948     0.9961     0.9974     0.9987
               1.0000
rtp25-24                  0.1
               0.0000     0.0014     0.0028     0.0042     0.0056
               0.0070     0.0084     0.0098     0.0112     0.0126
               0.0140     0.0154     0.0168     0.0182     0.0196
               0.0210     0.0224     0.0238     0.0253     0.0267
               0.0281     0.0295     0.0309     0.0323     0.0337
               0.0351     0.0365     0.0379     0.0393     0.0407
               0.0421     0.0435     0.0449     0.0463     0.0477
               0.0491     0.0505     0.0519     0.0533     0.0547
               0.0561     0.0575     0.0589     0.0603     0.0617
               0.0631     0.0645     0.0659     0.0673     0.0687
               0.0701     0.0715     0.0729     0.0744     0.0758
               0.0772     0.0786     0.0800     0.0814     0.0828
               0.0842     0.0869     0.0895     0.0922     0.0949
               0.0976     0.1003     0.1030     0.1057     0.1084
               0.1111     0.1137     0.1164     0.1191     0.1218
               0.1245     0.1272     0.1299     0.1326     0.1352
               0.1379     0.1406     0.1433     0.1460     0.1487
               0.1514     0.1541     0.1568     0.1594     0.1621
               0.1648     0.1690     0.1732     0.1773     0.1815
               0.1856     0.1898     0.1940     0.1981     0.2023
               0.2065     0.2106     0.2148     0.2190     0.2231
               0.2273     0.2316     0.2358     0.2400     0.2443
               0.2485     0.2566     0.2647     0.2728     0.2809
               0.2890     0.3101     0.3311     0.3622     0.4066
               0.5000     0.5934     0.6378     0.6689     0.6899
               0.7110     0.7191     0.7272     0.7353     0.7434
               0.7515     0.7557     0.7600     0.7642     0.7684
               0.7727     0.7769     0.7810     0.7852     0.7894
               0.7935     0.7977     0.8019     0.8060     0.8102
               0.8144     0.8185     0.8227     0.8268     0.8310
               0.8352     0.8379     0.8406     0.8432     0.8459
               0.8486     0.8513     0.8540     0.8567     0.8594
               0.8621     0.8648     0.8674     0.8701     0.8728
               0.8755     0.8782     0.8809     0.8836     0.8863
               0.8889     0.8916     0.8943     0.8970     0.8997
               0.9024     0.9051     0.9078     0.9105     0.9131
               0.9158     0.9172     0.9186     0.9200     0.9214
               0.9228     0.9242     0.9256     0.9271     0.9285
               0.9299     0.9313     0.9327     0.9341     0.9355
               0.9369     0.9383     0.9397     0.9411     0.9425
               0.9439     0.9453     0.9467     0.9481     0.9495
               0.9509     0.9523     0.9537     0.9551     0.9565
               0.9579     0.9593     0.9607     0.9621     0.9635
               0.9649     0.9663     0.9677     0.9691     0.9705
               0.9719     0.9733     0.9747     0.9762     0.9776
               0.9790     0.9804     0.9818     0.9832     0.9846
               0.9860     0.9874     0.9888     0.9902     0.9916
               0.9930     0.9944     0.9958     0.9972     0.9986
               1.0000
rtp50-24                  0.1
               0.0000     0.0015     0.0030     0.0044     0.0059
               0.0074     0.0089     0.0103     0.0118     0.0133
               0.0148     0.0162     0.0177     0.0192     0.0207
               0.0221     0.0236     0.0251     0.0266     0.0280
               0.0295     0.0310     0.0325     0.0339     0.0354
```

```
                 0.0369      0.0384      0.0398      0.0413      0.0428
                 0.0443      0.0457      0.0472      0.0487      0.0502
                 0.0516      0.0531      0.0546      0.0561      0.0575
                 0.0590      0.0605      0.0620      0.0634      0.0649
                 0.0664      0.0679      0.0694      0.0708      0.0723
                 0.0738      0.0753      0.0767      0.0782      0.0797
                 0.0812      0.0826      0.0841      0.0856      0.0871
                 0.0885      0.0913      0.0941      0.0969      0.0997
                 0.1025      0.1054      0.1082      0.1110      0.1138
                 0.1166      0.1194      0.1222      0.1250      0.1278
                 0.1306      0.1334      0.1362      0.1390      0.1418
                 0.1446      0.1474      0.1502      0.1530      0.1558
                 0.1586      0.1614      0.1642      0.1670      0.1698
                 0.1726      0.1768      0.1811      0.1853      0.1895
                 0.1938      0.1980      0.2022      0.2064      0.2107
                 0.2149      0.2191      0.2233      0.2276      0.2318
                 0.2360      0.2404      0.2447      0.2490      0.2534
                 0.2577      0.2660      0.2742      0.2824      0.2907
                 0.2989      0.3200      0.3411      0.3716      0.4139
                 0.5000      0.5861      0.6284      0.6589      0.6800
                 0.7011      0.7093      0.7176      0.7258      0.7340
                 0.7423      0.7466      0.7510      0.7553      0.7596
                 0.7640      0.7682      0.7724      0.7767      0.7809
                 0.7851      0.7893      0.7936      0.7978      0.8020
                 0.8062      0.8105      0.8147      0.8189      0.8232
                 0.8274      0.8302      0.8330      0.8358      0.8386
                 0.8414      0.8442      0.8470      0.8498      0.8526
                 0.8554      0.8582      0.8610      0.8638      0.8666
                 0.8694      0.8722      0.8750      0.8778      0.8806
                 0.8834      0.8862      0.8890      0.8918      0.8946
                 0.8975      0.9003      0.9031      0.9059      0.9087
                 0.9115      0.9129      0.9144      0.9159      0.9174
                 0.9188      0.9203      0.9218      0.9233      0.9247
                 0.9262      0.9277      0.9292      0.9306      0.9321
                 0.9336      0.9351      0.9366      0.9380      0.9395
                 0.9410      0.9425      0.9439      0.9454      0.9469
                 0.9484      0.9498      0.9513      0.9528      0.9543
                 0.9557      0.9572      0.9587      0.9602      0.9616
                 0.9631      0.9646      0.9661      0.9675      0.9690
                 0.9705      0.9720      0.9734      0.9749      0.9764
                 0.9779      0.9793      0.9808      0.9823      0.9838
                 0.9852      0.9867      0.9882      0.9897      0.9911
                 0.9926      0.9941      0.9956      0.9970      0.9985
                 1.0000
rtp100-24                    0.1
                 0.0000      0.0015      0.0031      0.0046      0.0062
                 0.0077      0.0093      0.0108      0.0124      0.0139
                 0.0155      0.0170      0.0186      0.0201      0.0217
                 0.0232      0.0248      0.0263      0.0279      0.0294
                 0.0310      0.0325      0.0341      0.0356      0.0372
                 0.0387      0.0403      0.0418      0.0434      0.0449
                 0.0465      0.0480      0.0496      0.0511      0.0527
                 0.0542      0.0558      0.0573      0.0589      0.0604
                 0.0620      0.0635      0.0651      0.0666      0.0682
                 0.0697      0.0713      0.0728      0.0744      0.0759
                 0.0774      0.0790      0.0805      0.0821      0.0836
                 0.0852      0.0867      0.0883      0.0898      0.0914
                 0.0929      0.0959      0.0988      0.1017      0.1046
                 0.1076      0.1105      0.1134      0.1163      0.1193
                 0.1222      0.1251      0.1280      0.1310      0.1339
                 0.1368      0.1397      0.1426      0.1456      0.1485
                 0.1514      0.1543      0.1573      0.1602      0.1631
                 0.1660      0.1690      0.1719      0.1748      0.1777
                 0.1807      0.1850      0.1892      0.1935      0.1978
                 0.2021      0.2064      0.2107      0.2150      0.2193
                 0.2236      0.2279      0.2322      0.2365      0.2407
                 0.2450      0.2494      0.2539      0.2583      0.2627
                 0.2671      0.2755      0.2839      0.2922      0.3006
                 0.3090      0.3299      0.3509      0.3806      0.4208
                 0.5000      0.5792      0.6194      0.6491      0.6701
                 0.6910      0.6994      0.7078      0.7161      0.7245
                 0.7329      0.7373      0.7417      0.7461      0.7506
                 0.7550      0.7593      0.7635      0.7678      0.7721
                 0.7764      0.7807      0.7850      0.7893      0.7936
                 0.7979      0.8022      0.8065      0.8108      0.8150
                 0.8193      0.8223      0.8252      0.8281      0.8310
                 0.8340      0.8369      0.8398      0.8427      0.8457
                 0.8486      0.8515      0.8544      0.8574      0.8603
```

```
          0.8632    0.8661    0.8690    0.8720    0.8749
          0.8778    0.8807    0.8837    0.8866    0.8895
          0.8924    0.8954    0.8983    0.9012    0.9041
          0.9071    0.9086    0.9102    0.9117    0.9133
          0.9148    0.9164    0.9179    0.9195    0.9210
          0.9226    0.9241    0.9256    0.9272    0.9287
          0.9303    0.9318    0.9334    0.9349    0.9365
          0.9380    0.9396    0.9411    0.9427    0.9442
          0.9458    0.9473    0.9489    0.9504    0.9520
          0.9535    0.9551    0.9566    0.9582    0.9597
          0.9613    0.9628    0.9644    0.9659    0.9675
          0.9690    0.9706    0.9721    0.9737    0.9752
          0.9768    0.9783    0.9799    0.9814    0.9830
          0.9845    0.9861    0.9876    0.9892    0.9907
          0.9923    0.9938    0.9954    0.9969    0.9985
          1.0000
rtp200-24           0.1
          0.0000    0.0016    0.0033    0.0049    0.0065
          0.0081    0.0098    0.0114    0.0130    0.0146
          0.0163    0.0179    0.0195    0.0211    0.0228
          0.0244    0.0260    0.0276    0.0293    0.0309
          0.0325    0.0341    0.0358    0.0374    0.0390
          0.0406    0.0423    0.0439    0.0455    0.0471
          0.0488    0.0504    0.0520    0.0536    0.0553
          0.0569    0.0585    0.0601    0.0618    0.0634
          0.0650    0.0667    0.0683    0.0699    0.0715
          0.0732    0.0748    0.0764    0.0780    0.0797
          0.0813    0.0829    0.0845    0.0862    0.0878
          0.0894    0.0910    0.0927    0.0943    0.0959
          0.0975    0.1006    0.1036    0.1067    0.1097
          0.1128    0.1158    0.1189    0.1219    0.1250
          0.1281    0.1311    0.1342    0.1372    0.1403
          0.1433    0.1464    0.1494    0.1525    0.1555
          0.1586    0.1616    0.1647    0.1677    0.1708
          0.1738    0.1769    0.1799    0.1830    0.1860
          0.1891    0.1934    0.1978    0.2021    0.2065
          0.2108    0.2152    0.2195    0.2239    0.2282
          0.2326    0.2369    0.2412    0.2456    0.2499
          0.2543    0.2588    0.2633    0.2678    0.2723
          0.2768    0.2852    0.2937    0.3021    0.3105
          0.3189    0.3397    0.3605    0.3894    0.4274
          0.5000    0.5726    0.6106    0.6395    0.6603
          0.6811    0.6895    0.6979    0.7063    0.7148
          0.7232    0.7277    0.7322    0.7367    0.7412
          0.7457    0.7501    0.7544    0.7588    0.7631
          0.7674    0.7718    0.7761    0.7805    0.7848
          0.7892    0.7935    0.7979    0.8022    0.8066
          0.8109    0.8140    0.8170    0.8201    0.8231
          0.8262    0.8292    0.8323    0.8353    0.8384
          0.8414    0.8445    0.8475    0.8506    0.8536
          0.8567    0.8597    0.8628    0.8658    0.8689
          0.8719    0.8750    0.8781    0.8811    0.8842
          0.8872    0.8903    0.8933    0.8964    0.8994
          0.9025    0.9041    0.9057    0.9073    0.9090
          0.9106    0.9122    0.9138    0.9155    0.9171
          0.9187    0.9203    0.9220    0.9236    0.9252
          0.9268    0.9285    0.9301    0.9317    0.9333
          0.9350    0.9366    0.9382    0.9399    0.9415
          0.9431    0.9447    0.9464    0.9480    0.9496
          0.9512    0.9529    0.9545    0.9561    0.9577
          0.9594    0.9610    0.9626    0.9642    0.9659
          0.9675    0.9691    0.9707    0.9724    0.9740
          0.9756    0.9772    0.9789    0.9805    0.9821
          0.9837    0.9854    0.9870    0.9886    0.9902
          0.9919    0.9935    0.9951    0.9967    0.9984
          1.0000
rtp500-24           0.1
          0.0000    0.0017    0.0034    0.0051    0.0069
          0.0086    0.0103    0.0120    0.0137    0.0154
          0.0171    0.0189    0.0206    0.0223    0.0240
          0.0257    0.0274    0.0291    0.0309    0.0326
          0.0343    0.0360    0.0377    0.0394    0.0411
          0.0429    0.0446    0.0463    0.0480    0.0497
          0.0514    0.0532    0.0549    0.0566    0.0583
          0.0600    0.0617    0.0634    0.0652    0.0669
          0.0686    0.0703    0.0720    0.0737    0.0754
          0.0772    0.0789    0.0806    0.0823    0.0840
          0.0857    0.0874    0.0892    0.0909    0.0926
```

```
          0.0943    0.0960    0.0977    0.0994    0.1012
          0.1029    0.1061    0.1093    0.1126    0.1158
          0.1190    0.1223    0.1255    0.1287    0.1320
          0.1352    0.1384    0.1417    0.1449    0.1481
          0.1514    0.1546    0.1578    0.1610    0.1643
          0.1675    0.1707    0.1740    0.1772    0.1804
          0.1837    0.1869    0.1901    0.1934    0.1966
          0.1998    0.2043    0.2087    0.2131    0.2176
          0.2220    0.2264    0.2309    0.2353    0.2397
          0.2441    0.2486    0.2530    0.2574    0.2619
          0.2663    0.2709    0.2755    0.2800    0.2846
          0.2892    0.2977    0.3062    0.3147    0.3232
          0.3318    0.3521    0.3725    0.4002    0.4354
          0.5000    0.5646    0.5998    0.6275    0.6479
          0.6682    0.6768    0.6853    0.6938    0.7023
          0.7108    0.7154    0.7200    0.7245    0.7291
          0.7337    0.7381    0.7426    0.7470    0.7514
          0.7559    0.7603    0.7647    0.7691    0.7736
          0.7780    0.7824    0.7869    0.7913    0.7957
          0.8002    0.8034    0.8066    0.8099    0.8131
          0.8163    0.8196    0.8228    0.8260    0.8293
          0.8325    0.8357    0.8390    0.8422    0.8454
          0.8486    0.8519    0.8551    0.8583    0.8616
          0.8648    0.8680    0.8713    0.8745    0.8777
          0.8810    0.8842    0.8874    0.8907    0.8939
          0.8971    0.8988    0.9006    0.9023    0.9040
          0.9057    0.9074    0.9091    0.9108    0.9126
          0.9143    0.9160    0.9177    0.9194    0.9211
          0.9228    0.9246    0.9263    0.9280    0.9297
          0.9314    0.9331    0.9348    0.9366    0.9383
          0.9400    0.9417    0.9434    0.9451    0.9468
          0.9486    0.9503    0.9520    0.9537    0.9554
          0.9571    0.9589    0.9606    0.9623    0.9640
          0.9657    0.9674    0.9691    0.9709    0.9726
          0.9743    0.9760    0.9777    0.9794    0.9811
          0.9829    0.9846    0.9863    0.9880    0.9897
          0.9914    0.9931    0.9949    0.9966    0.9983
          1.0000
rtp1-06             0.1
          0.0000    0.0061    0.0123    0.0184    0.0245
          0.0307    0.0368    0.0429    0.0491    0.0552
          0.0613    0.06744   0.0736    0.0797    0.0858
          0.0920    0.0977    0.1035    0.1092    0.1150
          0.1207    0.1313    0.1419    0.1526    0.1632
          0.1738    0.1996    0.2255    0.2667    0.3321
          0.5000    0.6679    0.7333    0.7745    0.8004
          0.8262    0.8368    0.8474    0.8581    0.8687
          0.8793    0.8850    0.8908    0.8965    0.9023
          0.9080    0.9142    0.9203    0.9264    0.9326
          0.9387    0.9448    0.9509    0.9571    0.9632
          0.9693    0.9755    0.9816    0.9877    0.9939
          1.00000
rtp2-06             0.1
          0.        0.0060    0.0120    0.0180    0.024
          0.0301    0.0361    0.0421    0.0481    0.0541
          0.0601    0.0661    0.0721    0.0781    0.0842
          0.0902    0.0958    0.1014    0.1070    0.1126
          0.1182    0.1286    0.1391    0.1495    0.1599
          0.1704    0.1971    0.2239    0.2663    0.3331
          0.5000    0.6669    0.7337    0.7761    0.8029
          0.8296    0.8401    0.8505    0.8609    0.8714
          0.8818    0.8874    0.8930    0.8986    0.9042
          0.9098    0.9158    0.9219    0.9279    0.9339
          0.9399    0.9459    0.9519    0.9579    0.9639
          0.9699    0.9760    0.9820    0.9880    0.9940
          1.0000
rtp5-06             0.1
          0.        0.0059    0.0118    0.0177    0.0236
          0.0295    0.0354    0.0413    0.0472    0.0531
          0.0590    0.0650    0.0709    0.0768    0.0827
          0.0886    0.0943    0.1001    0.1058    0.1115
          0.1173    0.1282    0.1391    0.1501    0.1610
          0.1719    0.2008    0.2296    0.2744    0.3425
          0.5000    0.6575    0.7256    0.7704    0.7992
          0.8281    0.8390    0.8499    0.8609    0.8718
          0.8827    0.8885    0.8942    0.8999    0.9057
          0.9114    0.9173    0.9232    0.9291    0.9350
          0.9410    0.9469    0.9528    0.9587    0.9646
```

```
                    0.9705    0.9764    0.9823    0.9882    0.9941
                    1.0000
          rtp10-06            0.1
                    0.        0.0060    0.0120    0.0180    0.0239
                    0.0299    0.0359    0.0419    0.0479    0.0539
                    0.0598    0.0658    0.0718    0.0778    0.0838
                    0.0898    0.0957    0.1017    0.1077    0.1137
                    0.1196    0.1310    0.1424    0.1537    0.1651
                    0.1765    0.2064    0.2364    0.2823    0.3501
                    0.5000    0.6499    0.7177    0.7635    0.7935
                    0.8235    0.8349    0.8463    0.8476    0.8690
                    0.8804    0.8863    0.8923    0.8983    0.9043
                    0.9102    0.9162    0.9222    0.9282    0.9342
                    0.9402    0.9461    0.9521    0.9581    0.9641
                    0.9701    0.9761    0.9820    0.9880    0.9940
                    1.0000



GLOBAL OUTPUT:
          1         1.        0.1       YN  N     YN  N




WinTR-20 Printed Page File      End of Input Data List

                               MILL SWAMP MAINSTEM

                          Name of printed page file:
                    C:\TR-20\Mill Swamp TR-20 Mainstem.out

                                           STORM p2-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE      1.007               13.45     467.8    193.30
CON-1         2.420  Upstream    1.007     14.10     13.45     467.8    193.30
CON-1         2.420 Downstream   1.006     14.08     13.71     464.5    191.93
DA-2          0.030    GAGE      0.754               12.92       8.3    276.96
CON-2         2.450  Upstream    1.003     13.14     13.77     467.6    190.88
CON-2         2.450 Downstream   1.003     13.14     13.77     467.6    190.85
DA-3          0.010    GAGE      0.495               12.12       9.6    959.77
CON-3         2.460  Upstream    1.001     13.01     13.77     467.6    190.06
CON-3         2.460 Downstream   1.000     13.00     14.10     464.6    188.86
DA-4          0.080    GAGE      0.990               13.18      18.3    228.46
OUTLET        2.540              0.999               14.09     474.3    186.73

                                           STORM p5-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE      1.653               13.45     787.8    325.53
CON-1         2.420  Upstream    1.653     15.96     13.45     787.8    325.53
CON-1         2.420 Downstream   1.653     15.95     13.72     783.1    323.60
DA-2          0.030    GAGE      1.409               12.94      13.9    461.91
CON-2         2.450  Upstream    1.650     14.56     13.70     788.4    321.78
CON-2         2.450 Downstream   1.650     14.56     13.70     788.3    321.76
DA-3          0.010    GAGE      0.953               12.12      14.7   1466.62
CON-3         2.460  Upstream    1.647     14.23     13.70     788.2    320.41
CON-3         2.460 Downstream   1.646     14.21     13.98     783.4    318.47
DA-4          0.080    GAGE      1.632               13.14      30.7    383.51
OUTLET        2.540              1.645               13.96     801.2    315.42

                                           STORM p10-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)
```

```
DA-1          2.420    GAGE        2.270               13.47    1066.8    440.84
CON-1         2.420  Upstream      2.270     16.79     13.47    1066.8    440.84
CON-1         2.420 Downstream     2.269     16.77     13.60    1060.0    438.00
DA-2          0.030    GAGE        1.981               12.90      18.7    622.83
CON-2         2.450  Upstream      2.266     15.53     13.65    1069.0    436.33
CON-2         2.450 Downstream     2.266     15.53     13.65    1068.8    436.23
DA-3          0.010    GAGE        1.307               12.11      18.7   1866.76
CON-3         2.460  Upstream      2.262     15.12     13.65    1068.8    434.45
CON-3         2.460 Downstream     2.260     15.11     13.90    1064.2    432.61
DA-4          0.080    GAGE        2.246               13.17      41.5    518.65
OUTLET        2.540                2.260               13.89    1089.7    429.00
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                                           STORM p25-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        3.266               13.40    1489.3    615.40
CON-1         2.420  Upstream      3.266     17.84     13.40    1489.3    615.40
CON-1         2.420 Downstream     3.265     17.82     13.67    1478.1    610.79
DA-2          0.030    GAGE        3.189               12.92      25.6    854.59
CON-2         2.450  Upstream      3.264     16.66     13.60    1490.1    608.19
CON-2         2.450 Downstream     3.264     16.66     13.60    1489.9    608.10
DA-3          0.010    GAGE        2.281               12.12      24.0   2402.84
CON-3         2.460  Upstream      3.260     16.54     13.60    1491.1    606.15
CON-3         2.460 Downstream     3.258     16.51     13.85    1484.6    603.48
DA-4          0.080    GAGE        3.241               13.18      57.3    716.59
OUTLET        2.540                3.258               13.83    1521.7    599.10

                                           STORM p50-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        4.199               13.39    1848.6    763.88
CON-1         2.420  Upstream      4.199     18.58     13.39    1848.6    763.88
CON-1         2.420 Downstream     4.198     18.55     13.53    1834.2    757.94
DA-2          0.030    GAGE        4.119               12.87      31.6   1051.81
CON-2         2.450  Upstream      4.197     18.10     13.54    1852.5    756.14
CON-2         2.450 Downstream     4.197     18.10     13.54    1851.0    755.52
DA-3          0.010    GAGE        3.362               12.11      28.2   2824.13
CON-3         2.460  Upstream      4.194     17.83     13.54    1852.7    753.12
CON-3         2.460 Downstream     4.192     17.81     13.82    1843.5    749.39
DA-4          0.080    GAGE        4.175               13.12      71.1    888.13
OUTLET        2.540                4.192               13.81    1890.6    744.33

                                           STORM p100-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        5.278               13.37    2230.7    921.77
CON-1         2.420  Upstream      5.278     19.38     13.37    2230.7    921.77
CON-1         2.420 Downstream     5.277     19.35     13.51    2213.4    914.64
DA-2          0.030    GAGE        5.203               12.84      37.6   1254.90
CON-2         2.450  Upstream      5.276     18.68     13.51    2236.4    912.82
CON-2         2.450 Downstream     5.276     18.68     13.51    2234.6    912.09
DA-3          0.010    GAGE        4.306               12.11      32.4   3236.86
CON-3         2.460  Upstream      5.272     18.53     13.51    2236.6    909.21
CON-3         2.460 Downstream     5.271     18.52     13.78    2226.2    904.96
DA-4          0.080    GAGE        5.260               13.14      85.3   1066.22
OUTLET        2.540                5.270               13.77    2285.1    899.64

                                           STORM p200-24
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Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        6.540               13.34     2634.9   1088.80
CON-1         2.420  Upstream      6.540     20.72     13.34     2634.9   1088.80
CON-1         2.420 Downstream     6.539     20.71     13.61     2623.4   1084.07
DA-2          0.030    GAGE        6.480               12.88       44.2   1474.33
CON-2         2.450  Upstream      6.539     19.45     13.55     2642.3   1078.48
CON-2         2.450 Downstream     6.539     19.45     13.55     2642.3   1078.48
DA-3          0.010    GAGE        5.392               12.11       36.4   3639.75
CON-3         2.460  Upstream      6.534     19.20     13.55     2644.6   1075.02
CON-3         2.460 Downstream     6.532     19.19     13.77     2633.4   1070.49
DA-4          0.080    GAGE        6.518               13.15      100.4   1255.40
OUTLET        2.540                6.532               13.75     2703.6   1064.42

                                           STORM p500-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        8.522               13.31     3212.3   1327.41
CON-1         2.420  Upstream      8.522     21.52     13.31     3212.3   1327.41
CON-1         2.420 Downstream     8.522     21.51     13.58     3203.3   1323.67
DA-2          0.030    GAGE        8.449               12.84       53.2   1774.93
CON-2         2.450  Upstream      8.521     20.32     13.52     3227.9   1317.53
CON-2         2.450 Downstream     8.521     20.31     13.52     3227.6   1317.37
DA-3          0.010    GAGE        8.277               12.11       41.6   4161.99
CON-3         2.460  Upstream      8.520     20.60     13.52     3230.6   1313.25
CON-3         2.460 Downstream     8.518     20.58     13.74     3218.5   1308.35
DA-4          0.080    GAGE        8.500               13.16      121.7   1521.15
OUTLET        2.540                8.518               13.72     3306.8   1301.88

                                           STORM p2-06

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        0.493                4.60      294.0    121.47
CON-1         2.420  Upstream      0.493     13.24      4.60      294.0    121.47
CON-1         2.420 Downstream     0.492     13.23      5.00      291.9    120.63
DA-2          0.030    GAGE        0.461                4.04        5.2    172.29
CON-2         2.450  Upstream      0.492     12.05      4.88      294.4    120.16
CON-2         2.450 Downstream     0.492     12.05      4.97      294.4    120.16
DA-3          0.010    GAGE        0.302                3.13        6.5    653.53
CON-3         2.460  Upstream      0.491     12.10      4.97      294.4    119.67
CON-3         2.460 Downstream     0.489     12.09      5.34      292.3    118.84
DA-4          0.080    GAGE        0.481                4.27       11.4    142.91
OUTLET        2.540                0.489                5.33      298.3    117.45

                                           STORM p5-06
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                               MILL SWAMP MAINSTEM

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)       (ft)     (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        0.834                4.47     516.0    213.24
CON-1         2.420  Upstream      0.834     14.32      4.47     516.0    213.24
CON-1         2.420 Downstream     0.833     14.31      4.87     513.7    212.29
DA-2          0.030    GAGE        0.809                3.99       9.1    304.83
CON-2         2.450  Upstream      0.833     13.36      4.84     517.5    211.23
CON-2         2.450 Downstream     0.833     13.36      4.84     517.5    211.23
DA-3          0.010    GAGE        0.622                3.12      10.7   1067.68
CON-3         2.460  Upstream      0.832     13.21      4.84     517.5    210.37
CON-3         2.460 Downstream     0.831     13.20      5.15     514.3    209.08
DA-4          0.080    GAGE        0.822                4.25      20.2    251.99
OUTLET        2.540                0.831                5.14     525.7    206.95

                                           STORM p10-06

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)       (ft)     (hr)     (cfs)     (csm)

DA-1          2.420    GAGE        1.154                4.48     719.9    297.49
CON-1         2.420  Upstream      1.154     15.20      4.48     719.9    297.49
CON-1         2.420 Downstream     1.154     15.19      4.74     717.3    296.39
DA-2          0.030    GAGE        1.127                3.95      12.7    423.49
CON-2         2.450  Upstream      1.153     14.13      4.79     722.1    294.75
CON-2         2.450 Downstream     1.153     14.13      4.79     722.1    294.72
DA-3          0.010    GAGE        0.883                3.12      14.1   1408.80
CON-3         2.460  Upstream      1.152     13.99      4.79     722.0    293.49
CON-3         2.460 Downstream     1.151     13.98      5.06     718.5    292.08
DA-4          0.080    GAGE        1.142                4.23      28.1    351.06
OUTLET        2.540                1.151                5.04     735.4    289.52
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                               MILL SWAMP MAINSTEM

 Area or    Drainage              ----------- Peak Flow by Storm -----------
  Reach       Area                   p2-24     p5-24    p10-24    p25-24    p50-24
Identifier   (sq mi)               (cfs)     (cfs)     (cfs)     (cfs)     (cfs)

DA-1          2.420                467.8     787.8    1066.8    1489.3    1848.6
DA-2          0.030                  8.3      13.9      18.7      25.6      31.6
DA-3          0.010                  9.6      14.7      18.7      24.0      28.2
DA-4          0.080                 18.3      30.7      41.5      57.3      71.1
CON-1         2.420                467.8     787.8    1066.8    1489.3    1848.6   POI-1
DOWNSTREAM                         464.5     783.1    1060.0    1478.1    1834.2
CON-2         2.450                467.6     788.4    1069.0    1490.1    1852.5   POI-2
DOWNSTREAM                         467.6     788.3    1068.8    1489.9    1851.0
CON-3         2.460                467.6     788.2    1068.8    1491.1    1852.7   POI-3
DOWNSTREAM                         464.6     783.4    1064.2    1484.6    1843.5
OUTLET        2.540                474.3     801.2    1089.7    1521.7    1890.6   POI-4

 Area or    Drainage              ----------- Peak Flow by Storm -----------
  Reach       Area                 p100-24   p200-24   p500-24     p2-06     p5-06
Identifier   (sq mi)               (cfs)     (cfs)     (cfs)     (cfs)     (cfs)

DA-1          2.420               2230.7    2634.9    3212.3     294.0     516.0
DA-2          0.030                 37.6      44.2      53.2       5.2       9.1
DA-3          0.010                 32.4      36.4      41.6       6.5      10.7
DA-4          0.080                 85.3     100.4     121.7      11.4      20.2
CON-1         2.420               2230.7    2634.9    3212.3     294.0     516.0   POI-1
DOWNSTREAM                        2213.4    2623.4    3203.3     291.9     513.7
CON-2         2.450               2236.4    2642.3    3227.9     294.4     517.5   POI-2
DOWNSTREAM                        2234.6    2642.3    3227.6     294.4     517.5
CON-3         2.460               2236.6    2644.6    3230.6     294.4     517.5   POI-3
DOWNSTREAM                        2226.2    2633.4    3218.5     292.3     514.3
OUTLET        2.540               2285.1    2703.6    3306.8     298.3     525.7   POI-4

 Area or    Drainage              ----------- Peak Flow by Storm -----------
  Reach       Area                  p10-06
Identifier   (sq mi)               (cfs)     (cfs)     (cfs)     (cfs)     (cfs)

DA-1          2.420                719.9
DA-2          0.030                 12.7
DA-3          0.010                 14.1
DA-4          0.080                 28.1
CON-1         2.420                719.9   POI-1
DOWNSTREAM                         717.3
CON-2         2.450                722.1   POI-2
DOWNSTREAM                         722.1
CON-3         2.460                722.0   POI-3
DOWNSTREAM                         718.5
OUTLET        2.540                735.4   POI-4
```

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WinTR-20 Printed Page File      Beginning of Input Data List
C:\TR-20\Mill Swamp TR-20 UNT.inp

WinTR-20: Version 3.20                  0         0         1.0       0
MILL SWAMP UNT

SUB-AREA:
          DA-5      CON-4     GAGE      2.76      72.7      1.872
          DA-6      Outlet    GAGE      0.01      72.7      0.573


STREAM REACH:
          CON-4     Outlet    XS5                 410.


STORM ANALYSIS:
          p2-24     GAGE                3.14      rtp2-24   2
          p5-24     GAGE                4.05      rtp5-24   2
          p10-24    GAGE                4.86      rtp10-24  2
          p25-24    GAGE                6.08      rtp25-24  2
          p50-24    GAGE                7.16      rtp50-24  2
          p100-24   GAGE                8.39      rtp100-24 2
          p200-24   GAGE                9.77      rtp200-24 2
          p500-24   GAGE                11.9      rtp500-24 2
          p2-06     GAGE                2.27      rtp2-06   2

STREAM CROSS SECTION:
          XS5       14.92
                    13.5      0.        0.        0.        0.06
                    14.9      4.1       12.8      15.3      0.06
                    15.4      15.6      76.       185.5     0.06
                    16.       59.7      178.4     208.9     0.06
                    16.5      118.7     371.9     468.2     0.06
                    17.       262.4     627.6     527.      0.06
                    17.5      466.1     940.9     612.8     0.06
                    18.       753.3     1261.1    620.1     0.06
                    18.6      1094.1    1585.1    627.5     0.06
                    19.1      1385.3    1921.     712.1     0.06
                    19.6      1850.7    2292.2    717.2     0.06
                    20.1      2369.3    2666.     722.3     0.06
                    20.6      2938.8    3042.4    727.3     0.06
                    21.2      3363.9    3446.     810.9     0.06
                    21.7      4057.9    3868.9    817.3     0.06
                    22.2      4804.5    4295.1    823.8     0.06
                    22.7      5594.4    4724.8    832.1     0.06
                    23.2      6425.5    5159.7    842.4     0.06
                    23.7      7306.6    5599.9    852.4     0.06
                    24.3      7850.7    6069.     935.9     0.06
                    24.8      8901.5    6556.2    940.1     0.06
                    25.3      10005.5   7045.6    944.3     0.06
                    25.8      11161.8   7537.2    948.6     0.06
                    26.3      12369.3   8031.     952.5     0.06
                    26.9      13627.1   8526.9    957.      0.06
                    27.4      14934.6   9025.1    961.2     0.06
                    27.9      15715.6   9538.3    1022.5    0.06
                    28.4      17184.3   10069.7   1024.     0.06
                    28.9      17185.3   10650.8   1223.8    0.06
                    29.5      18366.1   11289.    1233.6    0.06
                    30.       20035.5   11932.3   1243.4    0.06




RAINFALL DISTRIBUTION:
          rtp1-24             0.1
                    0.0000    0.0011    0.0021    0.0032    0.0043
                    0.0053    0.0064    0.0075    0.0085    0.0096
                    0.0107    0.0118    0.0128    0.0139    0.0150
                    0.0160    0.0171    0.0182    0.0192    0.0203
                    0.0214    0.0224    0.0235    0.0246    0.0256
                    0.0267    0.0278    0.0289    0.0299    0.0310
                    0.0321    0.0331    0.0342    0.0353    0.0363
                    0.0374    0.0385    0.0395    0.0406    0.0417
                    0.0427    0.0438    0.0449    0.0460    0.0470
                    0.0481    0.0492    0.0502    0.0513    0.0524
                    0.0534    0.0545    0.0556    0.0566    0.0577
                    0.0588    0.0598    0.0609    0.0620    0.0631
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USED FOR POI-5 & POI-6

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                0.0641      0.0666      0.0691      0.0716      0.0741
                0.0766      0.0791      0.0817      0.0842      0.0867
                0.0892      0.0917      0.0942      0.0967      0.0992
                0.1017      0.1042      0.1067      0.1092      0.1117
                0.1142      0.1167      0.1192      0.1217      0.1242
                0.1267      0.1292      0.1317      0.1342      0.1367
                0.1393      0.1437      0.1481      0.1525      0.1570
                0.1614      0.1658      0.1703      0.1747      0.1791
                0.1836      0.1880      0.1924      0.1968      0.2013
                0.2057      0.2099      0.2141      0.2184      0.2226
                0.2268      0.2345      0.2422      0.2499      0.2576
                0.2653      0.2839      0.3025      0.3322      0.3792
                0.5000      0.6208      0.6678      0.6975      0.7161
                0.7347      0.7424      0.7501      0.7578      0.7655
                0.7732      0.7774      0.7816      0.7859      0.7901
                0.7943      0.7987      0.8032      0.8076      0.8120
                0.8164      0.8209      0.8253      0.8297      0.8342
                0.8386      0.8430      0.8475      0.8519      0.8563
                0.8607      0.8633      0.8658      0.8683      0.8708
                0.8733      0.8758      0.8783      0.8808      0.8833
                0.8858      0.8883      0.8908      0.8933      0.8958
                0.8983      0.9008      0.9033      0.9058      0.9083
                0.9108      0.9133      0.9158      0.9183      0.9209
                0.9234      0.9259      0.9284      0.9309      0.9334
                0.9359      0.9369      0.9380      0.9391      0.9402
                0.9412      0.9423      0.9434      0.9444      0.9455
                0.9466      0.9476      0.9487      0.9498      0.9508
                0.9519      0.9530      0.9540      0.9551      0.9562
                0.9573      0.9583      0.9594      0.9605      0.9615
                0.9626      0.9637      0.9647      0.9658      0.9669
                0.9679      0.9690      0.9701      0.9711      0.9722
                0.9733      0.9744      0.9754      0.9765      0.9776
                0.9786      0.9797      0.9808      0.9818      0.9829
                0.9840      0.9850      0.9861      0.9872      0.9882
                0.9893      0.9904      0.9915      0.9925      0.9936
                0.9947      0.9957      0.9968      0.9979      0.9989
                1.0000
rtp2-24                     0.1
                0.0000      0.0011      0.0022      0.0033      0.0044
                0.0055      0.0066      0.0077      0.0088      0.0099
                0.0110      0.0120      0.0131      0.0142      0.0153
                0.0164      0.0175      0.0186      0.0197      0.0208
                0.0219      0.0230      0.0241      0.0252      0.0263
                0.0274      0.0285      0.0296      0.0307      0.0318
                0.0329      0.0340      0.0350      0.0361      0.0372
                0.0383      0.0394      0.0405      0.0416      0.0427
                0.0438      0.0449      0.0460      0.0471      0.0482
                0.0493      0.0504      0.0515      0.0526      0.0537
                0.0548      0.0559      0.0570      0.0580      0.0591
                0.0602      0.0613      0.0624      0.0635      0.0646
                0.0657      0.0682      0.0706      0.0731      0.0755
                0.0780      0.0804      0.0829      0.0854      0.0878
                0.0903      0.0927      0.0952      0.0976      0.1001
                0.1025      0.1050      0.1075      0.1099      0.1124
                0.1148      0.1173      0.1197      0.1222      0.1246
                0.1271      0.1295      0.1320      0.1345      0.1369
                0.1394      0.1437      0.1481      0.1524      0.1567
                0.1611      0.1654      0.1698      0.1741      0.1784
                0.1828      0.1871      0.1915      0.1958      0.2002
                0.2045      0.2086      0.2128      0.2169      0.2211
                0.2252      0.2328      0.2403      0.2479      0.2554
                0.2630      0.2822      0.3015      0.3320      0.3800
                0.5000      0.6200      0.6680      0.6985      0.7178
                0.7370      0.7446      0.7521      0.7597      0.7672
                0.7748      0.7789      0.7831      0.7872      0.7914
                0.7955      0.7998      0.8042      0.8085      0.8129
                0.8172      0.8216      0.8259      0.8302      0.8346
                0.8389      0.8433      0.8476      0.8519      0.8563
                0.8606      0.8631      0.8655      0.8680      0.8705
                0.8729      0.8754      0.8778      0.8803      0.8827
                0.8852      0.8876      0.8901      0.8925      0.8950
                0.8975      0.8999      0.9024      0.9048      0.9073
                0.9097      0.9122      0.9146      0.9171      0.9196
                0.9220      0.9245      0.9269      0.9294      0.9318
                0.9343      0.9354      0.9365      0.9376      0.9387
                0.9398      0.9409      0.9420      0.9430      0.9441
                0.9452      0.9463      0.9474      0.9485      0.9496
                0.9507      0.9518      0.9529      0.9540      0.9551
```

```
          0.9562    0.9573    0.9584    0.9595    0.9606
          0.9617    0.9628    0.9639    0.9650    0.9660
          0.9671    0.9682    0.9693    0.9704    0.9715
          0.9726    0.9737    0.9748    0.9759    0.9770
          0.9781    0.9792    0.9803    0.9814    0.9825
          0.9836    0.9847    0.9858    0.9869    0.9880
          0.9890    0.9901    0.9912    0.9923    0.9934
          0.9945    0.9956    0.9967    0.9978    0.9989
          1.0000
rtp5-24             0.1
          0.0000    0.0012    0.0024    0.0036    0.0049
          0.0061    0.0073    0.0085    0.0097    0.0109
          0.0121    0.0134    0.0146    0.0158    0.0170
          0.0182    0.0194    0.0206    0.0219    0.0231
          0.0243    0.0255    0.0267    0.0279    0.0291
          0.0304    0.0316    0.0328    0.0340    0.0352
          0.0364    0.0377    0.0389    0.0401    0.0413
          0.0425    0.0437    0.0449    0.0462    0.0474
          0.0486    0.0498    0.0510    0.0522    0.0534
          0.0547    0.0559    0.0571    0.0583    0.0595
          0.0607    0.0619    0.0632    0.0644    0.0656
          0.0668    0.0680    0.0692    0.0704    0.0717
          0.0729    0.0754    0.0778    0.0803    0.0828
          0.0853    0.0877    0.0902    0.0927    0.0952
          0.0977    0.1001    0.1026    0.1051    0.1076
          0.1100    0.1125    0.1150    0.1175    0.1199
          0.1224    0.1249    0.1274    0.1299    0.1323
          0.1348    0.1373    0.1398    0.1422    0.1447
          0.1472    0.1514    0.1556    0.1597    0.1639
          0.1681    0.1723    0.1765    0.1806    0.1848
          0.1890    0.1932    0.1973    0.2015    0.2057
          0.2099    0.2140    0.2181    0.2222    0.2264
          0.2305    0.2382    0.2460    0.2537    0.2615
          0.2692    0.2895    0.3098    0.3413    0.3893
          0.5000    0.6107    0.6587    0.6902    0.7105
          0.7308    0.7385    0.7463    0.7540    0.7618
          0.7695    0.7736    0.7778    0.7819    0.7860
          0.7901    0.7943    0.7985    0.8027    0.8068
          0.8110    0.8152    0.8194    0.8235    0.8277
          0.8319    0.8361    0.8403    0.8444    0.8486
          0.8528    0.8553    0.8578    0.8602    0.8627
          0.8652    0.8677    0.8701    0.8726    0.8751
          0.8776    0.8801    0.8825    0.8850    0.8875
          0.8900    0.8924    0.8949    0.8974    0.8999
          0.9023    0.9048    0.9073    0.9098    0.9123
          0.9147    0.9172    0.9197    0.9222    0.9246
          0.9271    0.9283    0.9296    0.9308    0.9320
          0.9332    0.9344    0.9356    0.9368    0.9381
          0.9393    0.9405    0.9417    0.9429    0.9441
          0.9453    0.9466    0.9478    0.9490    0.9502
          0.9514    0.9526    0.9538    0.9551    0.9563
          0.9575    0.9587    0.9599    0.9611    0.9623
          0.9636    0.9648    0.9660    0.9672    0.9684
          0.9696    0.9709    0.9721    0.9733    0.9745
          0.9757    0.9769    0.9781    0.9794    0.9806
          0.9818    0.9830    0.9842    0.9854    0.9866
          0.9879    0.9891    0.9903    0.9915    0.9927
          0.9939    0.9951    0.9964    0.9976    0.9988
          1.0000
rtp10-24            0.1
          0.0000    0.0013    0.0026    0.0039    0.0052
          0.0065    0.0079    0.0092    0.0105    0.0118
          0.0131    0.0144    0.0157    0.0170    0.0183
          0.0196    0.0209    0.0223    0.0236    0.0249
          0.0262    0.0275    0.0288    0.0301    0.0314
          0.0327    0.0340    0.0353    0.0366    0.0380
          0.0393    0.0406    0.0419    0.0432    0.0445
          0.0458    0.0471    0.0484    0.0497    0.0510
          0.0524    0.0537    0.0550    0.0563    0.0576
          0.0589    0.0602    0.0615    0.0628    0.0641
          0.0654    0.0668    0.0681    0.0694    0.0707
          0.0720    0.0733    0.0746    0.0759    0.0772
          0.0785    0.0811    0.0836    0.0862    0.0887
          0.0913    0.0938    0.0964    0.0990    0.1015
          0.1041    0.1066    0.1092    0.1117    0.1143
          0.1168    0.1194    0.1219    0.1245    0.1270
          0.1296    0.1321    0.1347    0.1372    0.1398
          0.1424    0.1449    0.1475    0.1500    0.1526
```

```
            0.1551    0.1593    0.1634    0.1675    0.1717
            0.1758    0.1799    0.1841    0.1882    0.1924
            0.1965    0.2006    0.2048    0.2089    0.2130
            0.2172    0.2214    0.2256    0.2298    0.2340
            0.2381    0.2460    0.2539    0.2618    0.2697
            0.2775    0.2982    0.3188    0.3503    0.3969
            0.5000    0.6031    0.6497    0.6812    0.7018
            0.7225    0.7303    0.7382    0.7461    0.7540
            0.7619    0.7660    0.7702    0.7744    0.7786
            0.7828    0.7870    0.7911    0.7952    0.7994
            0.8035    0.8076    0.8118    0.8159    0.8201
            0.8242    0.8283    0.8325    0.8366    0.8407
            0.8449    0.8474    0.8500    0.8525    0.8551
            0.8576    0.8602    0.8628    0.8653    0.8679
            0.8704    0.8730    0.8755    0.8781    0.8806
            0.8832    0.8857    0.8883    0.8908    0.8934
            0.8959    0.8985    0.9010    0.9036    0.9062
            0.9087    0.9113    0.9138    0.9164    0.9189
            0.9215    0.9228    0.9241    0.9254    0.9267
            0.9280    0.9293    0.9306    0.9319    0.9332
            0.9346    0.9359    0.9372    0.9385    0.9398
            0.9411    0.9424    0.9437    0.9450    0.9463
            0.9476    0.9490    0.9503    0.9516    0.9529
            0.9542    0.9555    0.9568    0.9581    0.9594
            0.9607    0.9620    0.9634    0.9647    0.9660
            0.9673    0.9686    0.9699    0.9712    0.9725
            0.9738    0.9751    0.9764    0.9777    0.9791
            0.9804    0.9817    0.9830    0.9843    0.9856
            0.9869    0.9882    0.9895    0.9908    0.9921
            0.9935    0.9948    0.9961    0.9974    0.9987
            1.0000
rtp25-24              0.1
            0.0000    0.0014    0.0028    0.0042    0.0056
            0.0071    0.0085    0.0099    0.0113    0.0127
            0.0141    0.0155    0.0169    0.0183    0.0198
            0.0212    0.0226    0.0240    0.0254    0.0268
            0.0282    0.0296    0.0310    0.0325    0.0339
            0.0353    0.0367    0.0381    0.0395    0.0409
            0.0423    0.0438    0.0452    0.0466    0.0480
            0.0494    0.0508    0.0522    0.0536    0.0550
            0.0565    0.0579    0.0593    0.0607    0.0621
            0.0635    0.0649    0.0663    0.0677    0.0692
            0.0706    0.0720    0.0734    0.0748    0.0762
            0.0776    0.0790    0.0804    0.0819    0.0833
            0.0847    0.0874    0.0900    0.0927    0.0954
            0.0981    0.1008    0.1035    0.1062    0.1088
            0.1115    0.1142    0.1169    0.1196    0.1223
            0.1250    0.1276    0.1303    0.1330    0.1357
            0.1384    0.1411    0.1437    0.1464    0.1491
            0.1518    0.1545    0.1572    0.1599    0.1625
            0.1652    0.1694    0.1736    0.1777    0.1819
            0.1861    0.1903    0.1944    0.1986    0.2028
            0.2070    0.2111    0.2153    0.2195    0.2237
            0.2278    0.2321    0.2365    0.2408    0.2451
            0.2494    0.2575    0.2656    0.2737    0.2819
            0.2900    0.3109    0.3318    0.3628    0.4070
            0.5000    0.5930    0.6372    0.6682    0.6891
            0.7100    0.7181    0.7263    0.7344    0.7425
            0.7506    0.7549    0.7592    0.7635    0.7679
            0.7722    0.7763    0.7805    0.7847    0.7889
            0.7930    0.7972    0.8014    0.8056    0.8097
            0.8139    0.8181    0.8223    0.8264    0.8306
            0.8348    0.8375    0.8401    0.8428    0.8455
            0.8482    0.8509    0.8536    0.8563    0.8589
            0.8616    0.8643    0.8670    0.8697    0.8724
            0.8750    0.8777    0.8804    0.8831    0.8858
            0.8885    0.8912    0.8938    0.8965    0.8992
            0.9019    0.9046    0.9073    0.9100    0.9126
            0.9153    0.9167    0.9181    0.9196    0.9210
            0.9224    0.9238    0.9252    0.9266    0.9280
            0.9294    0.9308    0.9323    0.9337    0.9351
            0.9365    0.9379    0.9393    0.9407    0.9421
            0.9435    0.9450    0.9464    0.9478    0.9492
            0.9506    0.9520    0.9534    0.9548    0.9562
            0.9577    0.9591    0.9605    0.9619    0.9633
            0.9647    0.9661    0.9675    0.9690    0.9704
            0.9718    0.9732    0.9746    0.9760    0.9774
            0.9788    0.9802    0.9817    0.9831    0.9845
```

```
          0.9859    0.9873    0.9887    0.9901    0.9915
          0.9929    0.9944    0.9958    0.9972    0.9986
          1.0000
rtp50-24            0.1
          0.0000    0.0015    0.0030    0.0045    0.0059
          0.0074    0.0089    0.0104    0.0119    0.0134
          0.0148    0.0163    0.0178    0.0193    0.0208
          0.0223    0.0238    0.0252    0.0267    0.0282
          0.0297    0.0312    0.0327    0.0342    0.0356
          0.0371    0.0386    0.0401    0.0416    0.0431
          0.0445    0.0460    0.0475    0.0490    0.0505
          0.0520    0.0535    0.0549    0.0564    0.0579
          0.0594    0.0609    0.0624    0.0639    0.0653
          0.0668    0.0683    0.0698    0.0713    0.0728
          0.0742    0.0757    0.0772    0.0787    0.0802
          0.0817    0.0832    0.0846    0.0861    0.0876
          0.0891    0.0919    0.0947    0.0975    0.1003
          0.1031    0.1059    0.1087    0.1115    0.1143
          0.1171    0.1199    0.1227    0.1255    0.1283
          0.1311    0.1339    0.1367    0.1395    0.1423
          0.1451    0.1479    0.1507    0.1535    0.1562
          0.1590    0.1618    0.1646    0.1674    0.1702
          0.1730    0.1773    0.1815    0.1857    0.1900
          0.1942    0.1984    0.2027    0.2069    0.2111
          0.2154    0.2196    0.2238    0.2281    0.2323
          0.2365    0.2409    0.2453    0.2497    0.2541
          0.2585    0.2668    0.2750    0.2833    0.2916
          0.2999    0.3208    0.3418    0.3722    0.4143
          0.5000    0.5857    0.6278    0.6582    0.6792
          0.7001    0.7084    0.7167    0.7250    0.7332
          0.7415    0.7459    0.7503    0.7547    0.7591
          0.7635    0.7677    0.7719    0.7762    0.7804
          0.7846    0.7889    0.7931    0.7973    0.8016
          0.8058    0.8100    0.8143    0.8185    0.8227
          0.8270    0.8298    0.8326    0.8354    0.8382
          0.8410    0.8438    0.8465    0.8493    0.8521
          0.8549    0.8577    0.8605    0.8633    0.8661
          0.8689    0.8717    0.8745    0.8773    0.8801
          0.8829    0.8857    0.8885    0.8913    0.8941
          0.8969    0.8997    0.9025    0.9053    0.9081
          0.9109    0.9124    0.9139    0.9154    0.9168
          0.9183    0.9198    0.9213    0.9228    0.9243
          0.9258    0.9272    0.9287    0.9302    0.9317
          0.9332    0.9347    0.9361    0.9376    0.9391
          0.9406    0.9421    0.9436    0.9451    0.9465
          0.9480    0.9495    0.9510    0.9525    0.9540
          0.9555    0.9569    0.9584    0.9599    0.9614
          0.9629    0.9644    0.9658    0.9673    0.9688
          0.9703    0.9718    0.9733    0.9748    0.9762
          0.9777    0.9792    0.9807    0.9822    0.9837
          0.9852    0.9866    0.9881    0.9896    0.9911
          0.9926    0.9941    0.9955    0.9970    0.9985
          1.0000
rtp100-24           0.1
          0.0000    0.0016    0.0031    0.0047    0.0062
          0.0078    0.0093    0.0109    0.0125    0.0140
          0.0156    0.0171    0.0187    0.0203    0.0218
          0.0234    0.0249    0.0265    0.0280    0.0296
          0.0312    0.0327    0.0343    0.0358    0.0374
          0.0389    0.0405    0.0421    0.0436    0.0452
          0.0467    0.0483    0.0499    0.0514    0.0530
          0.0545    0.0561    0.0576    0.0592    0.0608
          0.0623    0.0639    0.0654    0.0670    0.0685
          0.0701    0.0717    0.0732    0.0748    0.0763
          0.0779    0.0795    0.0810    0.0826    0.0841
          0.0857    0.0872    0.0888    0.0904    0.0919
          0.0935    0.0964    0.0993    0.1022    0.1052
          0.1081    0.1110    0.1139    0.1168    0.1198
          0.1227    0.1256    0.1285    0.1314    0.1343
          0.1373    0.1402    0.1431    0.1460    0.1489
          0.1519    0.1548    0.1577    0.1606    0.1635
          0.1665    0.1694    0.1723    0.1752    0.1781
          0.1811    0.1854    0.1897    0.1940    0.1983
          0.2026    0.2069    0.2112    0.2155    0.2198
          0.2241    0.2284    0.2327    0.2370    0.2413
          0.2456    0.2500    0.2545    0.2590    0.2634
          0.2679    0.2763    0.2847    0.2931    0.3015
          0.3099    0.3307    0.3516    0.3811    0.4212
```

```
          0.5000    0.5788    0.6189    0.6484    0.6693
          0.6901    0.6985    0.7069    0.7153    0.7237
          0.7321    0.7366    0.7410    0.7455    0.7500
          0.7544    0.7587    0.7630    0.7673    0.7716
          0.7759    0.7802    0.7845    0.7888    0.7931
          0.7974    0.8017    0.8060    0.8103    0.8146
          0.8189    0.8219    0.8248    0.8277    0.8306
          0.8335    0.8365    0.8394    0.8423    0.8452
          0.8481    0.8511    0.8540    0.8569    0.8598
          0.8627    0.8657    0.8686    0.8715    0.8744
          0.8773    0.8802    0.8832    0.8861    0.8890
          0.8919    0.8948    0.8978    0.9007    0.9036
          0.9065    0.9081    0.9096    0.9112    0.9128
          0.9143    0.9159    0.9174    0.9190    0.9205
          0.9221    0.9237    0.9252    0.9268    0.9283
          0.9299    0.9315    0.9330    0.9346    0.9361
          0.9377    0.9392    0.9408    0.9424    0.9439
          0.9455    0.9470    0.9486    0.9501    0.9517
          0.9533    0.9548    0.9564    0.9579    0.9595
          0.9611    0.9626    0.9642    0.9657    0.9673
          0.9688    0.9704    0.9720    0.9735    0.9751
          0.9766    0.9782    0.9797    0.9813    0.9829
          0.9844    0.9860    0.9875    0.9891    0.9907
          0.9922    0.9938    0.9953    0.9969    0.9984
          1.0000
rtp200-24           0.1
          0.0000    0.0016    0.0033    0.0049    0.0065
          0.0082    0.0098    0.0114    0.0131    0.0147
          0.0163    0.0180    0.0196    0.0212    0.0229
          0.0245    0.0261    0.0278    0.0294    0.0310
          0.0327    0.0343    0.0359    0.0376    0.0392
          0.0408    0.0425    0.0441    0.0457    0.0474
          0.0490    0.0506    0.0523    0.0539    0.0555
          0.0572    0.0588    0.0604    0.0621    0.0637
          0.0653    0.0670    0.0686    0.0702    0.0719
          0.0735    0.0751    0.0768    0.0784    0.0800
          0.0817    0.0833    0.0849    0.0866    0.0882
          0.0898    0.0915    0.0931    0.0947    0.0964
          0.0980    0.1010    0.1041    0.1071    0.1102
          0.1132    0.1163    0.1193    0.1224    0.1254
          0.1285    0.1315    0.1345    0.1376    0.1406
          0.1437    0.1467    0.1498    0.1528    0.1559
          0.1589    0.1620    0.1650    0.1681    0.1711
          0.1741    0.1772    0.1802    0.1833    0.1863
          0.1894    0.1937    0.1981    0.2024    0.2068
          0.2112    0.2155    0.2199    0.2242    0.2286
          0.2329    0.2373    0.2417    0.2460    0.2504
          0.2547    0.2593    0.2638    0.2684    0.2730
          0.2775    0.2860    0.2944    0.3029    0.3113
          0.3198    0.3404    0.3611    0.3899    0.4277
          0.5000    0.5723    0.6101    0.6389    0.6596
          0.6802    0.6887    0.6971    0.7056    0.7140
          0.7225    0.7270    0.7316    0.7362    0.7407
          0.7453    0.7496    0.7540    0.7583    0.7627
          0.7671    0.7714    0.7758    0.7801    0.7845
          0.7888    0.7932    0.7976    0.8019    0.8063
          0.8106    0.8137    0.8167    0.8198    0.8228
          0.8259    0.8289    0.8319    0.8350    0.8380
          0.8411    0.8441    0.8472    0.8502    0.8533
          0.8563    0.8594    0.8624    0.8655    0.8685
          0.8715    0.8746    0.8776    0.8807    0.8837
          0.8868    0.8898    0.8929    0.8959    0.8990
          0.9020    0.9036    0.9053    0.9069    0.9085
          0.9102    0.9118    0.9134    0.9151    0.9167
          0.9183    0.9200    0.9216    0.9232    0.9249
          0.9265    0.9281    0.9298    0.9314    0.9330
          0.9347    0.9363    0.9379    0.9396    0.9412
          0.9428    0.9445    0.9461    0.9477    0.9494
          0.9510    0.9526    0.9543    0.9559    0.9575
          0.9592    0.9608    0.9624    0.9641    0.9657
          0.9673    0.9690    0.9706    0.9722    0.9739
          0.9755    0.9771    0.9788    0.9804    0.9820
          0.9837    0.9853    0.9869    0.9886    0.9902
          0.9918    0.9935    0.9951    0.9967    0.9984
          1.0000
rtp500-24           0.1
          0.0000    0.0017    0.0034    0.0052    0.0069
          0.0086    0.0103    0.0120    0.0138    0.0155
```

```
                    0.0172    0.0189    0.0207    0.0224    0.0241
                    0.0258    0.0275    0.0293    0.0310    0.0327
                    0.0344    0.0361    0.0379    0.0396    0.0413
                    0.0430    0.0447    0.0465    0.0482    0.0499
                    0.0516    0.0534    0.0551    0.0568    0.0585
                    0.0602    0.0620    0.0637    0.0654    0.0671
                    0.0688    0.0706    0.0723    0.0740    0.0757
                    0.0774    0.0792    0.0809    0.0826    0.0843
                    0.0861    0.0878    0.0895    0.0912    0.0929
                    0.0947    0.0964    0.0981    0.0998    0.1015
                    0.1033    0.1065    0.1097    0.1129    0.1162
                    0.1194    0.1226    0.1259    0.1291    0.1323
                    0.1355    0.1388    0.1420    0.1452    0.1484
                    0.1517    0.1549    0.1581    0.1614    0.1646
                    0.1678    0.1710    0.1743    0.1775    0.1807
                    0.1839    0.1872    0.1904    0.1936    0.1968
                    0.2001    0.2045    0.2090    0.2134    0.2178
                    0.2223    0.2267    0.2312    0.2356    0.2401
                    0.2445    0.2489    0.2534    0.2578    0.2623
                    0.2667    0.2713    0.2760    0.2806    0.2852
                    0.2898    0.2984    0.3069    0.3154    0.3240
                    0.3325    0.3528    0.3731    0.4006    0.4357
                    0.5000    0.5643    0.5994    0.6269    0.6472
                    0.6675    0.6760    0.6846    0.6931    0.7016
                    0.7102    0.7148    0.7194    0.7240    0.7287
                    0.7333    0.7377    0.7422    0.7466    0.7511
                    0.7555    0.7599    0.7644    0.7688    0.7733
                    0.7777    0.7822    0.7866    0.7910    0.7955
                    0.7999    0.8032    0.8064    0.8096    0.8128
                    0.8161    0.8193    0.8225    0.8257    0.8290
                    0.8322    0.8354    0.8386    0.8419    0.8451
                    0.8483    0.8516    0.8548    0.8580    0.8612
                    0.8645    0.8677    0.8709    0.8741    0.8774
                    0.8806    0.8838    0.8871    0.8903    0.8935
                    0.8967    0.8985    0.9002    0.9019    0.9036
                    0.9053    0.9071    0.9088    0.9105    0.9122
                    0.9139    0.9157    0.9174    0.9191    0.9208
                    0.9226    0.9243    0.9260    0.9277    0.9294
                    0.9312    0.9329    0.9346    0.9363    0.9380
                    0.9398    0.9415    0.9432    0.9449    0.9466
                    0.9484    0.9501    0.9518    0.9535    0.9553
                    0.9570    0.9587    0.9604    0.9621    0.9639
                    0.9656    0.9673    0.9690    0.9707    0.9725
                    0.9742    0.9759    0.9776    0.9793    0.9811
                    0.9828    0.9845    0.9862    0.9880    0.9897
                    0.9914    0.9931    0.9948    0.9966    0.9983
                    1.0000
          rtp2-06             0.1
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                    0.0301    0.0361    0.0421    0.0481    0.0542
                    0.0602    0.0662    0.0722    0.0782    0.0843
                    0.0903    0.0960    0.1018    0.1075    0.1132
                    0.1190    0.1295    0.1399    0.1504    0.1609
                    0.1714    0.1981    0.2248    0.2670    0.3337
                    0.5000    0.6663    0.7330    0.7752    0.8019
                    0.8286    0.8391    0.8496    0.8601    0.8705
                    0.8810    0.8868    0.8925    0.8982    0.9040
                    0.9097    0.9157    0.9218    0.9278    0.9338
                    0.9398    0.9458    0.9519    0.9579    0.9639
                    0.9699    0.9759    0.9819    0.9880    0.9940
                    1.0000



GLOBAL OUTPUT:
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                       C:\TR-20\Mill Swamp TR-20 UNT.out

                                           STORM p2-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time       Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)      (cfs)     (csm)

DA-5          2.760    GAGE        0.929               13.31      531.7    192.63
CON-4         2.760  Upstream      0.929     17.61     13.31      531.7    192.63
CON-4         2.760 Downstream     0.928     17.61     13.43      530.3    192.13
DA-6          0.010    GAGE        0.473               12.42        4.4    440.18
OUTLET        2.770                0.927               13.43      530.0    191.34

                                           STORM p5-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time       Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)      (cfs)     (csm)

DA-5          2.760    GAGE        1.542               13.23      910.0    329.73
CON-4         2.760  Upstream      1.542     18.28     13.23      910.0    329.73
CON-4         2.760 Downstream     1.542     18.27     13.34      908.6    329.22
DA-6          0.010    GAGE        0.870               12.41        7.3    732.04
OUTLET        2.770                1.540               13.35      909.7    328.40

                                           STORM p10-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time       Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)      (cfs)     (csm)

DA-5          2.760    GAGE        2.147               13.23     1257.6    455.65
CON-4         2.760  Upstream      2.147     18.88     13.23     1257.6    455.65
CON-4         2.760 Downstream     2.146     18.88     13.35     1255.2    454.79
DA-6          0.010    GAGE        1.275               12.42        9.8    984.65
OUTLET        2.770                2.143               13.36     1256.5    453.60

                                           STORM p25-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time       Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)      (cfs)     (csm)

DA-5          2.760    GAGE        3.126               13.24     1772.2    642.10
CON-4         2.760  Upstream      3.126     19.52     13.24     1772.2    642.10
CON-4         2.760 Downstream     3.126     19.51     13.36     1767.5    640.42
DA-6          0.010    GAGE        2.159               12.40       13.4   1341.87
OUTLET        2.770                3.122               13.34     1768.6    638.48

                                           STORM p50-24
```

```
Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-5          2.760    GAGE        4.041               13.18    2206.7    799.51
CON-4         2.760  Upstream      4.041     19.94     13.18    2206.7    799.51
CON-4         2.760 Downstream     4.041     19.94     13.30    2206.7    799.51
DA-6          0.010    GAGE        3.232               12.39      16.3   1632.20
OUTLET        2.770                4.038               13.30    2207.6    796.98

                                           STORM p100-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-5          2.760    GAGE        5.121               13.19    2684.5    972.65
CON-4         2.760  Upstream      5.121     20.38     13.19    2684.5    972.65
CON-4         2.760 Downstream     5.121     20.37     13.31    2678.9    970.63
DA-6          0.010    GAGE        4.130               12.40      19.3   1934.03
OUTLET        2.770                5.117               13.31    2682.3    968.32

                                           STORM p200-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-5          2.760    GAGE        6.367               13.22    3185.9   1154.33
CON-4         2.760  Upstream      6.367     20.95     13.22    3185.9   1154.33
CON-4         2.760 Downstream     6.367     20.94     13.34    3178.4   1151.61
DA-6          0.010    GAGE        5.291               12.38      22.4   2237.91
OUTLET        2.770                6.363               13.32    3181.5   1148.55

                                           STORM p500-24

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-5          2.760    GAGE        8.340               13.24    3892.4   1410.29
CON-4         2.760  Upstream      8.340     21.58     13.24    3892.4   1410.29
CON-4         2.760 Downstream     8.339     21.58     13.24    3887.9   1408.65
DA-6          0.010    GAGE        8.048               12.39      26.5   2653.72
OUTLET        2.770                8.338               13.26    3892.6   1405.26

                                           STORM p2-06

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

DA-5          2.760    GAGE        0.437                4.43     321.4    116.43
CON-4         2.760  Upstream      0.437     17.14      4.43     321.4    116.43
CON-4         2.760 Downstream     0.437     17.14      4.55     320.4    116.10
DA-6          0.010    GAGE        0.256                3.47       2.6    261.34
```

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                                 MILL SWAMP UNT

Area or    Drainage  Rain Gage     Runoff   ------------ Peak Flow ------------
 Reach       Area      ID or       Amount   Elevation   Time      Rate      Rate
Identifier  (sq mi)   Location      (in)      (ft)      (hr)     (cfs)     (csm)

OUTLET        2.770                0.436                4.56     320.4    115.66
```

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                                    MILL SWAMP UNT

  Area or    Drainage             ----------- Peak Flow by Storm -----------
   Reach       Area                p2-24     p5-24     p10-24    p25-24    p50-24
 Identifier  (sq mi)               (cfs)     (cfs)     (cfs)     (cfs)     (cfs)

 DA-5          2.760               531.7     910.0    1257.6    1772.2    2206.7
 DA-6          0.010                 4.4       7.3       9.8      13.4      16.3
 CON-4         2.760               531.7     910.0    1257.6    1772.2    2206.7   POI-5
 DOWNSTREAM                        530.3     908.6    1255.2    1767.5    2206.7
 OUTLET        2.770               530.0     909.7    1256.5    1768.6    2207.6   POI-6

  Area or    Drainage             ----------- Peak Flow by Storm -----------
   Reach       Area               p100-24   p200-24   p500-24     p2-06
 Identifier  (sq mi)               (cfs)     (cfs)     (cfs)     (cfs)     (cfs)

 DA-5          2.760              2684.5    3185.9    3892.4     321.4
 DA-6          0.010                19.3      22.4      26.5       2.6
 CON-4         2.760              2684.5    3185.9    3892.4     321.4   POI-5
 DOWNSTREAM                       2678.9    3178.4    3887.9     320.4
 OUTLET        2.770              2682.3    3181.5    3892.6     320.4   POI-6
```

# APPENDIX E.8
# PHOTOGRAPHS OF PROPOSED MITIGATION SITE

***Figure 1:*** *SR-1 exhibits an over-widened stream channel that is disconnected from its floodplain, lacks overhead cover, and exhibits little to no in-channel habitat. Disconnection from floodplain contributes to flooding at Marshall Hall Rd.*

***Figure 2:*** *SR-1 exhibits exposed, cut banks exhibiting lateral migration due to streambank erosion.*

***Figure 3**: Upstream view of Dual Box Culvert 6' x 12' upstream of SR-1 at Marshall Hall Rd.*

***Figure 4**: Multiple drainage features are found within SR-1.*

***Figure 5:*** *Evidence of beaver activity is present within SR-1.*

***Figure 6:*** *Downstream view of longitudinal profile 1 (LP-1) on SR-1.*

***Figure 7:*** *Downstream view of SR-1 riffle cross-section (XS-1).*

***Figure 8:*** *Left bank view of SR-1 riffle cross-section (XS-1).*

***Figure 9:*** *SR-2 is over-widened and exhibits little to no biological abundance or diversity.*

***Figure 10:*** *Oxbow feature within SR-2.*

***Figure 11:*** *SR-2 depositional features, mid-channel bars.*

***Figure 12****: Stream channel of SR-2, stream channel split.*

***Figure 13****: Downstream view of 72" RCP driveway culvert, downstream of SR-2.*

***Figure 14****: Downstream view of longitudinal profile 2 (LP-2) on SR-2.*

***Figure 15**: Downstream view of SR-2 riffle cross-section (XS-4).*

***Figure 16**: Left bank view of SR-2 riffle cross-section (XS-4).*

***Figure 17**: Right bank view of SR-2 riffle cross-section (XS-4).*

***Figure 18**: Downstream view of SR-2 pool cross-section (XS-3).*

***Figure 19****: Left bank view of SR-2 pool cross-section (XS-3).*

***Figure 20****: Right bank view of SR-2 pool cross-section (XS-3).*

***Figure 21:*** *SR-3 is over-widened and exhibits little to no biological abundance or diversity.*

***Figure 22:*** *SR-3 has been historically straightened, which has disconnected the channel from the floodplain, causing impairment to in-channel habitat.*

***Figure 23****: Upstream view of 72" RCP driveway culvert, Upstream of SR-3.*

***Figure 24:*** *Historical well and drainage feature within SR-3.*

***Figure 25**: Downstream view of longitudinal profile 3 (LP-3) on SR-3.*

***Figure 26**: Downstream view of SR-3 riffle cross-section (XS-5).*

***Figure 27**: Downstream view of SR-3 pool cross-section (XS-6).*

***Figure 28**: Left bank view of SR-3 pool cross-section (XS-6).*

***Figure 29**: Right bank view of SR-3 pool cross-section (XS-6).*

***Figure 30**: Left bank view of SR-3 riffle cross-section (XS-5).*

***Figure 31**: Right bank view of SR-3 riffle cross-section (XS-5).*

***Figure 32:** Downstream view of debris jam feature within SR-3.*

***Figure 33:*** *Downstream view of tie-in, downstream of SR-3.*

***Figure 34:*** *SR-4 is over widened and disconnected from the floodplain resulting in impaired sediment transport capability and flooding at Marshall Hall Rd.*

***Figure 35:*** *SR-4 exhibits cut banks, showing disconnection from floodplain.*

***Figure 36****: Upstream view of Dual Box Culvert 6' x 10.5' upstream of SR-4 at Marshall Hall Rd.*

***Figure 37:*** *Upstream view of debris jam feature within SR-4.*

***Figure 38:*** *Downstream view of SR-4.*

***Figure 39**: Upstream view of longitudinal profile 4 (LP-4) on SR-4.*

***Figure 40**: Downstream view of SR-4 pool cross-section (XS-7).*

***Figure 41**: Left bank view of SR-4 riffle cross-section (XS-8).*

***Figure 42**: Right bank view of SR-4 riffle cross-section (XS-8).*

***Figure 43***: *Left bank view of SR-4 pool cross-section (XS-7).*

***Figure 44***: *Right bank view of SR-4 pool cross-section (XS-7).*

***Figure 45:*** *SR-5 is over-widened, disconnected from the floodplain, and lacks discernable facet features.*

***Figure 46:*** *SR-5 displays aggradation of sediment throughout the stream corridor.*

***Figure 47:*** *Downstream view of SR-5 riffle cross-section (XS-10).*

***Figure 48****: Left bank view of SR-5 riffle cross-section (XS-10).*

***Figure 49****: Right bank view of SR-5 riffle cross-section (XS-10).*

***Figure 50:*** *Downstream view of SR-5 pool cross-section (XS-9).*

***Figure 51**: Left bank view of SR-5 pool cross-section (XS-9).*

***Figure 52**: Right bank view of SR-5 pool cross-section (XS-9).*

***Figure 53:*** *Downstream view of tie-in, downstream of SR-5.*

# APPENDIX E.9
# EXISTING BASELINE CONDITION ASSESSMENT

Not Final

| STREAM BANK EROSION RATES LEGEND (TON /YEAR /FT) | |
|---|---|
| 🟩 | 0.00 – 0.09 |
| 🟦 | 0.10 – 0.49 |
| 🟨 | 0.50 – 0.99 |
| 🟧 | 1.00 – 1.50 |

BY: HConneally –

PROFESSIONAL CERTIFICATION

"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 31183, EXPIRATION DATE: 1/13/2027."

DESIGN PROFESSIONAL /CONTACT

JEREMY KOSER
JOHNSON, MIRMIRAN & THOMPSON
40 WIGHT AVENUE
HUNT VALLEY, MD 21030
TELEPHONE: 410-316-2360
EMAIL: JKOSER@JMT.COM

# MILL SWAMP MITIGATION BANK

BRYANS ROAD, MD 20616

CHARLES COUNTY ELECTION DISTRICT: 07
CONGRESSIONAL DISTRICT: 05

MARYLAND COORDINATE SYSTEM
HOR. NAD 83/91 MD STATE PLANE VERT. NAVD 88

OWNER /DEVELOPER INFORMATION:
JOHNSON, MIRMIRAN & THOMPSON
40 WIGHT AVENUE
HUNT VALLEY, MD 21030

CONTACT INFORMATION:
JEREMY KOSER
JOHNSON, MIRMIRAN & THOMPSON
TELEPHONE: 410-316-2360
EMAIL: JKOSER@JMT.COM

REVISIONS

CONCEPT DESIGN

NOT FOR CONSTRUCTION

## SITE ASSESSMENT MAP

SCALE AS SHOWN
DATE JULY 2025
PROJECT NO. 25-00175-001

DESIGNED BY KNH
DRAWN BY HAC
CHECKED BY JJM
F.A.P. NO. N/A
COUNTY CHARLES COUNTY
LOGMILE N/A
HORIZONTAL SCALE N /A
VERTICAL SCALE N /A

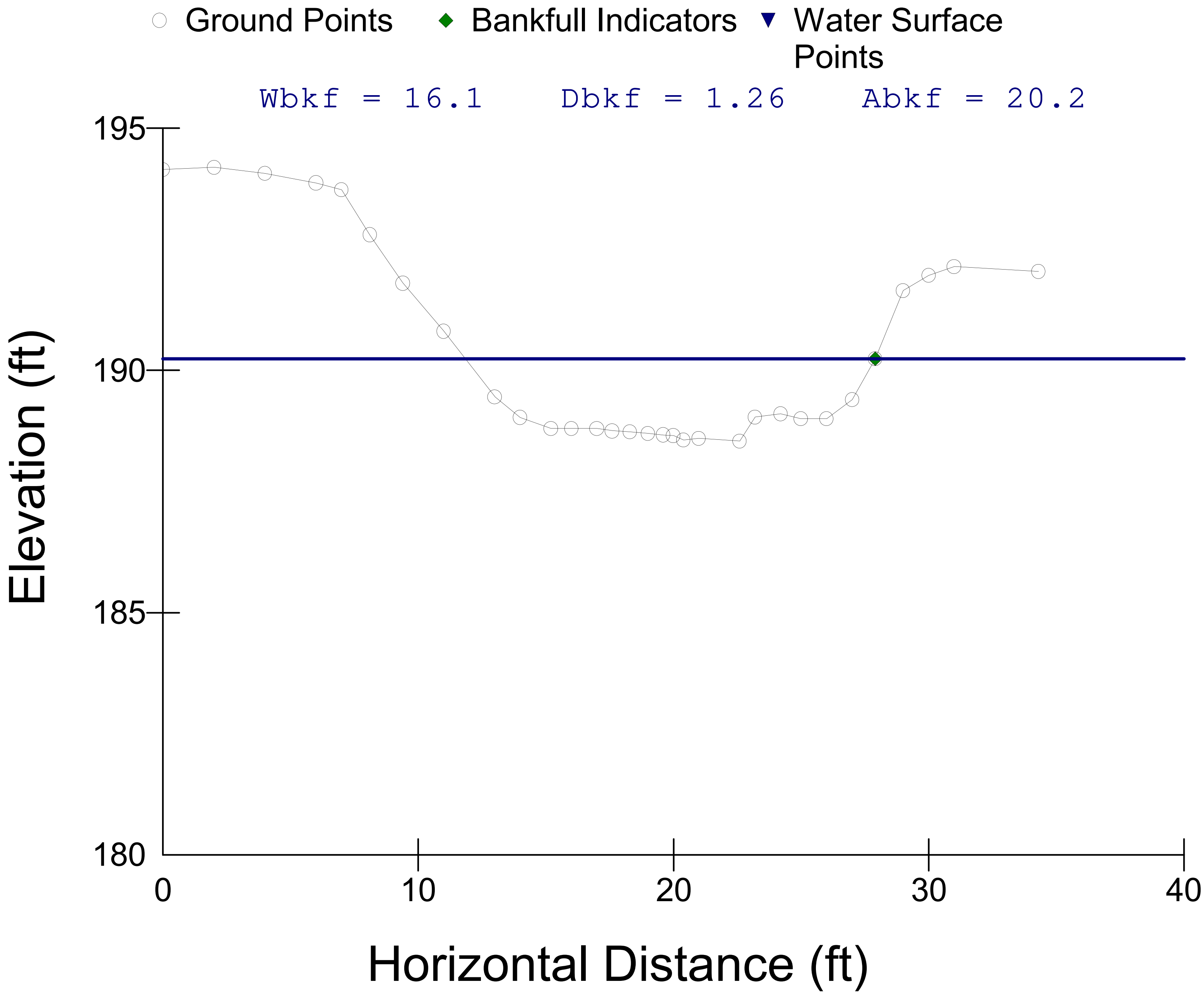
DRAWING NO. SAM-01 OF 01
SHEET NO. OF 45

pw:\\jmt-pw.bentley.com:jmt-pw-01\Documents\Projects\2025\25-00175\25-00175-001\JMT\Water Resources\2D Drawing\SAM-E001_Mill Swamp
6/11/2025

# CROSS SECTION DATA

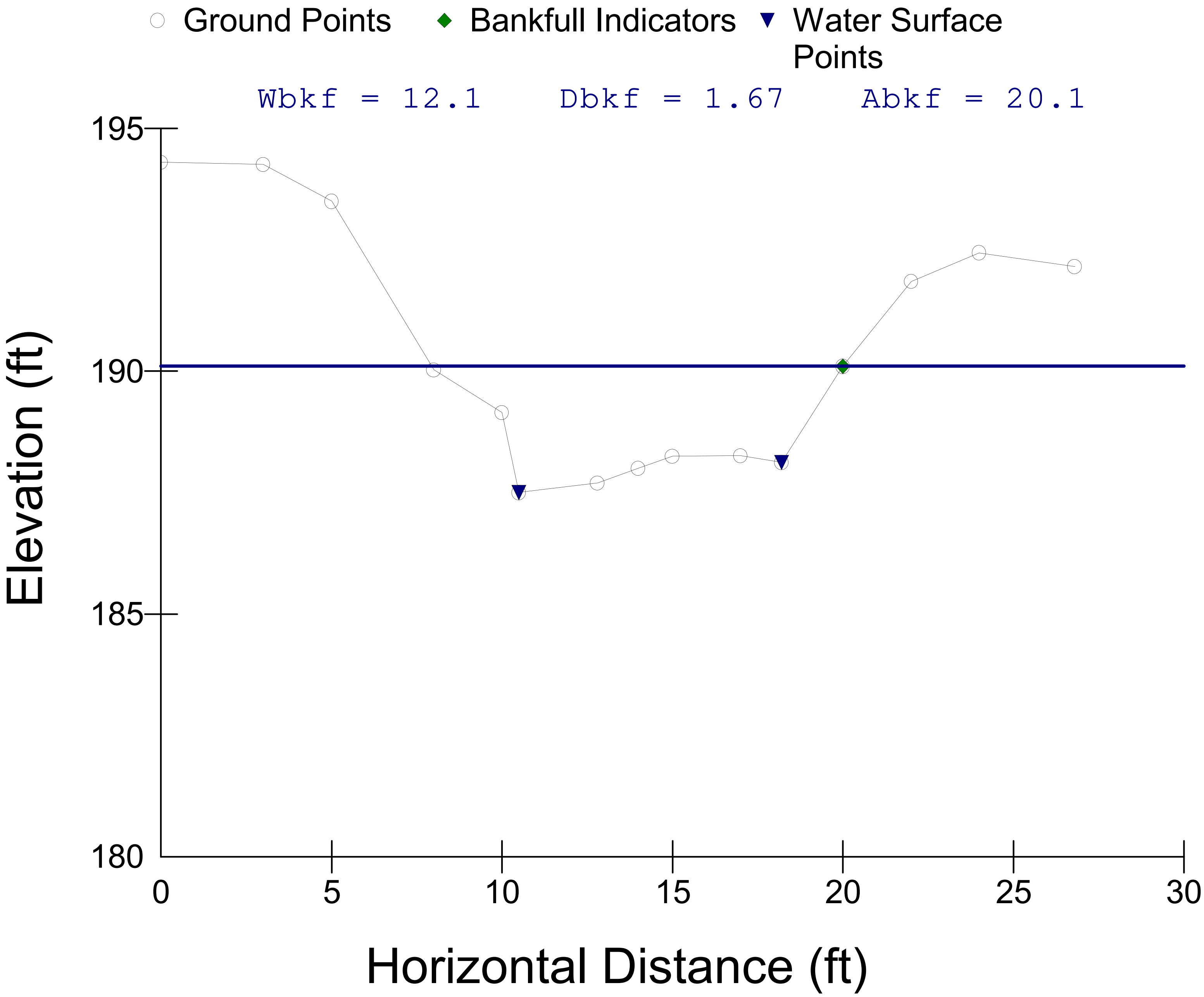
Not Final

# Riffle XS-1 (Mill Swamp SR-1)



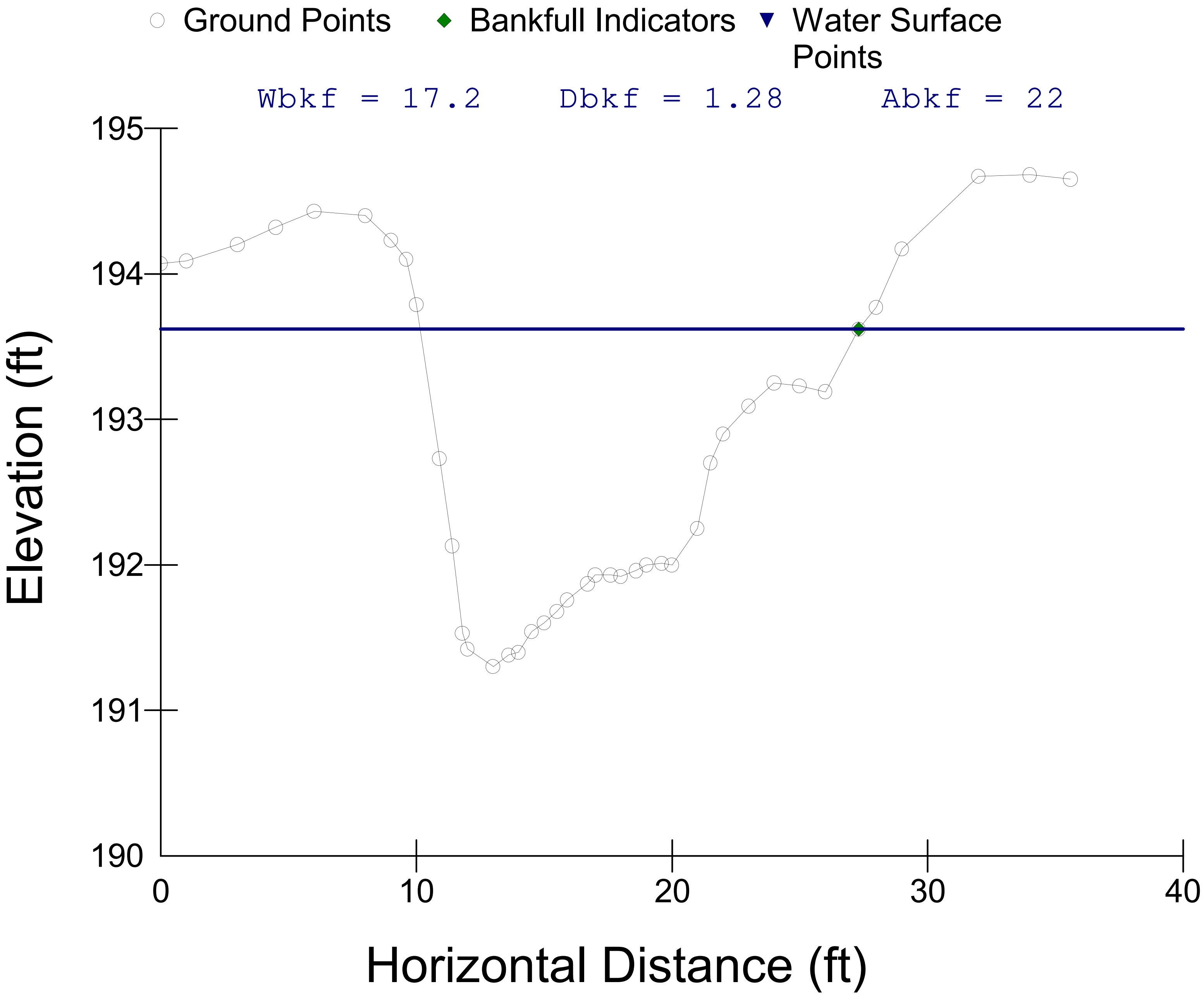
Not Final

# Pool XS-2 (Mill Swamp SR-1)



Not Final

# Pool XS-3 (Mill Swamp SR-2)



Not Final

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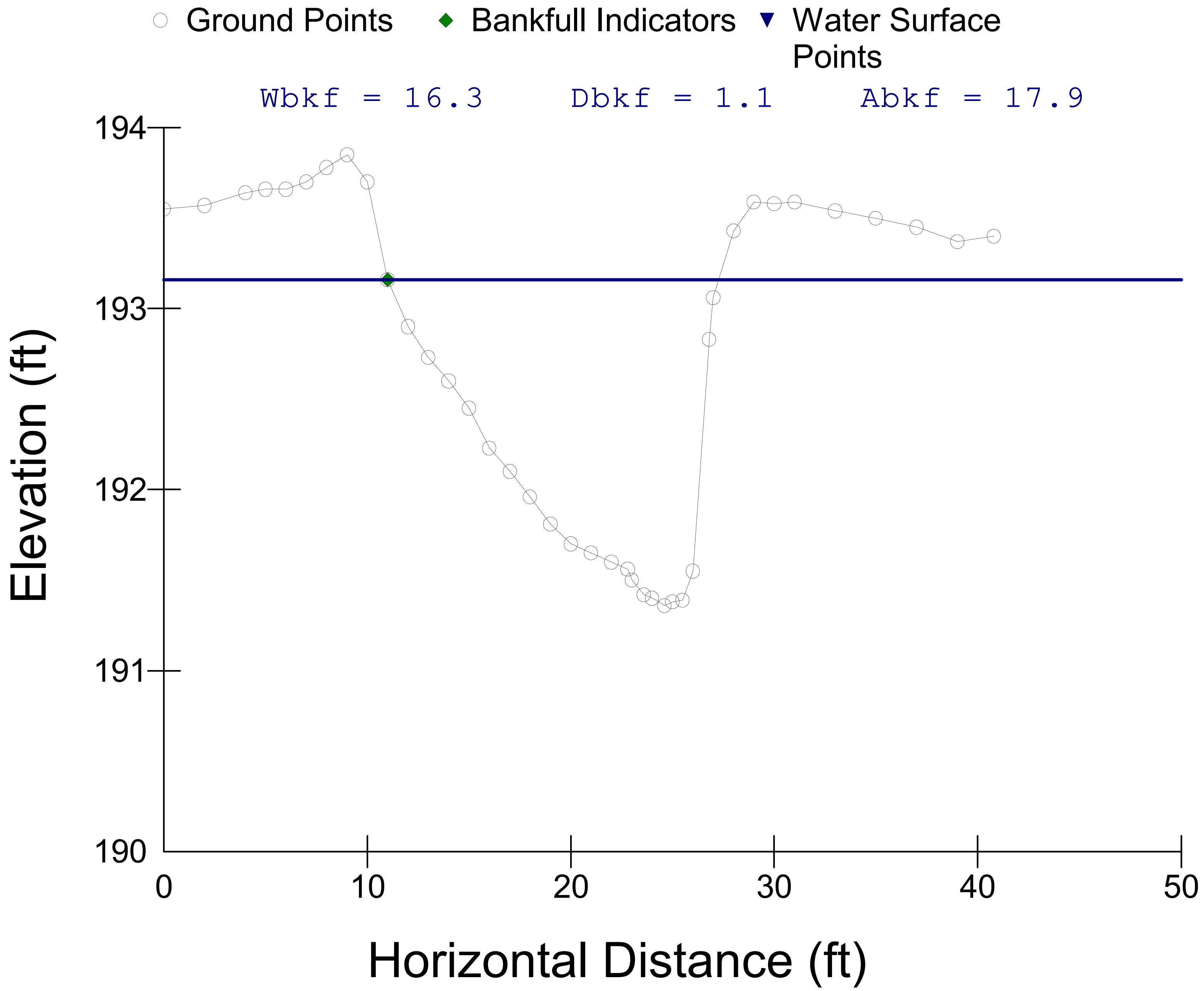

Not Final

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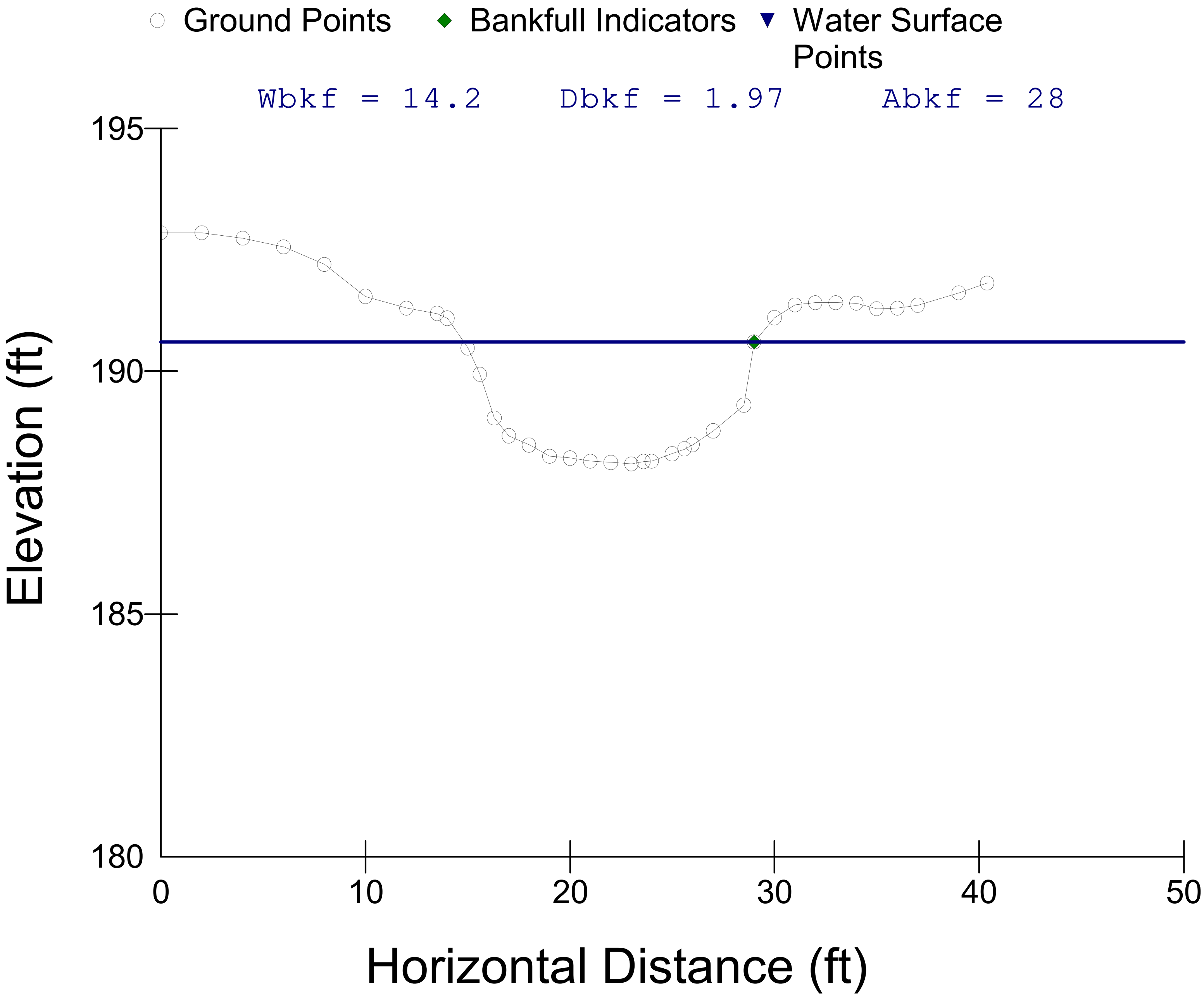

Not Final

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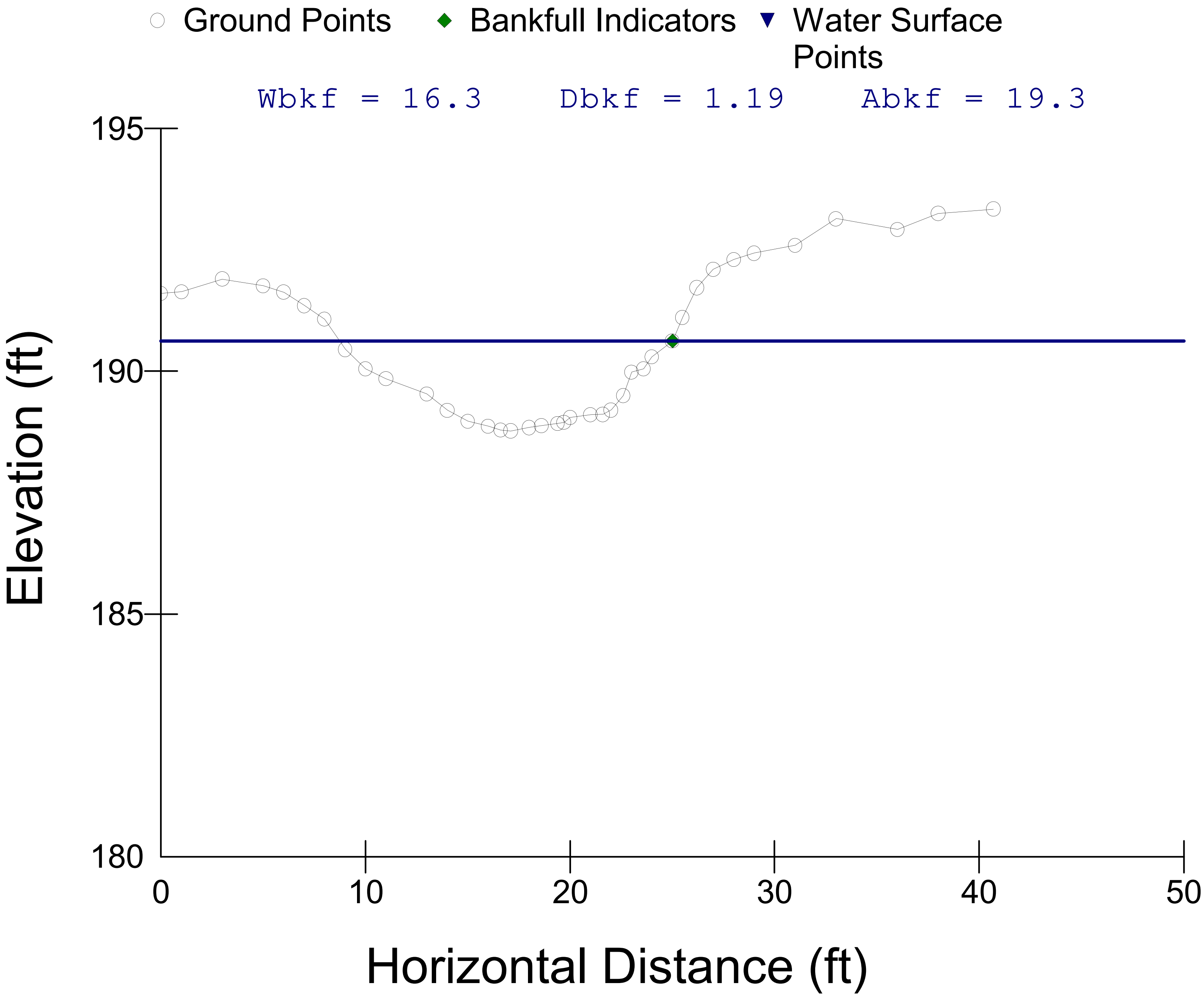

Not Final

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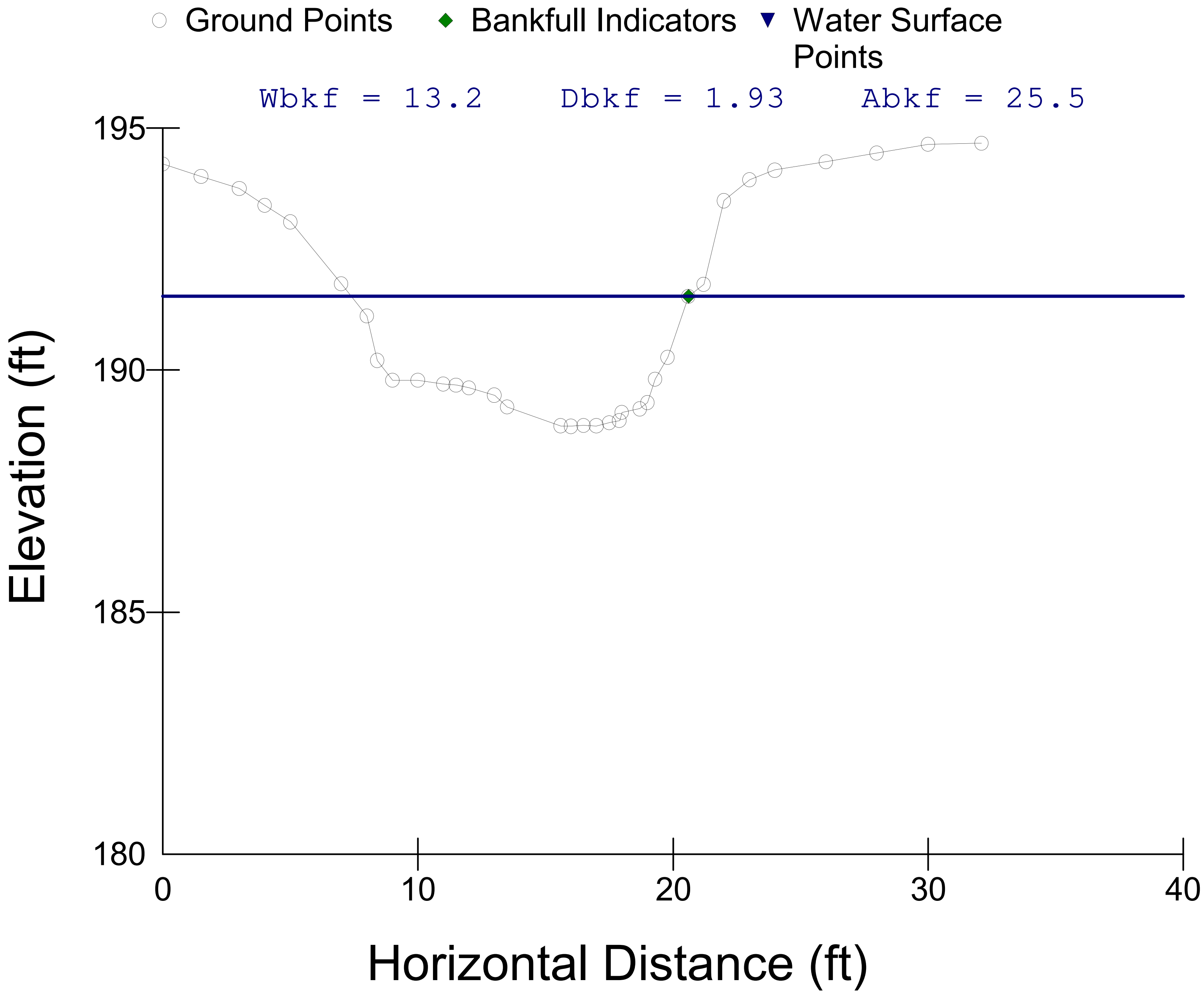
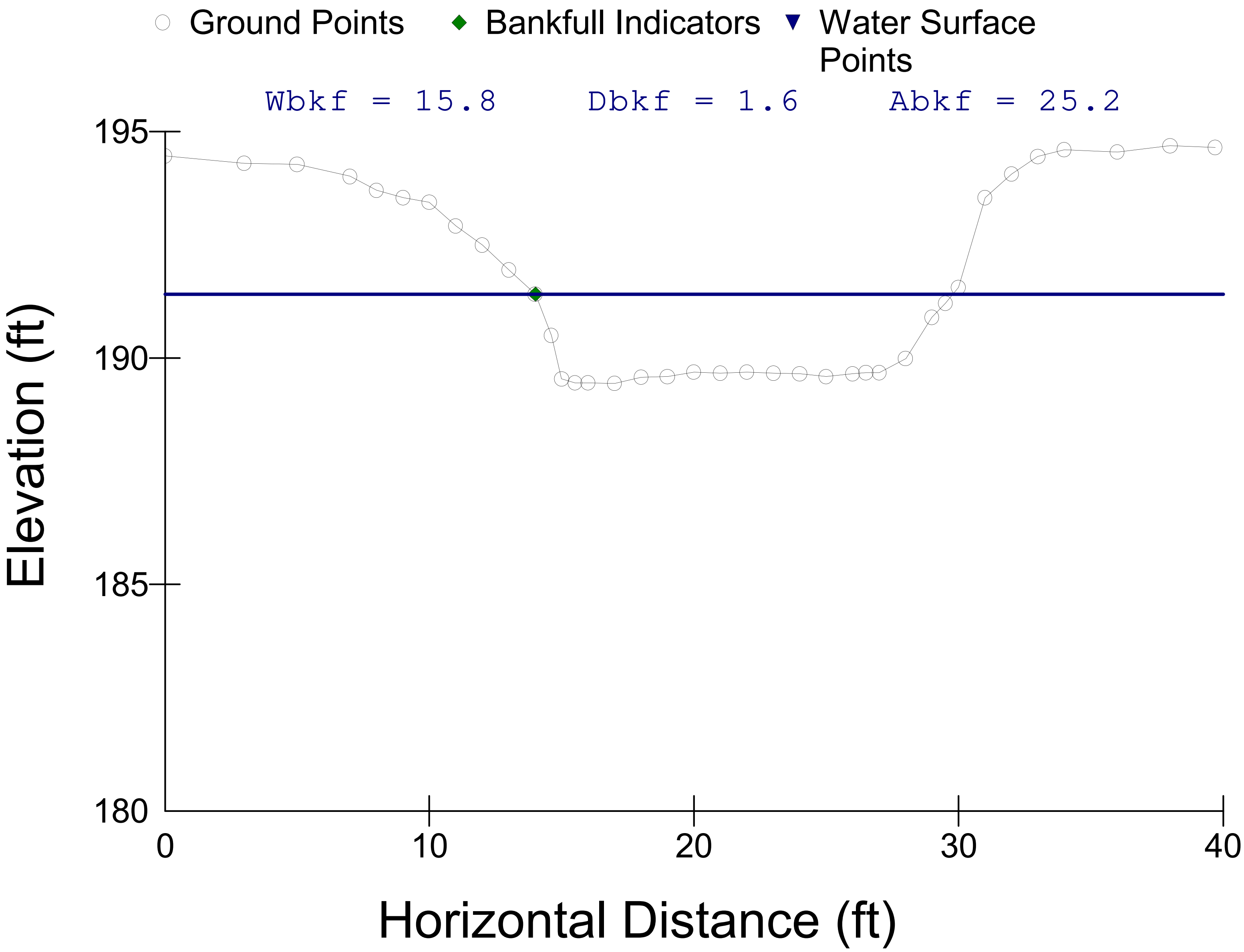


Not Final

# Riffle XS-8 (UNT to Mill Swamp SR-4)



Not Final

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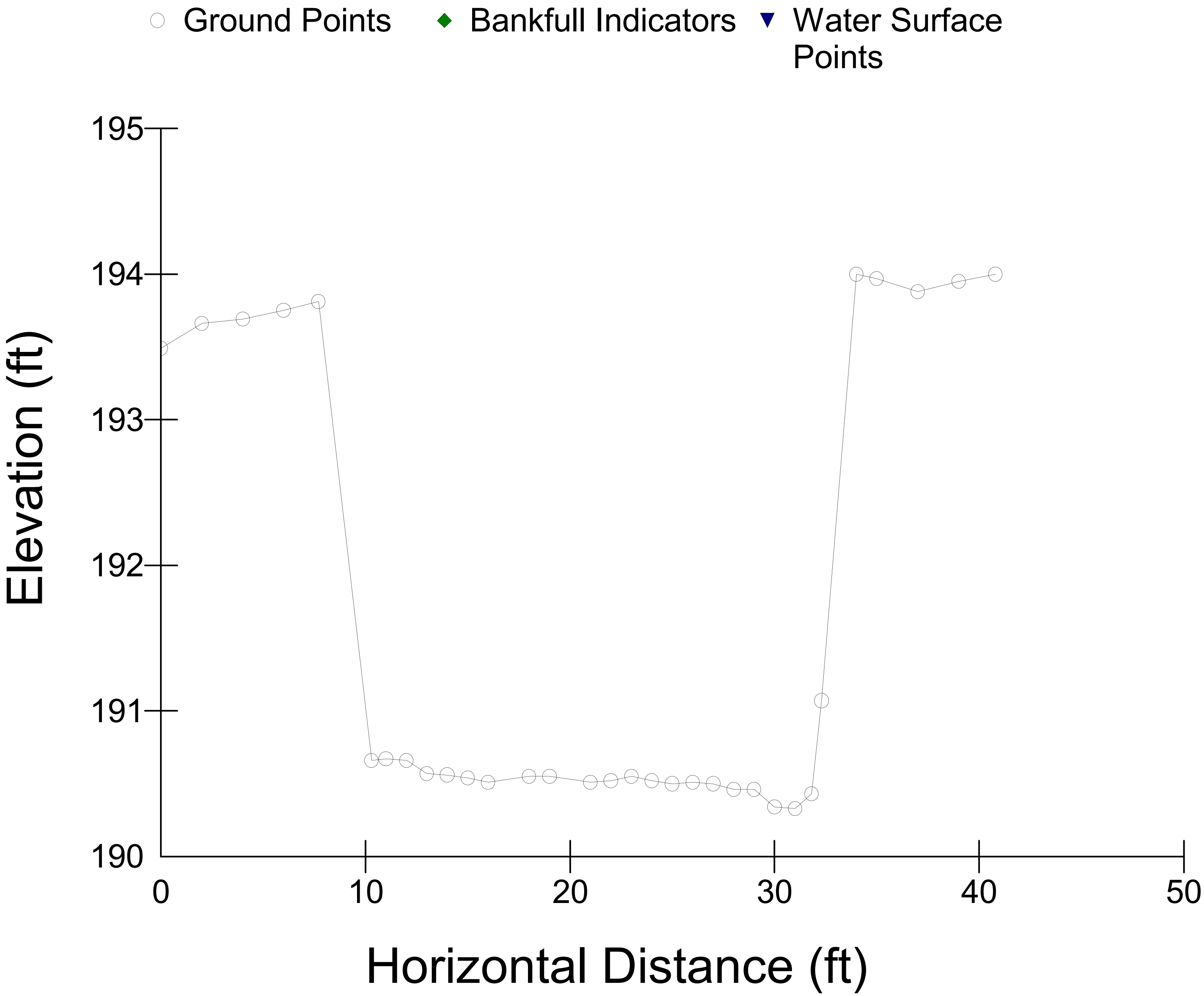
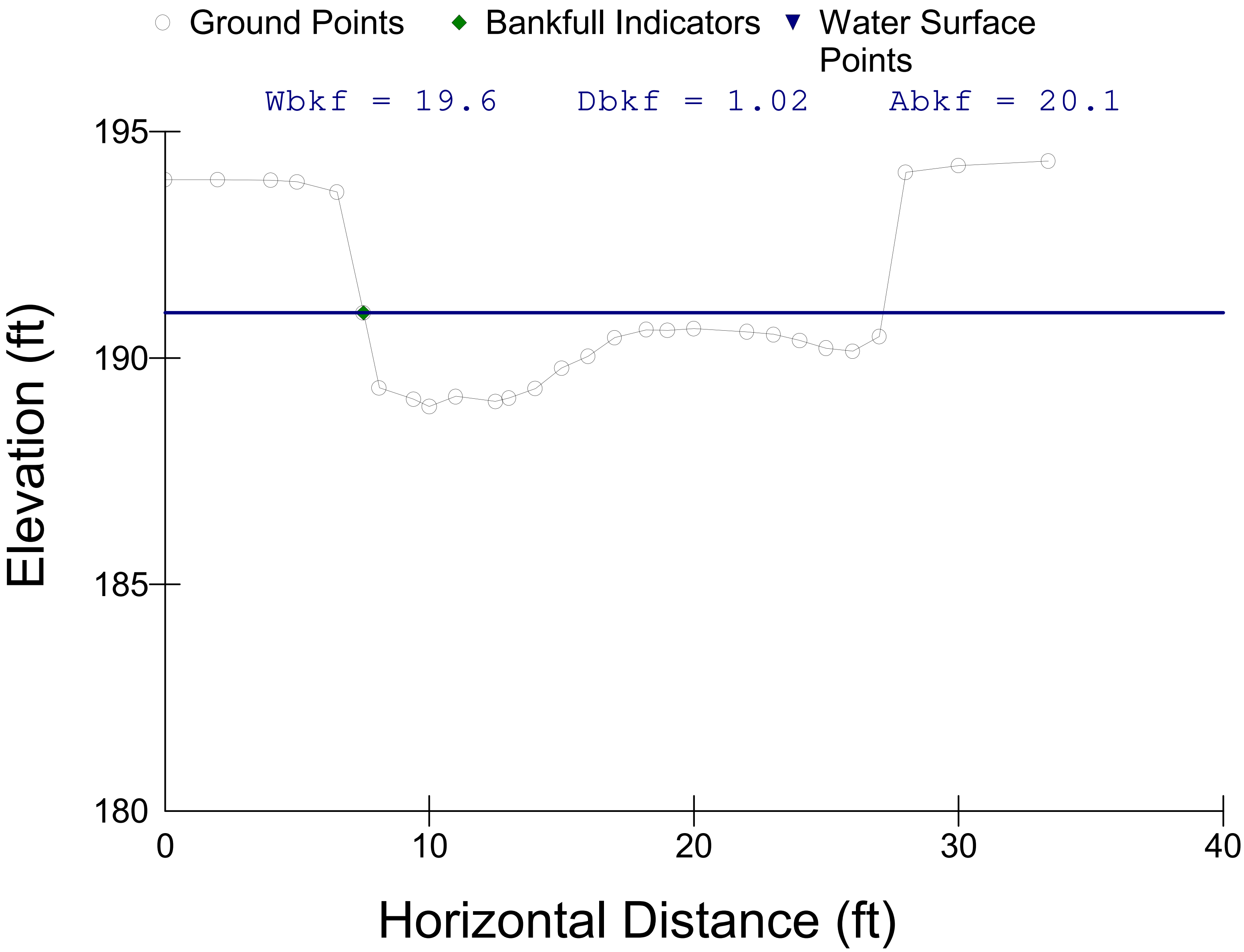


Not Final

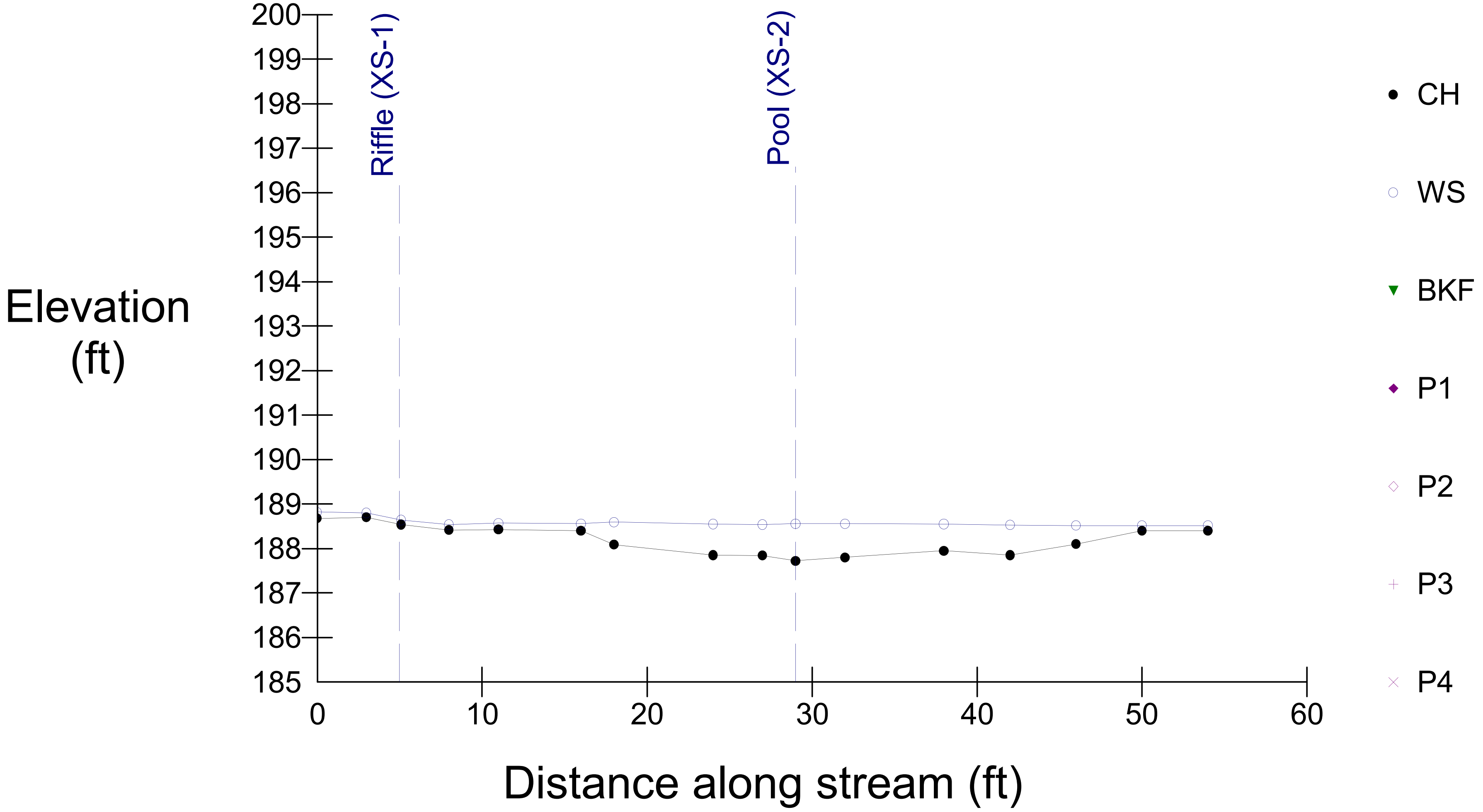
# Riffle XS-10 (UNT to Mill Swamp SR-5)



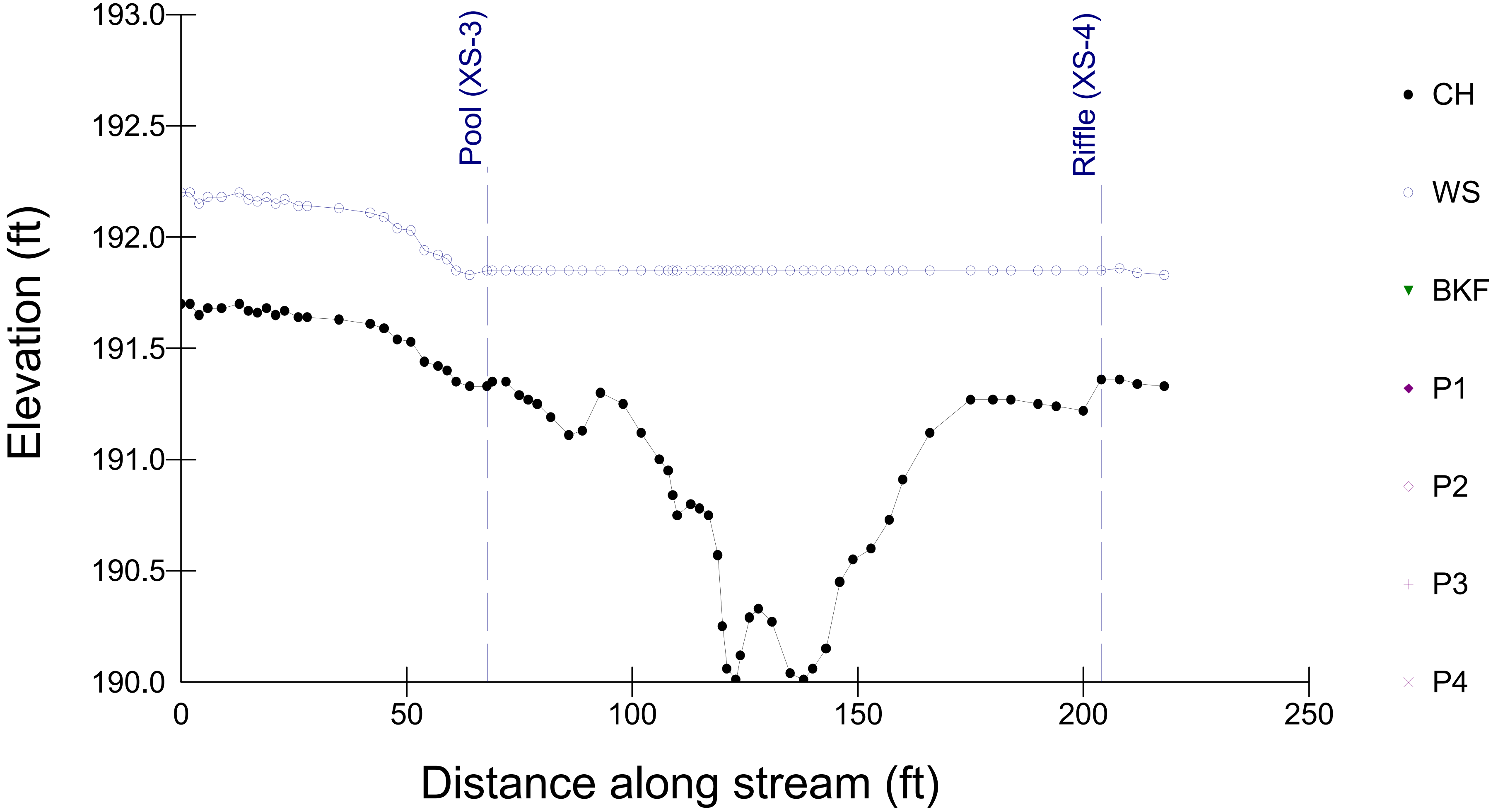
# LONGITUDINAL PROFILE DATA

Not Final

# Longitudinal Profile 1 (Mill Swamp SR-1)

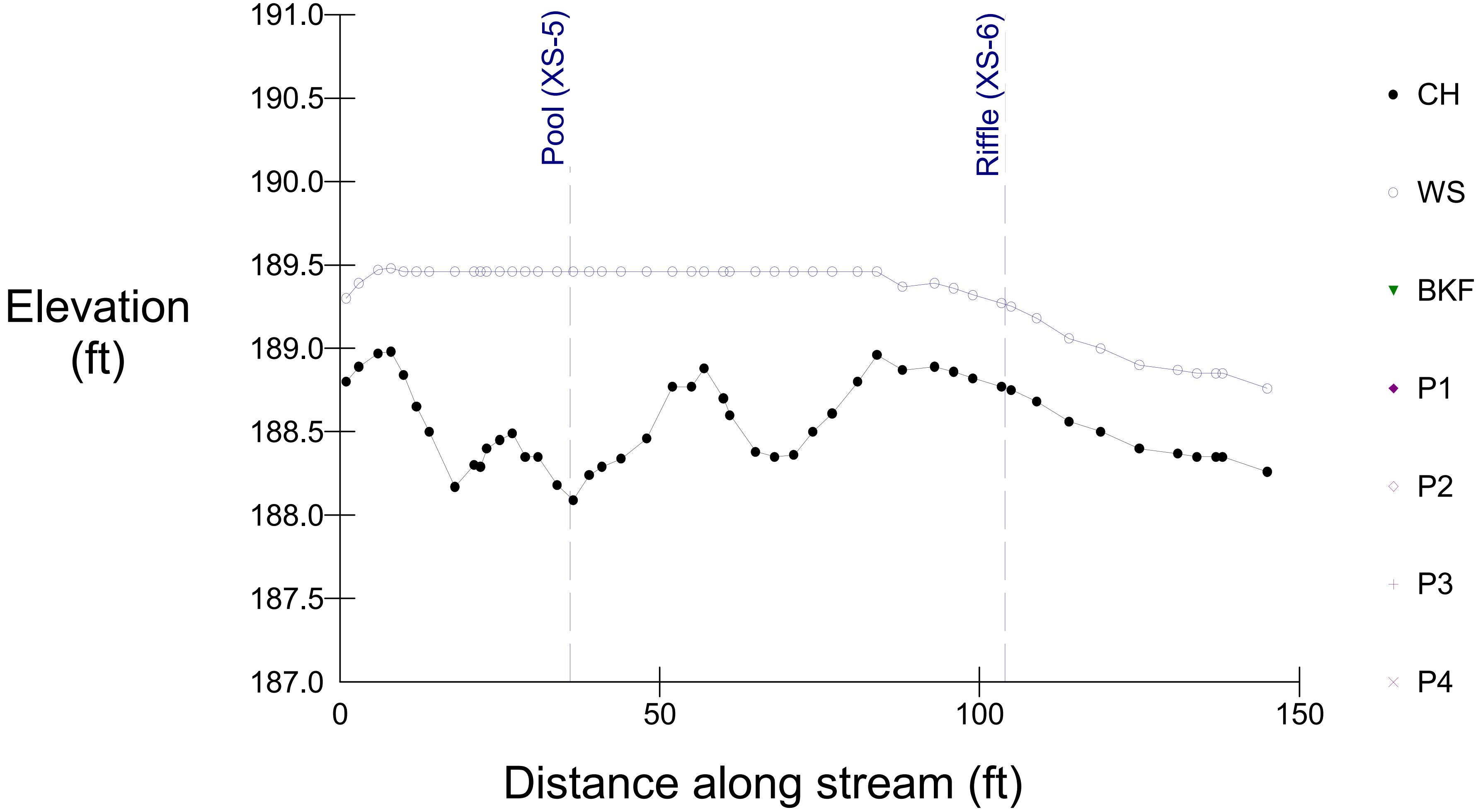


# Longitudinal Profile 2 (Mill Swamp SR-2)



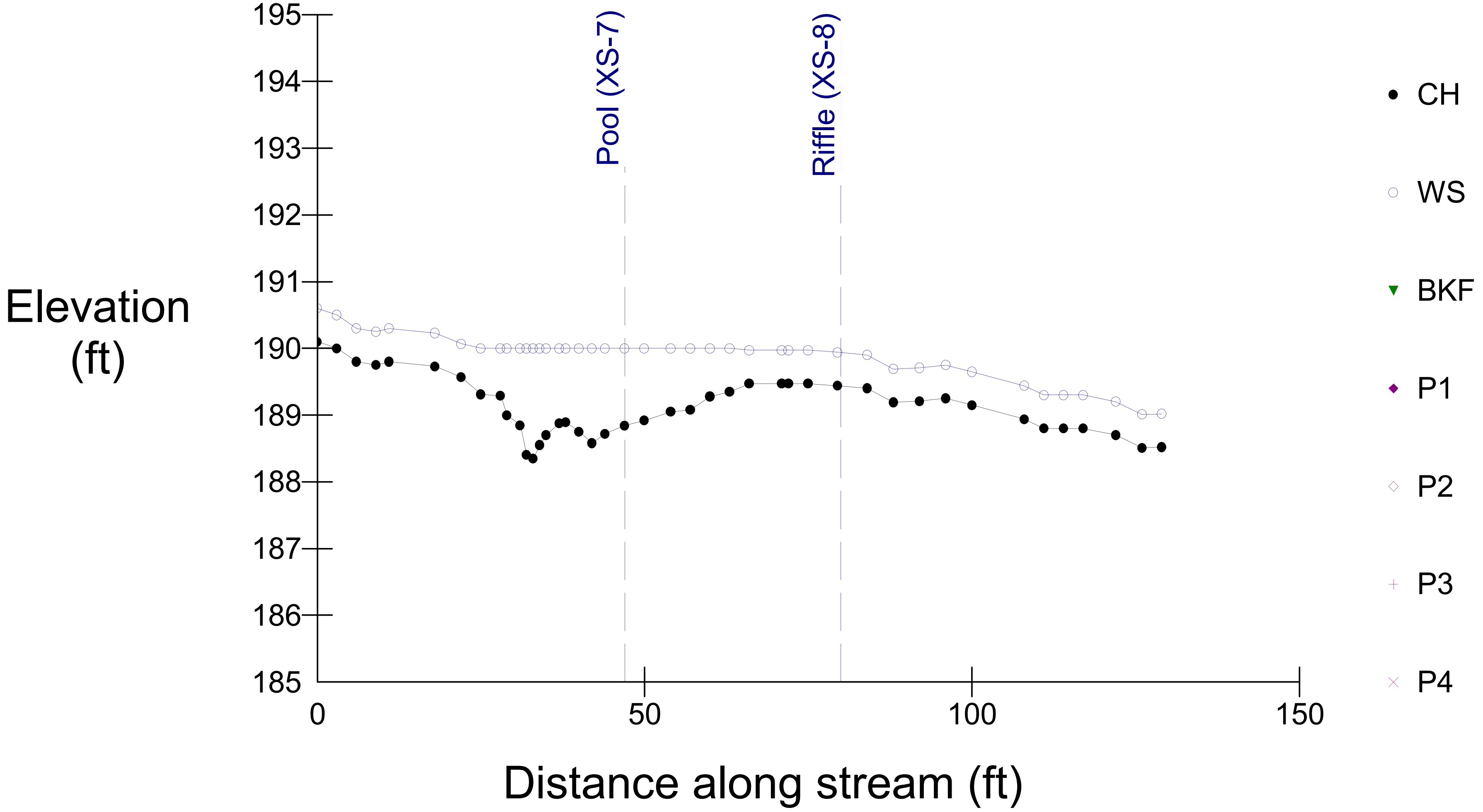
Not Final

# Longitudinal Profile 3 (Mill Swamp SR-3)



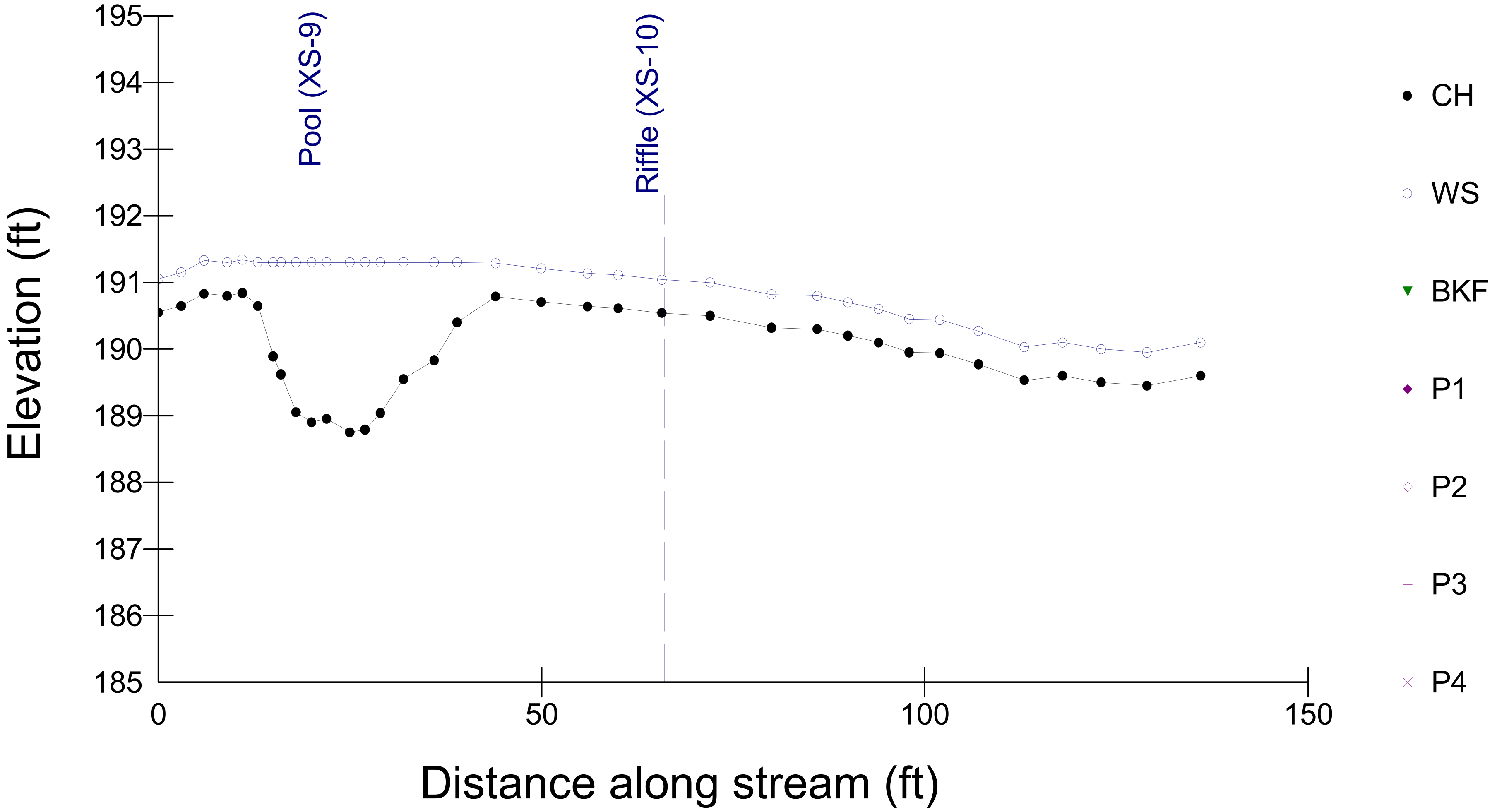
Not Final

# Longitudinal Profile 4 (UNT to Mill Swamp SR-4)



Not Final

# Longitudinal Profile 5 (UNT to Mill Swamp SR-5)

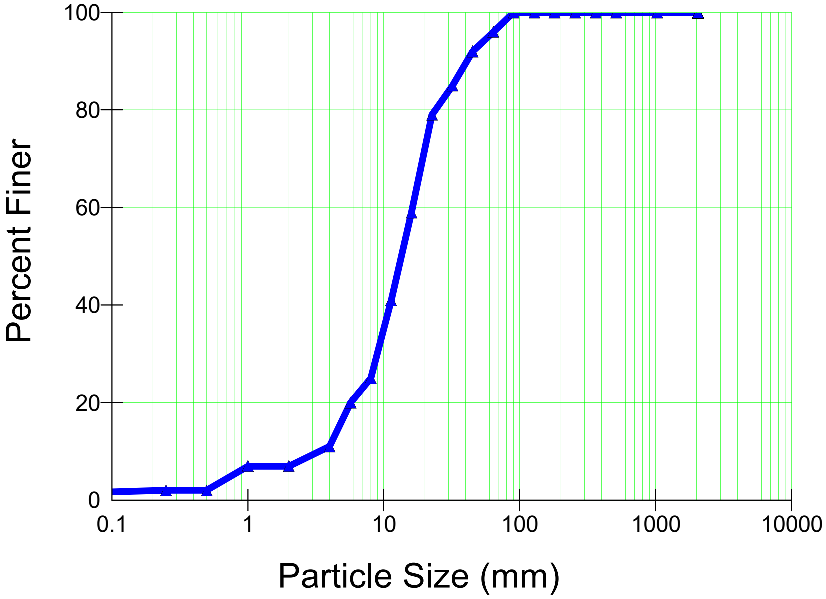


# PEBBLE COUNT DATA

```
                     RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:         Mill Swamp Mitigation Bank - Existing
Reach Name:         SR-1
Sample Name:        PC-1
Survey Date:        11/11/2024

----------------------------------------------------------------------

Size (mm)                TOT #     ITEM %    CUM %
----------------------------------------------------------------------
0 - 0.062                0         0.00      0.00
0.062 - 0.125            0         0.00      0.00
0.125 - 0.25             2         2.00      2.00
0.25 - 0.50              0         0.00      2.00
0.50 - 1.0               5         5.00      7.00
1.0 - 2.0                0         0.00      7.00
2.0 - 4.0                4         4.00      11.00
4.0 - 5.7                9         9.00      20.00
5.7 - 8.0                5         5.00      25.00
8.0 - 11.3               16        16.00     41.00
11.3 - 16.0              18        18.00     59.00
16.0 - 22.6              20        20.00     79.00
22.6 - 32.0              6         6.00      85.00
32 - 45                  7         7.00      92.00
45 - 64                  4         4.00      96.00
64 - 90                  4         4.00      100.00
90 - 128                 0         0.00      100.00
128 - 180                0         0.00      100.00
180 - 256                0         0.00      100.00
256 - 362                0         0.00      100.00
362 - 512                0         0.00      100.00
512 - 1024               0         0.00      100.00
1024 - 2048              0         0.00      100.00
Bedrock                  0         0.00      100.00

D16 (mm)                 4.94
D35 (mm)                 10.06
D50 (mm)                 13.65
D84 (mm)                 30.43
D95 (mm)                 59.25
D100 (mm)                90
Silt/Clay (%)            0
Sand (%)                 7
Gravel (%)               89
Cobble (%)               4
Boulder (%)              0
Bedrock (%)              0

Total Particles = 100.
```

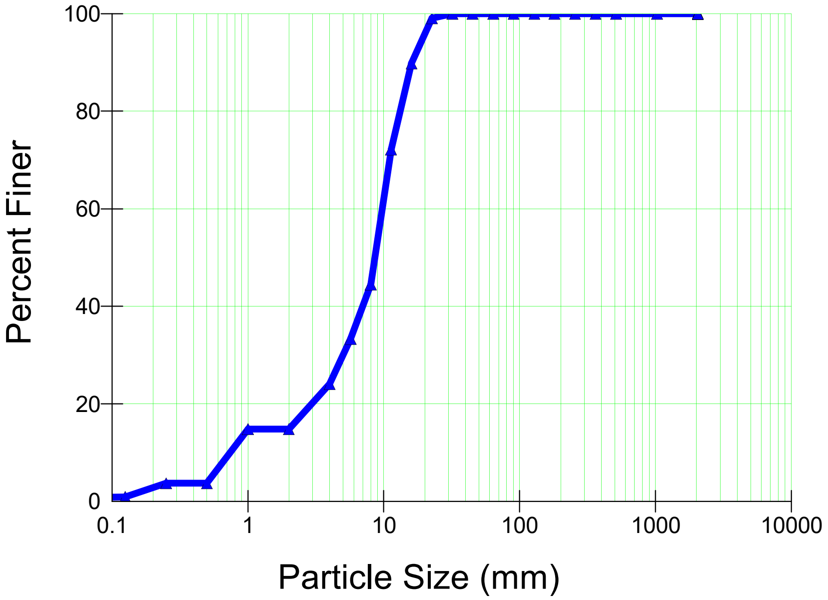
Not Final

# Riffle Pebble Count PC-1 (Mill Swamp SR-1)



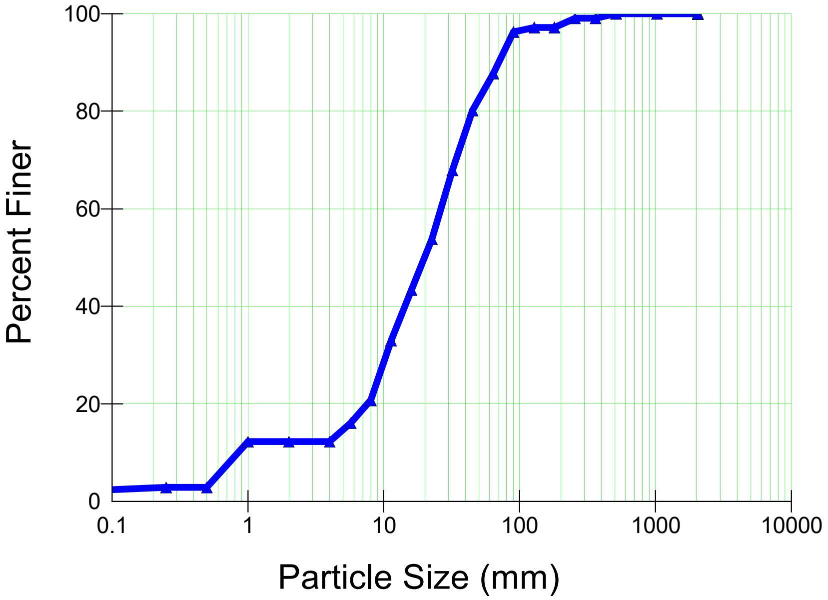
```
                     RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:         Mill Swamp Mitigation Bank - Existing
Reach Name:         SR-2
Sample Name:        PC-2
Survey Date:        11/11/2024

----------------------------------------------------------------------

Size (mm)                TOT #     ITEM %    CUM %
----------------------------------------------------------------------
0 - 0.062                0         0.00      0.00
0.062 - 0.125            1         0.93      0.93
0.125 - 0.25             3         2.78      3.70
0.25 - 0.50              0         0.00      3.70
0.50 - 1.0               12        11.11     14.81
1.0 - 2.0                0         0.00      14.81
2.0 - 4.0                10        9.26      24.07
4.0 - 5.7                10        9.26      33.33
5.7 - 8.0                12        11.11     44.44
8.0 - 11.3               30        27.78     72.22
11.3 - 16.0              19        17.59     89.81
16.0 - 22.6              10        9.26      99.07
22.6 - 32.0              1         0.93      100.00
32 - 45                  0         0.00      100.00
45 - 64                  0         0.00      100.00
64 - 90                  0         0.00      100.00
90 - 128                 0         0.00      100.00
128 - 180                0         0.00      100.00
180 - 256                0         0.00      100.00
256 - 362                0         0.00      100.00
362 - 512                0         0.00      100.00
512 - 1024               0         0.00      100.00
1024 - 2048              0         0.00      100.00
Bedrock                  0         0.00      100.00

D16 (mm)                 2.26
D35 (mm)                 6.05
D50 (mm)                 8.66
D84 (mm)                 14.45
D95 (mm)                 19.7
D100 (mm)                32
Silt/Clay (%)            0
Sand (%)                 14.81
Gravel (%)               85.19
Cobble (%)               0
Boulder (%)              0
Bedrock (%)              0

Total Particles = 108.
```

# Riffle Pebble Count PC-2 (Mill Swamp SR-2)



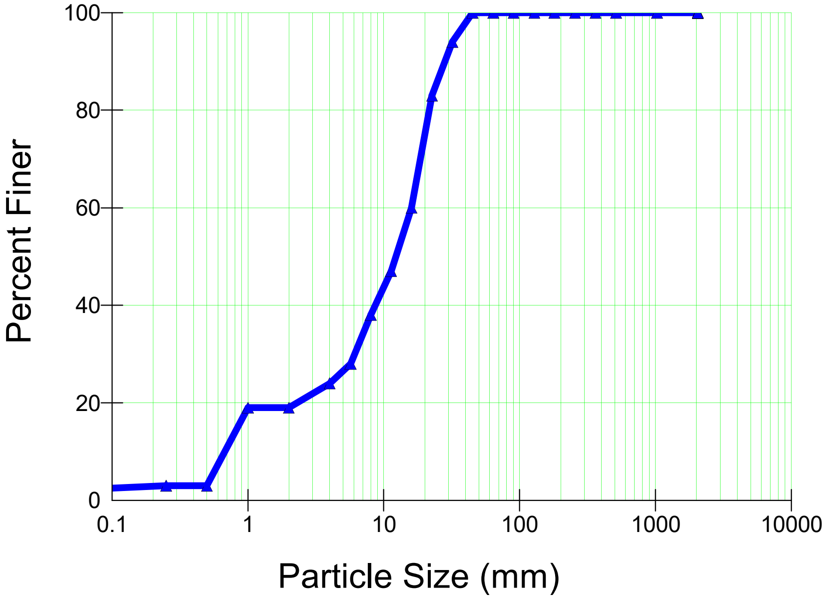
```
                     RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:          Mill Swamp Mitigation Bank - Existing
Reach Name:          SR-3
Sample Name:         PC-3
Survey Date:         11/06/2024

----------------------------------------------------------------------

Size (mm)                 TOT #      ITEM %     CUM %
----------------------------------------------------------------------
0 - 0.062                 0          0.00       0.00
0.062 - 0.125             0          0.00       0.00
0.125 - 0.25              3          2.83       2.83
0.25 - 0.50               0          0.00       2.83
0.50 - 1.0                10         9.43       12.26
1.0 - 2.0                 0          0.00       12.26
2.0 - 4.0                 0          0.00       12.26
4.0 - 5.7                 4          3.77       16.04
5.7 - 8.0                 5          4.72       20.75
8.0 - 11.3                13         12.26      33.02
11.3 - 16.0               11         10.38      43.40
16.0 - 22.6               11         10.38      53.77
22.6 - 32.0               15         14.15      67.92
32 - 45                   13         12.26      80.19
45 - 64                   8          7.55       87.74
64 - 90                   9          8.49       96.23
90 - 128                  1          0.94       97.17
128 - 180                 0          0.00       97.17
180 - 256                 2          1.89       99.06
256 - 362                 0          0.00       99.06
362 - 512                 1          0.94       100.00
512 - 1024                0          0.00       100.00
1024 - 2048               0          0.00       100.00
Bedrock                   0          0.00       100.00

D16 (mm)                  5.68
D35 (mm)                  12.2
D50 (mm)                  20.2
D84 (mm)                  54.59
D95 (mm)                  86.23
D100 (mm)                 511.98
Silt/Clay (%)             0
Sand (%)                  12.26
Gravel (%)                75.48
Cobble (%)                11.32
Boulder (%)               0.94
Bedrock (%)               0

Total Particles = 106.
```

# Riffle Pebble Count PC-3 (Mill Swamp SR-3)



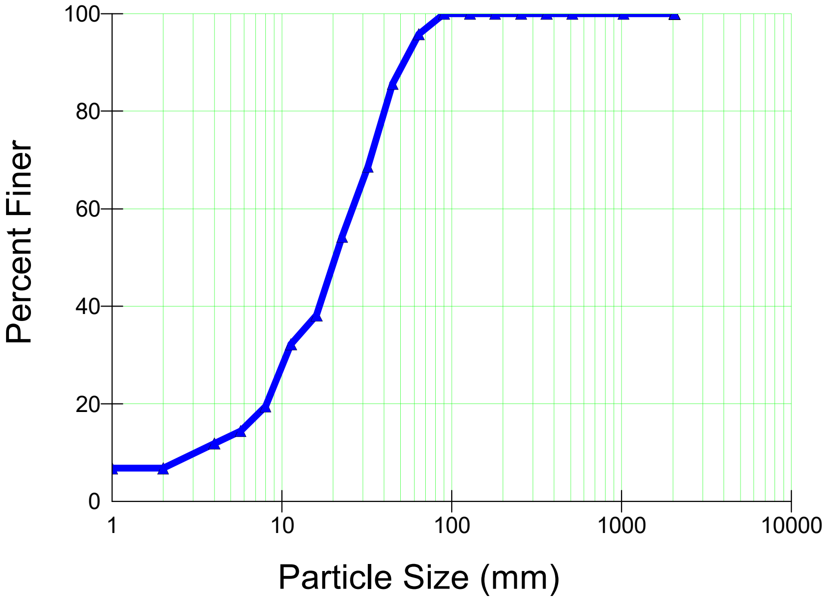
```
                     RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:         Mill Swamp Mitigation Bank - Existing
Reach Name:         SR-4
Sample Name:        PC-4
Survey Date:        11/11/2024

----------------------------------------------------------------------

Size (mm)                TOT #     ITEM %    CUM %
----------------------------------------------------------------------
0 - 0.062                0         0.00      0.00
0.062 - 0.125            0         0.00      0.00
0.125 - 0.25             3         3.00      3.00
0.25 - 0.50              0         0.00      3.00
0.50 - 1.0               16        16.00     19.00
1.0 - 2.0                0         0.00      19.00
2.0 - 4.0                5         5.00      24.00
4.0 - 5.7                4         4.00      28.00
5.7 - 8.0                10        10.00     38.00
8.0 - 11.3               9         9.00      47.00
11.3 - 16.0              13        13.00     60.00
16.0 - 22.6              23        23.00     83.00
22.6 - 32.0              11        11.00     94.00
32 - 45                  6         6.00      100.00
45 - 64                  0         0.00      100.00
64 - 90                  0         0.00      100.00
90 - 128                 0         0.00      100.00
128 - 180                0         0.00      100.00
180 - 256                0         0.00      100.00
256 - 362                0         0.00      100.00
362 - 512                0         0.00      100.00
512 - 1024               0         0.00      100.00
1024 - 2048              0         0.00      100.00
Bedrock                  0         0.00      100.00

D16 (mm)                 0.91
D35 (mm)                 7.31
D50 (mm)                 12.38
D84 (mm)                 23.45
D95 (mm)                 34.17
D100 (mm)                45
Silt/Clay (%)            0
Sand (%)                 19
Gravel (%)               81
Cobble (%)               0
Boulder (%)              0
Bedrock (%)              0

Total Particles = 100.
```

# Riffle Pebble Count PC-4 (UNT to Mill Swamp SR-4)



```
                         RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:         Mill Swamp Mitigation Bank - Existing
Reach Name:         SR-5
Sample Name:        PC-5
Survey Date:        11/11/2024

----------------------------------------------------------------------

Size (mm)                TOT #     ITEM %    CUM %
----------------------------------------------------------------------
0 - 0.062                0         0.00      0.00
0.062 - 0.125            0         0.00      0.00
0.125 - 0.25             0         0.00      0.00
0.25 - 0.50              0         0.00      0.00
0.50 - 1.0               8         6.78      6.78
1.0 - 2.0                0         0.00      6.78
2.0 - 4.0                6         5.08      11.86
4.0 - 5.7                3         2.54      14.41
5.7 - 8.0                6         5.08      19.49
8.0 - 11.3               15        12.71     32.20
11.3 - 16.0              7         5.93      38.14
16.0 - 22.6              19        16.10     54.24
22.6 - 32.0              17        14.41     68.64
32 - 45                  20        16.95     85.59
45 - 64                  12        10.17     95.76
64 - 90                  5         4.24      100.00
90 - 128                 0         0.00      100.00
128 - 180                0         0.00      100.00
180 - 256                0         0.00      100.00
256 - 362                0         0.00      100.00
362 - 512                0         0.00      100.00
512 - 1024               0         0.00      100.00
1024 - 2048              0         0.00      100.00
Bedrock                  0         0.00      100.00

D16 (mm)                 6.42
D35 (mm)                 13.52
D50 (mm)                 20.86
D84 (mm)                 43.78
D95 (mm)                 62.58
D100 (mm)                90
Silt/Clay (%)            0
Sand (%)                 6.78
Gravel (%)               88.98
Cobble (%)               4.24
Boulder (%)              0
Bedrock (%)              0

Total Particles = 118.
```

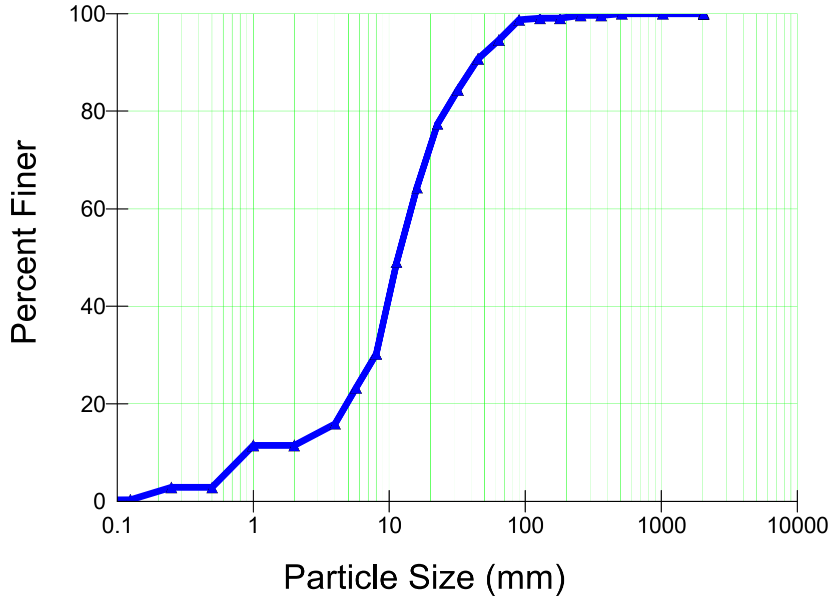
# Riffle Pebble Count PC-5 (UNT to Mill Swamp SR-5)



```
                    RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:         Mill Swamp Mitigation Bank - Existing
Reach Name:         Combined Pebble Count
Sample Name:        Combined Pebble Count (Mill Swamp)
Survey Date:        11/11/2024

----------------------------------------------------------------------

Size (mm)                TOT #     ITEM %    CUM %
----------------------------------------------------------------------
0 - 0.062                0         0.00      0.00
0.062 - 0.125            1         0.32      0.32
0.125 - 0.25             8         2.55      2.87
0.25 - 0.50              0         0.00      2.87
0.50 - 1.0               27        8.60      11.46
1.0 - 2.0                0         0.00      11.46
2.0 - 4.0                14        4.46      15.92
4.0 - 5.7                23        7.32      23.25
5.7 - 8.0                22        7.01      30.25
8.0 - 11.3               59        18.79     49.04
11.3 - 16.0              48        15.29     64.33
16.0 - 22.6              41        13.06     77.39
22.6 - 32.0              22        7.01      84.39
32 - 45                  20        6.37      90.76
45 - 64                  12        3.82      94.59
64 - 90                  13        4.14      98.73
90 - 128                 1         0.32      99.04
128 - 180                0         0.00      99.04
180 - 256                2         0.64      99.68
256 - 362                0         0.00      99.68
362 - 512                1         0.32      100.00
512 - 1024               0         0.00      100.00
1024 - 2048              0         0.00      100.00
Bedrock                  0         0.00      100.00

D16 (mm)                 4.02
D35 (mm)                 8.83
D50 (mm)                 11.6
D84 (mm)                 31.48
D95 (mm)                 66.57
D100 (mm)                511.95
Silt/Clay (%)            0
Sand (%)                 11.46
Gravel (%)               83.13
Cobble (%)               5.09
Boulder (%)              0.32
Bedrock (%)              0

Total Particles = 314.
```

Not Final

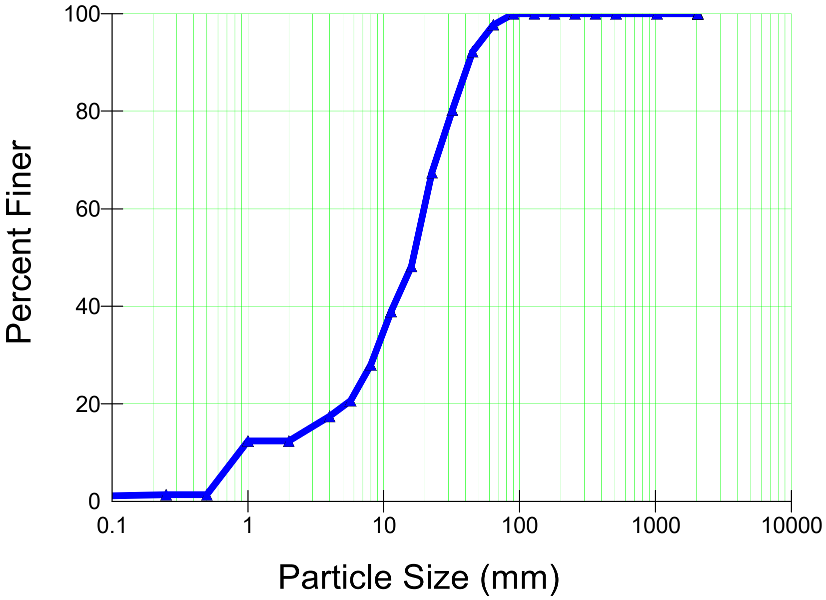
## Combined Pebble Count - Mill Swamp (PC-1, PC-2 & PC-3)



```
                     RIVERMORPH PARTICLE SUMMARY
----------------------------------------------------------------------

River Name:         Mill Swamp Mitigation Bank - Existing
Reach Name:         Combined Pebble Count
Sample Name:        Combined Pebble Count (UNT)
Survey Date:        11/11/2024

----------------------------------------------------------------------

Size (mm)                TOT #     ITEM %    CUM %
----------------------------------------------------------------------
0 - 0.062                0         0.00      0.00
0.062 - 0.125            0         0.00      0.00
0.125 - 0.25             3         1.38      1.38
0.25 - 0.50              0         0.00      1.38
0.50 - 1.0               24        11.01     12.39
1.0 - 2.0                0         0.00      12.39
2.0 - 4.0                11        5.05      17.43
4.0 - 5.7                7         3.21      20.64
5.7 - 8.0                16        7.34      27.98
8.0 - 11.3               24        11.01     38.99
11.3 - 16.0              20        9.17      48.17
16.0 - 22.6              42        19.27     67.43
22.6 - 32.0              28        12.84     80.28
32 - 45                  26        11.93     92.20
45 - 64                  12        5.50      97.71
64 - 90                  5         2.29      100.00
90 - 128                 0         0.00      100.00
128 - 180                0         0.00      100.00
180 - 256                0         0.00      100.00
256 - 362                0         0.00      100.00
362 - 512                0         0.00      100.00
512 - 1024               0         0.00      100.00
1024 - 2048              0         0.00      100.00
Bedrock                  0         0.00      100.00

D16 (mm)                 3.43
D35 (mm)                 10.1
D50 (mm)                 16.63
D84 (mm)                 36.06
D95 (mm)                 54.66
D100 (mm)                90
Silt/Clay (%)            0
Sand (%)                 12.39
Gravel (%)               85.32
Cobble (%)               2.29
Boulder (%)              0
Bedrock (%)              0

Total Particles = 218.
```

# Not Final

## Combined Pebble Count - UNT to Mill Swamp (PC-4 & PC-5)



## EXISTING STREAM CLASSIFICATION WORKSHEETS

**Worksheet 2-3.** Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream: **Mill Swamp - Reach SR-1 (Existing Conditions)**
Basin: Drainage Area: **1548.8** acres **2.42** $mi^2$
Location: **Mill Swamp Mitigation Bank**
Twp.&Rge: **;** Sec.&Qtr.: **;**
Cross-Section Monuments (Lat./Long.): **38.65667 Lat / 77.08 Long** Date: **03/05/25**
Observers: **HAC KNH** Valley Type: U-AL-FD

| | | |
|---|---|---|
| **Bankfull WIDTH ($W_{bkf}$)**<br>WIDTH of the stream channel at bankfull stage elevation, in a riffle section. | **16.06** | ft |
| **Bankfull DEPTH ($d_{bkf}$)**<br>Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A / W_{bkf}$). | **1.26** | ft |
| **Bankfull X-Section AREA ($A_{bkf}$)**<br>AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section. | **20.17** | $ft^2$ |
| **Width/Depth Ratio ($W_{bkf} / d_{bkf}$)**<br>Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section. | **12.75** | ft/ft |
| **Maximum DEPTH ($d_{mbkf}$)**<br>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section. | **1.7** | ft |
| **WIDTH of Flood-Prone Area ($W_{fpa}$)**<br>Twice maximum DEPTH, or ($2 \times d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section. | **20.72** | ft |
| **Entrenchment Ratio (ER)**<br>The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH ($W_{fpa} / W_{bkf}$) (riffle section). | **1.29** | ft/ft |
| **Channel Materials (Particle Size Index ) $D_{50}$**<br>The $D_{50}$ particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations. | **13.65** | mm |
| **Water Surface SLOPE (S)**<br>Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage. | **0.0015** | ft/ft |
| **Channel SINUOSITY (k)**<br>Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S). | **1.09** | |

***Stream Type*** **F 4** (See **Figure 2-14**)

**Worksheet 2-3.** Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream: **Mill Swamp - Reach SR-2 (Existing Conditions)**

Basin: Drainage Area: **1568** acres **2.45** $mi^2$

Location: **Mill Swamp Mitigation Bank**

Twp.&Rge: **;** Sec.&Qtr.: **;**

Cross-Section Monuments (Lat./Long.): **38.65556 Lat / 77.08167 Long** Date: **03/05/25**

Observers: **HAC KNH** Valley Type: U-AL-FD

| | | |
|---|---|---|
| **Bankfull WIDTH ($W_{bkf}$)**<br>WIDTH of the stream channel at bankfull stage elevation, in a riffle section. | **16.27** | ft |
| **Bankfull DEPTH ($d_{bkf}$)**<br>Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A / W_{bkf}$). | **1.1** | ft |
| **Bankfull X-Section AREA ($A_{bkf}$)**<br>AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section. | **17.91** | $ft^2$ |
| **Width/Depth Ratio ($W_{bkf} / d_{bkf}$)**<br>Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section. | **14.79** | ft/ft |
| **Maximum DEPTH ($d_{mbkf}$)**<br>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section. | **1.8** | ft |
| **WIDTH of Flood-Prone Area ($W_{fpa}$)**<br>Twice maximum DEPTH, or ($2 \times d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section. | **40.8** | ft |
| **Entrenchment Ratio (ER)**<br>The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH ($W_{fpa} / W_{bkf}$) (riffle section). | **2.51** | ft/ft |
| **Channel Materials (Particle Size Index ) $D_{50}$**<br>The $D_{50}$ particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations. | **8.66** | mm |
| **Water Surface SLOPE (S)**<br>Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage. | **0.0028** | ft/ft |
| **Channel SINUOSITY (k)**<br>Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S). | **1.25** | |

***Stream Type*** **C 4** (See **Figure 2-14**)

**Worksheet 2-3.** Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream: **Mill Swamp - Reach SR-3 (Existing Conditions)**

Basin: Drainage Area: **1625.6** acres **2.54** $mi^2$

Location: **Mill Swamp Mitigation Bank**

Twp.&Rge: **;** Sec.&Qtr.: **;**

Cross-Section Monuments (Lat./Long.): **38.65444 Lat / 77.08444 Long** Date: **03/05/25**

Observers: **HAC KNH** Valley Type: U-AL-AF

| | | |
|---|---|---|
| **Bankfull WIDTH ($W_{bkf}$)**<br>WIDTH of the stream channel at bankfull stage elevation, in a riffle section. | **16.27** | ft |
| **Bankfull DEPTH ($d_{bkf}$)**<br>Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A / W_{bkf}$). | **1.19** | ft |
| **Bankfull X-Section AREA ($A_{bkf}$)**<br>AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section. | **19.33** | $ft^2$ |
| **Width/Depth Ratio ($W_{bkf} / d_{bkf}$)**<br>Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section. | **13.67** | ft/ft |
| **Maximum DEPTH ($d_{mbkf}$)**<br>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section. | **1.85** | ft |
| **WIDTH of Flood-Prone Area ($W_{fpa}$)**<br>Twice maximum DEPTH, or (2 x $d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section. | **29.5** | ft |
| **Entrenchment Ratio (ER)**<br>The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH ($W_{fpa} / W_{bkf}$) (riffle section). | **1.81** | ft/ft |
| **Channel Materials (Particle Size Index ) $D_{50}$**<br>The $D_{50}$ particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations. | **20.2** | mm |
| **Water Surface SLOPE (S)**<br>Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage. | **0.003** | ft/ft |
| **Channel SINUOSITY (k)**<br>Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S). | **1.03** | |

***Stream Type*** **B 4c** (See **Figure 2-14**)

**Worksheet 2-3.** Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream: **UNT to Mill Swamp - Reach SR-4 (Existing Conditions)**

Basin: Drainage Area: **1766.4** acres **2.76** $mi^2$

Location: **Mill Swamp Mitigation Bank**

Twp.&Rge: **;** Sec.&Qtr.: **;**

Cross-Section Monuments (Lat./Long.): **38.65389 Lat / 77.07889 Long** Date: **03/05/25**

Observers: **HAC KNH** Valley Type: U-AL-FD

| | | |
|---|---|---|
| **Bankfull WIDTH ($W_{bkf}$)**<br>WIDTH of the stream channel at bankfull stage elevation, in a riffle section. | **15.79** | ft |
| **Bankfull DEPTH ($d_{bkf}$)**<br>Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A / W_{bkf}$). | **1.6** | ft |
| **Bankfull X-Section AREA ($A_{bkf}$)**<br>AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section. | **25.23** | $ft^2$ |
| **Width/Depth Ratio ($W_{bkf} / d_{bkf}$)**<br>Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section. | **9.87** | ft/ft |
| **Maximum DEPTH ($d_{mbkf}$)**<br>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section. | **1.97** | ft |
| **WIDTH of Flood-Prone Area ($W_{fpa}$)**<br>Twice maximum DEPTH, or (2 x $d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section. | **20.8** | ft |
| **Entrenchment Ratio (ER)**<br>The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH ($W_{fpa} / W_{bkf}$) (riffle section). | **1.32** | ft/ft |
| **Channel Materials (Particle Size Index ) $D_{50}$**<br>The $D_{50}$ particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations. | **12.38** | mm |
| **Water Surface SLOPE (S)**<br>Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage. | **0.0037** | ft/ft |
| **Channel SINUOSITY (k)**<br>Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S). | **1.02** | |

***Stream Type*** **G 4c** (See **Figure 2-14**)

**Worksheet 2-3.** Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream: **UNT to Mill Swamp - Reach SR-5 (Existing Conditions)**

Basin: Drainage Area: **1772.8** acres **2.77** $mi^2$

Location: **Mill Swamp Mitigation Bank**

Twp.&Rge: **;** Sec.&Qtr.: **;**

Cross-Section Monuments (Lat./Long.): **38.65361 Lat / 77.07972 Long** Date: **03/04/25**

Observers: **HAC KNH** Valley Type: U-AL-FD

| | | |
|---|---|---|
| **Bankfull WIDTH ($W_{bkf}$)**<br>WIDTH of the stream channel at bankfull stage elevation, in a riffle section. | **19.64** | ft |
| **Bankfull DEPTH ($d_{bkf}$)**<br>Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section ($d_{bkf} = A / W_{bkf}$). | **1.02** | ft |
| **Bankfull X-Section AREA ($A_{bkf}$)**<br>AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section. | **20.08** | $ft^2$ |
| **Width/Depth Ratio ($W_{bkf} / d_{bkf}$)**<br>Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section. | **19.25** | ft/ft |
| **Maximum DEPTH ($d_{mbkf}$)**<br>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section. | **2.07** | ft |
| **WIDTH of Flood-Prone Area ($W_{fpa}$)**<br>Twice maximum DEPTH, or ($2 \times d_{mbkf}$) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section. | **20.99** | ft |
| **Entrenchment Ratio (ER)**<br>The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH ($W_{fpa} / W_{bkf}$) (riffle section). | **1.07** | ft/ft |
| **Channel Materials (Particle Size Index ) $D_{50}$**<br>The $D_{50}$ particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations. | **20.86** | mm |
| **Water Surface SLOPE (S)**<br>Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage. | **0.0045** | ft/ft |
| **Channel SINUOSITY (k)**<br>Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S). | **1.05** | |

***Stream Type*** **F 4** (See **Figure 2-14**)

# EXISTING SEDIMENT TRANSPORT ANALYSIS

## SEDIMENT TRANSPORT ANALYSIS

*CALCULATING BOUNDARY SHEAR STRESS TO ANALYZE*
*MOBILE PARTICLES FOR THE BANKFULL CHANNEL*

**Project:** Mill Swamp Mitigation Bank
**Site Condition:** Existing
**Reach:** SR-1

| | | | | | |
|---|---|---|---|---|---|
| **$D_{50}$ Riffle:** | 13.65 | mm | | | |
| **$D_{50}$ Bar/Sub:** | N/A | mm | | | |
| **Mobile Size ($D_i$):** | 2.30 | mm | 0.008 | ft | at Average Boundary Shear Stress |
| **Mobile Size ($D_i$):** | 1.60 | mm | 0.005 | ft | at Maximum Boundary Shear Stress |
| ***Slope:** | 0.0394 | ft/ft | | | |
| **Friction Slope ($S_f$):** | 0.003 | | | | |
| **Hydraulic Radius (R):** | 1.18 | ft | | | |
| **$D_{max}$:** | 1.70 | ft | | | |

**Slope of the steepest riffle to evaluate the max shear conditions*
***Critical shear stress represents the minimum amount of force per unit area (shear stress)*

**BOUNDARY SHEAR STRESS**

| | | |
|---|---|---|
| **$T_b$:** | **0.221** | lb/sf |
| **$T_{bmax}$:** | **0.318** | lb/sf |

**AVERAGE BOUNDARY SHEAR STRESS**

$T_b$ = 62.4 x R x $S_f$

**MAXIMUM BOUNDARY SHEAR STRESS**

$T_{bmax}$ = 62.4 x $D_{max}$ x $S_f$

**AVERAGE BOUNDARY SHEAR STRESS**
**ANDREWS 1995 METHODOLOGY**

| | | |
|---|---|---|
| **$T_c$*:** | **0.221** | |
| **$T_c$:** | **0.17** | lb/sf |
| **Depth:** | **0.07** | ft |

**MAXIMUM BOUNDARY SHEAR STRESS**
**ANDREWS 1995 METHODOLOGY**

| | | |
|---|---|---|
| **$T_c$*:** | **0.318** | |
| **$T_c$:** | **0.17** | lb/sf |
| **Depth:** | **0.07** | ft |

**ANDREWS 1995 METHODOLOGY**

Tc* = 0.0376 x [(Di / D50(riffle)]^-0.994
Tc = Tc* x 1.65 x 62.4 x Di
Depth = (Tc* x 1.65 x Di) / Slope

Not Final

# SEDIMENT TRANSPORT ANALYSIS

*CALCULATING BOUNDARY SHEAR STRESS TO ANALYZE*
*MOBILE PARTICLES FOR THE BANKFULL CHANNEL*

**Project:** Mill Swamp Mitigation Bank
**Site Condition:** Existing
**Reach:** SR-2

| | | | | | |
|---|---|---|---|---|---|
| **$D_{50}$ Riffle:** | 8.66 | mm | | | |
| **$D_{50}$ Bar/Sub:** | N/A | mm | | | |
| **Mobile Size ($D_i$):** | 2.49 | mm | 0.008 | ft | at Average Boundary Shear Stress |
| **Mobile Size ($D_i$):** | 1.43 | mm | 0.005 | ft | at Maximum Boundary Shear Stress |
| ***Slope:** | 0.0022 | ft/ft | | | |
| **Friction Slope ($S_f$):** | 0.002 | | | | |
| **Hydraulic Radius (R):** | 1.04 | ft | | | |
| **$D_{max}$:** | 1.80 | ft | | | |

**Slope of the steepest riffle to evaluate the max shear conditions*
***Critical shear stress represents the minimum amount of force per unit area (shear stress)*

## BOUNDARY SHEAR STRESS

| | | |
|---|---|---|
| **$T_b$:** | 0.130 | lb/sf |
| **$T_{bmax}$:** | 0.225 | lb/sf |

**AVERAGE BOUNDARY SHEAR STRESS**

$T_b = 62.4 \times R \times S_f$

**MAXIMUM BOUNDARY SHEAR STRESS**

$T_{bmax} = 62.4 \times D_{max} \times S_f$

## AVERAGE BOUNDARY SHEAR STRESS
## ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | 0.130 | |
| **$T_c$:** | 0.11 | lb/sf |
| **Depth:** | 0.80 | ft |

## MAXIMUM BOUNDARY SHEAR STRESS
## ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | 0.225 | |
| **$T_c$:** | 0.11 | lb/sf |
| **Depth:** | 0.79 | ft |

## ANDREWS 1995 METHODOLOGY

Tc* = 0.0376 x [(Di / D50(riffle)]^-0.994
Tc = Tc* x 1.65 x 62.4 x Di
Depth = (Tc* x 1.65 x Di) / Slope

# SEDIMENT TRANSPORT ANALYSIS

*CALCULATING BOUNDARY SHEAR STRESS TO ANALYZE*
*MOBILE PARTICLES FOR THE BANKFULL CHANNEL*

**Project:** Mill Swamp Mitigation Bank
**Site Condition:** Existing
**Reach:** SR-3

| | | | | |
|---|---|---|---|---|
| **$D_{50}$ Riffle:** | 20.2 | mm | | |
| **$D_{50}$ Bar/Sub:** | N/A | mm | | |
| **Mobile Size ($D_i$):** | 3.53 | mm | 0.012 ft | at Average Boundary Shear Stress |
| **Mobile Size ($D_i$):** | 2.17 | mm | 0.007 ft | at Maximum Boundary Shear Stress |
| ***Slope:** | 0.0122 | ft/ft | | |
| **Friction Slope ($S_f$):** | 0.003 | | | |
| **Hydraulic Radius (R):** | 1.14 | ft | | |
| **$D_{max}$:** | 1.85 | ft | | |

**Slope of the steepest riffle to evaluate the max shear conditions*
***Critical shear stress represents the minimum amount of force per unit area (shear stress)*

## BOUNDARY SHEAR STRESS

| | | |
|---|---|---|
| **$T_b$:** | 0.213 | lb/sf |
| **$T_{bmax}$:** | 0.346 | lb/sf |

**AVERAGE BOUNDARY SHEAR STRESS**

$T_b = 62.4 \times R \times S_f$

**MAXIMUM BOUNDARY SHEAR STRESS**

$T_{bmax} = 62.4 \times D_{max} \times S_f$

## AVERAGE BOUNDARY SHEAR STRESS
## ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | 0.213 | |
| **$T_c$:** | 0.25 | lb/sf |
| **Depth:** | 0.33 | ft |

## MAXIMUM BOUNDARY SHEAR STRESS
## ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | 0.346 | |
| **$T_c$:** | 0.25 | lb/sf |
| **Depth:** | 0.33 | ft |

## ANDREWS 1995 METHODOLOGY

Tc* = 0.0376 x [(Di / D50(riffle)]^-0.994
Tc = Tc* x 1.65 x 62.4 x Di
Depth = (Tc* x 1.65 x Di) / Slope

# SEDIMENT TRANSPORT ANALYSIS

*CALCULATING BOUNDARY SHEAR STRESS TO ANALYZE*
*MOBILE PARTICLES FOR THE BANKFULL CHANNEL*

**Project:** Mill Swamp Mitigation Bank
**Site Condition:** Existing
**Reach:** SR-4

| | | | | |
|---|---|---|---|---|
| **$D_{50}$ Riffle:** | 12.38 | mm | | |
| **$D_{50}$ Bar/Sub:** | N/A | mm | | |
| **Mobile Size ($D_i$):** | 1.28 | mm | 0.004 ft | at Average Boundary Shear Stress |
| **Mobile Size ($D_i$):** | 0.93 | mm | 0.003 ft | at Maximum Boundary Shear Stress |
| ***Slope:** | 0.0084 | ft/ft | | |
| **Friction Slope ($S_f$):** | 0.004 | | | |
| **Hydraulic Radius (R):** | 1.44 | ft | | |
| **$D_{max}$:** | 1.97 | ft | | |

**Slope of the steepest riffle to evaluate the max shear conditions*

***Critical shear stress represents the minimum amount of force per unit area (shear stress)*

## BOUNDARY SHEAR STRESS

| | | |
|---|---|---|
| **$T_b$:** | 0.359 | lb/sf |
| **$T_{bmax}$:** | 0.492 | lb/sf |

**AVERAGE BOUNDARY SHEAR STRESS**

$T_b = 62.4 \times R \times S_f$

**MAXIMUM BOUNDARY SHEAR STRESS**

$T_{bmax} = 62.4 \times D_{max} \times S_f$

## AVERAGE BOUNDARY SHEAR STRESS ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | 0.359 | |
| **$T_c$:** | 0.16 | lb/sf |
| **Depth:** | 0.30 | ft |

## MAXIMUM BOUNDARY SHEAR STRESS ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | 0.492 | |
| **$T_c$:** | 0.15 | lb/sf |
| **Depth:** | 0.30 | ft |

## ANDREWS 1995 METHODOLOGY

$Tc^* = 0.0376 \times [(Di / D50(riffle)]^{-0.994}$

$Tc = Tc^* \times 1.65 \times 62.4 \times Di$

$Depth = (Tc^* \times 1.65 \times Di) / Slope$

# SEDIMENT TRANSPORT ANALYSIS

*CALCULATING BOUNDARY SHEAR STRESS TO ANALYZE*
*MOBILE PARTICLES FOR THE BANKFULL CHANNEL*

**Project:** Mill Swamp Mitigation Bank
**Site Condition:** Existing
**Reach:** SR-5

| | | | | | |
|---|---|---|---|---|---|
| **$D_{50}$ Riffle:** | 20.86 | mm | | | |
| **$D_{50}$ Bar/Sub:** | N/A | mm | | | |
| **Mobile Size ($D_i$):** | 3.34 | mm | 0.011 | ft | at Average Boundary Shear Stress |
| **Mobile Size ($D_i$):** | 1.49 | mm | 0.005 | ft | at Maximum Boundary Shear Stress |
| ***Slope:** | 0.0084 | ft/ft | | | |
| **Friction Slope ($S_f$):** | 0.004 | | | | |
| **Hydraulic Radius (R):** | 0.93 | ft | | | |
| **$D_{max}$:** | 2.07 | ft | | | |

**Slope of the steepest riffle to evaluate the max shear conditions*
***Critical shear stress represents the minimum amount of force per unit area (shear stress)*

## BOUNDARY SHEAR STRESS

| | | |
|---|---|---|
| **$T_b$:** | **0.232** | lb/sf |
| **$T_{bmax}$:** | **0.517** | lb/sf |

**AVERAGE BOUNDARY SHEAR STRESS**

$T_b$ = 62.4 x R x Sf

**MAXIMUM BOUNDARY SHEAR STRESS**

$T_{bmax}$ = 62.4 x $D_{max}$ x Sf

## AVERAGE BOUNDARY SHEAR STRESS
## ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | **0.232** | |
| **$T_c$:** | **0.26** | lb/sf |
| **Depth:** | **0.50** | ft |

## MAXIMUM BOUNDARY SHEAR STRESS
## ANDREWS 1995 METHODOLOGY

| | | |
|---|---|---|
| **$T_c$*:** | **0.517** | |
| **$T_c$:** | **0.26** | lb/sf |
| **Depth:** | **0.50** | ft |

## ANDREWS 1995 METHODOLOGY

Tc* = 0.0376 x [(Di / D50(riffle)]^-0.994
Tc = Tc* x 1.65 x 62.4 x Di
Depth = (Tc* x 1.65 x Di) / Slope

# BANK EROSION ESTIMATE / SEDIMENT AND NUTRIENT REDUCTION ANALYSIS

| Project Name | Mill Swamp Mitigation Bank | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feature | Lat/Long | | | | | | | | | | | | | |
| Feature I.D. (Bank., Headcut or Deposition I.D.) | Start Headcut Location or Start of Bank/Deposition | End For Banks or Deposition only | Length, ft (Bank or deposition) | Height, ft (Bank or Headcut) | BEHI Rating | NBS Rating | Predicted Rate of Bank Erosion (ft/year) | Predicted Erosion Amount ($ft^3$/year) | Predicted Erosion Amount (tons/year) | Predicted Erosion Rate (tons/year/ft) | Estimated TN (lbs/yr) TMDL Reduction | Estimated TP (lbs/yr) TMDL Reduction | Estimated TSS (tons/yr) TMDL Reduction | Comments |
| SR-1 Left Bank, LB1 | 0.00000 | 25.00000 | 25.0 | 3.8 | Moderate | Low | 0.13 | 11.88 | 0.31 | 0.01 | 0.36 | 0.07 | 0.01 | |
| SR-1 Left Bank, LB2 | 25.00000 | 280.50000 | 255.5 | 4.7 | High | Moderate | 0.64 | 768.54 | 20.18 | 0.08 | 23.39 | 4.22 | 0.62 | |
| SR-1 Left Bank, LB3 | 280.50000 | 345.00000 | 64.5 | 5.0 | Very High | Moderate | 0.64 | 206.40 | 5.42 | 0.08 | 6.28 | 1.13 | 0.17 | |
| SR-1 Left Bank, LB4 | 345.00000 | 582.50000 | 237.5 | 4.0 | Moderate | Moderate | 0.30 | 285.00 | 7.48 | 0.03 | 8.67 | 1.57 | 0.23 | |
| SR-1 Left Bank, LB5 | 582.50000 | 806.50000 | 224.0 | 3.4 | Very High | Moderate | 0.64 | 487.42 | 12.80 | 0.06 | 14.83 | 2.68 | 0.39 | |
| SR-2 Left Bank, LB6 | 806.50000 | 921.10000 | 114.6 | 3.4 | Moderate | Moderate | 0.30 | 116.89 | 3.07 | 0.03 | 3.56 | 0.64 | 0.09 | |
| SR-2 Left Bank, LB7 | 921.10000 | 1150.80000 | 229.7 | 2.8 | High | Low | 0.40 | 257.22 | 6.75 | 0.03 | 7.83 | 1.41 | 0.21 | |
| SR-2 Left Bank, LB8 | 1150.80000 | 1236.20000 | 85.4 | 3.0 | Low | Low | 0.03 | 7.69 | 0.20 | 0.00 | 0.23 | 0.04 | 0.01 | |
| SR-2 Left Bank, LB9 | 1236.20000 | 1620.00000 | 383.8 | 2.7 | Moderate | Moderate | 0.30 | 310.88 | 8.16 | 0.02 | 9.46 | 1.71 | 0.25 | |
| SR-2 Left Bank, LB10 | 1620.00000 | 1687.27000 | 67.3 | 2.5 | Moderate | Moderate | 0.30 | 50.45 | 1.32 | 0.02 | 1.54 | 0.28 | 0.04 | |
| SR-1 Right Bank, RB1 | 0.00000 | 56.00000 | 56.0 | 3.4 | Moderate | High | 0.80 | 152.32 | 4.00 | 0.07 | 4.64 | 0.84 | 0.12 | |
| SR-1 Right Bank, RB2 | 56.00000 | 227.00000 | 171.0 | 4.1 | Moderate | Moderate | 0.30 | 210.33 | 5.52 | 0.03 | 6.40 | 1.16 | 0.17 | |
| SR-1 Right Bank, RB3 | 227.00000 | 381.50000 | 154.5 | 4.5 | High | Moderate | 0.64 | 444.96 | 11.68 | 0.08 | 13.54 | 2.44 | 0.36 | |
| SR-1 Right Bank, RB4 | 381.50000 | 531.00000 | 149.5 | 4.0 | Moderate | Moderate | 0.30 | 179.40 | 4.71 | 0.03 | 5.46 | 0.99 | 0.14 | |
| SR-1 Right Bank, RB5 | 531.00000 | 832.00000 | 301.0 | 3.8 | Very High | Moderate | 0.64 | 732.03 | 19.22 | 0.06 | 22.28 | 4.02 | 0.59 | |
| SR-2 Right Bank, RB6 | 832.00000 | 967.85000 | 135.9 | 3.4 | Very High | Moderate | 0.64 | 295.61 | 7.76 | 0.06 | 9.00 | 1.62 | 0.24 | |
| SR-2 Right Bank, RB7 | 967.85000 | 1176.09000 | 208.2 | 3.0 | High | Low | 0.40 | 249.89 | 6.56 | 0.03 | 7.61 | 1.37 | 0.20 | |
| SR-2 Right Bank, RB8 | 1176.09000 | 1237.76000 | 61.7 | 2.5 | High | High | 1.00 | 154.18 | 4.05 | 0.07 | 4.69 | 0.85 | 0.12 | |
| SR-2 Right Bank, RB9 | 1237.76000 | 1288.70000 | 50.9 | 2.8 | High | Moderate | 0.64 | 91.28 | 2.40 | 0.05 | 2.78 | 0.50 | 0.07 | |
| SR-2 Right Bank, RB10 | 1288.70000 | 1659.61000 | 370.9 | 3.0 | Moderate | Moderate | 0.30 | 333.82 | 8.76 | 0.02 | 10.16 | 1.83 | 0.27 | |
| SR-2 Right Bank, RB11 | 1659.61000 | 1712.68000 | 53.1 | 2.8 | Low | Low | 0.03 | 4.46 | 0.12 | 0.00 | 0.14 | 0.02 | 0.00 | |
| SR-3 Left Bank, LB11 | 0.00000 | 177.15000 | 177.2 | 5.2 | Moderate | Low | 0.13 | 115.15 | 3.02 | 0.02 | 3.50 | 0.63 | 0.09 | |
| SR-3 Left Bank, LB12 | 177.15000 | 465.34000 | 288.2 | 3.8 | High | Moderate | 0.64 | 700.88 | 18.40 | 0.06 | 21.33 | 3.85 | 0.56 | |
| SR-3 Left Bank, LB13 | 465.34000 | 522.87000 | 57.5 | 4.4 | Moderate | Low | 0.13 | 31.64 | 0.83 | 0.01 | 0.96 | 0.17 | 0.03 | |
| SR-3 Left Bank, LB14 | 522.87000 | 718.20000 | 195.3 | 4.0 | High | Moderate | 0.64 | 500.04 | 13.13 | 0.07 | 15.22 | 2.75 | 0.40 | |
| SR-3 Left Bank, LB15 | 718.20000 | 980.74000 | 262.5 | 5.4 | Very High | High | 1.00 | 1417.72 | 37.22 | 0.14 | 43.15 | 7.79 | 1.14 | |
| SR-3 Right Bank, RB12 | 0.00000 | 51.20000 | 51.2 | 5.2 | Moderate | Low | 0.13 | 33.28 | 0.87 | 0.02 | 1.01 | 0.18 | 0.03 | |
| SR-3 Right Bank, RB13 | 51.20000 | 103.93000 | 52.7 | 5.2 | High | Moderate | 0.64 | 175.49 | 4.61 | 0.09 | 5.34 | 0.96 | 0.14 | |
| SR-3 Right Bank, RB14 | 103.93000 | 325.51000 | 221.6 | 4.6 | Moderate | Low | 0.13 | 127.41 | 3.34 | 0.02 | 3.88 | 0.70 | 0.10 | |
| SR-3 Right Bank, RB15 | 325.51000 | 485.74000 | 160.2 | 4.4 | High | Moderate | 0.64 | 451.21 | 11.85 | 0.07 | 13.73 | 2.48 | 0.36 | |
| SR-3 Right Bank, RB16 | 485.74000 | 560.78000 | 75.0 | 5.0 | High | Low | 0.40 | 150.08 | 3.94 | 0.05 | 4.57 | 0.82 | 0.12 | |

# Not Final

| Feature | Lat/Long | | Length, ft (Bank or deposition) | Height, ft (Bank or Headcut) | BEHI Rating | NBS Rating | Predicted Rate of Bank Erosion (ft/year) | Predicted Erosion Amount ($ft^3$/year) | Predicted Erosion Amount (tons/year) | Predicted Erosion Rate (tons/year/ft) | Estimated TN (lbs/yr) TMDL Reduction | Estimated TP (lbs/yr) TMDL Reduction | Estimated TSS (tons/yr) TMDL Reduction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feature I.D. (Bank., Headcut or Deposition I.D.) | Start | End | | | | | | | | | | | | |
| | Headcut Location or Start of Bank/Deposition | For Banks or Deposition only | | | | | | | | | | | | |
| SR-3 Right Bank, RB17 | 560.78000 | 679.43000 | 118.7 | 4.8 | Moderate | Low | 0.13 | 71.19 | 1.87 | 0.02 | 2.17 | 0.39 | 0.06 | |
| SR-3 Right Bank, RB18 | 679.43000 | 980.67000 | 301.2 | 5.6 | Very High | High | 1.00 | 1686.94 | 44.29 | 0.15 | 51.34 | 9.27 | 1.35 | |
| SR-4 Left Bank, LB16 | 0.00000 | 74.43000 | 74.4 | 2.9 | High | Moderate | 0.64 | 138.14 | 3.63 | 0.05 | 4.20 | 0.76 | 0.11 | |
| SR-4 Left Bank, LB17 | 74.43000 | 187.16000 | 112.7 | 4.8 | Very High | High | 1.00 | 541.10 | 14.21 | 0.13 | 16.47 | 2.97 | 0.43 | |
| SR-4 Left Bank, LB18 | 187.16000 | 231.93000 | 44.8 | 6.3 | Extreme | Very High | 3.50 | 987.18 | 25.92 | 0.58 | 30.05 | 5.42 | 0.79 | |
| SR-4 Left Bank, LB19 | 231.93000 | 279.93000 | 48.0 | 5.8 | Very High | High | 1.00 | 278.40 | 7.31 | 0.15 | 8.47 | 1.53 | 0.22 | |
| SR-4 Left Bank, LB20 | 279.93000 | 366.23000 | 86.3 | 5.5 | Moderate | Low | 0.13 | 59.33 | 1.56 | 0.02 | 1.81 | 0.33 | 0.05 | |
| SR-4 Left Bank, LB21 | 366.23000 | 427.17000 | 60.9 | 5.7 | Very High | High | 1.00 | 347.36 | 9.12 | 0.15 | 10.57 | 1.91 | 0.28 | |
| SR-4 Left Bank, LB22 | 427.17000 | 610.55000 | 183.4 | 5.2 | High | High | 1.00 | 953.58 | 25.03 | 0.14 | 29.02 | 5.24 | 0.76 | |
| SR-4 Left Bank, LB23 | 610.55000 | 654.07000 | 43.5 | 5.6 | Extreme | High | 2.50 | 609.28 | 16.00 | 0.37 | 18.54 | 3.35 | 0.49 | |
| SR-5 Left Bank, LB24 | 654.07000 | 890.15000 | 236.1 | 5.6 | Extreme | High | 2.50 | 3305.12 | 86.77 | 0.37 | 100.59 | 18.16 | 2.65 | |
| SR-5 Left Bank, LB25 | 890.15000 | 956.77000 | 66.6 | 3.7 | High | Moderate | 0.64 | 157.76 | 4.14 | 0.06 | 4.80 | 0.87 | 0.13 | |
| SR-4 Right Bank, RB19 | 0.00000 | 21.97000 | 22.0 | 4.2 | High | High | 1.00 | 92.27 | 2.42 | 0.11 | 2.81 | 0.51 | 0.07 | |
| SR-4 Right Bank, RB20 | 21.97000 | 266.30000 | 244.3 | 4.0 | Very High | High | 1.00 | 977.32 | 25.66 | 0.11 | 29.74 | 5.37 | 0.78 | |
| SR-4 Right Bank, RB21 | 266.30000 | 374.00000 | 107.7 | 5.8 | Extreme | Very High | 3.50 | 2186.31 | 57.40 | 0.53 | 66.54 | 12.01 | 1.75 | |
| SR-4 Right Bank, RB22 | 374.00000 | 654.12000 | 280.1 | 5.5 | Very High | Moderate | 0.64 | 986.02 | 25.89 | 0.09 | 30.01 | 5.42 | 0.79 | |
| SR-5 Right Bank, RB23 | 654.12000 | 719.58000 | 65.5 | 5.5 | Very High | Moderate | 0.64 | 230.42 | 6.05 | 0.09 | 7.01 | 1.27 | 0.18 | |
| SR-5 Right Bank, RB24 | 719.58000 | 807.43000 | 87.9 | 5.6 | Extreme | High | 2.50 | 1229.90 | 32.29 | 0.37 | 37.43 | 6.76 | 0.98 | |
| SR-5 Right Bank, RB25 | 807.43000 | 888.39000 | 81.0 | 5.0 | Moderate | Low | 0.13 | 50.60 | 1.33 | 0.02 | 1.54 | 0.28 | 0.04 | |
| SR-5 Right Bank, RB26 | 888.39000 | 956.81000 | 68.4 | 4.2 | Extreme | Very High | 3.50 | 1005.77 | 26.40 | 0.39 | 30.61 | 5.52 | 0.81 | |
| **TOTAL OF ALL GRIDS** | | | **5636.4** | **N/A** | **N/A** | **N/A** | **N/A** | **21469.3** | **563.6** | **N/A** | **653.4** | **117.9** | **17.2** | |

# EPA RAPID BIOASSESSMENT PROTOCOL FOR LOW GRADIENT STREAMS (RBP)

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| | | |
|---|---|---|
| STREAM NAME Mill Swamp | LOCATION SR 1 | |
| STATION #__________ RIVERMILE__________ | STREAM CLASS | |
| LAT _______________ LONG _______________ | RIVER BASIN | |
| STORET # | AGENCY JMT | |
| INVESTIGATORS HAC, GLZ | | |
| FORM COMPLETED BY GLZ, HAC | DATE 11/6/2024<br>TIME 12:47 AM [✓ PM] | REASON FOR SURVEY Pre-Construction Data Collection |

Parameters to be evaluated in sampling reach

| Habitat Parameter | Condition Category | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **1. Epifaunal Substrate/ Available Cover** | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| **SCORE** 10 | 20 19 18 17 16 | 15 14 13 12 11 | [✓ 10] 9 8 7 6 | 5 4 3 2 1 0 |
| **2. Pool Substrate Characterization** | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| **SCORE** 13 | 20 19 18 17 16 | 15 14 [✓ 13] 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **3. Pool Variability** | Even mix of large-shallow, large-deep, small-shallow, small-deep pools present. | Majority of pools large-deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small-shallow or pools absent. |
| **SCORE** 8 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 [✓ 8] 7 6 | 5 4 3 2 1 0 |
| **4. Sediment Deposition** | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| **SCORE** 14 | 20 19 18 17 16 | 15 [✓ 14] 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **5. Channel Flow Status** | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| **SCORE** 4 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 [✓ 4] 3 2 1 0 |

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

**Parameters to be evaluated broader than sampling reach**

| **Habitat Parameter** | **Condition Category** | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **6. Channel Alteration** | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |
| **7. Channel Sinuosity** | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| **SCORE** 7 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 [✓ 7] 6 | 5 4 3 2 1 0 |
| **8. Bank Stability (score each bank)** | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| SCORE 1 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| SCORE 1 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| **9. Vegetative Protection** (score each bank)<br>Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE 4 (LB) | Left Bank 10 9 | 8 7 6 | 5 [✓ 4] 3 | 2 1 0 |
| SCORE 4 (RB) | Right Bank 10 9 | 8 7 6 | 5 [✓ 4] 3 | 2 1 0 |
| **10. Riparian Vegetative Zone Width** (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| SCORE 10 (LB) | Left Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 10 (RB) | Right Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |

**Total Score** 95

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Mill Swamp
LOCATION SR 2
STATION #_________ RIVERMILE_________
STREAM CLASS
LAT _____________ LONG _____________
RIVER BASIN
STOREº #
AGENCY JMT
INVESTIGATORS HAC, GLZ
FORM COMPLETED BY GLZ, HAC
DATE 11/6/2024
TIME 4:12 AM [✓ PM]
REASON FOR SURVEY Pre-Construction Data Collection

Parameters to be evaluated in sampling reach

| Habitat Parameter | Condition Category | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **1. Epifaunal Substrate/ Available Cover** | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |
| **2. Pool Substrate Characterization** | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |
| **3. Pool Variability** | Even mix of large-shallow, large-deep, small-shallow, small-deep pools present. | Majority of pools large-deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small-shallow or pools absent. |
| **SCORE** 7 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 [✓ 7] 6 | 5 4 3 2 1 0 |
| **4. Sediment Deposition** | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| **SCORE** 10 | 20 19 18 17 16 | 15 14 13 12 11 | [✓ 10] 9 8 7 6 | 5 4 3 2 1 0 |
| **5. Channel Flow Status** | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| **SCORE** 5 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | [✓ 5] 4 3 2 1 0 |

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

**Parameters to be evaluated broader than sampling reach**

| **Habitat Parameter** | **Condition Category** | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **6. Channel Alteration** | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| **SCORE** 17 | 20 19 18 [✓ 17] 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **7. Channel Sinuosity** | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |
| **8. Bank Stability (score each bank)** | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| SCORE 2 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 3 | [✓ 2] 1 0 |
| SCORE 2 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 3 | [✓ 2] 1 0 |
| **9. Vegetative Protection** (score each bank)<br>Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE 4 (LB) | Left Bank 10 9 | 8 7 6 | 5 [✓ 4] 3 | 2 1 0 |
| SCORE 4 (RB) | Right Bank 10 9 | 8 7 6 | 5 [✓ 4] 3 | 2 1 0 |
| **10. Riparian Vegetative Zone Width** (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| SCORE 10 (LB) | Left Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 10 (RB) | Right Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |

**Total Score** 98

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Mill Swamp
LOCATION SR 3
STATION #__________ RIVERMILE__________
STREAM CLASS
LAT _______________ LONG _______________
RIVER BASIN
STORET #
AGENCY JMT
INVESTIGATORS HAC, GLZ
FORM COMPLETED BY GLZ, HAC
DATE 11/6/2024
TIME 5:24 AM [✓ PM]
REASON FOR SURVEY Pre-Construction Data Collection

| | Habitat Parameter | Condition Category | | | |
|---|---|---|---|---|---|
| | | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **Parameters to be evaluated in sampling reach** | **1. Epifaunal Substrate/ Available Cover** | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| | **SCORE** 14 | 20 19 18 17 16 | 15 [✓ 14] 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **2. Pool Substrate Characterization** | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| | **SCORE** 15 | 20 19 18 17 16 | [✓ 15] 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **3. Pool Variability** | Even mix of large-shallow, large-deep, small-shallow, small-deep pools present. | Majority of pools large-deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small-shallow or pools absent. |
| | **SCORE** 11 | 20 19 18 17 16 | 15 14 13 12 [✓ 11] | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **4. Sediment Deposition** | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | **SCORE** 13 | 20 19 18 17 16 | 15 14 [✓ 13] 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **5. Channel Flow Status** | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| | **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

**Parameters to be evaluated broader than sampling reach**

| **Habitat Parameter** | **Condition Category** | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **6. Channel Alteration** | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| **SCORE** 7 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 [✓ 7] 6 | 5 4 3 2 1 0 |
| **7. Channel Sinuosity** | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| **SCORE** 11 | 20 19 18 17 16 | 15 14 13 12 [✓ 11] | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **8. Bank Stability (score each bank)** | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| SCORE 3 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 [✓ 3] | 2 1 0 |
| SCORE 3 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 [✓ 3] | 2 1 0 |
| **9. Vegetative Protection** (score each bank)<br>Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE 7 (LB) | Left Bank 10 9 | 8 [✓ 7] 6 | 5 4 3 | 2 1 0 |
| SCORE 7 (RB) | Right Bank 10 9 | 8 [✓ 7] 6 | 5 4 3 | 2 1 0 |
| **10. Riparian Vegetative Zone Width** (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| SCORE 10 (LB) | Left Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 8 (RB) | Right Bank 10 9 | [✓ 8] 7 6 | 5 4 3 | 2 1 0 |

**Total Score** 118

Not Final

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| | |
|---|---|
| STREAM NAME Mill Swamp | LOCATION SR 4 |
| STATION #__________ RIVERMILE__________ | STREAM CLASS |
| LAT _______________ LONG _______________ | RIVER BASIN |
| STOREt # | AGENCY JMT |
| INVESTIGATORS HAC, GLZ | |
| FORM COMPLETED BY GLZ, HAC | DATE 11/7/2024<br>TIME 9:34 [✓ AM] PM<br>REASON FOR SURVEY Pre-Construction Data Collection |

Parameters to be evaluated in sampling reach

| Habitat Parameter | Condition Category | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **1. Epifaunal Substrate/ Available Cover** | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| **SCORE** 5 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | [✓ 5] 4 3 2 1 0 |
| **2. Pool Substrate Characterization** | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |
| **3. Pool Variability** | Even mix of large-shallow, large-deep, small-shallow, small-deep pools present. | Majority of pools large-deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small-shallow or pools absent. |
| **SCORE** 0 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 [✓ 0] |
| **4. Sediment Deposition** | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| **SCORE** 8 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 [✓ 8] 7 6 | 5 4 3 2 1 0 |
| **5. Channel Flow Status** | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| **SCORE** 1 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 [✓ 1] 0 |

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

**Parameters to be evaluated broader than sampling reach**

| **Habitat Parameter** | **Condition Category** | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **6. Channel Alteration** | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| **SCORE** 7 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 [✓ 7] 6 | 5 4 3 2 1 0 |
| **7. Channel Sinuosity** | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| **SCORE** 2 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 [✓ 2] 1 0 |
| **8. Bank Stability (score each bank)** | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| SCORE 1 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| SCORE 1 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| **9. Vegetative Protection** (score each bank)<br>Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE 1 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| SCORE 1 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| **10. Riparian Vegetative Zone Width** (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| SCORE 10 (LB) | Left Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 10 (RB) | Right Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |

**Total Score** 56

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| | |
|---|---|
| STREAM NAME Mill Swamp | LOCATION SR 5 |
| STATION #_________ RIVERMILE_________ | STREAM CLASS |
| LAT ______________ LONG ______________ | RIVER BASIN |
| STORE T # | AGENCY JMT |
| INVESTIGATORS HAC, GLZ | |
| FORM COMPLETED BY GLZ, HAC | DATE 11/7/2024<br>TIME 10:01 [✓ AM] PM |
| REASON FOR SURVEY Pre-Construction Data Collection | |

Parameters to be evaluated in sampling reach

| Habitat Parameter | Condition Category | | | |
|---|---|---|---|---|
| | Optimal | Suboptimal | Marginal | Poor |
| **1. Epifaunal Substrate/ Available Cover** | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| **SCORE** 5 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | [✓ 5] 4 3 2 1 0 |
| **2. Pool Substrate Characterization** | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 [✓ 9] 8 7 6 | 5 4 3 2 1 0 |
| **3. Pool Variability** | Even mix of large-shallow, large-deep, small-shallow, small-deep pools present. | Majority of pools large-deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small-shallow or pools absent. |
| **SCORE** 1 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 [✓ 1] 0 |
| **4. Sediment Deposition** | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| **SCORE** 8 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 [✓ 8] 7 6 | 5 4 3 2 1 0 |
| **5. Channel Flow Status** | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| **SCORE** 1 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 [✓ 1] 0 |

# HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

**Parameters to be evaluated broader than sampling reach**

| **Habitat Parameter** | **Condition Category** | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **6. Channel Alteration** | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| **SCORE** 11 | 20 19 18 17 16 | 15 14 13 12 [✓ 11] | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **7. Channel Sinuosity** | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| **SCORE** 6 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 [✓ 6] | 5 4 3 2 1 0 |
| **8. Bank Stability (score each bank)** | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| SCORE 1 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| SCORE 1 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| **9. Vegetative Protection** (score each bank)<br>Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE 1 (LB) | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| SCORE 1 (RB) | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 [✓ 1] 0 |
| **10. Riparian Vegetative Zone Width** (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| SCORE 10 (LB) | Left Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 10 (RB) | Right Bank [✓ 10] 9 | 8 7 6 | 5 4 3 | 2 1 0 |

**Total Score** 65

# MBSS BENTHIC AND FISH SAMPLING / ANALYSIS TECHNICAL MEMORANDUM

# Not Final

## MBSS Site Summary for: PRMT-201-R-2002

Located on MILL SWAMP RUN UT 1 in the Potomac River M tidal watershed, 8-digit code: (02140102).
This stream was visited in the spring on 3/21/2002 and again in the summer on 7/1/2002.

| | |
|---|---|
| An Index of Biotic Integrity (IBI) is a scientific tool used to identify and classify stream health. An IBI associates anthropogenic influences on a stream or with biological condition in the stream, and is formulated using data developed from biosurveys.<br>Details on the development and application of MBSS IBIs are in this document. | |
| Fish IBI | Poor - 2.3 / 5.0 |
| Benthic IBI | Poor - 1.6 / 5.0 |

Land Use:
Landuse can provide important information for determining streamhealth.
(Hint: hovering over the text will display definitions of land use variables.)

| | |
|---|---|
| Catchment area | 1,884 acres |
| Urban Land Use | 14 % |
| Agricultural Land Use | 7 % |
| Forested Land Use | 77 % |

*An example of a highly channelized urban stream.*

*An example of woody debris in a stream.*

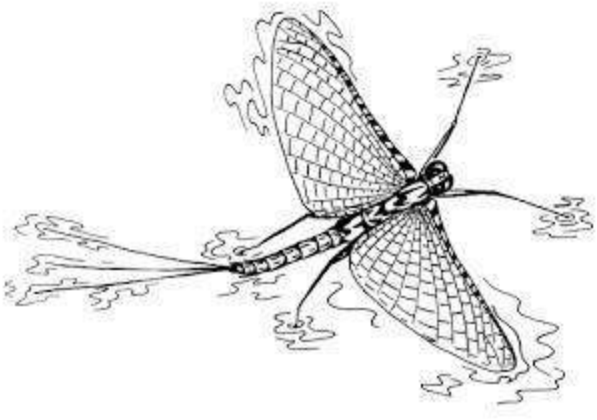
Physical Stream Habitat:

| | |
|---|---|
| Instream Habitat | 1/20 (Poor) |
| Epifaunal Substrate | 1/20 (Poor) |
| Velocity/Depth Diversity | 0/20 (Poor) |
| Pool Quality<br>Pool Extent = 8 meters | 2/20 (Poor) |
| Riffle Quality<br>Riffle Extent = 0 meters | 0/20 (Poor) |
| Shading | 88 % |
| Embeddedness | 60 % |

The embeddedness, a measure of silt on the stream bottom, was 60%. This is relatively high, and may exclude some biota.

Not Final

| Stream Water Quality: | |
|---|---|
| Water temperature | 19.7 º C |
| Dissolved oxygen (DO) | 2.2 mg/L |
| pH (lab) | 6.64 |
| Conductivity | 140 µmho/cm |
| Alkalinity (acid neutralizing capacity) | 179.7 µeq/L |
| Dissolved organic carbon (DOC) | 4.4 mg/L |
| Dissolved oxygen levels measured in the stream were very low (2.2 mg/L). Many fishes and other aquatic animals cannot tolerate low levels of oxygen in the water. | |



Biological Stream Condition:
Surveys of the organisms living within a stream can give indications of stream health. Species richness, or the number of different species present, as well as indicator species (species whose presence, absence or abundance can serve as a measure of environmental conditions) are informative for stream health.

# Not Final

**Fish Survey Results:**
The following **5** fish species were collected at **PRMT-201-R-2002.**
Sensitive taxa are indicated by green text, tolerant taxa are indicated by red text, and those with intermediate sensitivity are indicated by gold text.

| Common name | Count |
|---|---|
| TOTAL | 27 |
| Creek Chub | 12 |
| Blacknose Dace | 10 |
| Eastern Mudminnow | 3 |
| Pumpkinseed | 1 |
| Creek Chubsucker | 1 |

*Electrofishing to sample fish communities.*

**Amphibians and Reptiles:**
No amphibians and reptiles were noted at this site

**Crayfish:**
No crayfish were noted at this site.

**Exotic Plants:**
The following exotic plants were noted at this site:

Japanese Honeysuckle

Japanese Stiltgrass

**Benthic Macroinvertebrates:**
These are organisms like insects, snails, and bivalves, which inhabit the bottom substrates of streams for at least part of their life cycles. Good water quality is indicated by high taxonomic diversity, an abundance of taxa that are sensitive to disturbance, and a lack of taxa that are tolerant of disturbance. Sensitive taxa are indicated by green text, tolerant taxa are indicated by red text, and those with intermediate sensitivity are indicated by gold text.

| Genus/Family | Common Name | Count |
|---|---|---|
| *Hydrobaenus* | Midge | 59 |
| *Orthocladius* | Non-Biting Midges | 19 |
| *Rheocricotopus* | Non-Biting Midges | 6 |
| *Naididae* | Aquatic Worm | 5 |
| *Cricotopus* | Non-Biting Midges | 3 |
| *Prostoma* | Freshwater Nemertean (Ribbon Worm) | 2 |
| *Conchapelopia* | Non-Biting Midges | 2 |
| *Amphinemura* | Spring Stonefly | 1 |
| *Prosimulium* | Black Fly | 1 |
| *Tipula* | Crane Fly | 1 |
| *Zavrelimyia* | Non-Biting Midges | 1 |
| *Nemouridae* | Nemourid Stonefly | 1 |
| *Ceratopogonidae* | Biting Midge | 1 |

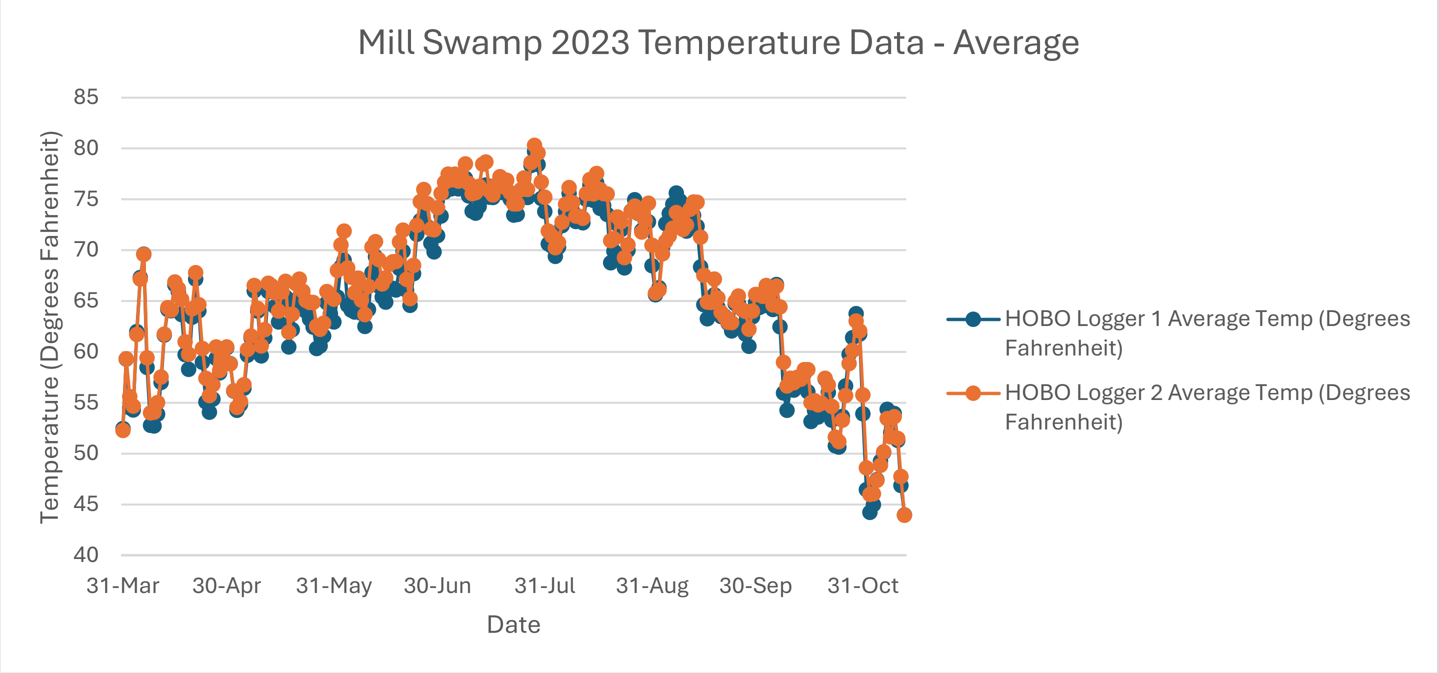
*Sampling with a kick net for benthic macroinvertebrates.*

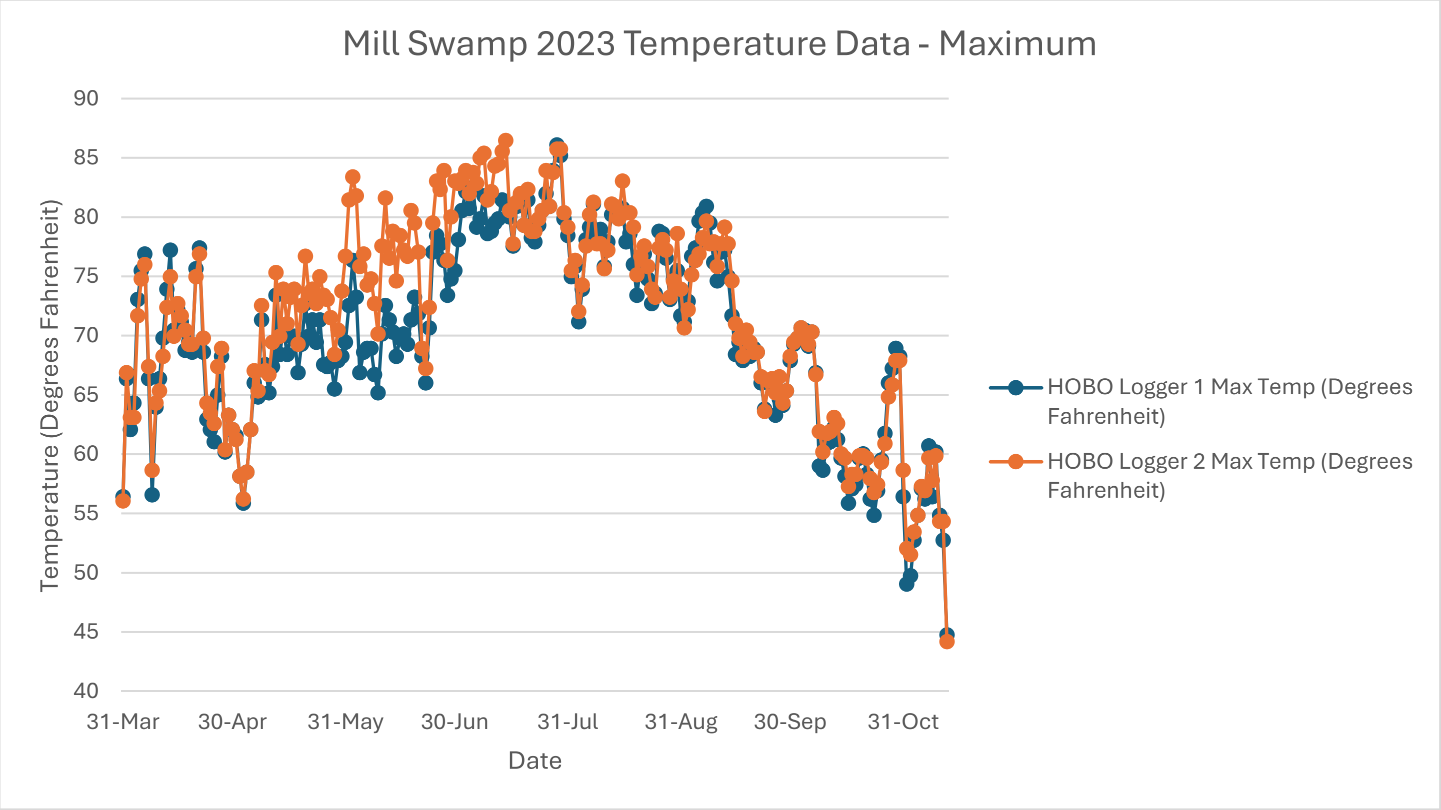
# THERMAL MONITORING DATA

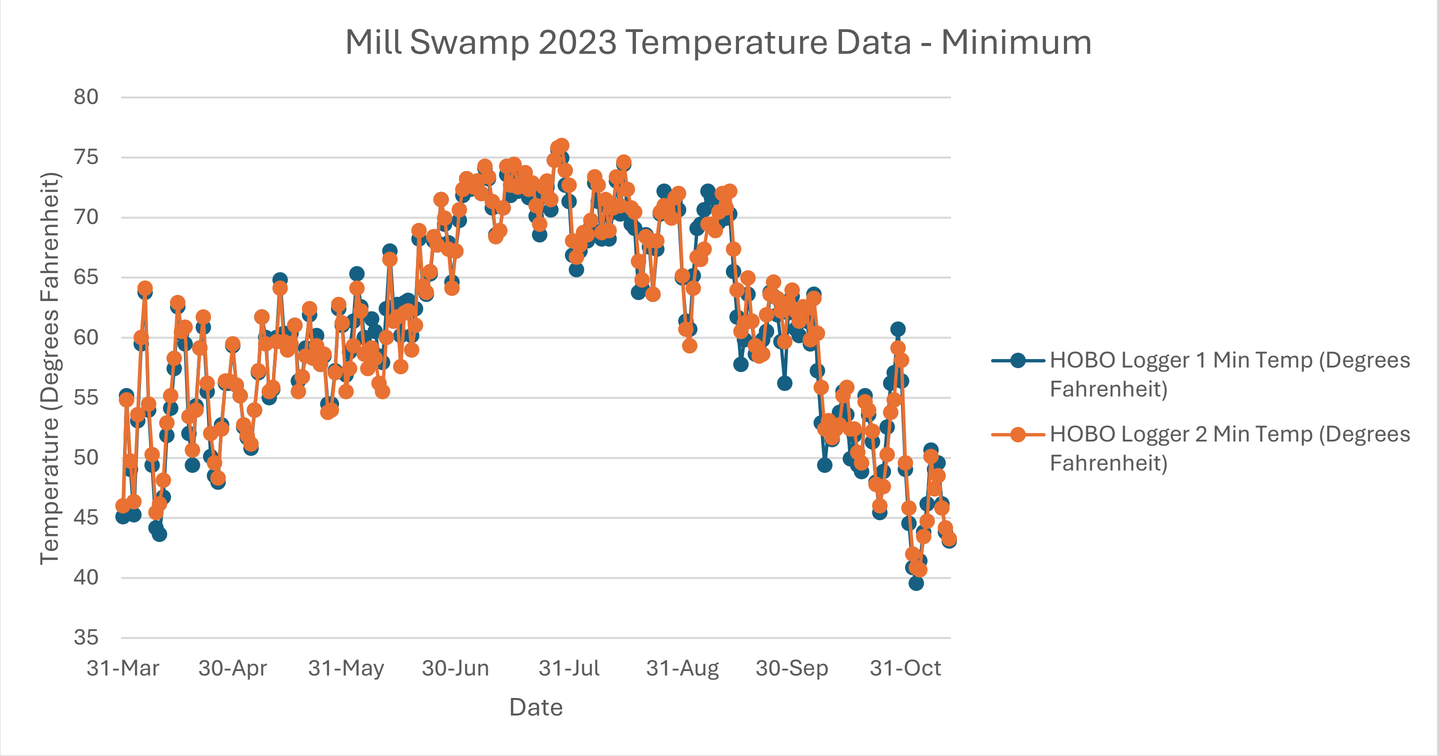
Not Final

***See Site Assessment Map for Thermal Data Logger Locations**

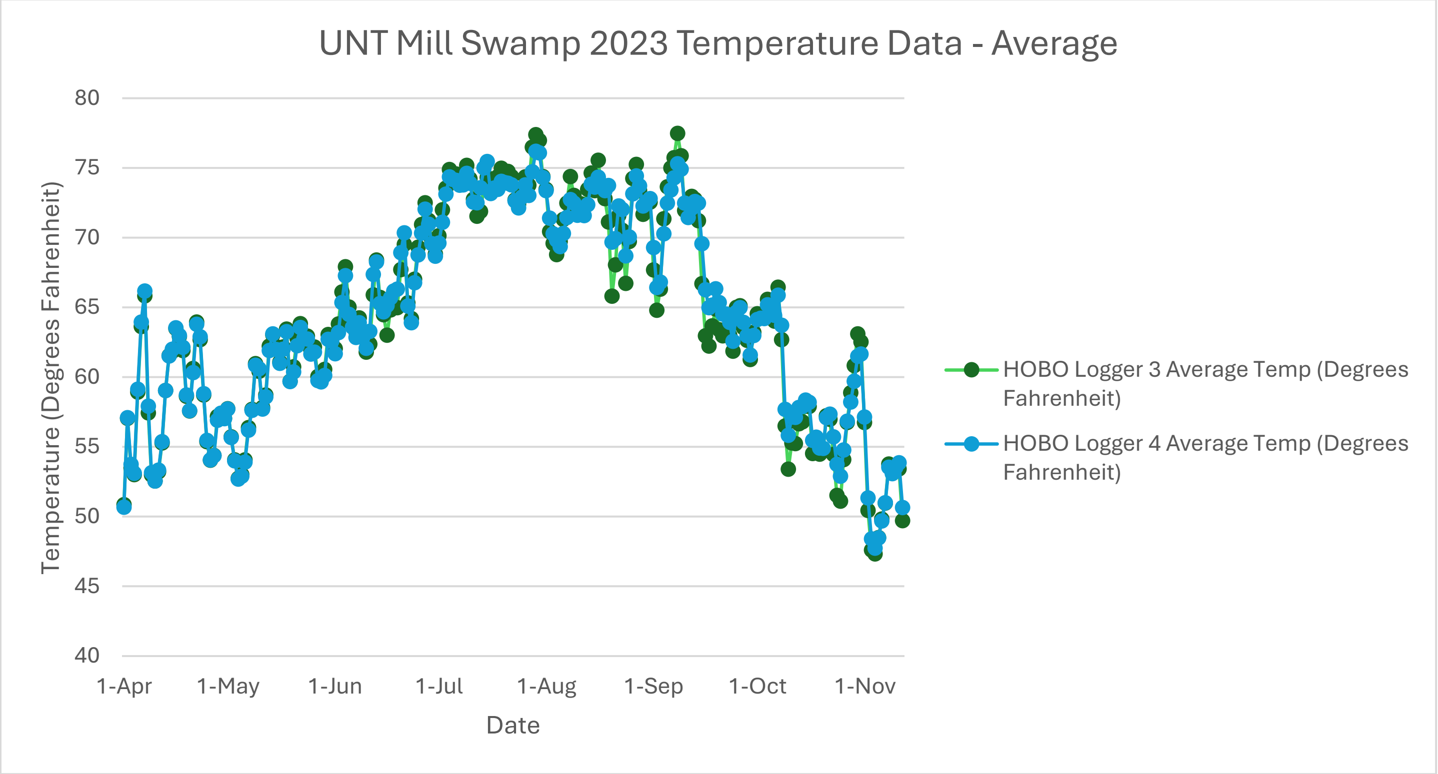
**Mill Swamp 2023 Temperature Data – Average, Maximum, Minimum**

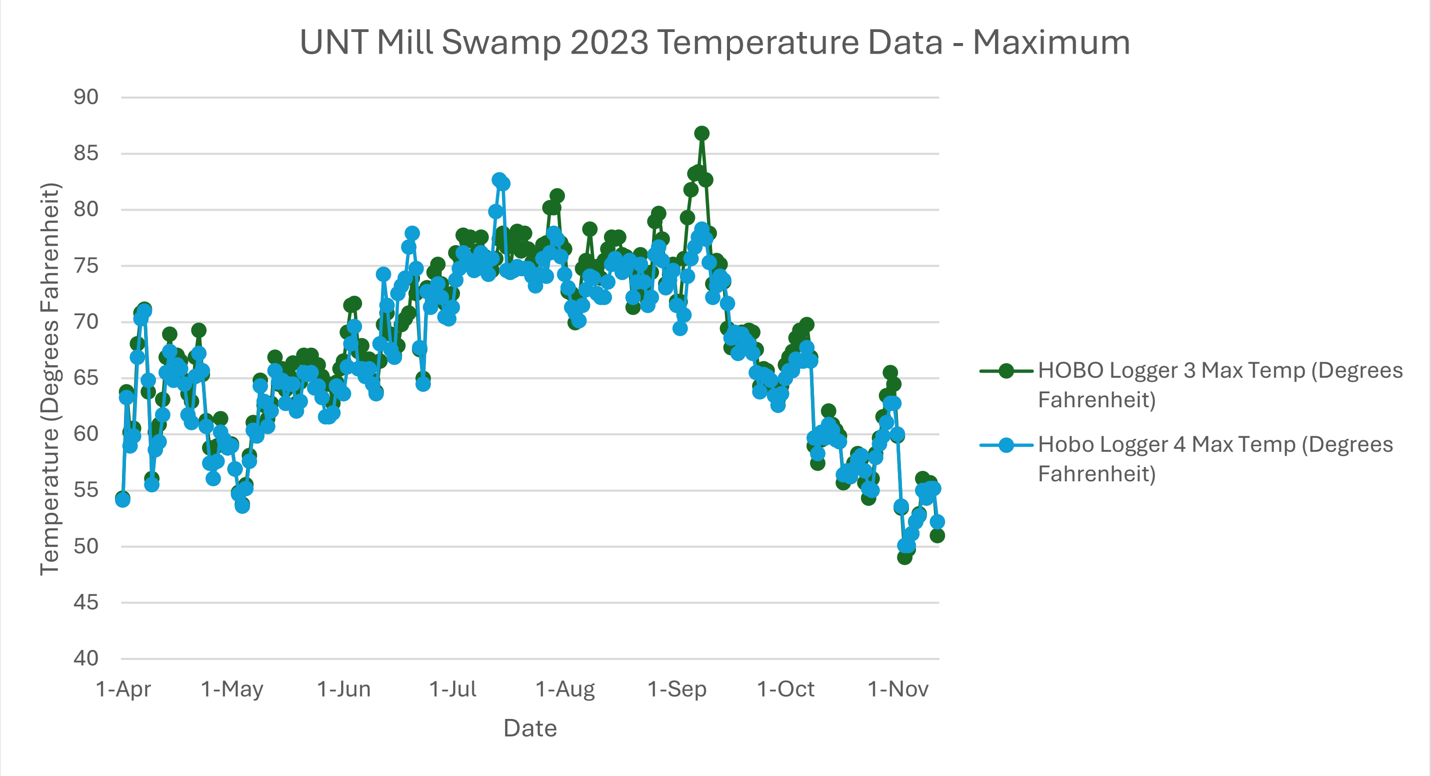


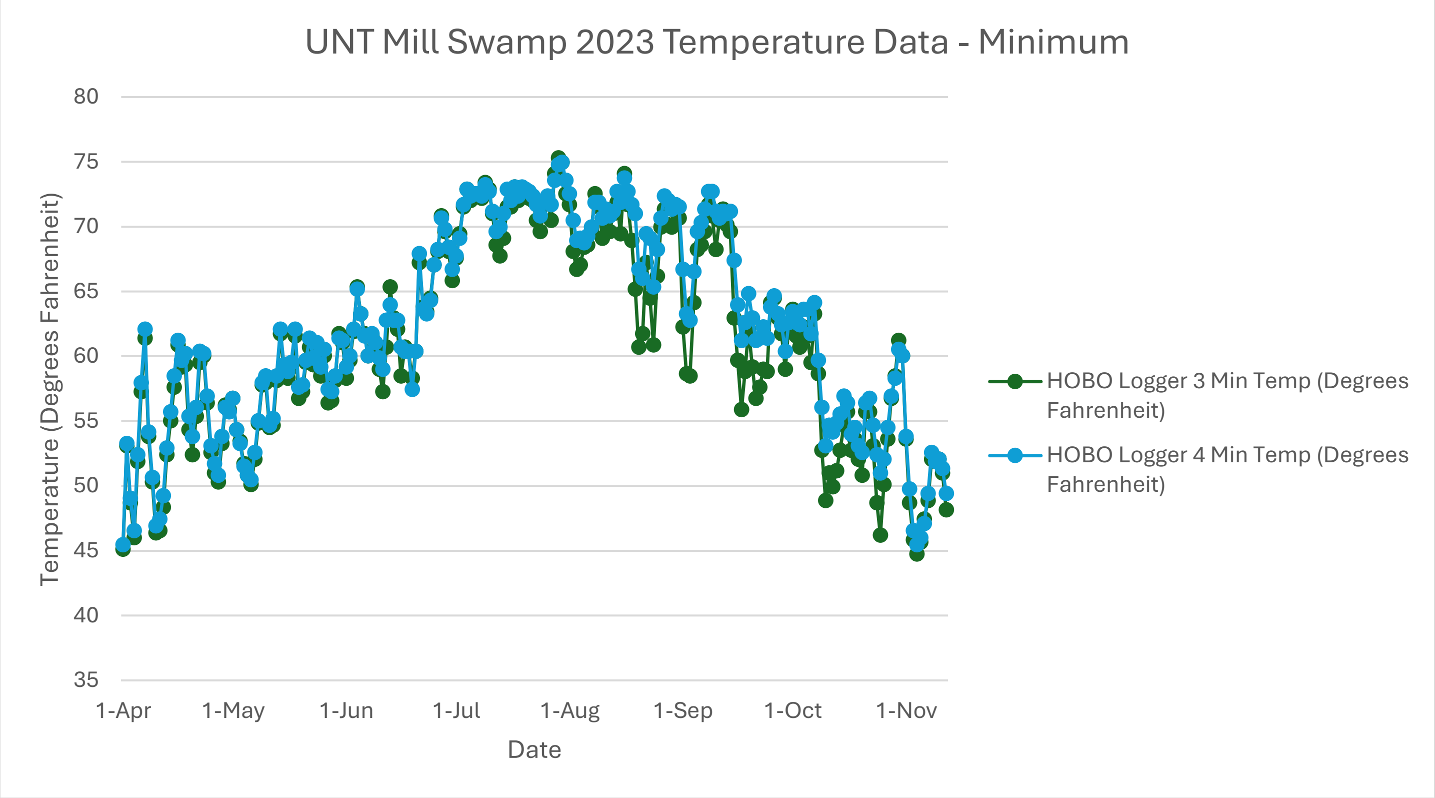




## UNT Mill Swamp 2023 Temperature Data – Average, Maximum, Minimum




UNT Mill Swamp 2023 Temperature Data - Maximum
Temperature (Degrees Fahrenheit)
90
85
80
75
70
65
60
55
50
45
40
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
Date
HOBO Logger 3 Max Temp (Degrees Fahrenheit)
Hobo Logger 4 Max Temp (Degrees Fahrenheit)


UNT Mill Swamp 2023 Temperature Data - Minimum
Temperature (Degrees Fahrenheit)
80
75
70
65
60
55
50
45
40
35
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
Date
HOBO Logger 3 Min Temp (Degrees Fahrenheit)
HOBO Logger 4 Min Temp (Degrees Fahrenheit)

**2023 Temperature Data - Average**

| Month | HOBO Logger 1 Average Temp (°$F$) | HOBO Logger 2 Average Temp (°$F$) | HOBO Logger 3 Average Temp (°$F$) | HOBO Logger 4 Average Temp (°$F$) |
|---|---|---|---|---|
| **April** | 60.05 | 60.77 | 58.31 | 58.39 |
| **May** | 62.07 | 63.15 | 60.05 | 59.84 |
| **June** | 67.46 | 69.50 | 66.35 | 66.42 |
| **July** | 75.67 | 76.79 | 74.11 | 73.77 |
| **August** | 72.60 | 73.39 | 71.63 | 71.59 |
| **September** | 67.40 | 67.87 | 67.37 | 67.78 |
| **October** | 58.04 | 58.75 | 58.22 | 58.72 |
| **November*** | 48.76 | 49.09 | 50.59 | 50.91 |
| **Total** | 64.01 | 64.92 | 63.33 | 63.46 |

**2023 Temperature Data - Maximum**

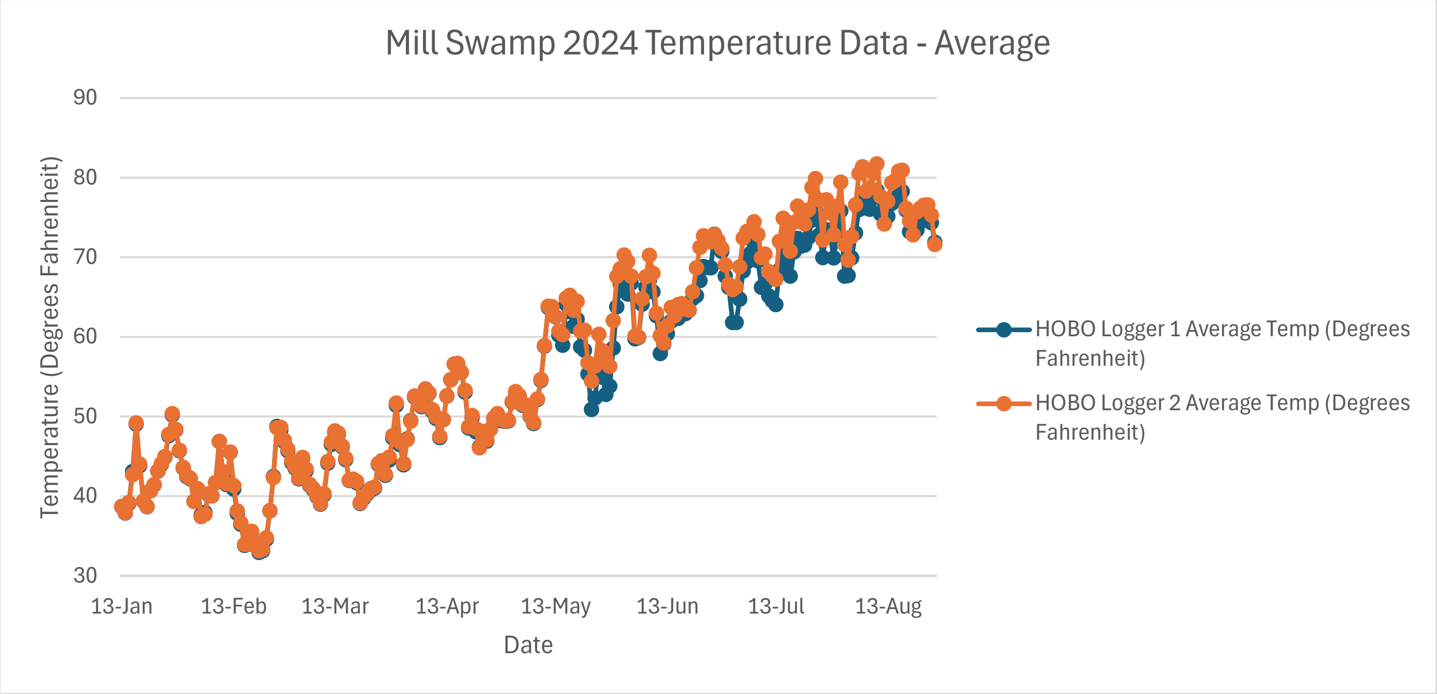
| Month | HOBO Logger 1 Maximum Temp (°$F$) | HOBO Logger 2 Maximum Temp (°$F$) | HOBO Logger 3 Maximum Temp (°$F$) | HOBO Logger 4 Maximum Temp (°$F$) |
|---|---|---|---|---|
| **April** | 77.40 | 76.88 | 71.17 | 71.00 |
| **May** | 73.41 | 76.70 | 67.05 | 65.68 |
| **June** | 78.45 | 83.94 | 75.14 | 77.92 |
| **July** | 86.10 | 86.46 | 81.27 | 82.69 |
| **August** | 81.09 | 83.04 | 79.68 | 76.70 |
| **September** | 80.91 | 79.68 | 86.82 | 78.27 |
| **October** | 70.65 | 70.65 | 69.79 | 67.74 |
| **November*** | 60.71 | 59.85 | 56.06 | 55.19 |
| **Total** | 86.10 | 86.46 | 86.82 | 82.69 |

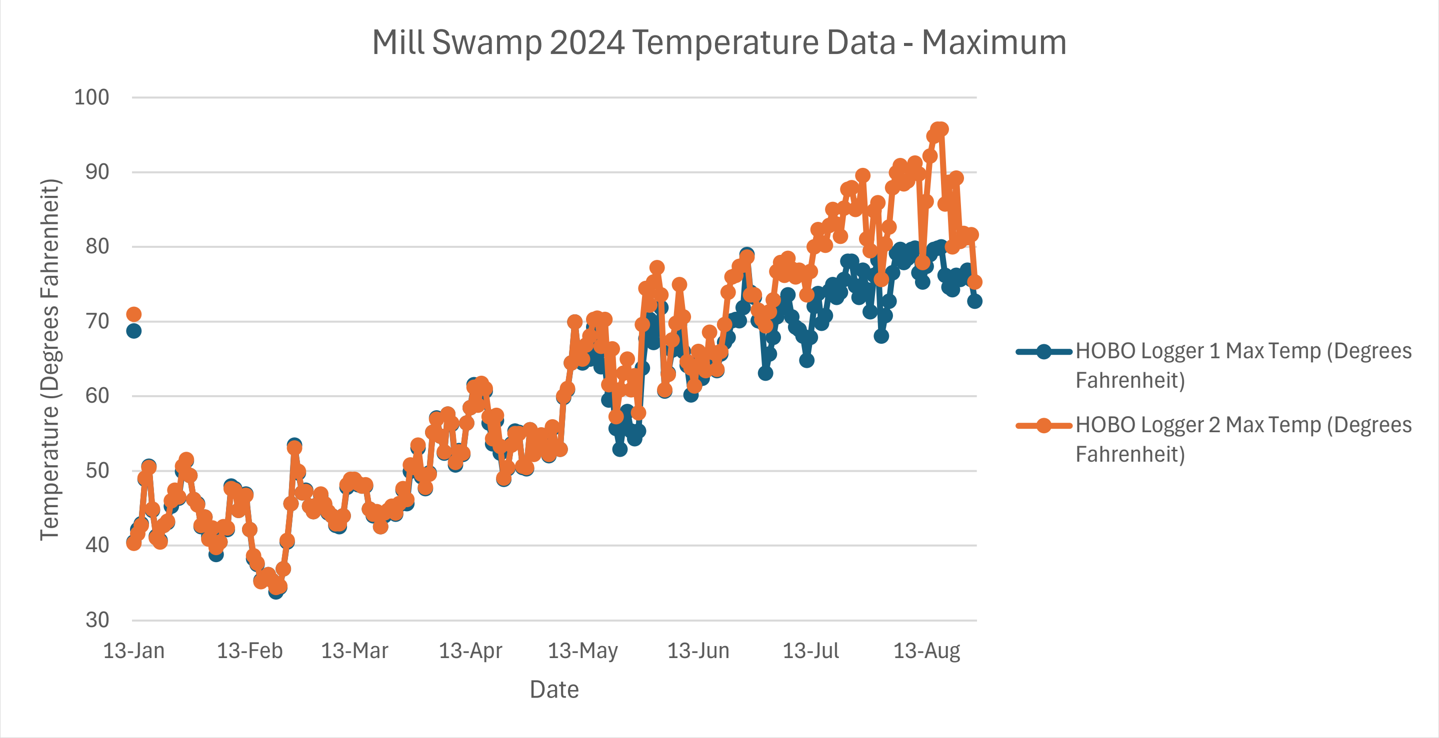
**2023 Temperature Data - Minimum**

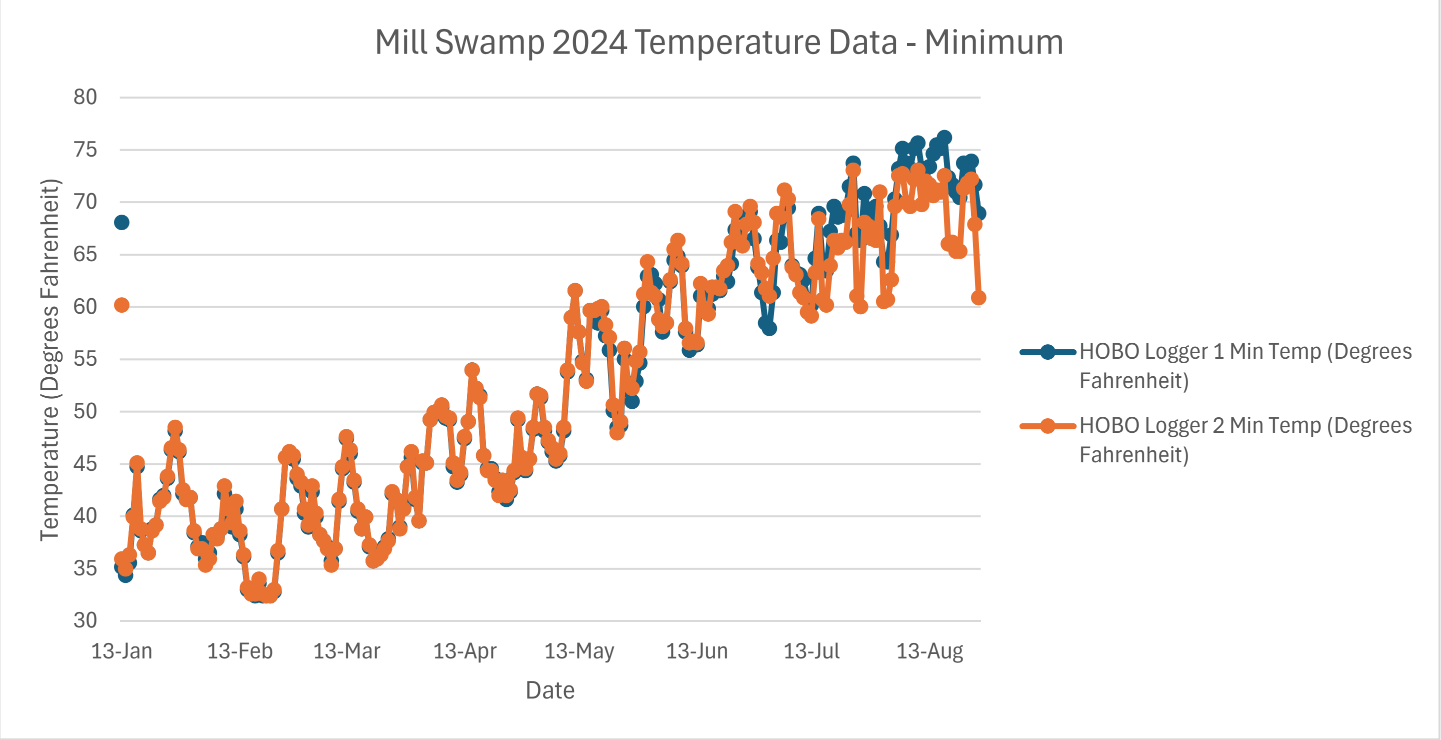
| Month | HOBO Logger 1 Minimum Temp (°$F$) | HOBO Logger 2 Minimum Temp (°$F$) | HOBO Logger 3 Minimum Temp (°$F$) | HOBO Logger 4 Minimum Temp (°$F$) |
|---|---|---|---|---|
| **April** | 43.65 | 45.47 | 46.01 | 46.55 |
| **May** | 50.82 | 51.17 | 50.11 | 50.47 |
| **June** | 57.96 | 55.54 | 57.27 | 57.44 |
| **July** | 68.59 | 68.42 | 67.74 | 69.11 |
| **August** | 63.63 | 63.63 | 60.71 | 65.34 |
| **September** | 56.23 | 58.48 | 55.88 | 60.37 |
| **October** | 45.47 | 46.01 | 46.19 | 51.00 |
| **November*** | 39.57 | 40.70 | 44.74 | 45.47 |
| **Total** | 39.57 | 40.70 | 44.74 | 45.47 |

*Data not collected for entirety of Month.

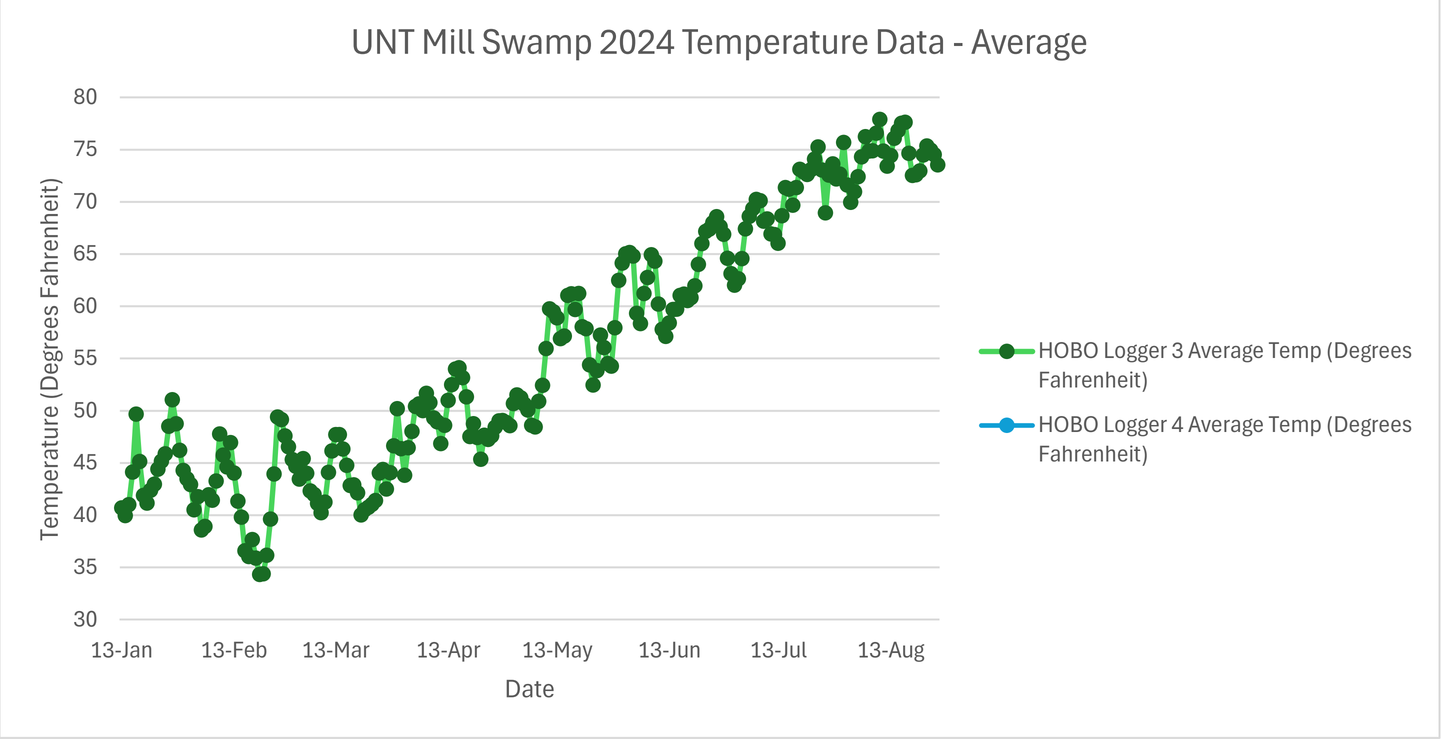
### Mill Swamp 2024 Temperature Data – Average, Maximum, Minimum

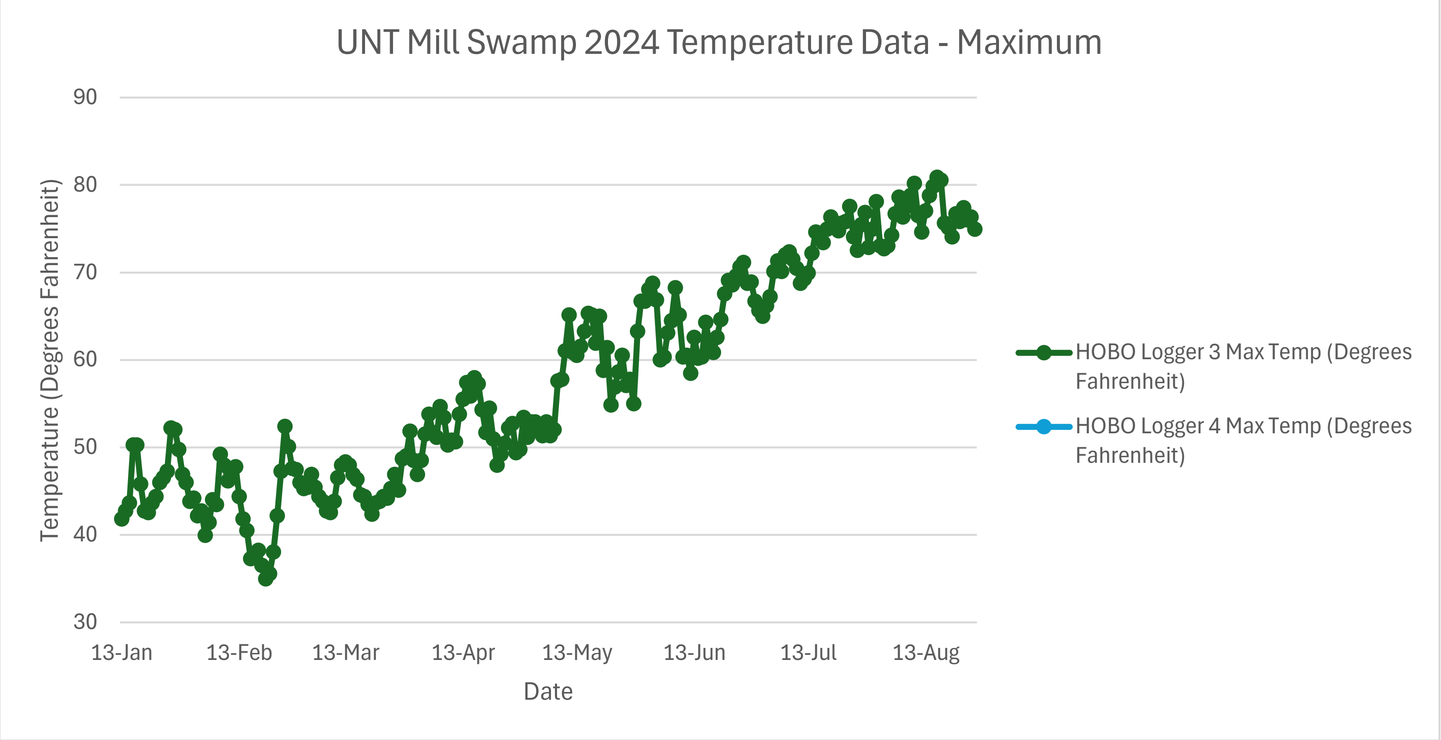


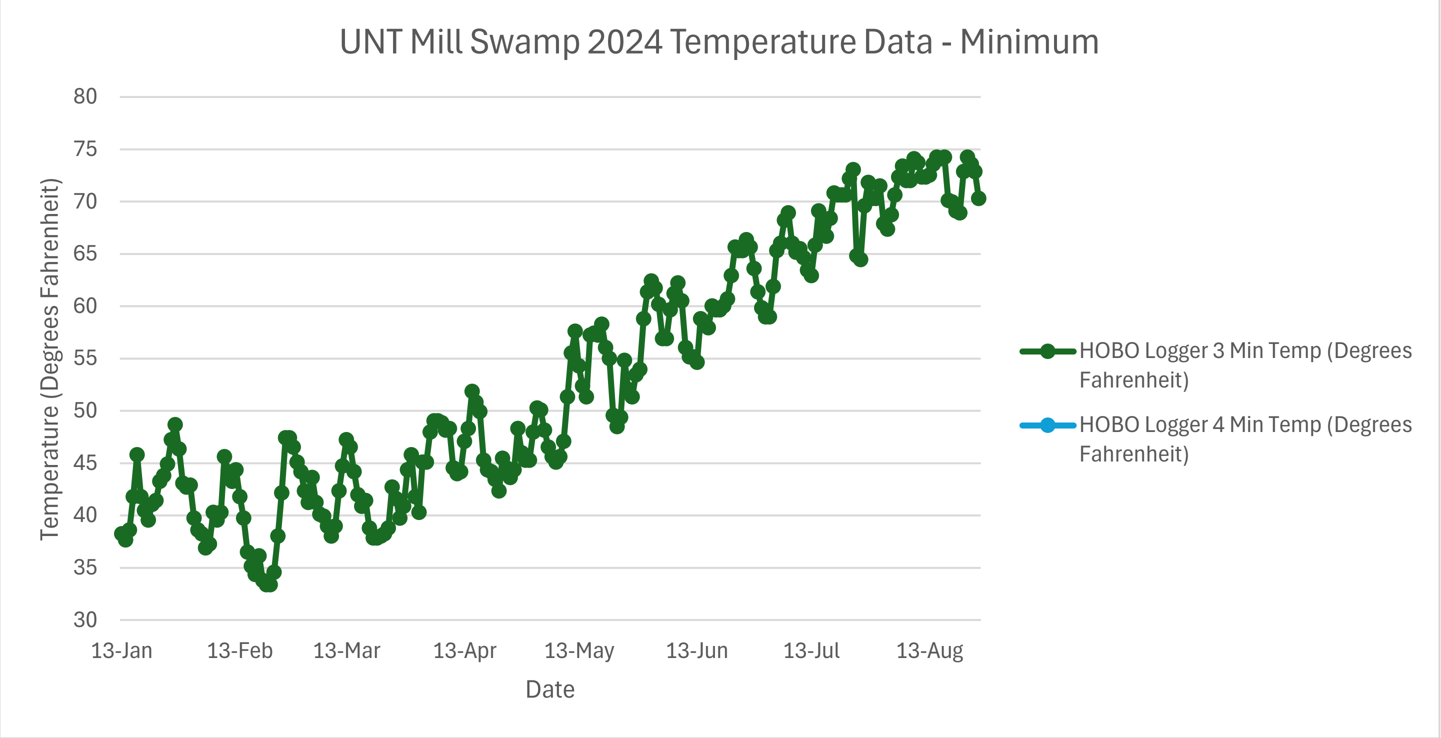




**UNT Mill Swamp 2024 Temperature Data – Average, Maximum, Minimum**




UNT Mill Swamp 2024 Temperature Data - Maximum
Temperature (Degrees Fahrenheit)
90
80
70
60
50
40
30
13-Jan
13-Feb
13-Mar
13-Apr
13-May
13-Jun
13-Jul
13-Aug
Date
HOBO Logger 3 Max Temp (Degrees Fahrenheit)
HOBO Logger 4 Max Temp (Degrees Fahrenheit)


UNT Mill Swamp 2024 Temperature Data - Minimum
Temperature (Degrees Fahrenheit)
80
75
70
65
60
55
50
45
40
35
30
13-Jan
13-Feb
13-Mar
13-Apr
13-May
13-Jun
13-Jul
13-Aug
Date
HOBO Logger 3 Min Temp (Degrees Fahrenheit)
HOBO Logger 4 Min Temp (Degrees Fahrenheit)

| 2024 Temperature Data - Average | | | | |
|---|---|---|---|---|
| **Month** | HOBO Logger 1 Average Temp (°$F$) | HOBO Logger 2 Average Temp (°$F$) | HOBO Logger 3 Average Temp (°$F$) | HOBO Logger 4** Average Temp (°$F$) |
| **January** | 43.24 | 43.31 | 44.58 | N/A |
| **February** | 40.00 | 40.10 | 41.69 | N/A |
| **March** | 43.34 | 43.50 | 43.76 | N/A |
| **April** | 50.46 | 50.56 | 49.25 | N/A |
| **May** | 57.01 | 58.54 | 55.50 | N/A |
| **June** | 65.01 | 66.60 | 62.93 | N/A |
| **July** | 69.60 | 73.12 | 70.11 | N/A |
| **August** | 74.49 | 76.12 | 74.33 | N/A |
| **Total** | 55.39 | 56.50 | 55.27 | N/A |

| 2024 Temperature Data - Maximum | | | | |
|---|---|---|---|---|
| **Month** | HOBO Logger 1 Maximum Temp (°$F$) | HOBO Logger 2 Maximum Temp (°$F$) | HOBO Logger 3 Maximum Temp (°$F$) | HOBO Logger 4** Maximum Temp (°$F$) |
| **January** | 51.35 | 51.52 | 52.23 | N/A |
| **February** | 53.45 | 53.1 | 52.40 | N/A |
| **March** | 53.1 | 53.45 | 51.87 | N/A |
| **April** | 61.57 | 61.74 | 57.96 | N/A |
| **May** | 70.31 | 74.45 | 66.71 | N/A |
| **June** | 78.98 | 78.62 | 71.17 | N/A |
| **July** | 78.27 | 89.57 | 78.10 | N/A |
| **August** | 80.3 | 95.78 | 80.91 | N/A |
| **Total** | 80.3 | 95.78 | 80.91 | N/A |

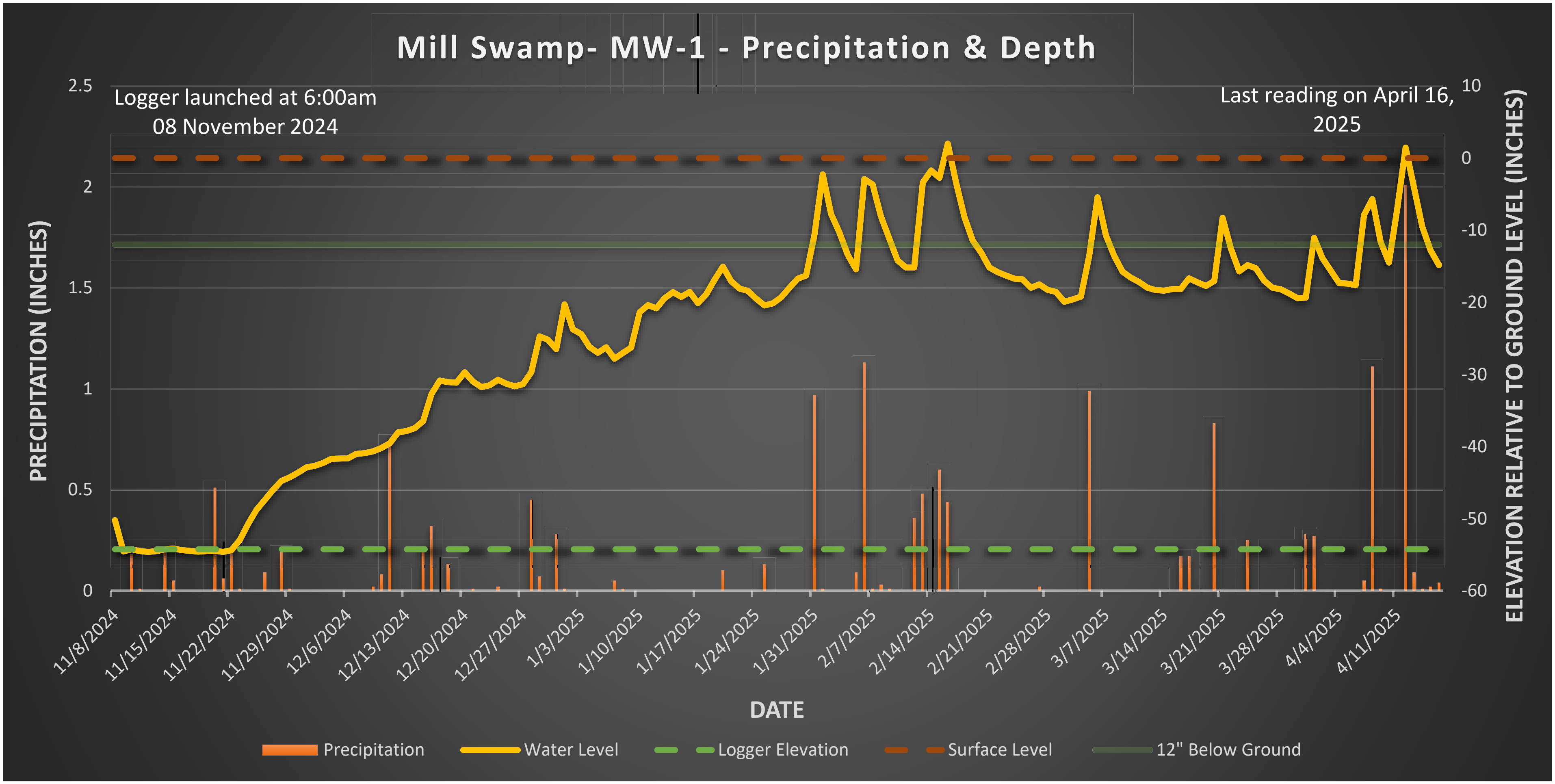
| 2024 Temperature Data – Minimum | | | | |
|---|---|---|---|---|
| **Month** | HOBO Logger 1 Minimum Temp (°$F$) | HOBO Logger 2 Minimum Temp (°$F$) | HOBO Logger 3 Minimum Temp (°$F$) | HOBO Logger 4** Minimum Temp (°$F$) |
| **January** | 34.39 | 34.98 | 36.91 | N/A |
| **February** | 32.42 | 32.42 | 33.41 | N/A |
| **March** | 35.76 | 35.76 | 37.87 | N/A |
| **April** | 41.63 | 41.99 | 42.36 | N/A |
| **May** | 48.52 | 47.98 | 48.52 | N/A |
| **June** | 57.96 | 59.16 | 57.96 | N/A |
| **July** | 63.455 | 60.02 | 64.48 | N/A |
| **August** | 68.08 | 60.20 | 68.93 | N/A |
| **Total** | 32.42 | 32.42 | 33.41 | N/A |

**Logger unable to be retrieved.

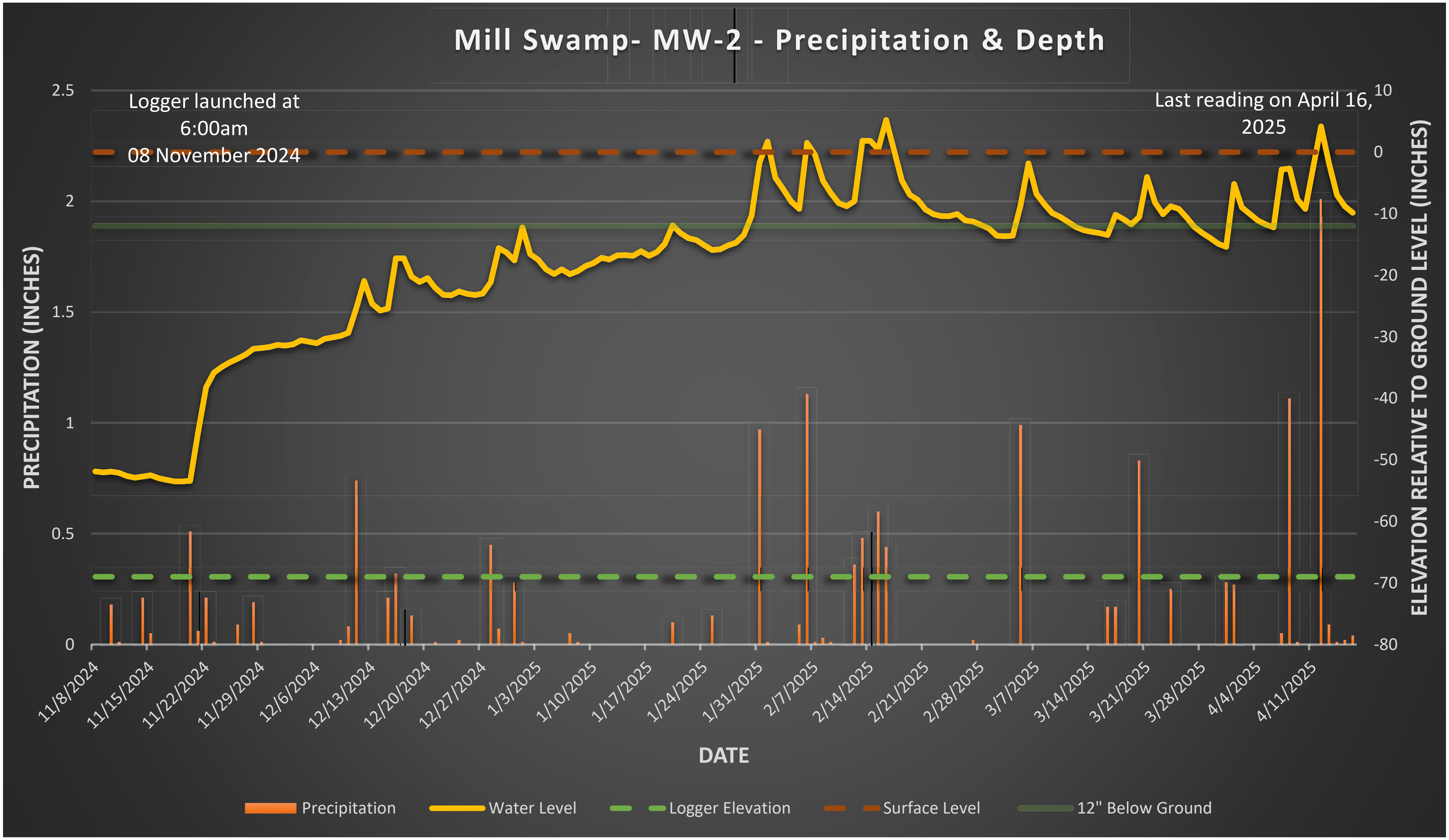
# GROUNDWATER MONITORING DATA

***See Site Assessment Map for Monitoring Well Locations**

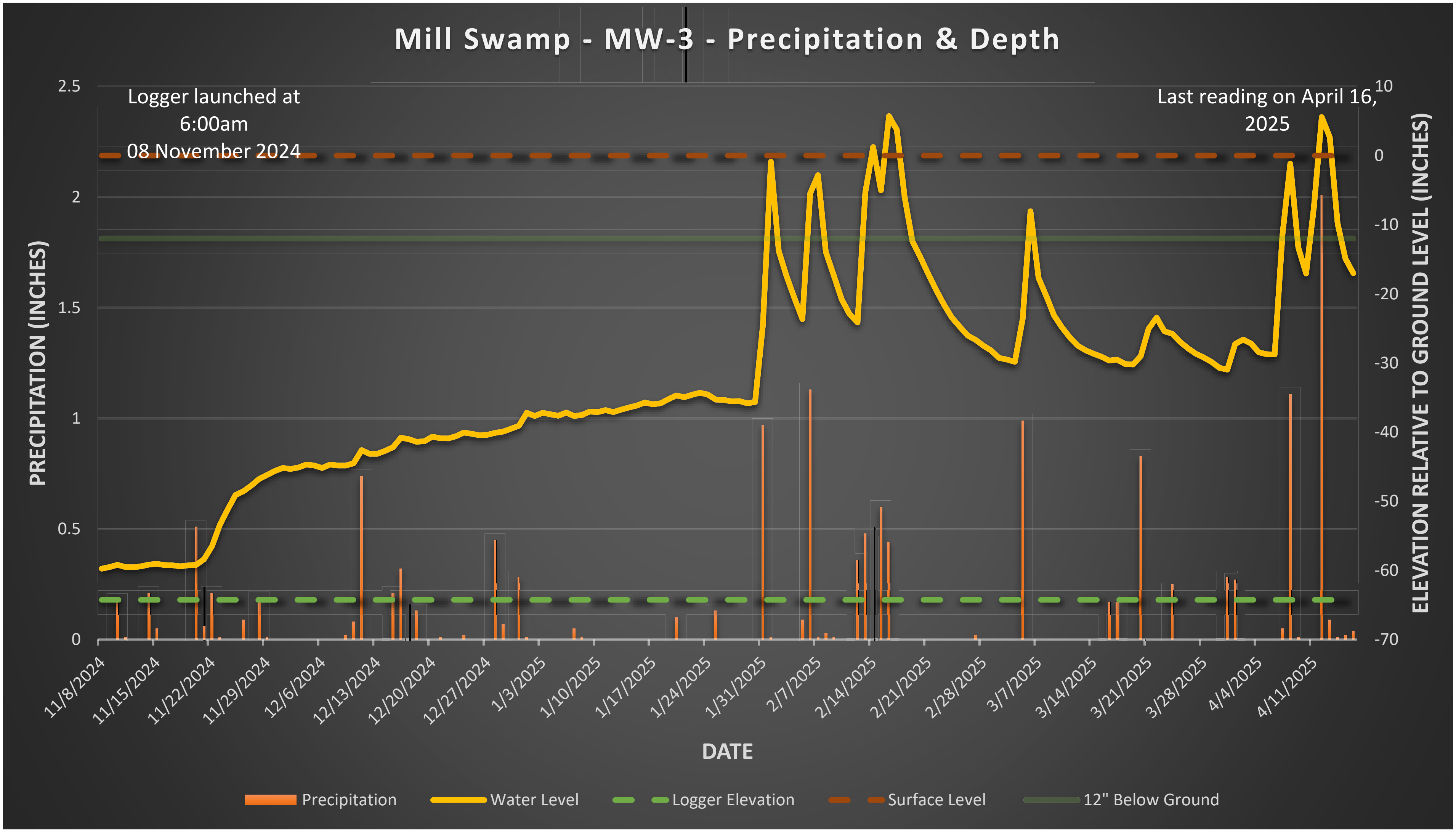
### Mill Swamp Groundwater Monitoring Well Hydrographs



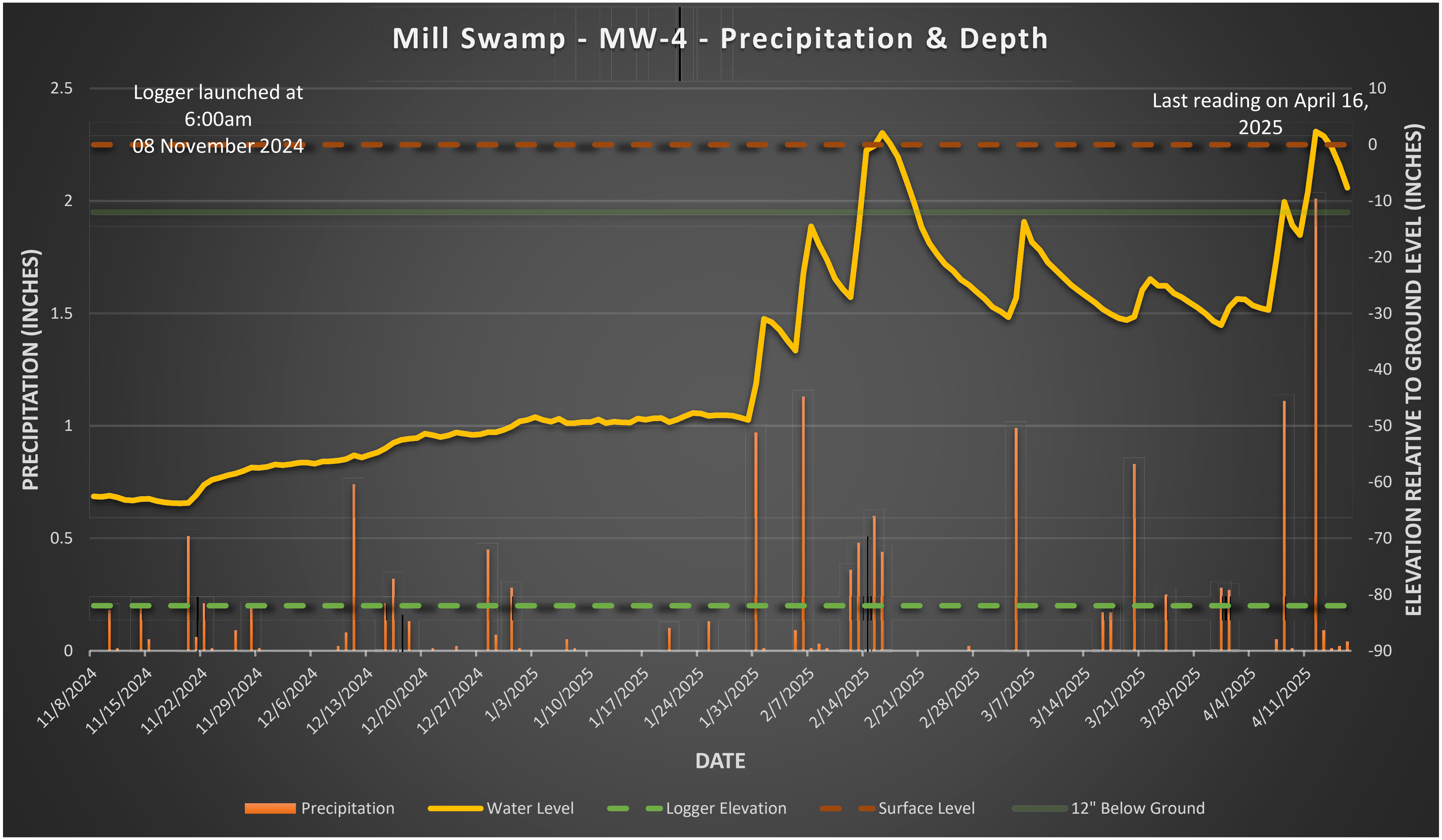
# Not Final


Mill Swamp- MW-2 - Precipitation & Depth
Logger launched at 6:00am 08 November 2024
Last reading on April 16, 2025
PRECIPITATION (INCHES)
2.5
2
1.5
1
0.5
0
ELEVATION RELATIVE TO GROUND LEVEL (INCHES)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
11/8/2024
11/15/2024
11/22/2024
11/29/2024
12/6/2024
12/13/2024
12/20/2024
12/27/2024
1/3/2025
1/10/2025
1/17/2025
1/24/2025
1/31/2025
2/7/2025
2/14/2025
2/21/2025
2/28/2025
3/7/2025
3/14/2025
3/21/2025
3/28/2025
4/4/2025
4/11/2025
DATE
Precipitation
Water Level
Logger Elevation
Surface Level
12" Below Ground

# Not Final


Mill Swamp - MW-3 - Precipitation & Depth
Logger launched at 6:00am 08 November 2024
Last reading on April 16, 2025
PRECIPITATION (INCHES)
2.5
2
1.5
1
0.5
0
ELEVATION RELATIVE TO GROUND LEVEL (INCHES)
10
0
-10
-20
-30
-40
-50
-60
-70
11/8/2024
11/15/2024
11/22/2024
11/29/2024
12/6/2024
12/13/2024
12/20/2024
12/27/2024
1/3/2025
1/10/2025
1/17/2025
1/24/2025
1/31/2025
2/7/2025
2/14/2025
2/21/2025
2/28/2025
3/7/2025
3/14/2025
3/21/2025
3/28/2025
4/4/2025
4/11/2025
DATE
Precipitation
Water Level
Logger Elevation
Surface Level
12" Below Ground

# Not Final


Mill Swamp - MW-4 - Precipitation & Depth
Logger launched at 6:00am 08 November 2024
Last reading on April 16, 2025
PRECIPITATION (INCHES)
2.5
2
1.5
1
0.5
0
ELEVATION RELATIVE TO GROUND LEVEL (INCHES)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
11/8/2024
11/15/2024
11/22/2024
11/29/2024
12/6/2024
12/13/2024
12/20/2024
12/27/2024
1/3/2025
1/10/2025
1/17/2025
1/24/2025
1/31/2025
2/7/2025
2/14/2025
2/21/2025
2/28/2025
3/7/2025
3/14/2025
3/21/2025
3/28/2025
4/4/2025
4/11/2025
DATE
Precipitation
Water Level
Logger Elevation
Surface Level
12" Below Ground

# APPENDIX E.10
# DELINEATION OF AQUATIC RESOURCES

WETLAND AND WATERWAY INVESTIGATION REPORT

# MILL SWAMP MITIGATION BANK

Charles County, MD

25-00175-001

**June 2025**

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# 1.0 INTRODUCTION

Johnson, Mirmiran, & Thompson (JMT) is proposing to create a wetland and stream mitigation bank in Bryans Road, Charles County, Maryland. To support this effort, JMT performed a wetland and waterway investigation to identify environmental resources that could be impacted within the Study Area.

The Study Area for this project totals approximately 29.2 acres and is located west of Marshall Hall Road (**Figure 1**). The Study Area consists of forest, wetland, meadow, and oldfield habitat. Low density residential housing exists in all directions around the Study Area, but the area remains largely undeveloped, with agriculture and forest covering much of the watershed. Mill Swamp and its unnamed tributary flow into Pomonkey Creek, which flows into the Potomac River. The Potomac River is located approximately two miles to the north and west of the project location.

The Study Area is within the Atlantic Coastal Plain Physiographic Province. It lies in the Maryland Department of the Environment (MDE) 8-digit Potomac River Middle Tidal Watershed (#021400102; MDE, 2005) and US Geological Survey (USGS) Watershed Boundary Dataset 8-digit Middle Potomac-Anacostia-Occoquan Watershed (#02070010; USGS, 2016).

A Forest Stand Delineation and Specimen Tree Survey will also be completed for the Study Area. Details regarding forests and trees will be under separate cover.

# 2.0 METHODOLOGY

## 2.1 PUBLISHED INFORMATION

JMT reviewed several background data sources prior to completing the field work. These sources included topographic maps, soil survey maps, National Wetland Inventory (NWI) and Maryland Department of Natural Resources (MDNR) mapped wetlands, MDE mapped streams, Federal Emergency Management Agency (FEMA) floodplain maps, and recent aerial photographs.

## 2.2 AGENCY COORDINATION

JMT coordinated with MDNR, US Fish and Wildlife Service (USFWS), and Maryland Historic Trust (MHT) to determine whether state-protected species, federal-protected species, and/or known historical or archaeological sites are present within the Study Area.

Figure 1: Vicinity Map

## 2.3 FIELD INVESTIGATIONS

Field investigations are conducted to delineate potentially regulated waters of the United States, including wetlands and waterways, within the Study Area. Wetland delineations are performed according to the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Regional Supplement, Version 2.0,* (US Army Corps of Engineers [USACE], 2010*)*. The *Corps of Engineers Wetland Delineation Manual* states three criteria (wetland vegetation, wetland soils, and wetland hydrology) must be present for an area to qualify as a wetland, unless the area is significantly disturbed (atypical situation) or is considered a problem area (e.g., seasonally ponded soils). If the area is significantly disturbed or a problem area, then only two parameters must be evident to classify an area as a wetland. All delineated wetlands are classified into system, subsystem, class and subclass according to the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al.*, 1979).

Wetland (hydrophytic) vegetation is determined using the USACE National Wetland Plant List (NWPL), (USACE, accessed 2025). This document assigns a wetland indicator status to plants based on how frequently they occur in wetlands. The NWPL wetland indicator status and definitions are listed in **Table 1**.

**Table 1: National Wetland Plant List Indicator Status Groups**

| Wetland Indicator Status | Definition |
|---|---|
| Obligate Wetland (OBL) | Almost always occur in wetlands |
| Facultative Wetland (FACW) | Usually occur in wetlands, but may occur in non-wetlands |
| Facultative (FAC) | Occur in wetlands or non-wetlands |
| Facultative Upland (FACU) | Usually occur in non-wetlands, but may occur in wetlands |
| Obligate Upland (UPL) | Almost never occur in wetlands |

Source: USACE, accessed 2025

In order to delineate wetland boundaries, samples are taken periodically using an open-faced auger. Soil samples are collected at each wetland and upland sample point, and soil colors are recorded in the field using a Munsell soil color chart (Munsell Color, 2012).

Wetland and waterway boundaries are flagged in the field and documented using a Trimble® global positioning system (GPS) capable of sub-meter accuracy. Waterway boundaries are delineated at top of bank. A rapid wetland assessment was completed for the delineated wetlands using Version 1.1 of *The Maryland Wetland Assessment Method (*USACE, 2025) [MDWAM].

In the state of Maryland, both USACE and MDE regulate wetlands and waterways. As of September 8, 2023, the Revised Definition of Waters of the United States (WOTUS); Conforming Rule became effective. This conformed final rule is operative in several states, including Maryland. In locations where the 2023 Rule is not currently operative due to litigation, USACE is implementing the pre-2015 regulatory regime, although utilizing an interpretation of WOTUS consistent with the results of *Sackett v. Environmental Protection Agency*. The delineated resource descriptions within this report have been structured to aid USACE regulators in determining jurisdiction using the 2023 WOTUS; Conforming Rule. However, resources not jurisdictional to USACE may still be regulated by MDE.

# 3.0 FINDINGS

## 3.1 PUBLISHED INFORMATION

The USGS Topographic Map Service depicts two mapped waterways and two wetland systems in the Study Area (**Figure 2**).

The NWI (USFWS, 2002) and MDNR (2005) wetland dataset shows three mapped palustrine wetlands within the Study Area (**Figure 3**).

The MDE Stream Designated Use Class Map (MDE, 2019) shows Mill Swamp and an unnamed tributary (Use I) within the Study Area. There are no Tier II watersheds within the Study Area (**Figure 3**).

The FEMA floodplain mapping for Charles County, Maryland (FEMA, 2015) depicts portions of both Study Area locations within the 100-year floodplain (FIRM Panel #24017C0040D) (**Figure 3**).

The Web Soil Survey for Charles County, Maryland, (Soil Survey Staff, accessed 2017) indicates that four soil survey units occur within the Study Area; of these, one unit is predominantly hydric (**Figure 4**).

The Chesapeake Bay Critical Area Map for Charles County, Maryland (MD iMAP, 2021) depicts the Resource Conservation Area of the Chesapeake Bay Critical Area near but outside of the Study Area (**Appendix E.13**).

Figure 2: USGS Topographic Map

Figure 3: Published Water Resources Map

Figure 4: Soil Survey Map

Figure 5: Chesapeake Bay Critical Area Map

## 3.2 AGENCY COORDINATION

### Rare, Threatened, and Endangered Species

JMT sent a letter on May 14, 2025, to the MDNR Wildlife and Heritage Service (WHS) to determine if state-listed rare, threatened, or endangered (RTE) species are present in the Study Area. Response from MDNR WHS was received on June 18, 2025, and indicates that the Study Area contains Forest Interior Dwelling Bird habitat but there are no official State or Federal records for listed plant or animal species within the Study Area (**Appendix E.13**).

On May 14, 2025, JMT used the MDNR Environmental Review Program (ERP) Aquatic Resources Pre-Screening Tool to determine the presence of anadromous finfish or other fish in the Study Area. The tool returned records of two Use I waterways within the Study Area as well as a record of anadromous fish downstream of the project area. A screenshot of the results can be found in **Appendix E.13**.

Through coordination with USFWS, records were returned for the endangered northern long-eared bat, proposed endangered tricolored bat, and the candidate species monarch butterfly. The northern long-eared bat and tricolored bat range-wide determination key will be completed when the project has progressed beyond concept design. The USFWS Official Species List dated May 14, 2025, documenting these results can be found in **Appendix E.13.**

### Historical Resources

JMT contacted the Maryland Historic Trust (MHT) in a letter dated January 19, 2022, to determine if the proposed project may impact known historical or archeological sites. A response was received on February 17, 2022, stating that MHT has determined that this project will have no adverse effects on historic or archaeological resources (**Appendix E.12**). A letter requesting an updated review was sent on May 14, 2025. A response is pending.

## 3.3 FIELD INVESTIGATIONS

Field investigations were conducted in April, May, and June 2022; November 2024; April 2025; and June 2025 to identify and delineate wetlands and waterways within the Study Area. JMT identified a total of 16 non-tidal wetlands and 11 waterways. Locations of the delineated systems are shown on the Delineated Resource Maps in **Appendix E.10.1**.

At least one wetland sample plot was taken for each wetland, and one upland plot was taken for each wetland or shared between adjacent wetlands. Stream data sheets as well as Wetland Determination Data Forms for the representative wetland and upland sample plots are presented in **Appendix E.10.2,** and photographic documentation is included in **Appendix E.10.3**.

MDWAM assessment was completed in April and May 2025. Maps of the wetland assessment areas, datasheets, and accompanying photographs can be found in **Appendix F.2**.

The identified resources are described below.

## Wetlands

### Wetland W 01 (WET W 01)

WET W 01 is a palustrine emergent (PEM) wetland and is approximately 0.07 acres in size. The wetland is a small backslope seep that abuts WC W 01 in the northwestern portion of the Study Area (**Appendix E.10.1, Maps 1-2**). WET 01 appears to be occasionally mowed; additionally, it appears that drains have been installed, which are likely enabling the encroachment of upland vegetation.

The dominance test for hydrophytic vegetation was met. Dominant plant species in the herbaceous stratum included Japanese stiltgrass (*Microstegium vimineum*, FAC), arrow-leaved tearthumb (*Persicaria sagittata*, OBL) and an unknown turf grass.

Primary hydrologic indicators observed included saturation and oxidized rhizospheres along living roots. Secondary hydrologic indicators included the drainage patterns, geomorphic position, and the FAC-Neutral Test. The soil profile met the depleted matrix (F3) and redox dark surface (F6) soil indicators.

Under MDWAM, WET W 01 was evaluated as Wetland Assessment Area (WAA)-01, which is considered a Backslope Wetland. It received a score of 65.0.

### Wetland W 02 (WET W 02)

WET W 02 is a palustrine forested (PFO) backslope seep wetland and is approximately 0.06 acres in size. WET W 02 is located in the northwestern portion of the Study Area, within forest south of Fenwick Road (**Appendix E.10.1, Map 1**). The main portion of the wetland is a hillside seep lacking surface connection to downstream waters, but it provides hydrology to a small, downslope emergent pocket delineated as WET W 02B that connects to WC W 01. Both WET W 02 polygons receive hydrology from groundwater seeps and upland runoff.

The dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included river birch (*Betula nigra*, FACW) and red maple (*Acer rubrum*, FAC). Multiflora rose (*Rosa multiflora*, FACU) was the dominant species in the sapling/shrub stratum. In the herbaceous stratum, wood reed grass (Cinna arundinacea, FACW), Japanese stiltgrass and an unknown species of *Carex* were the dominant species.

Primary hydrologic indicators observed included surface water, high water table, saturation, hydrogen sulfide odor, and the presence of reduced iron. Secondary hydrologic indicators included the geomorphic position and the FAC-neutral test. The soil profile met the hydrogen sulfide (A4) and loamy gleyed matrix (F2) hydric soil indicators.

Under MDWAM, WET W 02 was evaluated as WAA-02, which is considered a Backslope Wetland. It received a score of 63.8.

### Wetland W 03 (WET W 03)

WET W 03 consists of three wetland cover types: palustrine shrub scrub (PSS), palustrine emergent (PEM) and palustrine forested (PFO). The PSS area is approximately 1.27 acres in size, the PEM area is approximately 1.66 acres in size, and the PFO portion is approximately 0.02 acres. One wetland sample plot was taken within each cover type.

WET W 03 is located south of WC W 01 and east of WC W 03A (**Appendix E.10.1, Maps 1-2**). WET W 03 is a large seep wetland located at the toe of a long but gradual slope and within the floodplain of Mill Swamp (WC W 01) and WC W 03. WC W 03 has been moved to the very edge of its valley; WET W 03 appears to be located within the center of that valley and receives inundation from WC W 03 during periods of high flow, as evidence by drift deposits in the southern and central portions of the wetland. The wetland has likely been historically modified through the placement of fill and/or ditching for agriculture.

The majority of the wetland is recovering oldfield habitat, much of which is beginning succession to PFO wetland, with dense stands of small sweetgum (*Liquidambar styraciflua*, FAC) predominating. Taller, more mature sweetgum are located in the center of the field while a more mature stand of black willow (*Salix nigra*, OBL) is located adjacent to a ditch in the center of the field. The PEM and PSS portions of the wetland are highly interspersed. The easternmost portion of the wetland was mowed meadow until recently. The wetland enters the forest shortly before leaving the Study Area.

The source of hydrology for the wetland is a combination of upland runoff, groundwater, and rare flood flows from WC W 01 and WC W 03, with groundwater being the primary source of hydrology. The wetland continues outside of the Study Area to the southeast and has multiple surface connections to WC W 01. The small toe of slope seep WET W 03A is located a short distance to the northeast from the main portion of WET W 03.

Under MDWAM, the PEM and PSS portions of WET W 03 were evaluated as WAA-03, which is considered a Toe Slope Wetland. It received a score of 66.4. The PFO potion of WET W 03 was evaluated as WAA-04; the separation of the wetland into two WAAs was due to the differing disturbance regimes that these areas have experienced. WAA-04 is also considered a Toe Slope wetland and received a score of 75.0.

#### WET W 03-PSS

Within the PSS sample plot, the dominance test for hydrophytic vegetation was met. Dominant plant species in the sapling/shrub stratum included sweetgum. Dominant species in the herbaceous stratum included soft rush (*Juncus effusus*, OBL), Japanese stiltgrass, pointed broom sedge (*Carex scoparia*, FACW), sweetgum, arrow-leaved tearthumb and giant goldenrod (*Solidago gigantea*, FACW).

The primary hydrologic indicator observed included oxidized rhizospheres along living roots. Secondary hydrologic indicators included drainage patterns, geomorphic position, and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

#### WET W 03 PEM

Within the PEM sample plot, the rapid test for hydrophytic vegetation was met. Dominant plant species in the herbaceous stratum included soft rush, redtop grass (*Agrostis gigantea*, FACW), pointed broom sedge, and common marsh bedstraw (*Galium palustre*, OBL).

Primary hydrologic indicators observed included sediment deposits and oxidized rhizospheres along living roots. Secondary hydrologic indicators included the geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

#### WET W 03 PFO

Within the PEM sample plot, the dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included river birch, sweetgum, and willow oak (*Quercus phellos*, FACW). The dominant species in the sapling/shrub stratum was American hornbeam (*Carpinus caroliniana*, FAC). In the herbaceous stratum, Virginia wildrye (*Elymus virginicus*, FAC), white grass (*Leersia virginica*, FACW), and poison ivy (*Toxicodendron radicans*, FAC) were the dominant species. Roundleaf greenbrier (*Smilax rotundifolia*, FAC) and poison ivy were dominant in the woody vine stratum.

The primary hydrologic indicator observed included oxidized rhizospheres along living roots. Secondary hydrologic indicators included sparsely vegetated concave surface, drainage patterns, geomorphic position, and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

### Wetland W 04 (WET W 04)

WET W 04 is a palustrine emergent (PEM) wetland that is approximately 0.19 acres in size. It is located just northwest of the revised southern Study Area. It has formed within a small depression at the toe of adjacent slopes (**Appendix E.10.1, Map 4**). WET W 04 lacks connectivity to downstream waters and appears to receive hydrology from upland runoff and possible groundwater seeps. The wetland and surrounding areas appear to have been historically compacted and are exposed to sediment loads from an adjacent dirt bike track. However, this sediment input is not considered substantial enough to result in disturbed or problematic soils. The principal functions and values provided by WET W 04 are floodflow alteration and sediment/toxicant retention.

The rapid test for hydrophytic vegetation was met. Dominant plant species in the herbaceous stratum included fox sedge (*Carex vulpinoidea*, FACW). Primary hydrologic indicators observed included sediment deposits, algal mat or crust, and oxidized rhizospheres along living roots. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

WET W 04 was not evaluated under MDWAM because it is located outside of the Study Area and will not be included in the proposed easement.

### Wetland W 05 (WET W 05)

WET W 05 consists of two wetland cover types: palustrine forested (PFO) and palustrine emergent (PEM). The PEM area is approximately 0.39 acres in size and the PFO portion is approximately 2.77 acres. One wetland sample plot was taken within each cover type.

WET W 05 is located west of Marshall Hall Road and to the south of WC W 03B (**Appendix E.10.1, Map 5**). The wetland is largely forested and is partially located in the floodplain of WC W 03B; prior to the relocation of the stream, WC W 03B may have contributed hydrology to the wetland. The PEM portion of the wetland appears to have been previously ditched in an attempt to drain the wetland and is periodically mowed wetland. The source of hydrology for the wetland is a combination of groundwater seeps and upland runoff, as well as discharge from WC W 13. The wetland connects to WC W 03B via WC W 12. WET W 05 continues outside of the Study Area to the south.

Under MDWAM, the PEM portion of WET W 05 was evaluated as WAA-06, which is considered a Toe Slope Wetland. It received a score of 60.8. The PFO potion of WET W 05 was evaluated as WAA-07; the separation of the wetland into two WAAs was due to the differing disturbance regimes that these areas have experienced. It received a score of 84.0.

#### WET W 05 PFO

Within the PFO sample plot, the dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included American hornbeam, red maple, and sweetgum. Dominant species in the sapling/shrub stratum included spicebush (*Lindera benzoin*, FACW) and swamp dewberry (*Rubus hispidus*, FACW). In the herbaceous stratum, Japanese stiltgrass, false nettle (*Boehmeria cylindrica*, FACW), and New York fern (*Parathelypteris noveboracensis*, FAC) were dominant. Virginia creeper (*Parthenocissus quinquefolia*, FACU) and roundleaf greenbrier were dominant in the woody vine stratum.

Primary hydrologic indicators observed included saturation, drift deposits, and iron deposits. Secondary hydrologic indicators included drainage patterns, geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

#### WET W 05 PEM

Within the PEM sample plot, the dominance test for hydrophytic vegetation was met. Dominant plant species in the herbaceous stratum included sensitive fern (*Onoclea sensibilis*, FACW), pointed broom sedge, fox sedge, and Japanese stiltgrass. The primary hydrologic indicator observed included oxidized rhizospheres along living roots. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

### Wetland W 06 (WET W 06)

WET W 06 consists of three wetland cover types: palustrine forested (PFO), palustrine scrub shrub (PSS), and palustrine emergent (PEM). The PEM area is approximately 0.17 acres in size, the PSS area is approximately 0.04 acres, and the PFO portion is approximately 0.09 acres. One wetland sample plot was taken within each cover type.

WET W 06 is located within the floodplain of WC W 01 at the toe of the slope in the central portion of the northern Study Area (**Appendix E.10.1, Map 3**). The majority of the wetland is south of WC W 01 and is fed primarily by seeping groundwater. However, the portion of the wetland located between WC W 01 and WC W 07 is located at a lower elevation and receives most of its hydrology from the streams as well as from groundwater. WC W 01 may be migrating north in this area, with this portion of the wetland forming as a result. The wetland abuts both WC W 01 and WC W 07.

Under MDWAM, the PSS portion of WET W 06 located between WC W 01 and WC W 07 was evaluated as WAA-08, which is considered an Active Floodplain Wetland. It received a score of 80.1. The remainder of WET W 06 was evaluated as WAA-09 and is considered a Toe Slope Wetland. It received a score of 81.4.

#### WET W 06 PFO

Within the PFO sample plot, the dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included persimmon (*Diospyros virginiana*, FAC). Dominant species in the sapling/shrub stratum included sweetgum, black gum (*Nyssa sylvatica*, FAC), and American sycamore (*Platanus occidentalis*, FACW). In the herbaceous stratum, wood reed grass and false nettle were dominant.

Primary hydrologic indicators observed included oxidized rhizospheres on living roots. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

#### WET W 06 PSS

Within the PSS sample plot, the dominance test for hydrophytic vegetation was met. Dominant species in the sapling/shrub stratum included black willow. In the herbaceous stratum, false nettle, wood reed grass, Japanese stiltgrass, clearweed (*Pilea fontana*, FACW), and water speedwell (*Veronica anagallis-aquatica*, OBL) were dominant.

Primary hydrologic indicators observed included surface water, high water table, saturation, sediment deposits, drift deposits, iron deposits, and oxidized rhizospheres on living roots. Secondary hydrologic indicators included drainage patterns, geomorphic position, and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

WET W 06 PEM

Within the PEM sample plot, the dominance test for hydrophytic vegetation was met. Dominant plant species in the herbaceous stratum included wood reed grass, Japanese stiltgrass, and false nettle.

Primary hydrologic indicators observed included oxidized rhizospheres on living roots. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

### Wetland W 07 (WET W 07)

WET W 07 is a palustrine emergent (PEM) wetland and is approximately 0.07 acres in size. It is located between WC W 08 and WC W 01 (**Appendix E.10.1, Map 3**). While small portions of WET W 07 are located at lower elevations and are well-connected to WC W 01, receiving hydrology from that stream, the majority of the wetland is located on a higher terrace and is less-well connected to the stream. The wetland is also likely fed by groundwater.

The dominance test for hydrophytic vegetation was met. Dominant species in the sapling/shrub stratum included Siberian elm (*Ulmus pumila*, FACU). In the herbaceous stratum, Japanese stiltgrass, false nettle, and wood reed grass were dominant.

Primary hydrologic indicators observed included oxidized rhizospheres on living roots. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

Under MDWAM, WET W 07 was evaluated as WAA-10, which is considered a Toe Slope Wetland. It received a score of 72.4.

### Wetland W 09 (WET W 09)

WET W 09 is a palustrine emergent (PEM) wetland and is approximately 0.34 acres in size. It is a toe of slope groundwater seep located in the floodplain of WC W 01 and abuts that stream (**Appendix E.10.1, Map 3**). Despite abnormally dry conditions, the wetland remained extremely saturated.

The dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included American sycamore. Dominant species in the sapling/shrub stratum included black willow. In the herbaceous stratum, rice cutgrass (Leersia oryzoides, OBL), false nettle, and Japanese stiltgrass were dominant.

Primary hydrologic indicators observed included saturation. Secondary hydrologic indicators included crayfish burrows, geomorphic position, and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

Under MDWAM, WET W 09 was evaluated as WAA-12, which is considered a Toe Slope Wetland. It received a score of 79.4.

### Wetland W 10 (WET W 10)

WET W 10 is a palustrine emergent (PEM) wetland and is approximately 0.08 acres in size. It is consists of a backslope seep that discharges into an oxbow wetland located within the floodplain of WC W 01; it abuts that stream (**Appendix E.10.1, Map 3**). The oxbow receives hydrology from groundwater as well as discharge from WC W 01, while the backslope seep is fed by discharging groundwater.

Under MDWAM, the oxbow part of WET W 10 was evaluated as WAA-13, which is considered a Riverine Floodplain Feature Wetland. It received a score of 74.3. The seep part of the wetland was evaluated as WAA-14, which is considered a Backslope Wetland. It received a score of 86.2.

#### WET W 10 Oxbow

The dominance test for hydrophytic vegetation was met. In the herbaceous stratum, marsh dewflower (*Murdannia keisak*, OBL) and whitegrass were dominant.

Primary hydrologic indicators observed included surface water, high water table, saturation, sediment deposits, and drift deposits. Secondary hydrologic indicators included crayfish burrows, geomorphic position, and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

#### WET W 10 Seep

The dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included river birch. Dominant species in the sapling/shrub stratum included highbush blueberry (*Vaccinium corymbosum*, FACW), sweetgum, and American holly (Ilex opaca, FAC). In the herbaceous stratum, lizardtail (*Saururus cernuus*, OBL) and whitegrass were dominant.

Primary hydrologic indicators observed included high water table, saturation, and water-stained leaves. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. While the soil profile within the representative sample plot did not meet any hydric soil indicators, it is believed to be naturally problematic due to constant saturation. Hydric soils were presumed based on the strength of the hydrology and hydrophytic plants observed. Additionally, the depleted matrix (F3) was observed at the wetland margin.

### Wetland W 11 (WET W 11)

WET W 11 is a palustrine emergent (PEM) wetland and is approximately 0.02 acres in size. It is a toe of slope wetland in the floodplain of WC W 01 and likely receives hydrology from that stream via WET W 10's oxbow, which WET W 11 abuts (**Appendix E.10.1, Map 3**). WET W 11 appears to primarily receive hydrology from groundwater.

The dominance test for hydrophytic vegetation was met. In the herbaceous stratum, Japanese stiltgrass, false nettle, and wood reed grass were dominant.

No primary hydrologic indicators were observed. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

Under MDWAM, WET W 11 was evaluated as WAA-15, which is considered a Toe Slope Wetland. It received a score of 70.2.

### Wetland W 12 (WET W 12)

WET W 12 is a palustrine emergent (PEM) wetland and is approximately 0.03 acres in size. It is located in the Mill Swamp floodplain at the toe of slope, adjacent to WC W 09 (**Appendix E.10.1, Map 3**). WET W 12 appears to receive hydrology from seeping groundwater. The wetland was delineated as two polygons, WET W 12 and WET W 12B, due to the lack of surface connection between the two areas.

The dominance test for hydrophytic vegetation was met. Dominant plant species in the tree stratum included river birch. Dominant species in the sapling/shrub stratum included sweetgum. In the herbaceous stratum, an unidentified sedge and lizardtail were dominant.

Primary hydrologic indicators observed included high water table and saturation. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. While the soil profile within the representative sample plot did not meet any hydric soil indicators, it is believed to be naturally problematic due to constant saturation. Hydric soils were presumed based on the strength of the hydrology and hydrophytic plants observed. Additionally, the depleted matrix (F3) was observed at the wetland margin.

Under MDWAM, WET W 12 was evaluated as WAA-16, which is considered a Toe Slope Wetland. It received a score of 79.1.

### Wetland W 13 (WET W 13)

WET W 13 is a palustrine emergent (PEM) wetland and is approximately 0.03 acres in size. It is located in the Mill Swamp floodplain north of WC W 01 (**Appendix E.10.1, Map 1**). It consists of two small, linear floodplain features, one of which (WET W 13B) directly abuts the stream. WET W 13 receives hydrology from flooding and groundwater.

The dominance test for hydrophytic vegetation was met. In the herbaceous stratum, Japanese stiltgrass was dominant.

Primary hydrologic indicators observed included high water table and saturation. Secondary hydrologic indicators included drainage patterns and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

Under MDWAM, WET W 13 was evaluated as WAA-17, which is considered a Riverine Floodplain Feature Wetland. It received a score of 73.7.

### Wetland W 14 (WET W 14)

WET W 14 is a palustrine emergent (PEM) wetland and is approximately 0.03 acres in size. It consists of a series of small floodplain feature wetland pockets abutting WC W 01 and/or WC W 08 (**Appendix E.10.1, Map 3**). WET W 14 appears to receive hydrology from groundwater and floodflow from WC W 01 and WC W 08.

The dominance test for hydrophytic vegetation was met. In the herbaceous stratum, Japanese stiltgrass was dominant.

Primary hydrologic indicators observed included high water table, saturation, sediment deposits, and drift deposits. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) indicator.

Under MDWAM, WET W 14 was evaluated as WAA-18, which is considered a Riverine Floodplain Feature Wetland. It received a score of 71.2.

### Wetland W 15 (WET W 15)

WET W 15 is a palustrine emergent (PEM) wetland and is approximately 0.002 acres in size. It is located in a small, closed depression located at the toe of slope within the Mill Swamp floodplain (**Appendix E.10.1, Map 3**). WET W 15 lacks surface connection to downstream waters and receives hydrology from groundwater and occasional floodflow from WC W 08.

The dominance test for hydrophytic vegetation was met. Dominant species in the sapling/shrub stratum included roundleaf greenbrier and sweetgum. In the herbaceous stratum, Japanese stiltgrass, an unidentified sedge (*Carex* sp.), and Japanese honeysuckle (*Lonicera japonica*, FACU) were dominant.

Primary hydrologic indicators observed included surface water, high water table, saturation, sediment deposits, and oxidized rhizospheres on living roots. Secondary hydrologic indicators included sparsely vegetated concave surface and geomorphic position. The soil profile met the depleted matrix (F3) indicator.

Under MDWAM, WET W 15 was evaluated as WAA-19, which is considered a Depression Wetland. It received a score of 65.1.

### Wetland W 16 (WET W 16)

WET W 16 is a palustrine emergent (PEM) wetland and is approximately 0.08 acres in size. It is a backslope groundwater seep located at the edge of the Mill Swamp floodplain, abutting and providing discharge to WC W 01 and WC W 02 (**Appendix E.10.1, Map 1**). A spring house is located within the wetland.

The dominance test for hydrophytic vegetation was met. Dominant species in the sapling/shrub stratum included American holly and multiflora rose. In the herbaceous stratum, fox sedge, an unidentified sedge (*Carex* sp.) and an unidentified grass were dominant.

Primary hydrologic indicators observed included surface water, high water table, saturation, sediment deposits, and iron deposits. Secondary hydrologic indicators included drainage patterns, crayfish burrows, geomorphic position, and the FAC-neutral test. While the soil profile did not meet any hydric soil indicators, it is believed to be naturally problematic due to constant saturation. Hydric soils were presumed based on the strength of the hydrology and hydrophytic plants observed.

Under MDWAM, WET W 16 was evaluated as WAA-20, which is considered a Backslope Wetland. It received a score of 80.8.

### Wetland W 17 (WET W 17)

WET W 17 is a palustrine emergent (PEM) wetland and is approximately 0.002 acres in size. It is a depression wetland excavated in uplands outside of the floodplain **(Appendix E.10.1, Map 4)**. WET W 17 lacks surface connection to downstream or upstream waters and receives hydrology from precipitation and groundwater. The wetland formed due to ground disturbance associated with logging as indicated on aerial imagery dated April 10, 2021 (Google Earth, 2025). This conclusion is also supported by ruts observed at the time of delineation. Despite this relatively recent ground disturbance, vegetation is well-established. The wetland likely did not exist prior to anthropogenic disturbance.

The dominance test for hydrophytic vegetation was met. In the herbaceous stratum, broomsedge bluestem (*Andropogon virginicus*, FAC) was dominant.

Primary hydrologic indicators observed included surface water, high water table, saturation, and oxidized rhizospheres on living roots. Secondary hydrologic indicators included geomorphic position and the FAC-neutral test. The soil profile met the depleted matrix (F3) and redox depressions (F8) indicators.

Under MDWAM, WET W 17 was evaluated as WAA-21, which is considered a Depression Wetland. It received a score of 72.9.

## Watercourses

### Watercourse W 01 (WC W 01 – Mill Swamp)

WC W 01 (Mill Swamp) is a perennial stream that flows east to west through the northern Study Area (**Appendix E.10.1, Maps 1-3**). The stream is a tributary to Pomonkey Creek, which is a tributary to the Potomac River (a TNW). The stream channel is approximately 5 to 20 feet wide with banks between 2 and 4 feet high; at the time of the delineation, flow within the channel varied between 6 and 24 inches deep. The substrate consists of cobble, gravel, sand, and silt.

### Watercourse W 02 (WC W 02)

WC W 02 is a spring-fed intermittent stream adjacent to WET W 16 (**Appendix E.10.1, Map 1**). The stream flows to the south, discharging into WC W 01. The stream channel is approximately 3 to 6 feet wide with banks 6 inches high; at the time of the delineation, flow within the channel varied between 1 and 4 inches deep. The substrate consists of sand, silt, and muck.

### Watercourse W 03 (WC W 03)

WC W 03 was delineated in two segments: WC W 03A flows north along the western edge of the northern Study Area (**Appendix E.10.1, Map 2**), while WC W 03B is further upstream and flows through the center of the southern Study Area (**Appendix E.10.1, Maps 4-5**). WC W 03B was initially flagged as WC W 04. The stream flows into Mill Swamp (WC W 01). WC W 03A's stream channel is approximately 8 to 12 feet wide with banks between 6 and 8 feet high; at the time of the delineation, flow within the channel was 4 inches deep. The substrate consists of cobble, sand, gravel, and silt. WC W 03B's stream channel is approximately 18 feet wide with banks between 1 and 5 feet high; at the time of the delineation, flow within the channel was between 1 and 2 inches deep. The substrate consists of cobble, sand, gravel, and silt.

### Watercourse W 05 (WC W 05)

WC W 05 is an ephemeral stream located in the eastern edge of the southern Study Area, immediately west of Marshall Hall Road (**Appendix E.10.1, Map 5**). The stream flows to the south and discharges into WC W 03B. The stream channel is approximately 2 to 3 feet wide with banks 1 foot high; at the time of the delineation, flow within the channel varied between 0 and 1 inch deep. The substrate consists of sand, silt, and vegetation. It should be noted that ephemeral streams are no longer jurisdictional to USACE and are not regulated by MDE.

### Watercourse W 06 (WC W 06)

WC W 06 is an intermittent stream located in the central portion of the northern Study Area (**Appendix E.10.1, Map 1**). The stream flows southeast into WC W 01. The stream channel is approximately 2 to 4 feet wide with banks between 2 to 3 feet high; at the time of the delineation, flow within the channel varied between 2 and 4 inches deep. The substrate consists of sand, silt, and muck.

### Watercourse W 07 (WC W 07)

WC W 07 is a perennial stream located in the central portion of the northern Study Area, abutting and fed by discharge from WET W 06 (**Appendix E.10.1, Map 3**). The stream flows southwest into WC W 01. The stream channel is approximately 2 feet wide with banks approximately 2 feet high; at the time of the delineation, flow within the channel was 6 inches deep. The substrate consists of silt and muck.

### Watercourse W 08 (WC W 08)

WC W 08 is a perennial stream located in the northeastern portion of the northern Study Area, formed where Mill Swamp splits (**Appendix E.10.1, Map 3**). It is unclear whether WC W 08 is in the process of becoming Mill Swamp's new channel, or if it's an old channel in the process of being abandoned. The stream flows west into WC W 01. The stream channel is approximately 3 to 9 feet wide with banks between 1 and 3 feet high; at the time of the delineation, flow within the channel varied between 0 and 2 inches deep. This lack of depth was due to the abnormally dry conditions experienced in November 2025. The substrate consists of gravel, sand, silt, muck, and vegetation.

### Watercourse W 09 (WC W 09)

WC W 09 is an intermittent stream located at the northeastern edge of the northern Study Area (**Appendix E.10.1, Map 3**). It appears to be an overflow channel for Mill Swamp during periods of high flow, as well as conveying groundwater discharge. The stream flows west into WC W 01. The stream channel is approximately 3 to 6 feet wide with banks between 1 and 2 feet high; at the time of the delineation, flow within the channel was absent. The substrate consists of sand, silt, and vegetation.

### Watercourse W 12 (WC W 12)

WC W 12 is an intermittent stream located at the southern edge of the southern Study Area (**Appendix E.10.1, Map 5**). It forms from the drainage patterns within WET W 05 and conveys discharge from that wetland; it may have been channelized in a past attempt to drain the wetland. The stream flows southwest toward WC W 03B and flows into that stream outside of the Study Area. The stream channel is approximately 4 to 6.5 feet wide with banks between 6 to 24 inches high; at the time of the delineation, flow within the channel varied between 2 and 6 inches deep. The substrate consists of sand, silt, and muck.

### Watercourse W 13 (WC W 13)

WC W 13 is an intermittent stream located at the southern edge of the southern Study Area (**Appendix E.10.1, Map 5**). It enters the Study Area from beyond a fence and flows northwest into WC W 12. The stream channel is approximately 2 to 3 feet wide with banks between 6 and 12 inches high; at the time of the delineation, flow within the channel varied between 2 and 6 inches deep. The substrate consists of sand and silt.

### Watercourse W 14 (WC W 14)

WC W 14 is an intermittent stream located in the northeastern portion of the northern Study Area, conveying overflow between WC W 01 and WC W 08 (**Appendix E.10.1, Map 3**). During an abnormally dry period, it was initially delineated as an active floodplain wetland (WET W 08); however, under more normal conditions, it appears to more accurately be classified as an intermittent stream. The stream flows south into WC W 01.

The stream channel is approximately 3 to 5 feet wide with banks approximately 18 inches high; at the time of the delineation, flow within the channel was 2 inches deep. The substrate consists of sand, silt, and muck.

## 4.0 CONCLUSIONS

JMT conducted a review of published information and performed field investigations based on the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* to identify potentially regulated wetlands and waterways within the Study Area. Based on the results of the investigation, JMT identified 16 non-tidal wetlands and 11 waterways within the Study Area. **Table 2** below summarizes the delineated resources.

Environmental resources identified in this report may be subject to verification and regulation by USACE and MDE. Impacts to these resources may require authorization by USACE and MDE as well as mitigation.

### Table 2: Summary of Delineated Resources

| Wetland Name | Cowardin Classification | MDWAM Classification and Score |
|---|---|---|
| WET W 01 | PEM | WAA-01, Backslope Wetland, 65.0 |
| WET W 02 (incl. WET W 02A) | PFO and PEM | WAA-02, Backslope Wetland, 63.8 |
| WET W 03 (incl. WET W 03A) | PFO, PEM, PSS | WAA-03, PEM/PSS Toe Slope Wetland, 66.4<br>WAA-04, PFO Toe Slope Wetland, 75.0 |
| WET W 04 | PEM | Not Completed |
| WET W 05 | PFO and PEM | WAA-06, PEM Toe Slope Wetland, 60.8<br>WAA-07, PFO Toe Slope Wetland, 84.0 |
| WET W 06 | PFO, PEM, PSS | WAA-08, Active Floodplain Wetland, 80.1<br>WAA-09, Toe Slope Wetland, 81.4 |
| WET W 07 | PEM | WAA-10, Toe Slope Wetland, 72.4 |
| WET W 09 | PEM | WAA-12, Toe Slope Wetland, 79.4 |
| WET W 10 | PEM | WAA-13, Floodplain Feature Wetland, 74.3<br>WAA-14, Backslope Wetland, 86.2 |
| WET W 11 | PEM | WAA-15, Toe Slope Wetland, 70.2 |
| WET W 12 (incl. WET W 12B) | PEM | WAA-16, Toe Slope Wetland, 79.1 |
| WET W 13 (incl. WET W 13B) | PEM | WAA-17, Floodplain Feature Wetland, 73.7 |
| WET W 14 (incl. WET W 14A, WET W 14B, WET W 14C) | PEM | WAA-18, Floodplain Feature Wetland, 71.2 |
| WET W 15 | PEM | WAA-19, Depression Wetland, 65.1 |
| WET W 16 | PEM | WAA-20, Backslope Wetland, 80.8 |
| WET W 17 | PEM | WAA-21, Depression Wetland, 72.9 |
| **Waterway Name** | **Stream Classification** | **MDWAM Classification and Score** |
| WC W 01 | Perennial | NA |
| WC W 02 | Intermittent | NA |
| WC W 03A and WC W 03B | Perennial | NA |
| WC W 05 | Ephemeral | NA |
| WC W 06 | Intermittent | NA |
| WC W 07 | Perennial | NA |
| WC W 08 | Perennial | NA |
| WC W 09 | Intermittent | NA |
| WC W 12 | Intermittent | NA |
| WC W 13 | Intermittent | NA |
| WC W 14 | Intermittent | NA |

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# APPENDIX E.10.1

# DELINEATED RESOURCE MAPS

**Legend**

- ▭ Study Area
- ▭ 100-Year Floodplain
- ▨ Regulatory Floodway
- — 25' Wetland Buffer

Del. Streams
- — Intermittent
- — Perennial
- — Ephemeral

Del. Wetlands
- 🟦 PEM
- 🟩 PFO
- 🟧 PSS

- ⊙ Upland Data Point
- ◉ Wetland Data Point

JMT

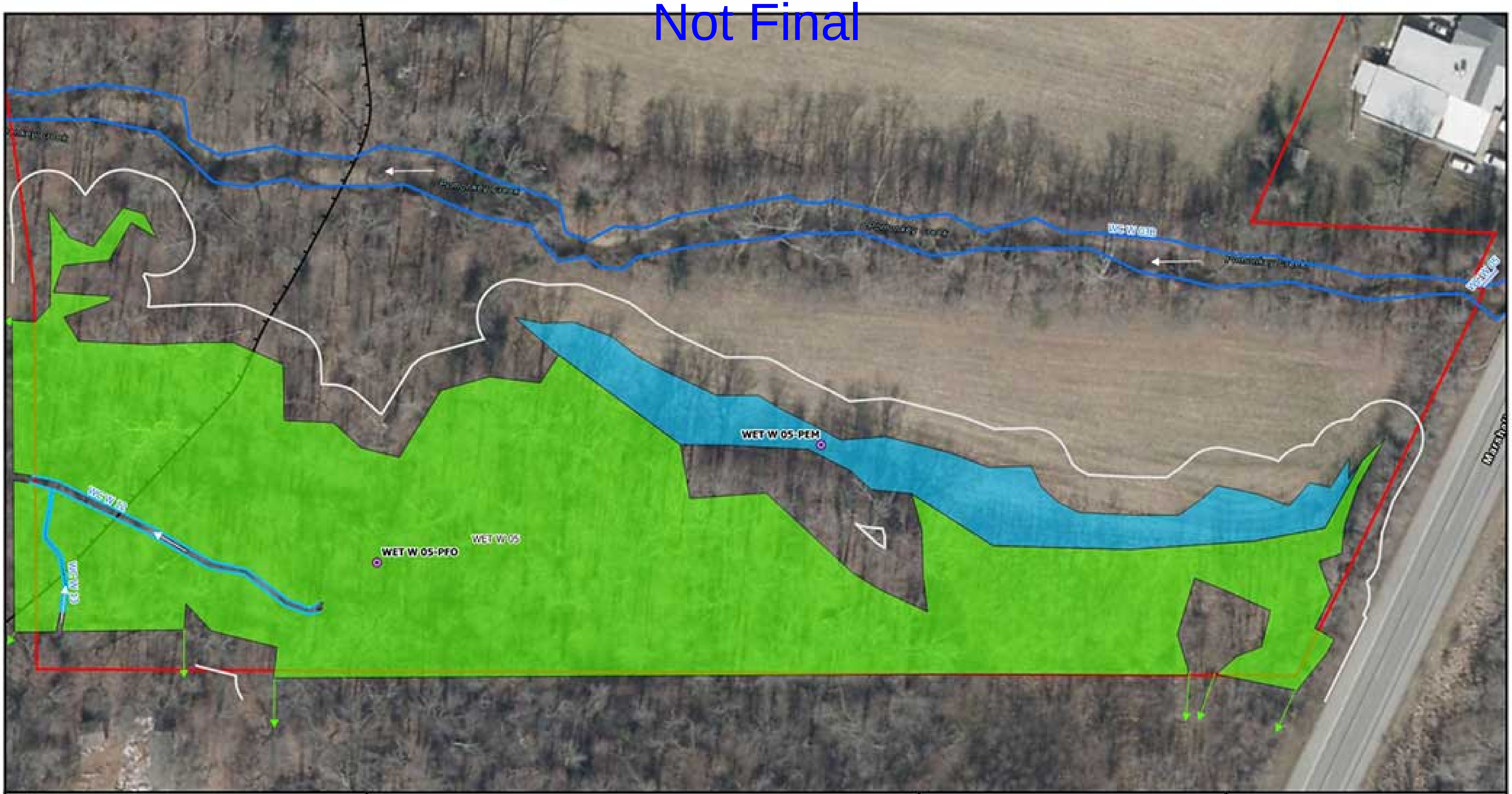
CREATED BY: ERM
SOURCE: MD IMAP, ESRI

0 30 60 120 Feet
1" = 60'

# DELINEATED RESOURCE MAP 4

## MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



**Legend**

- 🟥 Study Area
- ▭ 100-Year Floodplain
- ▨ Regulatory Floodway
- — 25' Wetland Buffer

Del. Streams

- — Intermittent
- — Perennial
- — Ephemeral

Del. Wetlands

- 🟦 PEM
- 🟩 PFO
- 🟨 PSS

- ⊙ Upland Data Point
- ● Wetland Data Point

JMT

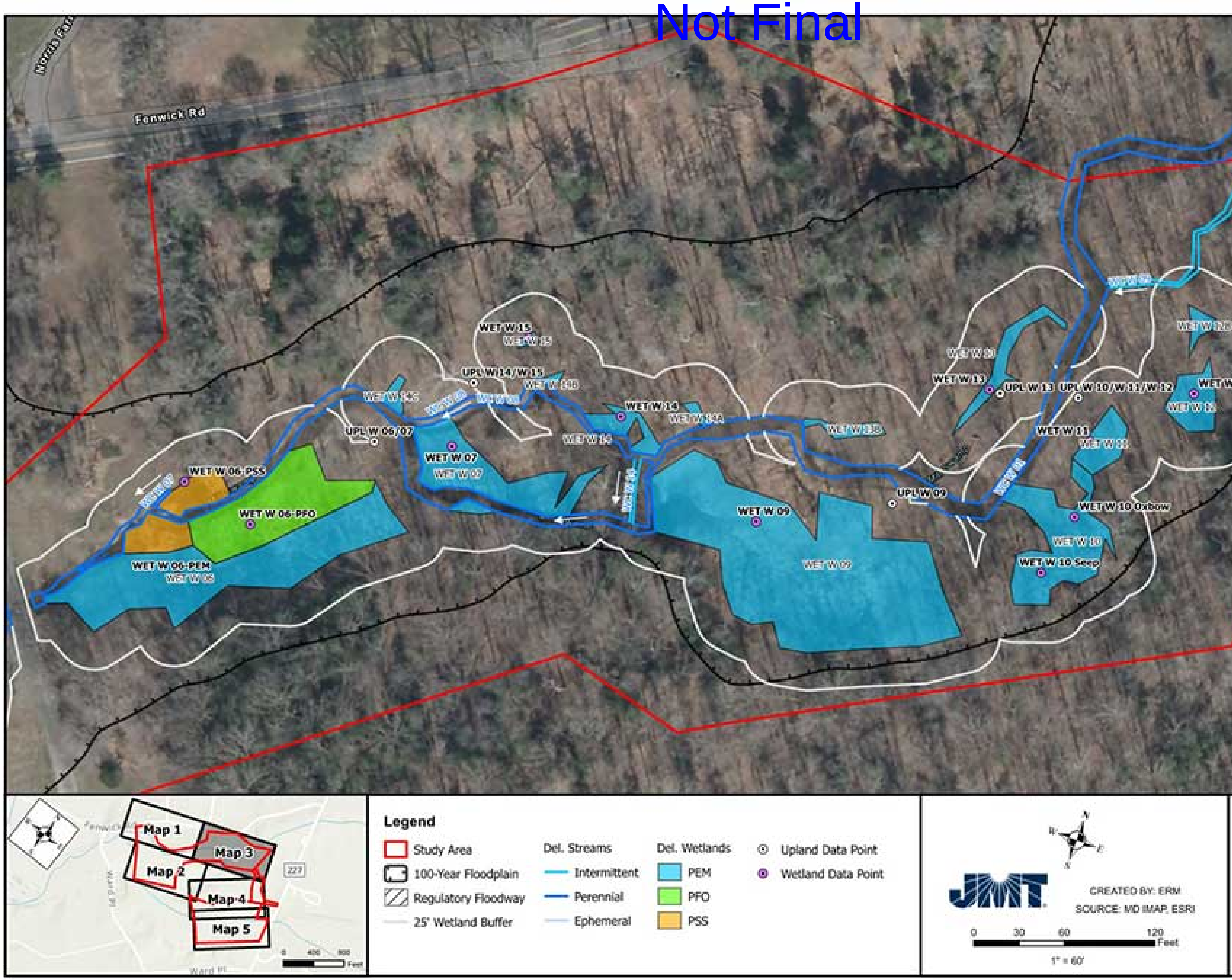
CREATED BY: ERM
SOURCE: MD IMAP, ESRI

0 30 60 120 Feet
1" = 60'

# DELINEATED RESOURCE MAP 5

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



CREATED BY: ERM
SOURCE: MD IMAP, ESRI

# DELINEATED RESOURCE MAP 3

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025

**Legend**

🟥 Study Area
▭ 100-Year Floodplain
▨ Regulatory Floodway
— 25' Wetland Buffer

Del. Streams
— Intermittent
— Perennial
— Ephemeral

Del. Wetlands
🟦 PEM
🟩 PFO
🟧 PSS

⊙ Upland Data Point
● Wetland Data Point

JMT

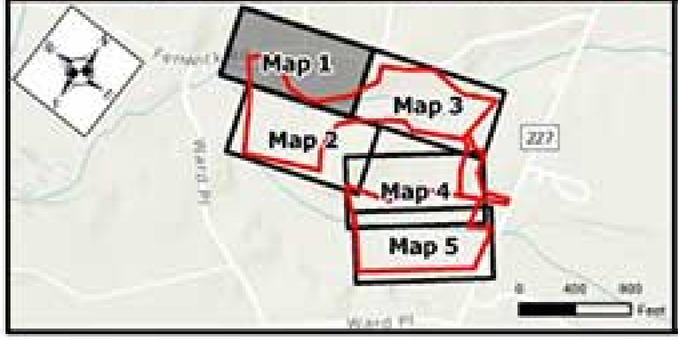
CREATED BY: ERM
SOURCE: MD IMAP, ESRI

0 30 60 120 Feet
1" = 60'

# DELINEATED RESOURCE MAP 2

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



**Legend**

🟥 Study Area

100-Year Floodplain

▨ Regulatory Floodway

25' Wetland Buffer

Del. Streams

Intermittent

Perennial

Ephemeral

Del. Wetlands

🟦 PEM

🟩 PFO

🟨 PSS

⊙ Upland Data Point

● Wetland Data Point

JMT

CREATED BY: ERM

SOURCE: MD IMAP, ESRI

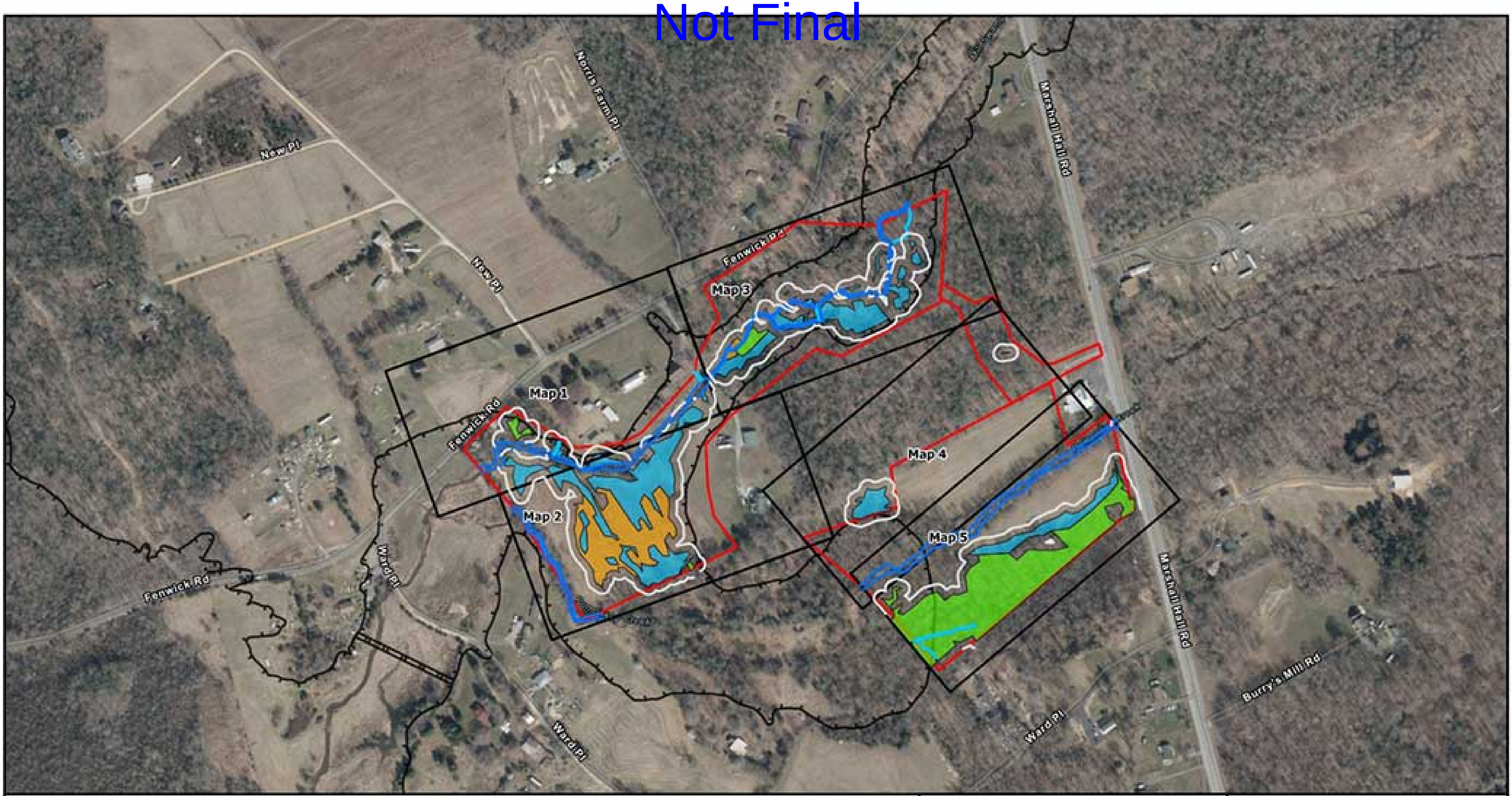
0 30 60 120 Feet

1" = 60'

# DELINEATED RESOURCE MAP 1

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



**Legend**

🟥 Study Area
▭ 100-Year Floodplain
▨ Regulatory Floodway
— 25' Wetland Buffer

Del. Streams
— Intermittent
— Perennial
— Ephemeral

Del. Wetlands
🟦 PEM
🟩 PFO
🟧 PSS

N
W E
S

JMT

CREATED BY: ERM
SOURCE: MD IMAP, ESRI

0 155 310 620 Feet
1" = 300'

## DELINEATED RESOURCE KEY MAP

## MILL SWAMP MITIGATION BANK

DATE: JUNE 2025

# APPENDIX E.10.2

# WETLAND, UPLAND, AND STREAM DATASHEETS

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-04-04
Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 01/W 02/W 16
Investigator(s): MM EM Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR or MLRA): S 149A Lat: 38.6548034 Long: -77.0843809 Datum: NAD 83
Soil Map Unit Name: PcB - Piccowaxen loam, 2 to 5 percent slopes NWI classification: UPL
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ______ | **Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓ |
| Hydric Soil Present? | Yes ______ | No ✓ | |
| Wetland Hydrology Present? | Yes ______ | No ✓ | |

Remarks:

At the time of delineation, the weather had been abnormally dry, per the US Drought Monitor.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

**Wetland Hydrology Present? Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 01/W 02/W 16

| Tree Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Acer rubrum | 20 | ✓ | FAC |
| 2. Betula nigra | 10 | ✓ | FACW |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 30 | = Total Cover | |

50% of total cover: 15.00 20% of total cover: 6.00

| Sapling/Shrub Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. Ilex opaca | 5 | ✓ | FAC |
| 2. Rosa multiflora | 2 | ✓ | FACU |
| 3. Smilax rotundifolia | 2 | ✓ | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 9 | = Total Cover | |

50% of total cover: 4.50 20% of total cover: 1.80

| Herb Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. Lonicera japonica | 25 | ✓ | FACU |
| 2. Claytonia virginica | 10 | ✓ | FACU |
| 3. Microstegium vimineum | 10 | ✓ | FAC |
| 4. Allium schoenoprasum | 5 | | FACU |
| 5. Carex sp | 5 | | |
| 6. Elymus virginicus | 5 | | FAC |
| 7. Stellaria media | 5 | | FACU |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 65 | = Total Cover | |

50% of total cover: 32.50 20% of total cover: 13.00

| Woody Vine Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 62.50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 10 | x 2 = | 20 |
| FAC species | 42 | x 3 = | 126 |
| FACU species | 47 | x 4 = | 188 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 99 (A) | | 334 (B) |

Prevalence Index = B/A = 3.37

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☐ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: UPL W 01/W 02/W 16

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 4 | 10YR 4/2 | 100 |  |  |  |  | Sandy Clay Loam |  |
| 4 - 12 | 10YR 5/3 | 95 | 10YR 5/6 | 5 | C | M | Sandy Clay Loam |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______________________

Depth (inches): ______________________

**Hydric Soil Present?** **Yes** ______ **No** ✓

Remarks:

# WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-05-26

Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 03

Investigator(s): MM EM Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR or MLRA): S 149A Lat: 38.6542235 Long: -77.0836533 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ______ No ✓

Wetland Hydrology Present? Yes ______ No ✓

**Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓

Remarks:

Man-altered former agricultural field adjacent to large wetland. Historic placement of fill in upland areas likely.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present?** **Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall occurred in May 2022.

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 03

| Tree Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Liquidambar styraciflua | 70 | ✓ | FAC |
| 2. Diospyros virginiana | 10 | | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 80 | = Total Cover | |

50% of total cover: 40.00 20% of total cover: 16.00

| Herb Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Lonicera japonica | 20 | ✓ | FACU |
| 2. Solidago gigantea | 20 | ✓ | FACW |
| 3. Apocynum cannabinum | 15 | ✓ | FACU |
| 4. Carex scoparia | 15 | ✓ | FACW |
| 5. Liquidambar styraciflua | 10 | | FAC |
| 6. Microstegium vimineum | 10 | | FAC |
| 7. Rubus allegheniensis | 10 | | UPL |
| 8. Potentilla simplex | 5 | | FACU |
| 9. Dichanthelium clandestinum | 2 | | FACW |
| 10. Galium palustre | 2 | | OBL |
| 11. Persicaria sagittata | 2 | | OBL |
| 12. | | | |
| | 111 | = Total Cover | |

50% of total cover: 55.50 20% of total cover: 22.20

| Woody Vine Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | 4 | x 1 = 4 |
| FACW species | 37 | x 2 = 74 |
| FAC species | 100 | x 3 = 300 |
| FACU species | 40 | x 4 = 160 |
| UPL species | 10 | x 5 = 50 |
| Column Totals: | 191 (A) | 588 (B) |

Prevalence Index = B/A = 3.07

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

Not Final

## SOIL

Sampling Point: UPL W 03

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 2 | 10YR 5/3 | 100 | | | | | Silty Clay Loam | |
| 2 - 6 | 10YR 6/3 | 95 | 10YR 6/6 | 5 | C | M | Silty Clay Loam | |
| 6 - 12 | 10YR 6/4 | 60 | 10YR 6/6 | 10 | C | M | Silty Clay Loam | 10Yr 5/8 30% second matrix color |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ____________

Depth (inches): ____________

**Hydric Soil Present? Yes** ______ **No** ✓

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-05-26

Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 04/W 05

Investigator(s): MM EM Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR or MLRA): S 149A Lat: 38.6541717 Long: -77.0805151 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ______ |
| Hydric Soil Present? | Yes ______ | No ✓ |
| Wetland Hydrology Present? | Yes ✓ | No ______ |

**Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓

Remarks:

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ______ | No ✓ | Depth (inches): ______ |
| Water Table Present? | Yes ______ | No ✓ | Depth (inches): ______ |
| Saturation Present?<br>(includes capillary fringe) | Yes ______ | No ✓ | Depth (inches): ______ |

**Wetland Hydrology Present?** **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall in the previous month.

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 04/W 05

| Tree Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | ______ = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | ______ = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Herb Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. Agrostis gigantea | 25 | ✓ | FACW |
| 2. Apocynum cannabinum | 10 | ✓ | FACU |
| 3. Boehmeria cylindrica | 10 | ✓ | FACW |
| 4. Dactylis glomerata | 10 | ✓ | FACU |
| 5. Juncus tenuis | 10 | ✓ | FAC |
| 6. Carex vulpinoidea | 5 | | FACW |
| 7. Anthoxanthum odoratum | 5 | | FACU |
| 8. Scirpus cyperinus | 5 | | OBL |
| 9. Erigeron philadelphicus | 5 | | FAC |
| 10. Onoclea sensibilis | 2 | | FACW |
| 11. Platanus occidentalis | 2 | | FACW |
| 12. | | | |
| | 89 = Total Cover | | |

50% of total cover: 44.50 20% of total cover: 17.80

| Woody Vine Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | ______ = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 5 | x 1 = | 5 |
| FACW species | 44 | x 2 = | 88 |
| FAC species | 15 | x 3 = | 45 |
| FACU species | 25 | x 4 = | 100 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 89 (A) | | 238 (B) |

Prevalence Index = B/A = 2.67

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: UPL W 04/W 05

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 4 | 10YR 6/3 | 95 | 10YR 4/1 | 5 | D | M | Sandy Loam |  |
| 4 - 12 | 10YR 6/3 | 75 | 10YR 5/3 | 25 | C | M | Silt Loam |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ______ **No** ✓

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2024-11-12
Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 06/07
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.65586422 Long: -77.08146382 Datum: WGS 84
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | | |
|---|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ____ | Is the Sampled Area within a Wetland? | Yes ____ | No ✓ |
| Hydric Soil Present? | Yes ____ | No ✓ | | | |
| Wetland Hydrology Present? | Yes ____ | No ✓ | | | |

Remarks:

Atypical conditions due to abnormally dry period/drought. See WET W 06-PFO for notes.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ____ No ✓ Depth (inches): ________
Water Table Present? Yes ____ No ✓ Depth (inches): ________
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

**Wetland Hydrology Present? Yes ____ No ✓**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 06/07

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Ulmus pumila | 40 | ✓ | FACU |
| 2. Asimina triloba | 7 | | FAC |
| 3. Liquidambar styraciflua | 3 | | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 50 = Total Cover | | |

50% of total cover: 25.00 20% of total cover: 10.00

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Microstegium vimineum | 40 | ✓ | FAC |
| 2. Cinna arundinacea | 20 | ✓ | FACW |
| 3. Carex sp. | 5 | | |
| 4. Lonicera japonica | 5 | | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 70 = Total Cover | | |

50% of total cover: 35.00 20% of total cover: 14.00

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Vitus sp. | 10 | ✓ | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 10 = Total Cover | | |

50% of total cover: 5.00 20% of total cover: 2.00

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 20 | x 2 = | 40 |
| FAC species | 50 | x 3 = | 150 |
| FACU species | 45 | x 4 = | 180 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 115 (A) | | 370 (B) |

Prevalence Index = B/A = 3.21

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☐ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: UPL W 06/07

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 4 | 10YR 5/3 | 100 | | | | | Sandy Loam | |
| 4 - 14 | 10YR 4/4 | 95 | 7.5YR 4/6 | 5 | C | M | Sandy Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ______ **No** ✓

Remarks:

# WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2024-11-12

Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 09

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR or MLRA): S 149A Lat: 38.65609328 Long: -77.08030408 Datum: WGS 84

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ______ |
| Hydric Soil Present? | Yes ______ | No ✓ |
| Wetland Hydrology Present? | Yes ______ | No ✓ |

**Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓

Remarks:

Atypical conditions due to abnormally dry period/drought.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ______ | No ✓ | Depth (inches): ____________ |
| Water Table Present? | Yes ______ | No ✓ | Depth (inches): ____________ |
| Saturation Present? (includes capillary fringe) | Yes ______ | No ✓ | Depth (inches): ____________ |

**Wetland Hydrology Present? Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 09

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 60 | ✓ | FACW |
| 2. Liquidambar styraciflua | 5 | | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

65 = Total Cover

50% of total cover: 32.50 20% of total cover: 13.00

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Liquidambar styraciflua | 5 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

5 = Total Cover

50% of total cover: 2.50 20% of total cover: 1.00

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Microstegium vimineum | 50 | ✓ | FAC |
| 2. Dichanthelium clandestinum | 15 | ✓ | FACW |
| 3. Boehmeria cylindrica | 5 | | FACW |
| 4. Carex Sp. | 5 | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |

75 = Total Cover

50% of total cover: 37.50 20% of total cover: 15.00

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

= Total Cover

50% of total cover: 20% of total cover:

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 80 | x 2 = | 160 |
| FAC species | 60 | x 3 = | 180 |
| FACU species | 0 | x 4 = | 0 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 140 (A) | | 340 (B) |

Prevalence Index = B/A = 2.42

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No**

Remarks: (If observed, list morphological adaptations below).

Not Final

**SOIL**

Sampling Point: UPL W 09

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 8 | 10YR 5/3 | 100 | | | | | Sandy Loam | |
| 8 - 12 | 10YR 5/3 | 70 | 7.5YR 5/6 | 10 | C | M | Sandy Loam | |
| 8 - 12 | 10YR 6/2 | 20 | | | | | Sandy Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ____________

Depth (inches): ____________

**Hydric Soil Present? Yes** ______ **No** ✓

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-15
Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 10 / W 11 / W 12
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 2
Subregion (LRR or MLRA): S 149A Lat: 38.65637589 Long: -77.07997328 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ______ No ✓
Wetland Hydrology Present? Yes ______ No ✓

**Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓

Remarks:

Atypical conditions due to abnormally dry period/drought.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________
Water Table Present? Yes ______ No ✓ Depth (inches): ____________
Saturation Present? Yes ______ No ✓ Depth (inches): ____________
(includes capillary fringe)

**Wetland Hydrology Present? Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 10 / W 11 / W 12

Tree Stratum (Plot size: 30 ft r)

| | | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|---|
| 1. | Betula nigra | 40 | ✓ | FACW |
| 2. | Nyssa sylvatica | 25 | ✓ | FAC |
| 3. | Acer rubrum | 10 | | FAC |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| | | 75 | = Total Cover | |

50% of total cover: 37.50 20% of total cover: 15.00

Sapling/Shrub Stratum (Plot size: 30 ft r)

| | | | | |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| | | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

Herb Stratum (Plot size: 30 ft r)

| | | | | |
|---|---|---|---|---|
| 1. | Microstegium vimineum* | 40 | ✓ | FAC |
| 2. | Claytonia virginica | 30 | ✓ | FACU |
| 3. | Boehmeria cylindrica | 20 | | FACW |
| 4. | Celastrus orbiculatus* | 5 | | FACU |
| 5. | Impatiens capensis | 5 | | FACW |
| 6. | Lonicera japonica* | 5 | | FACU |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |
| 10. | | | | |
| 11. | | | | |
| 12. | | | | |
| | | 105 | = Total Cover | |

50% of total cover: 52.50 20% of total cover: 21.00

Woody Vine Stratum (Plot size: 30 ft r)

| | | | | |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| | | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 65 | x 2 = | 130 |
| FAC species | 75 | x 3 = | 225 |
| FACU species | 40 | x 4 = | 160 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 180 (A) | | 515 (B) |

Prevalence Index = B/A = 2.86

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: UPL W 10 / W 11 / W 12

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 7 | 10YR 5/3 | 60 | 7.5YR 5/8 | 10 | C | M | Silty Clay | |
| 0 - 7 | 2.5Y 6/2 | 30 | | | | | Silty Clay | |
| 7 - 12 | 2.5Y 6/4 | 60 | 10YR 6/6 | 20 | C | M | Silty Clay | |
| 7 - 12 | 10YR 4/4 | 20 | | | | | Silty Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______________________________

Depth (inches): ______________________

**Hydric Soil Present? Yes ______ No ✓**

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-15
Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 13
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.65633237 Long: -77.08014087 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ______ No ✓

**Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓

Remarks:

Atypical conditions due to abnormally dry period/drought.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present?** **Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 13

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 60 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 60 | = Total Cover | |

50% of total cover: 30.00 20% of total cover: 12.00

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Liquidambar styraciflua | 5 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 5 | = Total Cover | |

50% of total cover: 2.50 20% of total cover: 1.00

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Microstegium vimineum* | 70 | ✓ | FAC |
| 2. Celastrus orbiculatus* | 10 | | FACU |
| 3. Claytonia virginica | 10 | | FACU |
| 4. Carex Sp. | 5 | | |
| 5. Lonicera japonica* | 5 | | FACU |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 100 | = Total Cover | |

50% of total cover: 50.00 20% of total cover: 20.00

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Celastrus orbiculatus* | 10 | ✓ | FACU |
| 2. Toxicodendron radicans | 5 | ✓ | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 15 | = Total Cover | |

50% of total cover: 7.50 20% of total cover: 3.00

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 60 | x 2 = | 120 |
| FAC species | 80 | x 3 = | 240 |
| FACU species | 35 | x 4 = | 140 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 175 (A) | | 500 (B) |

Prevalence Index = B/A = 2.85

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

Not Final

## SOIL

Sampling Point: UPL W 13

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 6 | 10YR 3/4 | 100 |  |  |  |  | Silty Clay |  |
| 6 - 12 | 10YR 5/2 | 80 | 7.5YR 4/6 | 20 | C | M | Clay |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: __________

Depth (inches): __________

**Hydric Soil Present?** **Yes** ✓ **No** ____

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-16

Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 14 / W 15

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): S 149A Lat: 38.65601674 Long: -77.0813058 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ______ | **Is the Sampled Area within a Wetland?** | **Yes ______ No ✓** |
| Hydric Soil Present? | Yes ______ | No ✓ | | |
| Wetland Hydrology Present? | Yes ✓ | No ______ | | |

Remarks:

Atypical conditions due to abnormally dry period/drought.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present? Yes ✓ No ______**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 14 / W 15

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 40 | ✓ | FACW |
| 2. Platanus occidentalis | 20 | ✓ | FACW |
| 3. Liriodendron tulipifera | 10 | | FACU |
| 4. Acer rubrum | 5 | | FAC |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 75 | = Total Cover | |

50% of total cover: 37.50 20% of total cover: 15.00

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Liquidambar styraciflua | 10 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 10 | = Total Cover | |

50% of total cover: 5.00 20% of total cover: 2.00

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Microstegium vimineum* | 50 | ✓ | FAC |
| 2. Boehmeria cylindrica | 20 | ✓ | FACW |
| 3. Lonicera japonica* | 20 | ✓ | FACU |
| 4. Carex Sp. | 5 | | |
| 5. Cinna arundinacea | 5 | | FACW |
| 6. Claytonia virginica | 5 | | FACU |
| 7. Onoclea sensibilis | 5 | | FACW |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 110 | = Total Cover | |

50% of total cover: 55.00 20% of total cover: 22.00

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Lonicera japonica* | 15 | ✓ | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 15 | = Total Cover | |

50% of total cover: 7.50 20% of total cover: 3.00

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.42 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 90 | x 2 = | 180 |
| FAC species | 65 | x 3 = | 195 |
| FACU species | 50 | x 4 = | 200 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 205 (A) | | 575 (B) |

Prevalence Index = B/A = 2.80

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☐ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

Not Final

## SOIL

Sampling Point: UPL W 14 / W 15

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 9 | 10YR 5/3 | 96 | 7.5YR 5/8 | 2 | C | M | Silty Clay | |
| 0 - 9 | | | 10YR 5/1 | 2 | D | M | Silty Clay | |
| 9 - 11 | 10YR 5/3 | 70 | 7.5YR 4/6 | 10 | C | M | Clay | |
| 9 - 11 | 10YR 4/4 | 20 | | | | | Clay | |
| 11 - 15 | 10YR 5/3 | 70 | 7.5YR 4/6 | 30 | C | M | Clay | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ____

Depth (inches): ____

**Hydric Soil Present? Yes** ____ **No** ✓

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-06-02
Applicant/Owner: JMT State: Maryland Sampling Point: UPL W 17
Investigator(s): RF, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Convex Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.65558494 Long: -77.0787696 Datum: NAD 83
Soil Map Unit Name: PcB - Piccowaxen loam, 2 to 5 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ______ No ✓

**Is the Sampled Area within a Wetland?** **Yes** ______ **No** ✓

Remarks:

Man-altered/recently logged early successional upland habitat.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present? Yes ______ No ✓**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Not Final

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: UPL W 17

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Rubus allegheniensis | 25 | ✓ | UPL |
| 2. Liquidambar styraciflua | 15 | ✓ | FAC |
| 3. Rosa multiflora | 5 | | FACU |
| 4. Platanus occidentalis | 3 | | FACW |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 48 = Total Cover | | |

50% of total cover: 24.00 20% of total cover: 9.60

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Andropogon virginicus | 30 | ✓ | FAC |
| 2. Microstegium vimineum | 25 | ✓ | FAC |
| 3. Eupatorium serotinum | 10 | | FAC |
| 4. Carex Sp. | 3 | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 68 = Total Cover | | |

50% of total cover: 34.00 20% of total cover: 13.60

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 3 | x 2 = | 6 |
| FAC species | 80 | x 3 = | 240 |
| FACU species | 5 | x 4 = | 20 |
| UPL species | 25 | x 5 = | 125 |
| Column Totals: | 113 (A) | | 391 (B) |

Prevalence Index = B/A = 3.46

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☐ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

Not Final

## SOIL

Sampling Point: UPL W 17

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 3 | 10YR 5/3 | 95 | 5YR 4/6 | 5 | C | M | Silty Clay | |
| 3 - 20 | 10YR 4/1 | 10 | 5YR 4/6 | 20 | C | M | Silty Clay | |
| 3 - 20 | 2.5Y 5/3 | 70 | | | | | Silty Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West  City/County: Bryans Road/Charles  Sampling Date: 2022-04-04
Applicant/Owner: JMT  State: Maryland  Sampling Point: WET W 01
Investigator(s): M McCormick, E Markel  Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Toeslope  Local relief (concave, convex, none): Concave  Slope (%): 2
Subregion (LRR or MLRA): S 149A  Lat: 38.654603  Long: -77.0833504  Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded  NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ____, or Hydrology ✓ significantly disturbed?  Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic?  (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ____ |
| Hydric Soil Present? | Yes ✓ | No ____ |
| Wetland Hydrology Present? | Yes ✓ | No ____ |

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ____

Remarks:

WET W 01 consists of a small seep wetland abutting WC W 01. Drains have been installed within WET 01, possibly contributing to presence of scattered drier species; this area also appears to be occasionally mowed. Large amount of saturated soils. At the time of delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☑ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☑ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☑ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ____ | No ✓ | Depth (inches): ____ |
| Water Table Present? | Yes ____ | No ✓ | Depth (inches): ____ |
| Saturation Present? (includes capillary fringe) | Yes ✓ | No ____ | Depth (inches): 0 |

**Wetland Hydrology Present?** **Yes** ✓ **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Surface water observed outside of the plot

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 01

| Tree Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Herb Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Microstegium vimineum* | 25 | ✓ | FAC |
| 2. Persicaria sagittata | 20 | ✓ | OBL |
| 3. Unknown turf grass | 18 | ✓ | |
| 4. Carex vulpinoidea | 10 | | FACW |
| 5. Boehmeria cylindrica | 5 | | FACW |
| 6. Carex lurida | 5 | | OBL |
| 7. Impatiens capensis | 5 | | FACW |
| 8. Juncus effusus | 5 | | OBL |
| 9. Thalictrum sp. | 3 | | |
| 10. Allium schoenoprasum | 2 | | FACU |
| 11. Glechoma hederacea | 2 | | FACU |
| 12. | | | |
| | 100 = Total Cover | | |

50% of total cover: 50.00 20% of total cover: 20.00

| Woody Vine Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | 30 | x 1 = 30 |
| FACW species | 20 | x 2 = 40 |
| FAC species | 25 | x 3 = 75 |
| FACU species | 4 | x 4 = 16 |
| UPL species | 0 | x 5 = 0 |
| Column Totals: | 79 (A) | 161 (B) |

Prevalence Index = B/A = 2.03

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

25% relative cover by invasive species in herb stratum.

Not Final

## SOIL

Sampling Point: WET W 01

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 4 | 10YR 3/2 | 95 | 5YR 3/4 | 5 | C | PL | Mucky Loam/Clay | |
| 4 - 8 | 10YR 4/1 | 85 | 5YR 4/3 | 15 | C | M | Sandy Clay | |
| 8 - 16 | 10YR 5/1 | 70 | 5YR 5/6 | 30 | C | M | Sandy Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☑ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

# WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-04-04
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 02
Investigator(s): MM EM Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.6548645 Long: -77.0842372 Datum: NAD 83
Soil Map Unit Name: PcB - Piccowaxen loam, 2 to 5 percent slopes NWI classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ No ______ | **Is the Sampled Area within a Wetland?** | **Yes** ✓ **No** ______ |
| Hydric Soil Present? | Yes ✓ No ______ | | |
| Wetland Hydrology Present? | Yes ✓ No ______ | | |

Remarks:

Main portion of wetland is a forested hillside seep lacking surface connection to downstream waters; it receives hydrology from groundwater and runoff. WET W 02A is a small emergent pocket located downslope that receives hydrology from the main body of the wetland. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☑ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ✓ | No ______ | Depth (inches): 0.5 |
| Water Table Present? | Yes ✓ | No ______ | Depth (inches): 4 |
| Saturation Present? (includes capillary fringe) | Yes ✓ | No ______ | Depth (inches): 0 |

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 02

| Tree Stratum (Plot size: ______ ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 15 | ✓ | FACW |
| 2. Acer rubrum | 10 | ✓ | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 25 | = Total Cover | |

50% of total cover: 12.50 20% of total cover: 5.00

| Sapling/Shrub Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

| Herb Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. Cinna arundinacea | 20 | ✓ | FACW |
| 2. Microstegium vimineum* | 15 | ✓ | FAC |
| 3. Carex sp | 10 | | |
| 4. Lonicera japonica* | 5 | | FACU |
| 5. Rosa multiflora* | 2 | | FACU |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 52 | = Total Cover | |

50% of total cover: 26.00 20% of total cover: 10.40

| Woody Vine Stratum (Plot size: ______ ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | | = Total Cover | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 35 | x 2 = | 70 |
| FAC species | 25 | x 3 = | 75 |
| FACU species | 7 | x 4 = | 28 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 67 (A) | | 173 (B) |

Prevalence Index = B/A = 2.58

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasive in tree stratum, 42% relative cover by invasives in herb stratum.

Not Final

## SOIL

Sampling Point: WET W 02

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 2 | 10Y 3/ | 100 | | | | | Mucky Loam/Clay | Gley 1 3/10Y |
| 2 - 6 | 10GY 5/ | 60 | 7.5YR 5/6 | 40 | C | M | Sandy Clay | Gley 1 5/10GY |
| 6 - 14 | 7.5YR 5/6 | 60 | N 6/ | 30 | D | M | Clay Loam | Gley 1 6/N |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☑ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☑ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______________________

Depth (inches): ______________________

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-05-19

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 03-PEM

Investigator(s): E. Markel, S. Gill Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): S 149A Lat: 38.6544185 Long: -77.0826671 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland? Yes** ✓ **No** ______

Remarks:

WET W 03 is a large seep wetland with PEM, PSS, and PFO components. It flows into WC W 01. It is located at the toe of a large but gradual slope and within the floodplain of Mill Swamp (WC W 01) and Pomonkey Creek (WC W 03), that have been moved to the very edge of their valleys. WET W 03 appears to be located within the center of WC W 03's valley and receives inundation from that stream during periods of high flow, as evidenced by drift deposits in the southern and central portions of the wetland. These drift deposits indicate northbound flow.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ____________

Water Table Present? Yes ______ No ✓ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ____________

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall occurred in May 2022

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 03-PEM

| Tree Stratum (Plot size: ______) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | ______ = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: ______) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | ______ = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Herb Stratum (Plot size: ______) | | | |
|---|---|---|---|
| 1. Juncus effusus | 25 | ✓ | OBL |
| 2. Agrostis gigantea* | 15 | ✓ | FACW |
| 3. Carex scoparia | 15 | ✓ | FACW |
| 4. Galium palustre | 15 | ✓ | OBL |
| 5. Carex lurida | 10 | | OBL |
| 6. Sisyrinchium angustifolium | 10 | | FACW |
| 7. Anthoxanthum odoratum | 5 | | FACU |
| 8. Carex vulpinoidea | 5 | | FACW |
| 9. Liquidambar styraciflua | 5 | | FAC |
| 10. Apocynum cannabinum | 2 | | FACU |
| 11. Eupatorium perfoliatum | 1 | | FACW |
| 12. | | | |
| | 108 = Total Cover | | |

50% of total cover: 54 20% of total cover: 21.6

| Woody Vine Stratum (Plot size: ______) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | ______ = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 50 | x 1 = | 50 |
| FACW species | 46 | x 2 = | 92 |
| FAC species | 5 | x 3 = | 15 |
| FACU species | 7 | x 4 = | 28 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 108 (A) | | 185 (B) |

Prevalence Index = B/A = 1.71

**Hydrophytic Vegetation Indicators:**

☑ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

13.9% relative cover invasives in the herbaceous layer; average invasives overall 13.9% (only one stratum)

## SOIL

Sampling Point: WET W 03-PEM

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 10 | 2.5Y 6/2 | 70 | 7.5YR 5/8 | 30 | C | PL / M | Sandy Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-05-26
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 03-PFO
Investigator(s): MM EM Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR or MLRA): S 149A Lat: 38.6536442 Long: -77.082343 Datum: NAD 83
Soil Map Unit Name: MnD - Marr-Dodon complex, 10 to 15 percent slopes NWI classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

Continues outside the SA to the south. PFO portion of wetland. Appears to receive flood flow from WC W 03 (Pomonkey Creek) located to the south, as evidenced by large drift deposits.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall occurred in May 2022

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 03-PFO

| Tree Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 15 | ✓ | FACW |
| 2. Liquidambar styraciflua | 10 | ✓ | FAC |
| 3. Quercus phellos | 10 | ✓ | FACW |
| 4. Quercus palustris | 7 | | FACW |
| 5. Carpinus caroliniana | 5 | | FAC |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 47 | = Total Cover | |

50% of total cover: 23.5 20% of total cover: 9.4

| Sapling/Shrub Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Carpinus caroliniana | 5 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 5 | = Total Cover | |

50% of total cover: 2.5 20% of total cover: 1

| Herb Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Elymus virginicus | 10 | ✓ | FAC |
| 2. Leersia virginica | 10 | ✓ | FACW |
| 3. Toxicodendron radicans | 10 | ✓ | FAC |
| 4. Dichanthelium clandestinum | 5 | | FACW |
| 5. Lonicera japonica* | 5 | | FACU |
| 6. Rosa multiflora* | 5 | | FACU |
| 7. Parthenocissus quinquefolia | 3 | | FACU |
| 8. Arisaema triphyllum | 2 | | FACW |
| 9. Smilax rotundifolia | 2 | | FAC |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 52 | = Total Cover | |

50% of total cover: 26 20% of total cover: 10.4

| Woody Vine Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Toxicodendron radicans | 10 | ✓ | FAC |
| 2. Smilax rotundifolia | 5 | ✓ | FAC |
| 3. Lonicera japonica* | 2 | | FACU |
| 4. Rosa multiflora* | 2 | | FACU |
| 5. | | | |
| | 19 | = Total Cover | |

50% of total cover: 9.5 20% of total cover: 3.8

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 49 | x 2 = | 98 |
| FAC species | 57 | x 3 = | 171 |
| FACU species | 17 | x 4 = | 68 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 123 (A) | | 337 (B) |

Prevalence Index = B/A = 2.74

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below).

Relative percent cover by invasives was 0% for forest, 0% for shrubs, 19% for herbs, 21% for vines - average % cover of 10%

Not Final

## SOIL

Sampling Point: WET W 03-PFO

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 6 | 10YR 5/2 | 70 | 7.5YR 5/6 | 30 | C | PL / M | Silt Loam | |
| 6 - 12 | 10YR 5/2 | 50 | 7.5YR 5/6 | 50 | C | PL / M | Silt Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: __________

Depth (inches): __________

**Hydric Soil Present?** **Yes** ✓ **No** ____

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West    City/County: Bryans Road/Charles    Sampling Date: 2022-05-26

Applicant/Owner: JMT    State: Maryland    Sampling Point: WET W 03-PSS

Investigator(s): MM EM    Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression    Local relief (concave, convex, none): Concave    Slope (%): 2

Subregion (LRR or MLRA): S 149A    Lat: 38.653898    Long: -77.0834179    Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded    NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed?    Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic?    (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ____

Remarks:

PSS portion of WET 03. This wetland was likely historically modified by farmers through placement of fill and/or ditching. The drier, higher areas are beginning succession to PFO wetland. Taller, more mature sweetgum located in center of the field (located outside of plot). More mature stand of black willow located along a ditch near the southern end of the field.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ____ No ✓ Depth (inches): ________

Water Table Present? Yes ____ No ✓ Depth (inches): ________

Saturation Present? Yes ____ No ✓ Depth (inches): ________
(includes capillary fringe)

**Wetland Hydrology Present? Yes** ✓ **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall occurred in May 2022

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 03-PSS

| Tree Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Liquidambar styraciflua | 61 | ✓ | FAC |
| 2. Betula nigra | 5 | | FACW |
| 3. Diospyros virginiana | 2 | | FAC |
| 4. Platanus occidentalis | 2 | | FACW |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 70 = Total Cover | | |

50% of total cover: 35 20% of total cover: 14

| Herb Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Juncus effusus | 20 | ✓ | OBL |
| 2. Microstegium vimineum* | 20 | ✓ | FAC |
| 3. Carex scoparia | 10 | ✓ | FACW |
| 4. Liquidambar styraciflua | 10 | ✓ | FAC |
| 5. Persicaria sagittata | 10 | ✓ | OBL |
| 6. Solidago gigantea | 10 | ✓ | FACW |
| 7. Apocynum cannabinum | 5 | | FACU |
| 8. Betula nigra | 5 | | FACW |
| 9. Rubus sp. | 5 | | UPL |
| 10. Potentilla simplex | 3 | | FACU |
| 11. Carex vulpinoidea | 2 | | FACW |
| 12. | | | |
| | 100 = Total Cover | | |

50% of total cover: 50 20% of total cover: 20

| Woody Vine Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 30 | x 1 = | 30 |
| FACW species | 34 | x 2 = | 68 |
| FAC species | 93 | x 3 = | 279 |
| FACU species | 8 | x 4 = | 32 |
| UPL species | 5 | x 5 = | 25 |
| Column Totals: | 170 (A) | | 434 (B) |

Prevalence Index = B/A = 2.55

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

Relative percent cover in shrub layer is 0, in herb layer is 20%. Average relative percent cover is 10%.

Not Final

**SOIL**

Sampling Point: WET W 03-PSS

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 4 | 10YR 6/2 | 90 | 7.5YR 5/4 | 10 | C | PL / M | Silty Clay Loam |  |
| 4 - 14 | 2.5Y 6/2 | 80 | 7.5YR 5/6 | 20 | C | PL / M | Silty Clay Loam |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-05-26

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 04

Investigator(s): MM EM Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR or MLRA): S 149A Lat: 38.6542388 Long: -77.0802219 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland? Yes ✓ No ______**

Remarks:

Depression located in field at the toe of several slopes, including a slope containing a homemade dirt bike track. Wetland appears to have historically been filled and compacted. Exposed dirt area to the west provides sediment influx. The wetland is fed by upland runoff, likely groundwater seeping. Lacks connectivity to downstream waters.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? Yes ______ No ✓ Depth (inches): ______
(includes capillary fringe)

**Wetland Hydrology Present? Yes ✓ No ______**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall in the previous month.

Not Final

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 04

| Tree Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |

| Sapling/Shrub Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |

| Herb Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Carex vulpinoidea | 60 | ✓ | FACW |
| 2. Scirpus atrovirens | 10 | | OBL |
| 3. Carex scoparia | 3 | | FACW |
| 4. Agrostis gigantea | 3 | | FACW |
| 5. Juncus tenuis | 3 | | FAC |
| 6. Persicaria sp. | 1 | | OBL |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 80 = Total Cover | | |
| 50% of total cover: 40 | | 20% of total cover: 16 | |

| Woody Vine Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 11 | x 1 = | 11 |
| FACW species | 66 | x 2 = | 132 |
| FAC species | 3 | x 3 = | 9 |
| FACU species | 0 | x 4 = | 0 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 80 (A) | | 152 (B) |

Prevalence Index = B/A = 1.90

**Hydrophytic Vegetation Indicators:**

☑ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below).

Not Final

## SOIL

Sampling Point: WET W 04

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0 - 6 | 2.5Y 5/2 | 95 | 7.5YR 5/6 | 5 | C | PL / M | Silt Loam | |
| 6 - 12 | 2.5Y 6/2 | 70 | 7.5YR 4/6 | 30 | C | PL / M | Sandy Loam | Concretions |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-06-01

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 05-PEM

Investigator(s): MM EM Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): S 149A Lat: 38.6539565 Long: -77.0783872 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

PEM portion of large wetland complex. This portion is located within a field and appears to have been previously ditched in an attempt to drain the wetland. Fed by upland runoff and groundwater seeps.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

C8 observed outside of the plot

Remarks:

Higher than average rainfall in the previous month.

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 05-PEM

| Tree Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: 20% of total cover:

| Sapling/Shrub Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: 20% of total cover:

| Herb Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Onoclea sensibilis | 20 | ✓ | FACW |
| 2. Carex scoparia | 15 | ✓ | FACW |
| 3. Carex vulpinoidea | 15 | ✓ | FACW |
| 4. Microstegium vimineum* | 15 | ✓ | FAC |
| 5. Agrostis capillaris | 10 | | FAC |
| 6. Juncus effusus | 10 | | OBL |
| 7. Poa annua* | 7 | | FACU |
| 8. Anthoxanthum odoratum | 5 | | FACU |
| 9. Boehmeria cylindrica | 5 | | FACW |
| 10. Carex lurida | 5 | | OBL |
| 11. Holcus lanatus* | 5 | | FACU |
| 12. Scirpus atrovirens | 2 | | OBL |
| | 114 = Total Cover | | |

50% of total cover: 57 20% of total cover: 22.8

| Woody Vine Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: 20% of total cover:

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | 17 | x 1 = 17 |
| FACW species | 55 | x 2 = 110 |
| FAC species | 25 | x 3 = 75 |
| FACU species | 17 | x 4 = 68 |
| UPL species | 0 | x 5 = 0 |
| Column Totals: | 114 (A) | 270 (B) |

Prevalence Index = B/A = 2.37

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No**

Remarks: (If observed, list morphological adaptations below).

24% relative cover by invasives in the herbaceous stratum.

Not Final

## SOIL

Sampling Point: WET W 05-PEM

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 6 | 2.5Y 5/1 | 85 | 10YR 3/6 | 15 | C | PL / M | Silty Clay Loam |  |
| 6 - 12 | 2.5Y 5/2 | 75 | 7.5YR 4/4 | 25 | C | M | Silty Clay Loam |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2022-06-01
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 05-PFO
Investigator(s): MM EM Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.6532572 Long: -77.0790116 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

Large forested wetland, possibly historically a floodplain for WC W 03 before that stream was relocated to the edge of its valley for agriculture. Fed by upland runoff and groundwater seeps. Flows into WC W 03 outside of the Study Area.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ______ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 0

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Higher than average rainfall in the previous month.

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WET W 05-PFO

| Tree Stratum (Plot size: ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Carpinus caroliniana | 15 | ✓ | FAC |
| 2. Acer rubrum | 10 | ✓ | FAC |
| 3. Liquidambar styraciflua | 10 | ✓ | FAC |
| 4. Betula nigra | 5 | | FACW |
| 5. Ilex opaca | 5 | | FAC |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 45 | = Total Cover | |

50% of total cover: 22.5 20% of total cover: 9

| Sapling/Shrub Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Lindera benzoin | 10 | ✓ | FACW |
| 2. Rubus hispidus | 5 | ✓ | FACW |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 15 | = Total Cover | |

50% of total cover: 7.5 20% of total cover: 3

| Herb Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Microstegium vimineum* | 25 | ✓ | FAC |
| 2. Boehmeria cylindrica | 15 | ✓ | FACW |
| 3. Parathelypteris noveboracensis | 15 | ✓ | FAC |
| 4. Lindera benzoin | 10 | | FACW |
| 5. Onoclea sensibilis | 10 | | FACW |
| 6. Arisaema triphyllum | 5 | | FACW |
| 7. Carex vulpinoidea | 5 | | FACW |
| 8. Cinna arundinacea | 5 | | FACW |
| 9. Impatiens capensis | 5 | | FACW |
| 10. Parthenocissus quinquefolia | 5 | | FACU |
| 11. Smilax rotundifolia | 3 | | FAC |
| 12. Leersia virginica | 2 | | FACW |
| | 105 | = Total Cover | |

50% of total cover: 52.5 20% of total cover: 21

| Woody Vine Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. Parthenocissus quinquefolia | 5 | ✓ | FACU |
| 2. Smilax rotundifolia | 5 | ✓ | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 10 | = Total Cover | |

50% of total cover: 5 20% of total cover: 2

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 90.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 77 | x 2 = | 154 |
| FAC species | 88 | x 3 = | 264 |
| FACU species | 10 | x 4 = | 40 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 175 (A) | | 458 (B) |

Prevalence Index = B/A = 2.62

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below).

24% relative cover invasives in herbaceous layer; 0% invasives in tree, shrub, and woody vine layers.

## SOIL

Sampling Point: WET W 05-PFO

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0 - 5 | 10YR 5/2 | 80 | 7.5YR 4/6 | 20 | C | PL / M | Silty Clay | |
| 12 - 6 | 2.5Y 5/2 | 85 | 7.5YR 5/4 | 15 | C | M | Silty Clay Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______________________

Depth (inches): ______________________

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West    City/County: Bryans Road/Charles    Sampling Date: 2024-11-11

Applicant/Owner: JMT    State: Maryland    Sampling Point: WET W 06-PEM

Investigator(s): EM, DP    Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toeslope    Local relief (concave, convex, none): Concave    Slope (%): 0

Subregion (LRR or MLRA): S 149A    Lat: 38.65551928    Long: -77.08181458    Datum: WGS 84

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded    NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed?    Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic?    (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ____

Remarks:

Atypical conditions due to abnormally dry period/drought. See WET W 06-PFO for notes

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ____ No ✓ Depth (inches): ________

Water Table Present? Yes ____ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

**Wetland Hydrology Present? Yes** ✓ **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WET W 06-PEM

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ________ 20% of total cover: ________

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ________ 20% of total cover: ________

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Cinna arundinacea | 40 | ✓ | FACW |
| 2. Microstegium vimineum* | 30 | ✓ | FAC |
| 3. Boehmeria cylindrica | 20 | ✓ | FACW |
| 4. Carex crinita | 5 | | FACW |
| 5. Carex vulpinoidea | 5 | | FACW |
| 6. Solidago Sp. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 100 = Total Cover | | |

50% of total cover: 50.00 20% of total cover: 20.00

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ________ 20% of total cover: ________

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 70 | x 2 = | 140 |
| FAC species | 30 | x 3 = | 90 |
| FACU species | 0 | x 4 = | 0 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 100 (A) | | 230 (B) |

Prevalence Index = B/A = 2.30

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: WET W 06-PEM

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 3 | 10YR 4/3 | 100 | | | | | | |
| 3 - 16 | 10YR 5/2 | 65 | 5YR 4/6 | 35 | C | PL / M | Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2024-11-11

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 06-PFO

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR or MLRA): S 149A Lat: 38.65565001 Long: -77.08167883 Datum: WGS 84

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____

Hydric Soil Present? Yes ✓ No ____

Wetland Hydrology Present? Yes ✓ No ____

**Is the Sampled Area within a Wetland? Yes ✓ No ____**

Remarks:

Atypical conditions due to abnormally dry period/drought. PEM and PFO portions of wetland are disconnected from stream but do abut it, and are at the toe of a slope.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ____ No ✓ Depth (inches): ________

Water Table Present? Yes ____ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

**Wetland Hydrology Present? Yes ✓ No ____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Fed primarily by groundwater and upland runoff.

## **VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 06-PFO

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Diospyros virginiana | 50 | ✓ | FAC |
| 2. Platanus occidentalis | 10 | | FACW |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

60 = Total Cover

50% of total cover: 30.00 20% of total cover: 12.00

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Liquidambar styraciflua | 10 | ✓ | FAC |
| 2. Nyssa sylvatica | 5 | ✓ | FAC |
| 3. Platanus occidentalis | 5 | ✓ | FACW |
| 4. Rubus allegheniensis | 2 | | UPL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

22 = Total Cover

50% of total cover: 11.00 20% of total cover: 4.40

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Cinna arundinacea | 30 | ✓ | FACW |
| 2. Boehmeria cylindrica | 20 | ✓ | FACW |
| 3. Microstegium vimineum* | 15 | | FAC |
| 4. Lonicera japonica* | 10 | | FACU |
| 5. Carex crinita | 5 | | FACW |
| 6. Dichanthelium clandestinum | 5 | | FACW |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |

85 = Total Cover

50% of total cover: 42.50 20% of total cover: 17.00

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

= Total Cover

50% of total cover: 20% of total cover:

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 75 | x 2 = | 150 |
| FAC species | 80 | x 3 = | 240 |
| FACU species | 10 | x 4 = | 40 |
| UPL species | 2 | x 5 = | 10 |
| Column Totals: | 167 (A) | | 440 (B) |

Prevalence Index = B/A = 2.63

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No**

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasives in tree and shrub strata. 29% relative cover by invasives in the herb stratum.

**SOIL**

Sampling Point: WET W 06-PFO

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0 - 3 | 10YR 5/3 | 100 | | | | | Silty Clay Loam | |
| 3 - 14 | 10YR 5/2 | 85 | 7.5YR 4/6 | 15 | C | PL / M | Silty Clay Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

# Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2024-11-11
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 06-PSS
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.65568251 Long: -77.08185906 Datum: WGS 84
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ______ |
| Hydric Soil Present? | Yes ✓ | No ______ |
| Wetland Hydrology Present? | Yes ✓ | No ______ |

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

Atypical conditions due to abnormally dry period/drought. PSS portion of WET W06 is well connected to WC W01 via WC W07 and direct connection, and receives hydrology from overflow of stream and groundwater. Wetland contains standing water, even during period of drought.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ✓ | No ______ | Depth (inches): 2 |
| Water Table Present? | Yes ✓ | No ______ | Depth (inches): 0 |
| Saturation Present? (includes capillary fringe) | Yes ✓ | No ______ | Depth (inches): 0 |

**Wetland Hydrology Present?** **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 06-PSS

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ____ 20% of total cover: ____

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Salix nigra | 70 | ✓ | OBL |
| 2. Liquidambar styraciflua | 2 | | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 72 = Total Cover | | |

50% of total cover: 36.00 20% of total cover: 14.40

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Boehmeria cylindrica | 15 | ✓ | FACW |
| 2. Cinna arundinacea | 15 | ✓ | FACW |
| 3. Microstegium vimineum* | 10 | ✓ | FAC |
| 4. Pilea fontana | 10 | ✓ | FACW |
| 5. Veronica anagallis-aquatica | 10 | ✓ | OBL |
| 6. Leersia oryzoides | 5 | | OBL |
| 7. Lonicera japonica* | 5 | | FACU |
| 8. Ludwigia alternifolia | 5 | | OBL |
| 9. Carex Sp. | 2 | | |
| 10. Scirpus cyperinus | 2 | | OBL |
| 11. | | | |
| 12. | | | |
| | 79 = Total Cover | | |

50% of total cover: 39.50 20% of total cover: 15.80

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ____ 20% of total cover: ____

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 92 | x 1 = | 92 |
| FACW species | 40 | x 2 = | 80 |
| FAC species | 12 | x 3 = | 36 |
| FACU species | 5 | x 4 = | 20 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 149 (A) | | 228 (B) |

Prevalence Index = B/A = 1.53

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasives in the shrub stratum. 19% relative cover by invasives in the herb stratum.

**SOIL** Sampling Point: WET W 06-PSS

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0 - 8 | 2.5Y 5/2 | 80 | 7.5YR 4/4 | 20 | C | PL / M | Sandy Clay | |
| 8 - 10 | 2.5Y 5/2 | 100 | | | | | Sandy Clay Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2024-11-12

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 07

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): S 149A Lat: 38.65590105 Long: -77.08130686 Datum: WGS 84

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

Atypical conditions due to abnormally dry period/drought. Wetland that receives hydrology from groundwater and WC W 01 and WC W 08, which are both abutted by WET W 07. Small, lower portions of wetland are well-connected to stream, while the majority is on a higher terrace and is less-connected.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☑ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturation was noted in other parts of wetland closer to the stream.

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 07

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | | = Total Cover | |

50% of total cover: ________ 20% of total cover: ________

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Ulmus pumila | 15 | ✓ | FACU |
| 2. Liquidambar styraciflua | 2 | | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 17 | = Total Cover | |

50% of total cover: 8.50 20% of total cover: 3.40

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Microstegium vimineum* | 40 | ✓ | FAC |
| 2. Boehmeria cylindrica | 30 | ✓ | FACW |
| 3. Cinna arundinacea | 20 | ✓ | FACW |
| 4. Lonicera japonica* | 10 | | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 100 | = Total Cover | |

50% of total cover: 50.00 20% of total cover: 20.00

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | | = Total Cover | |

50% of total cover: ________ 20% of total cover: ________

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 50 | x 2 = | 100 |
| FAC species | 42 | x 3 = | 126 |
| FACU species | 25 | x 4 = | 100 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 117 (A) | | 326 (B) |

Prevalence Index = B/A = 2.78

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

50% relative cover by invasives in the herb stratum.

Not Final

**SOIL**

Sampling Point: WET W 07

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0 - 5 | 10YR 5/3 | 95 | 7.5YR 4/6 | 5 | C | M | Clay | |
| 5 - 13 | 10YR 5/2 | 80 | 7.5YR 4/6 | 20 | C | PL / M | Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

# WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2024-11-12

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 09

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): S 149A Lat: 38.65588199 Long: -77.08035335 Datum: WGS 84

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ No ______ | **Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______ |
| Hydric Soil Present? | Yes ✓ No ______ | |
| Wetland Hydrology Present? | Yes ✓ No ______ | |

Remarks:

Atypical conditions due to abnormally dry period/drought. Large toe of slope seep located at the edge of Mill Swamp floodplain and feeds into WC W 01. Portions of wetland remain extremely saturated despite being within drought and majority of wetland likely displays a low variability hyrdoperiod.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☑ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☑ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 0

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observed microtopography.

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 09

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Platanus occidentalis | 10 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

10 = Total Cover

50% of total cover: 5.00 20% of total cover: 2.00

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Salix nigra | 5 | ✓ | OBL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

5 = Total Cover

50% of total cover: 2.50 20% of total cover: 1.00

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Leersia oryzoides | 25 | ✓ | OBL |
| 2. Boehmeria cylindrica | 20 | ✓ | FACW |
| 3. Microstegium vimineum* | 20 | ✓ | FAC |
| 4. Cinna arundinacea | 10 | | FACW |
| 5. Carex lurida | 5 | | OBL |
| 6. Carex vulpinoidea | 5 | | FACW |
| 7. Dichanthelium clandestinum | 5 | | FACW |
| 8. Fern sp. | 5 | | |
| 9. Saururus cernuus | 5 | | OBL |
| 10. Clematis Sp. | 5 | | |
| 11. Commelina virginica | 3 | | FACW |
| 12. Scirpus cyperinus | 2 | | OBL |

110 = Total Cover

50% of total cover: 55.00 20% of total cover: 22.00

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

_______ = Total Cover

50% of total cover: _______ 20% of total cover: _______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| | Total % Cover of: | | Multiply by: | |
|---|---|---|---|---|
| OBL species | 42 | x 1 = | 42 | |
| FACW species | 53 | x 2 = | 106 | |
| FAC species | 20 | x 3 = | 60 | |
| FACU species | 0 | x 4 = | 0 | |
| UPL species | 0 | x 5 = | 0 | |
| Column Totals: | 115 | (A) | 208 | (B) |

Prevalence Index = B/A = 1.80

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasives in the tree and shrub strata. 18% relative cover by invasive species in the herbaceous stratum.

# Not Final

## SOIL

Sampling Point: WET W 09

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 2 | 10YR 5/3 | 95 | 7.5R 4/6 | 5 | C | M | Clay | |
| 2 - 7 | 10YR 5/2 | 80 | 5YR 4/4 | 20 | C | M | Clay | |
| 7 - 14 | 10YR 4/2 | 90 | 10YR 4/6 | 10 | C | M | Sandy Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ____

Depth (inches): ____

**Hydric Soil Present?** **Yes** ✓ **No** ____

Remarks:

Additional soil sample taken to be representative for MDWAM data forms. 2nd soil profile: (0-4", 10YR 4/2 100%, clay loam) ... (4-8", 10YR 3/2 98% matrix, 10YR 4/6 2% redox concentrations in Matrix, sandy clay)... (8-11", 10YR 4/2 100% clay loam).

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Charles County Sampling Date: 2025-04-15
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 10 Oxbow
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Oxbow Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.65615566 Long: -77.07989718 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ No ______ | **Is the Sampled Area within a Wetland?** | **Yes** ✓ **No** ______ |
| Hydric Soil Present? | Yes ✓ No ______ | | |
| Wetland Hydrology Present? | Yes ✓ No ______ | | |

Remarks:

WET W 10 is a floodplain feature and backslope seep wetland. It connects to and receives hydrology from WC W 01 as well as groundwater. It abuts and provides additional hydrology/flow to WET W 11. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☑ Surface Water (A1)
☑ High Water Table (A2)
☑ Saturation (A3)
☐ Water Marks (B1)
☑ Sediment Deposits (B2)
☑ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☑ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ✓ No ______ | Depth (inches): 2 | |
| Water Table Present? | Yes ✓ No ______ | Depth (inches): 0 | |
| Saturation Present? (includes capillary fringe) | Yes ✓ No ______ | Depth (inches): 0 | **Wetland Hydrology Present? Yes** ✓ **No** ______ |

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 10 Oxbow

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Murdannia keisak* | 40 | ✓ | OBL |
| 2. Leersia virginica | 15 | ✓ | FACW |
| 3. Saururus cernuus | 5 | | OBL |
| 4. Carex sp. | 2 | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 62 = Total Cover | | |

50% of total cover: 31.00 20% of total cover: 12.40

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 45 | x 1 = | 45 |
| FACW species | 15 | x 2 = | 30 |
| FAC species | 0 | x 3 = | 0 |
| FACU species | 0 | x 4 = | 0 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 60 (A) | | 75 (B) |

Prevalence Index = B/A = 1.25

**Hydrophytic Vegetation Indicators:**

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

65% relative cover by invasive species within the herbaceous stratum. The most dominant grass was initially not identifiable but on a later visit was identified as probably Murdannia keisak.

## SOIL

Sampling Point: WET W 10 Oxbow

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0 - 6 | 10YR 4/2 | 95 | 10YR 5/6 | 5 | C | PL | Clay | |
| 6 - 12 | 10YR 4/1 | 98 | 10YR 5/6 | 2 | C | M | Clay | |
| 12 - 15 | 10YR 5/1 | 90 | N 2.5/ | 5 | D | M | Sandy Clay | gravelly |
| 12 - 15 | | | 10YR 5/6 | 5 | C | M | Sandy Clay | gravelly |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______________________________

Depth (inches): ______________________

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-15
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 10 Seep
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Backslope Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR or MLRA): S 149A Lat: 38.65605205 Long: -77.07991121 Datum: NAD 83
Soil Map Unit Name: MnD - Marr-Dodon complex, 10 to 15 percent slopes NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No ______
Are Vegetation ______, Soil ✓, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

Datasheet covers backslope seep portion of WET W 10. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ✓ No ______ Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 0

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 10 Seep

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 10 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 10 | = Total Cover | |

50% of total cover: 5.00 20% of total cover: 2.00

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Vaccinium corymbosum | 7 | ✓ | FACW |
| 2. Liquidambar styraciflua | 5 | ✓ | FAC |
| 3. Ilex opaca | 3 | ✓ | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 15 | = Total Cover | |

50% of total cover: 7.50 20% of total cover: 3.00

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Saururus cernuus | 25 | ✓ | OBL |
| 2. Leersia virginica | 20 | ✓ | FACW |
| 3. Impatiens capensis | 15 | | FACW |
| 4. Lonicera japonica* | 5 | | FACU |
| 5. Parathelypteris noveboracensis | 5 | | FAC |
| 6. Ranunculus recurvatus | 5 | | FACW |
| 7. Cardamine pennsylvanica | 2 | | |
| 8. Carex Sp. | 1 | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 78 | = Total Cover | |

50% of total cover: 39.00 20% of total cover: 15.60

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Smilax rotundifolia | 5 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 5 | = Total Cover | |

50% of total cover: 2.50 20% of total cover: 1.00

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 25 | x 1 = | 25 |
| FACW species | 57 | x 2 = | 114 |
| FAC species | 18 | x 3 = | 54 |
| FACU species | 5 | x 4 = | 20 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 105 (A) | | 213 (B) |

Prevalence Index = B/A = 2.02

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasives in tree and shrub strata, 6% relative cover in the herbaceous stratum. Overall, average 2% relative cover by invasives.

Not Final

## SOIL

Sampling Point: WET W 10 Seep

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 6 | 7.5YR 4/1 | 95 | 2.5Y 5/2 | 5 | D | M | Silty Clay |  |
| 6 - 16 | 10YR 4/2 | 100 |  |  |  |  | Sandy Clay |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**
☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

Back slope wetland likely saturated year-round, hence the lack of redox concentrations. Based on strength of wetland vegetation and hydrology present, as well as F3 indicator noted at the edge of the wetland boundary (outside of the representative sample plot), this is believed to be hydric soil.

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-15

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 11

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR or MLRA): S 149A Lat: 38.65630063 Long: -77.07992095 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______

Hydric Soil Present? Yes ✓ No ______

Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland? Yes ✓ No ______**

Remarks:

WET W 11 is a floodplain wetland and toe of slope seep that receives occasional floodflow via WET W 10 and is connected to downstream waters through WET W 10. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

**Wetland Hydrology Present? Yes ✓ No ______**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 11

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

= Total Cover

50% of total cover: 20% of total cover:

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |

= Total Cover

50% of total cover: 20% of total cover:

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Microstegium vimineum* | 50 | ✓ | FAC |
| 2. Boehmeria cylindrica | 20 | ✓ | FACW |
| 3. Cinna arundinacea | 20 | ✓ | FACW |
| 4. Carex Sp. | 5 | | |
| 5. Claytonia virginica | 2 | | FACU |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |

97 = Total Cover

50% of total cover: 48.50 20% of total cover: 19.40

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

= Total Cover

50% of total cover: 20% of total cover:

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 40 | x 2 = | 80 |
| FAC species | 50 | x 3 = | 150 |
| FACU species | 2 | x 4 = | 8 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 92 (A) | | 238 (B) |

Prevalence Index = B/A = 2.58

**Hydrophytic Vegetation Indicators:**

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No**

Remarks: (If observed, list morphological adaptations below).

## SOIL

Sampling Point: WET W 11

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 4 | 10YR 5/3 | 40 | 7.5YR 4/6 | 30 | C | M | Clay | |
| 0 - 4 | 10YR 5/1 | 30 | | | | | Clay | |
| 4 - 11 | 2.5Y 6/2 | 65 | 7.5YR 5/6 | 30 | C | M | Clay | |
| 4 - 11 | | | 7.5YR 4/4 | 5 | C | M | Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-15
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 12
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): S 149A Lat: 38.65644773 Long: -77.07971099 Datum: NAD 83
Soil Map Unit Name: MnD - Marr-Dodon complex, 10 to 15 percent slopes NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ✓, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____
Hydric Soil Present? Yes ✓ No ____
Wetland Hydrology Present? Yes ✓ No ____

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ____

Remarks:

Wetland is a toe-slope seep, fed by groundwater, likely consistently saturated, and consists of two polygons that lack direct surface connections to each other and downstream waters. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ____ No ✓ Depth (inches): ____
Water Table Present? Yes ✓ No ____ Depth (inches): 3
Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 0

**Wetland Hydrology Present? Yes** ✓ **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 12

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Betula nigra | 18 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 18 = Total Cover | | |

50% of total cover: 9.00 20% of total cover: 3.60

| Sapling/Shrub Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Liquidambar styraciflua | 15 | ✓ | FAC |
| 2. Ilex opaca | 3 | | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 18 = Total Cover | | |

50% of total cover: 9.00 20% of total cover: 3.60

| Herb Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Carex Sp. | 30 | ✓ | |
| 2. Saururus cernuus | 25 | ✓ | OBL |
| 3. Cinna arundinacea | 10 | | FACW |
| 4. Impatiens capensis | 10 | | FACW |
| 5. Ranunculus pusillus | 3 | | FACW |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 78 = Total Cover | | |

50% of total cover: 39.00 20% of total cover: 15.60

| Woody Vine Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Smilax rotundifolia | 5 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 5 = Total Cover | | |

50% of total cover: 2.50 20% of total cover: 1.00

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | 25 | x 1 = 25 |
| FACW species | 41 | x 2 = 82 |
| FAC species | 23 | x 3 = 69 |
| FACU species | 0 | x 4 = 0 |
| UPL species | 0 | x 5 = 0 |
| Column Totals: | 89 (A) | 176 (B) |

Prevalence Index = B/A = 1.97

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No**

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasive species.

## SOIL

Sampling Point: WET W 12

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 18 | 10YR 4/2 | 100 | | | | | Sandy Clay | |
| 18 - 30 | 10YR 2/1 | 100 | | | | | Sandy Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ____________________

Depth (inches): ____________________

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

Soil from sample plot is likely problematic, as it does not get enough oxygen to form redox, but is believed to be saturated consistently due to the fact that it is a toe-slope seep. Additionally, an F3 depleted matrix indicator was found along delineated boundary.

Not Final

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-15

Applicant/Owner: JMT State: Maryland Sampling Point: WET W 13

Investigator(s): EM, DP Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR or MLRA): S 149A Lat: 38.65632448 Long: -77.08017221 Datum: NAD 83

Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland? Yes ✓ No ______**

Remarks:

Wetland is a floodplain feature that is connected to WC W 01, primarily fed by flooding and groundwater. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ✓ No ______ Depth (inches): 3
Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 0

**Wetland Hydrology Present? Yes ✓ No ______**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 13

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ________ 20% of total cover: ________

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ________ 20% of total cover: ________

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Microstegium vimineum* | 60 | ✓ | FAC |
| 2. Carex Sp. | 10 | | |
| 3. Cinna arundinacea | 10 | | FACW |
| 4. Dichanthelium clandestinum | 10 | | FACW |
| 5. Lonicera japonica* | 10 | | FACU |
| 6. Claytonia virginica | 5 | | FACU |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 105 = Total Cover | | |

50% of total cover: 52.50 20% of total cover: 21.00

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ________ 20% of total cover: ________

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 20 | x 2 = | 40 |
| FAC species | 60 | x 3 = | 180 |
| FACU species | 15 | x 4 = | 60 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 95 (A) | | 280 (B) |

Prevalence Index = B/A = 2.94

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

67% relative cover by invasives in the herbaceous stratum.

Not Final

## SOIL

Sampling Point: WET W 13

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 4 | 10YR 4/3 | 98 | 10YR 4/6 | 2 | C | M | Sandy Clay | |
| 4 - 14 | 10YR 5/2 | 80 | 7.5YR 4/6 | 20 | C | M | Sandy Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present? Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-16
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 14
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR or MLRA): S 149A Lat: 38.65607628 Long: -77.08093769 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______
Wetland Hydrology Present? Yes ✓ No ______

**Is the Sampled Area within a Wetland?** **Yes** ✓ **No** ______

Remarks:

WET W 14 consists of floodplain features (delineated as multiple polygons) that receive hydrology from groundwater and floodflow from WC W 01 and WC W 08. WET W 14 abuts WC W 08 and WC W 01. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ______ No ✓ Depth (inches): ______
Water Table Present? Yes ✓ No ______ Depth (inches): 9
Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 8

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 14

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Microstegium vimineum* | 50 | ✓ | FAC |
| 2. Carex Sp. | 10 | | |
| 3. Cinna arundinacea | 10 | | FACW |
| 4. Dichanthelium clandestinum | 8 | | FACW |
| 5. Boehmeria cylindrica | 5 | | FACW |
| 6. Celastrus orbiculatus* | 5 | | FACU |
| 7. Claytonia virginica | 5 | | FACU |
| 8. Lonicera japonica* | 5 | | FACU |
| 9. Impatiens capensis | 1 | | FACW |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 99 = Total Cover | | |

50% of total cover: 49.50 20% of total cover: 19.80

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x 1 = | 0 |
| FACW species | 24 | x 2 = | 48 |
| FAC species | 50 | x 3 = | 150 |
| FACU species | 15 | x 4 = | 60 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 89 (A) | | 258 (B) |

Prevalence Index = B/A = 2.89

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

61% relative cover by invasive species in the herb stratum.

Not Final

**SOIL**

Sampling Point: WET W 14

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix |  | Redox Features |  |  |  | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
|  | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] |  |  |
| 0 - 3 | 10YR 4/4 | 100 |  |  |  |  | Silty Clay |  |
| 3 - 12 | 10YR 5/2 | 80 | 7.5YR 4/6 | 20 | C | M | Silty Clay |  |
| 12 - 14 | 10YR 6/2 | 85 | 7.5YR 5/8 | 15 | C | M | Clay |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |
| - |  |  |  |  |  |  |  |  |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Not Final

# WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-16
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 15
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR or MLRA): S 149A Lat: 38.6561353 Long: -77.08119874 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ No ____ | **Is the Sampled Area within a Wetland?** | **Yes** ✓ **No** ____ |
| Hydric Soil Present? | Yes ✓ No ____ | | |
| Wetland Hydrology Present? | Yes ✓ No ____ | | |

Remarks:

Closed, small depression within the floodplain, at the toe of slope (seep). Lacks surface connection to downstream waters. Receives hydrology from groundwater and occasional floodflow from WC W 08. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☑ Surface Water (A1)
☑ High Water Table (A2)
☑ Saturation (A3)
☐ Water Marks (B1)
☑ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☑ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☑ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ✓ No ____ Depth (inches): .5
Water Table Present? Yes ✓ No ____ Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 0

**Wetland Hydrology Present? Yes** ✓ **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 15

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Smilax rotundifolia | 10 | ✓ | FAC |
| 2. Liquidambar styraciflua | 5 | ✓ | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 15 = Total Cover | | |

50% of total cover: 7.50 20% of total cover: 3.00

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Microstegium vimineum* | 15 | ✓ | FAC |
| 2. Carex sp. | 5 | ✓ | |
| 3. Lonicera japonica* | 5 | ✓ | FACU |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 25 = Total Cover | | |

50% of total cover: 12.50 20% of total cover: 5.00

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | 0 | x 1 = 0 |
| FACW species | 0 | x 2 = 0 |
| FAC species | 30 | x 3 = 90 |
| FACU species | 5 | x 4 = 20 |
| UPL species | 0 | x 5 = 0 |
| Column Totals: | 35 (A) | 110 (B) |

Prevalence Index = B/A = 3.14

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

0% relative cover by invasives in the shrub stratum, 80% relative cover by invasives in the herb stratum; average of 40% relative cover.

Not Final

**SOIL**

Sampling Point: WET W 15

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 8 | 10YR 4/2 | 100 | | | | | Silty Clay | |
| 8 - 14 | 10YR 4/1 | 70 | 5YR 4/6 | 30 | C | M | Sandy Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-04-17
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 16
Investigator(s): EM, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Backslope Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR or MLRA): S 149A Lat: 38.65468868 Long: -77.08384243 Datum: NAD 83
Soil Map Unit Name: Pu - Potobac-Issue complex, frequently flooded NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ✓ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No ___
Are Vegetation ___, Soil ✓, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ___
Hydric Soil Present? Yes ✓ No ___
Wetland Hydrology Present? Yes ✓ No ___

**Is the Sampled Area within a Wetland? Yes** ✓ **No** ___

Remarks:

Flows into/abuts WC W 01 and WC W 02. Backslope wetland fed by groundwater. At the time of the delineation, the weather had been abnormally dry, per the US Drought Monitor.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☑ Surface Water (A1)
☑ High Water Table (A2)
☑ Saturation (A3)
☐ Water Marks (B1)
☑ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☑ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☑ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☑ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

Surface Water Present? Yes ✓ No ___ Depth (inches): 0.5
Water Table Present? Yes ✓ No ___ Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

**Wetland Hydrology Present? Yes** ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 16

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Ilex opaca | 3 | ✓ | FAC |
| 2. Rosa multiflora* | 3 | ✓ | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 6 = Total Cover | | |
| 50% of total cover: 3.00 | | 20% of total cover: 1.20 | |

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Carex vulpinoidea | 35 | ✓ | FACW |
| 2. Carex sp. | 15 | ✓ | |
| 3. Unknown grass | 15 | ✓ | |
| 4. Lonicera japonica | 10 | | FACU |
| 5. Cinna arundinacea | 5 | | FACW |
| 6. Juncus effusus | 5 | | OBL |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 85 = Total Cover | | |
| 50% of total cover: 42.50 | | 20% of total cover: 17.00 | |

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | 5 | x 1 = 5 |
| FACW species | 40 | x 2 = 80 |
| FAC species | 3 | x 3 = 9 |
| FACU species | 13 | x 4 = 52 |
| UPL species | 0 | x 5 = 0 |
| Column Totals: | 61 (A) | 146 (B) |

Prevalence Index = B/A = 2.39

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation

☑ 2 - Dominance Test is >50%

☑ 3 - Prevalence Index is ≤3.0[1]

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below).

Due to the time of year of delineation, note that grasses and sedges cannot be definitively identified.

Not Final

**SOIL**

Sampling Point: WET W 16

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 7 | 5YR 2.5/2 | 100 | | | | | Mucky Loam/Clay | |
| 7 - 11 | 7.5YR 3/2 | 100 | | | | | Mucky Sand | |
| 11 - 15 | 7.5YR 3/2 | 100 | | | | | Loamy Sand | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

Soils are naturally problematic; backslope wetland is constantly saturated and therefore has little chance for developing redox. Hydric soils presumed on strength of plants and hydrology.

## WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Mill Swamp West City/County: Bryans Road/Charles Sampling Date: 2025-06-02
Applicant/Owner: JMT State: Maryland Sampling Point: WET W 17
Investigator(s): RF, DP Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR or MLRA): S 149A Lat: 38.65560084 Long: -77.07872292 Datum: NAD 83
Soil Map Unit Name: PcB - Piccowaxen loam, 2 to 5 percent slopes NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No ______ | **Is the Sampled Area within a Wetland?** | **Yes** ✓ **No** ______ |
| Hydric Soil Present? | Yes ✓ | No ______ | | |
| Wetland Hydrology Present? | Yes ✓ | No ______ | | |

Remarks:

Depressional precipitation and groundwater fed wetland excavated in uplands. Important to note that artificial excavation has occurred. Past aerial imagery indicates logging, clearing of land, and movement of ground occurred between 2020-2021, and that WET W 17 likely formed as a result of those recent alterations. Vegetation is well-established despite recently created ruts.

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

☑ Surface Water (A1)
☑ High Water Table (A2)
☑ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15) **(LRR U)**
☐ Hydrogen Sulfide Odor (C1)
☑ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Sparsely Vegetated Concave Surface (B8)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☑ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☑ FAC-Neutral Test (D5)
☐ Sphagnum moss (D8) **(LRR T, U)**

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ✓ | No ______ | Depth (inches): 0-1 |
| Water Table Present? | Yes ✓ | No ______ | Depth (inches): 4 |
| Saturation Present? (includes capillary fringe) | Yes ✓ | No ______ | Depth (inches): 4 |

**Wetland Hydrology Present? Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## **VEGETATION (Four Strata) –** Use scientific names of plants.

Sampling Point: WET W 17

| Tree Stratum (Plot size: 30 ft r) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

50% of total cover: ______ 20% of total cover: ______

| Sapling/Shrub Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Liquidambar styraciflua | 3 | | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 3 = Total Cover | | |

50% of total cover: 1.50 20% of total cover: 0.60

| Herb Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Andropogon virginicus | 60 | ✓ | FAC |
| 2. Microstegium vimineum* | 15 | | FAC |
| 3. Carex Sp. | 5 | | |
| 4. Juncus effusus | 5 | | OBL |
| 5. Liquidambar styraciflua | 3 | | FAC |
| 6. Platanus occidentalis | 3 | | FACW |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| | 91 = Total Cover | | |

50% of total cover: 45.50 20% of total cover: 18.20

| Woody Vine Stratum (Plot size: 30 ft r) | | | |
|---|---|---|---|
| 1. Lonicera japonica* | 3 | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 3 = Total Cover | | |

50% of total cover: 1.50 20% of total cover: 0.60

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 5 | x 1 = | 5 |
| FACW species | 3 | x 2 = | 6 |
| FAC species | 81 | x 3 = | 243 |
| FACU species | 0 | x 4 = | 0 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 89 | (A) | 254 (B) |

Prevalence Index = B/A = 2.85

**Hydrophytic Vegetation Indicators:**

☐ 1 - Rapid Test for Hydrophytic Vegetation
☑ 2 - Dominance Test is >50%
☑ 3 - Prevalence Index is ≤3.0[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✓ **No** ______

Remarks: (If observed, list morphological adaptations below).

Not Final

## SOIL

Sampling Point: WET W 17

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix | | Redox Features | | | | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | | |
| 0 - 6 | 10YR 4/2 | 85 | 7.5YR 5/6 | 15 | C | PL / M | Silty Clay | |
| 6 - 20 | 10YR 5/1 | 95 | 10YR 4/6 | 5 | C | M | Silty Clay | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ Organic Bodies (A6) **(LRR P, T, U)**
☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
☐ Muck Presence (A8) **(LRR U)**
☐ 1 cm Muck (A9) **(LRR P, T)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Coast Prairie Redox (A16) **(MLRA 150A)**
☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7) **(LRR P, S, T, U)**

☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
☐ Thin Dark Surface (S9) **(LRR S, T, U)**
☐ Loamy Mucky Mineral (F1) **(LRR O)**
☐ Loamy Gleyed Matrix (F2)
☑ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☑ Redox Depressions (F8)
☐ Marl (F10) **(LRR U)**
☐ Depleted Ochric (F11) **(MLRA 151)**
☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
☐ Umbric Surface (F13) **(LRR P, T, U)**
☐ Delta Ochric (F17) **(MLRA 151)**
☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

**Indicators for Problematic Hydric Soils[3]:**

☐ 1 cm Muck (A9) **(LRR O)**
☐ 2 cm Muck (A10) **(LRR S)**
☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: ______

Depth (inches): ______

**Hydric Soil Present?** **Yes** ✓ **No** ______

Remarks:

# Stream Datasheet

**Project:** Mill Swamp Mitigation Bank **Date:** 4/4/22 **Stream ID:** WC W 01 (Mill Swamp)

**Staff:** MM EM **Flow Type:** Perennial ☒ Intermittent ☐ Ephemeral ☐

**Flow Direction:** W **Drains Into:** Pomonkey Creek (outside of Study Area)

**Fed By:** WC E 02, WC E 03, WET W 01, WET W 03

**Bank Height:** 2-4’ **Water Depth:** 6-24” **Width:** 5-20’

**Channel Gradient (%):** 1 **Bank Stability:** Poor to moderate

**Avg. Bank Slope:** Vertical ☒ 1:1 ☒ 2:1 ☐ 3:1 ☐ 4:1 or greater ☐

**Mesohabitat:** % Run: 60 % Riffle: 15 % Pool: 25

**Substrate:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cobble | ☒ | Gravel | ☒ | Sand | ☒ | Silt | ☒ |
| Veg | ☐ | Riprap | ☐ | Concrete | ☐ | Muck | ☐ |
| Bedrock | ☐ | Boulder | ☐ | | | | |

**Channel Characteristics:** Natural ☐ Artificial ☐ Man-altered ☒

**OHWM:**

| | | | |
|---|---|---|---|
| Clear, natural line impressed on the bank | ☒ | Presence of litter and debris | ☐ |
| Changes in character of soil | ☐ | Destruction of terrestrial veg. | ☐ |
| Shelving | ☐ | Presence of wrack line | ☐ |
| Vegetation matted down, bent, or absent | ☐ | Sediment sorting | ☒ |
| Leaf litter disturbed or washed away | ☐ | Scour | ☒ |
| Sediment deposition | ☐ | Multiple observed/predicted flow events | ☐ |
| Water staining | ☐ | Abrupt change in plant community | ☐ |

**Photos?** Upstream ☒ Downstream ☒

**Connection to Traditional Navigable Waterway:** Flows into Pomonkey Creek, a tributary to the Potomac River, a TNW

**Other Comments:**

# Stream Datasheet

**Project:** Mill Swamp Mitigation Bank **Date:** 4/4/22 **Stream ID:** WC W 02

**Staff:** MM EM **Flow Type:** Perennial ☐ Intermittent ☒ Ephemeral ☐

**Flow Direction:** S **Drains Into:** WC W 01

**Fed By:** WET W 01A, WET W 02B, spring seep

**Bank Height:** 6” **Water Depth:** 1-4” **Width:** 3-6’

**Channel Gradient (%):** 3 **Bank Stability:** Stable

**Avg. Bank Slope:** Vertical ☐ 1:1 ☐ 2:1 ☒ 3:1 ☒ 4:1 or greater ☐

**Mesohabitat:** % Run: 0 % Riffle: 100 % Pool: 0

**Substrate:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Substrate:** | Cobble | ☐ | Gravel | ☐ | Sand | ☒ | Silt | ☒ |
| | Veg | ☐ | Riprap | ☐ | Concrete | ☐ | Muck | ☒ |
| | Bedrock | ☐ | Boulder | ☐ | | | | |

**Channel Characteristics:** Natural ☐ Artificial ☐ Man-altered ☒

| | | | | |
|---|---|---|---|---|
| **OHWM:** | Clear, natural line impressed on the bank | ☒ | Presence of litter and debris | ☐ |
| | Changes in character of soil | ☒ | Destruction of terrestrial veg. | ☐ |
| | Shelving | ☐ | Presence of wrack line | ☐ |
| | Vegetation matted down, bent, or absent | ☐ | Sediment sorting | ☐ |
| | Leaf litter disturbed or washed away | ☐ | Scour | ☐ |
| | Sediment deposition | ☐ | Multiple observed/predicted flow events | ☐ |
| | Water staining | ☒ | Abrupt change in plant community | ☐ |

**Photos?** Upstream ☒ Downstream ☒

**Connection to Traditional Navigable Waterway:** WC W 01 flows into Pomonkey Creek, a tributary to the Potomac River, a TNW

**Other Comments:** Flows from spring house.

# Stream Datasheet

**Project:** Mill Swamp Mitigation Bank **Date:** 4/4/22 **Stream ID:** WC W 03A

**Staff:** MM EM **Flow Type:** Perennial ☒ Intermittent ☐ Ephemeral ☐

**Flow Direction:** N **Drains Into:** Mill Swamp

**Fed By:** Resources outside study area

**Bank Height:** 6-8’ **Water Depth:** 4” **Width:** 8-12’

**Channel Gradient (%):** 1 **Bank Stability:** Poor to moderate

**Avg. Bank Slope:** Vertical ☐ 1:1 ☒ 2:1 ☐ 3:1 ☐ 4:1 or greater ☐

**Mesohabitat:** % Run: 45 % Riffle: 35 % Pool: 20

**Substrate:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cobble | ☒ | Gravel | ☒ | Sand | ☒ | Silt | ☒ |
| Veg | ☐ | Riprap | ☐ | Concrete | ☐ | Muck | ☐ |
| Bedrock | ☐ | Boulder | ☐ | | | | |

**Channel Characteristics:** Natural ☐ Artificial ☐ Man-altered ☒

**OHWM:**

| | | | |
|---|---|---|---|
| Clear, natural line impressed on the bank | ☒ | Presence of litter and debris | ☐ |
| Changes in character of soil | ☐ | Destruction of terrestrial veg. | ☐ |
| Shelving | ☐ | Presence of wrack line | ☐ |
| Vegetation matted down, bent, or absent | ☐ | Sediment sorting | ☐ |
| Leaf litter disturbed or washed away | ☐ | Scour | ☐ |
| Sediment deposition | ☐ | Multiple observed/predicted flow events | ☐ |
| Water staining | ☐ | Abrupt change in plant community | ☐ |

**Photos?** Upstream ☒ Downstream ☒

**Connection to Traditional Navigable Waterway:** WC W 03 flows into Pomonkey Creek, a tributary to the Potomac River, a TNW

**Other Comments:**

# Stream Datasheet

**Project:** Mill Swamp Mitigation Bank **Date:** 5/26/22 **Stream ID:** WC W 03B

**Staff:** MM EM **Flow Type:** Perennial ☒ Intermittent ☐ Ephemeral ☐

**Flow Direction:** W **Drains Into:** WC W 03A

**Fed By:** Culvert outside of the Study Area.

**Bank Height:** 1-5’ **Water Depth:** 1-2’ **Width:** 18’

**Channel Gradient (%):** 1 **Bank Stability:** Poor to moderate

**Avg. Bank Slope:** Vertical ☐ 1:1 ☐ 2:1 ☒ 3:1 ☐ 4:1 or greater ☐

**Mesohabitat:** % Run: 60 % Riffle: 20 % Pool: 20

**Substrate:**
Cobble ☒ Gravel ☒ Sand ☒ Silt ☒
Veg ☐ Riprap ☐ Concrete ☐ Muck ☐
Bedrock ☐ Boulder ☐

**Channel Characteristics:** Natural ☐ Artificial ☐ Man-altered ☒

**OHWM:**
- Clear, natural line impressed on the bank ☒
- Changes in character of soil ☐
- Shelving ☐
- Vegetation matted down, bent, or absent ☒
- Leaf litter disturbed or washed away ☐
- Sediment deposition ☒
- Water staining ☐
- Presence of litter and debris ☐
- Destruction of terrestrial veg. ☐
- Presence of wrack line ☐
- Sediment sorting ☒
- Scour ☒
- Multiple observed/predicted flow events ☐
- Abrupt change in plant community ☐

**Photos?** Upstream ☒ Downstream ☒

**Connection to Traditional Navigable Waterway:** WC W 03B later becomes WC W 03A. WC W 03A flows into Pomonkey Creek, which flows into the Potomac River, a TNW.

**Other Comments:** Beaver dam observed. This stream was flagged as WC W 04 and later changed to WC W 03B.

# Not Final

## Stream Datasheet

**Project:** Mill Swamp Mitigation Bank **Date:** 5/26/22 **Stream ID:** WC W 05

**Staff:** MM EM **Flow Type:** Perennial ☐ Intermittent ☐ Ephemeral ☒

**Flow Direction:** S **Drains Into:** WC W 03B

**Fed By:** Culvert

**Bank Height:** 1’ **Water Depth:** 0-1” **Width:** 2-3’

**Channel Gradient (%):** 1 **Bank Stability:** Poor to moderate

**Avg. Bank Slope:** Vertical ☐ 1:1 ☒ 2:1 ☐ 3:1 ☐ 4:1 or greater ☐

**Mesohabitat:** % Run: 100 % Riffle: 0 % Pool: 0

**Substrate:**

| | | | |
|---|---|---|---|
| Cobble ☐ | Gravel ☐ | Sand ☒ | Silt ☒ |
| Veg ☒ | Riprap ☐ | Concrete ☐ | Muck ☐ |
| Bedrock ☐ | Boulder ☐ | | |

**Channel Characteristics:** Natural ☐ Artificial ☒ Man-altered ☐

**OHWM:**

| | | | |
|---|---|---|---|
| Clear, natural line impressed on the bank | ☐ | Presence of litter and debris | ☐ |
| Changes in character of soil | ☐ | Destruction of terrestrial veg. | ☐ |
| Shelving | ☒ | Presence of wrack line | ☐ |
| Vegetation matted down, bent, or absent | ☐ | Sediment sorting | ☐ |
| Leaf litter disturbed or washed away | ☐ | Scour | ☐ |
| Sediment deposition | ☐ | Multiple observed/predicted flow events | ☐ |
| Water staining | ☐ | Abrupt change in plant community | ☐ |

**Photos?** Upstream ☒ Downstream ☒

**Connection to Traditional Navigable Waterway:** WC W 01 flows into Pomonkey Creek, a tributary to the Potomac River, a TNW. WC W 03B is a tributary to WC W 01.

**Other Comments:**

# Stream Datasheet

**Project:** Mill Swamp Mitigation Bank **Date:** 6/1/22 **Stream ID:** WC W 06

**Staff:** MM EM **Flow Type:** Perennial ☐ Intermittent ☒ Ephemeral ☐

**Flow Direction:** SE **Drains Into:** WC W 01

**Fed By:** Culvert outside of the Study Area

**Bank Height:** 2-3’ **Water Depth:** 2-4” **Width:** 2-4’

**Channel Gradient (%):** 2 **Bank Stability:** Poor to moderate

**Avg. Bank Slope:** Vertical ☒ 1:1 ☐ 2:1 ☐ 3:1 ☐ 4:1 or greater ☐

**Mesohabitat:** % Run: 100 % Riffle: ______ % Pool: ______

**Substrate:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cobble | ☐ | Gravel | ☐ | Sand | ☒ | Silt | ☒ |
| Veg | ☐ | Riprap | ☐ | Concrete | ☐ | Muck | ☒ |
| Bedrock | ☐ | Boulder | ☐ | | | | |

**Channel Characteristics:** Natural ☐ Artificial ☐ Man-altered ☒

**OHWM:**

| | | | |
|---|---|---|---|
| Clear, natural line impressed on the bank | ☒ | Presence of litter and debris | ☐ |
| Changes in character of soil | ☐ | Destruction of terrestrial veg. | ☐ |
| Shelving | ☐ | Presence of wrack line | ☐ |
| Vegetation matted down, bent, or absent | ☒ | Sediment sorting | ☐ |
| Leaf litter disturbed or washed away | ☐ | Scour | ☐ |
| Sediment deposition | ☐ | Multiple observed/predicted flow events | ☐ |
| Water staining | ☐ | Abrupt change in plant community | ☐ |

**Photos?** Upstream ☒ Downstream ☒

**Connection to Traditional Navigable Waterway:** WC W 01 flows into Pomonkey Creek, a tributary to the Potomac River, a TNW

**Other Comments:** ______

Not Final

# Stream Datasheet

**Project:** Mill Swamp **Stream ID:** WC W 07

**Date:** November 11, 2024 **Staff:** DP, EM

**Flow Direction:** SW

**Flow Type:** Perennial

**Drains Into:** WC W 01

**Fed By:** Wetland

**Bank Height:** 2’ **Water Depth:** 6”

**Width:** 2’ **Gradient (%):** 1

**Bank Stability/Slope:** Stable but vertical

**Substrate:** Silt, Muck

**Connects to TNW?** Yes

**Name of TNW:** Potomac River

**Other Comments:**

# Stream Datasheet

**Project:** Mill Swamp **Stream ID:** WC W 08

**Date:** November 11, 2024 **Staff:** DP, EM

**Flow Direction:** W

**Flow Type:** Perennial

**Drains Into:** WC W01

**Fed By:** WC 01, wetlands

**Bank Height:** 1-3’ **Water Depth:** 0-2”

**Width:** 3-9’ **Gradient (%):** 1

**Bank Stability/Slope:** Stable but vertical

**Substrate:** Gravel, Sand, Silt, Muck, Veg

**Connects to TNW?** Yes

**Name of TNW:** Potomac River

**Other Comments:** Appears to be a side channel of Mill Swamp, possibly an older channel that has been partially abandoned

# Stream Datasheet

**Project:** Mill Swamp **Stream ID:** WC W 09

**Date:** November 11, 2024 **Staff:** DP, EM

**Flow Direction:** W

**Flow Type:** Intermittent

**Drains Into:** WC W 01B

**Fed By:** WC W01B

**Bank Height:** 1-2’ **Water Depth:** 0”

**Width:** 3-6’ **Gradient (%):** 1

**Bank Stability/Slope:** Stable, vertical to 1:1

**Substrate:** Sand, Silt, Veg

**Connects to TNW?** Yes

**Name of TNW:** Potomac River

**Other Comments:** Overflow channel that gets fed by WC W 01B

# Stream Datasheet

**Project:** Mill Swamp **Stream ID:** WC W 12

**Date:** April 16, 2025 **Staff:** EM, DP

**Flow Direction:** SW

**Flow Type:** Intermittent

**Drains Into:** WC W 03B

**Fed By:** WET W 05

**Bank Height:** 6-24 inches **Water Depth:** 2-6 inches

**Width:** 4-6.5 ft **Gradient (%):** 1

**Bank Stability/Slope:** Stable, 1:1, becoming vertical downstream

**Substrate:** Sand, Silt, Muck

**Connects to TNW?** Yes

**Name of TNW:** Potomac River

**Other Comments:** Drainage patterns within WET W 05 become channelized to form this stream; the stream has been straightened/ditched towards its downstream end, likely in an attempt to drain the wetland.

# Stream Datasheet

**Project:** Mill Swamp

**Stream ID:** WC W 13

**Date:** April 16, 2025

**Staff:** EM, DP

**Flow Direction:** NW

**Flow Type:** Intermittent

**Drains Into:** WC W 12

**Fed By:** WET W 05

**Bank Height:** 6-12 inches

**Water Depth:** 2-6 inches

**Width:** 2-3 ft

**Gradient (%):** 1%

**Bank Stability/Slope:** Stable, 1:1 to vertical

**Substrate:** Sand, Silt

**Connects to TNW?** Yes

**Name of TNW:** Potomac River

**Other Comments:**

## Stream Datasheet

**Project:** Mill Swamp **Stream ID:** WC W 14

**Date:** April 17, 2025 **Staff:** EM, DP

**Flow Direction:** S

**Flow Type:** Intermittent

**Drains Into:** WC W 01

**Fed By:** WC W 01 and WC W 08

**Bank Height:** 18 inches **Water Depth:** 2 inches

**Width:** 3-5 ft **Gradient (%):** 1%

**Bank Stability/Slope:** 1:1, subject to erosion and change due to flooding

**Substrate:** Sand, Silt, Muck

**Connects to TNW?** Yes

**Name of TNW:** Potomac River

**Other Comments:** Floodplain feature carrying channel overflow during periods of high flow. Previously appeared to be a wetland during a period of drought when vegetation was established.

# APPENDIX E.10.3
# PHOTO DOCUMENTATION

Photo 1: UPL W 01/W 02/W 16 (Northeast)

Photo 2: UPL W 03 (West)

Photo 3: UPL W 04/W 05 (West)

Photo 4: UPL W 06/07, facing east.

Photo 5: UPL W 09, facing east.

Photo 6: UPL W 10/W 11/W 12, facing south.

Photo 7: UPL W 13, facing south.

Photo 8: UPL W 14/W 15, facing west.

Photo 9: UPL W 17, facing north.

Photo 10: WET W 01 (East)

Photo 11:  WET W 02 (South)

Photo 12: WET W 03-PEM (Northwest)

Photo 13: WET W 03-PSS (Southwest)

Photo 14: WET W 03-PFO (Southeast)

Photo 15: WET W 04 (East)

Photo 16: WET W 05-PEM (Northeast)

Photo 17: WET W 05-PFO (Southwest)

Photo 18: WET W 06-PEM, facing east.

Photo 19: WET W 06-PFO, facing east.

Photo 20: WET W 06-PSS, facing east.

Photo 21: WET W 07 (north side), facing east.

Photo 22: WET W 07 (south side) and WC W 01B, facing east.

Photo 23: WET W 09, facing east.

Photo 24: WET W 10 oxbow, facing west.

Photo 25: WET W 10 seep, facing south.

Photo 26: WET W 11, facing southwest towards WET W 10.

Photo 27: WET W 12B, facing south.

Photo 28: WET W 12B, facing south.

Photo 29: WET W 13, facing northeast.

Photo 30: WET W 13B, facing east.

Photo 31: WET W 14, facing east.

Photo 32: WET W 14A, facing east.

Photo 33: WET W 14B, facing east.

Photo 34: WET W 14C, facing south.

Photo 35: WET W 15, facing east.

Photo 36: WET W 16, facing southwest.

Photo 37: WET W 17, facing east.

Photo 38: WC W 01, Upstream (Northeast)

Photo 39: WC W 01, Downstream (Southwest)

Photo 40: WC W 02, Upstream (North)

Photo 41: WC W 02, Downstream (South)

Photo 42: WC W 03A, Upstream (Southeast)

Photo 43: WC W 03A, Downstream (Northwest)

Photo 44: WC W 03A upstream, facing south.

Photo 45: WC W 03B, Upstream (Northeast)

Photo 46: WC W 03B, Downstream (Southwest)

Photo 47: WC W 05, Upstream (North)

Photo 48: WC W 05, Downstream (South)

Photo 49: WC W 06, Upstream (Northwest)

Photo 50: WC W 06, Downstream (Southeast)

Photo 51: WC W 07 downstream, facing southwest.

Photo 52: WC W 07 upstream, facing northeast.

Photo 53: WC W 08 downstream, facing west.

Photo 54: WC W 08 upstream, facing east.

Photo 55: WC W 09 downstream, facing west.

Photo 56: WC W 09 upstream, facing east.

Photo 57: WC W 10 downstream, facing southeast.

Photo 58: WC W 10 upstream, facing northwest.

Photo 59: WC W 11 downstream, facing west.

Photo 60: WC W 11 upstream, facing east.

Photo 61: WC W 12 downstream, facing west.

Photo 62: WC W 12 upstream, facing east.

Photo 63: WC W 13 downstream, facing north.

Photo 64: WC W 13 upstream, facing south.

Photo 65: WC W 14 downstream, facing south.

Photo 66: WC W 14 upstream, facing north.

# APPENDIX E.11
# NON-NATIVE INVASIVE SPECIES INVENTORY MAP

# MEMORANDUM

| | |
|---|---|
| TO: | Interagency Review Team (IRT) |
| DATE: | June 12, 2025 |
| FROM: | Erin Markel |
| PROJECT: | Mill Swamp Mitigation Bank |
| JMT NO.: | 25-00175-001 |
| RE: | Baseline Invasive Survey Memorandum |

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On May 20, May 23, and June 2, 2025, environmental scientists from Johnson, Mirmiran & Thompson (JMT) performed a baseline invasive species survey at the proposed Mill Swamp Mitigation Bank in the community of Bryans Road, Charles County, Maryland. The Study Area for the invasive survey consisted of the proposed conservation easement. It is approximately 27.8 acres and consists of three sections:

- The northwestern area (**Attachment A, Maps 1 & 2**) features early successional oldfield habitat, formerly mowed areas, currently mowed turfgrass, and small patches of dense forest, as well as the Mill Swamp stream. One very large wetland and several smaller wetlands also characterize this area. Due to its proximity to multiple maintained private properties, this area contains a diverse array of buffer zones and vegetation communities.

- The northeastern area (**Attachment A, Map 3**) is characterized by the sparsely treed floodplain of Mill Swamp as well as by wetlands. The hill slopes surrounding the floodplain are densely forested.

- The southeastern area (**Attachment A, Maps 4 & 5**) is separated from the other two areas and is bisected by an unnamed tributary to Mill Swamp. A narrow strip of trees borders the stream, and meadows flank either side of the riparian corridor. A forest stand is located to the northwest of the stream; it continues to the southeast and becomes a large forested wetland along the southern edge of the Study Area.

Teams of environmental scientists reviewed the Study Area and divided it into invasive species assessment areas based on composition and prevalence of invasive species. Invasive area boundaries were recorded using a global positioning system (GPS) capable of submeter accuracy and overlaid onto aerial mapping (**Attachment A**). Areas of maintained turfgrass were not assessed. For each mapped invasive area, a datasheet was completed to document invasive species present and estimated absolute and relative aerial cover by invasives within each vegetated stratum at the time of the survey. An average relative percent cover by invasive species was calculated for each invasive assessment area (**Attachment B**). Photographs were also taken for each assessment area (**Attachment C**). The results of this survey are summarized by Study Area region below.

Northwestern Area (**Attachment A, Maps 1 & 2**) – This section of the Study Area includes 23 mapped invasive areas, covering approximately 9 acres of land. Average relative invasive coverage in these areas ranged from 4 to 85 percent, with an average coverage of 32 percent across the section. The majority of the dense invasive coverage was observed around the large open field and within the adjacent forested areas. Common invasive species included Japanese stiltgrass (*Microstegium viminuem*), multiflora rose (*Rosa multiflora*), ground ivy (*Glechoma hederacea*), Japanese honeysuckle (*Lonicera japonica*), Oriental bittersweet (*Celastrus orbiculatus*), Chinese privet (*Ligustrum sinense*), reed canary grass (*Phalaris arundinacea*), garlic mustard (*Alliaria petiolate*), and Japanese barberry (*Berberis thunbergii*). INV-B17, B20, and B32 are heavily dominated by invasive species. INV-B17 contains Japanese stiltgrass, Japanese honeysuckle, multiflora rose, Chinese privet, and autumn olive (*Elaeagnus umbellata*); INV-B20 includes reed canary grass, Japanese stiltgrass, and Japanese honeysuckle; and INV-B32 features reed canary grass, Japanese stiltgrass, Japanese honeysuckle, and multiflora rose. Reed canary grass was also found in INV-B18 and B29.

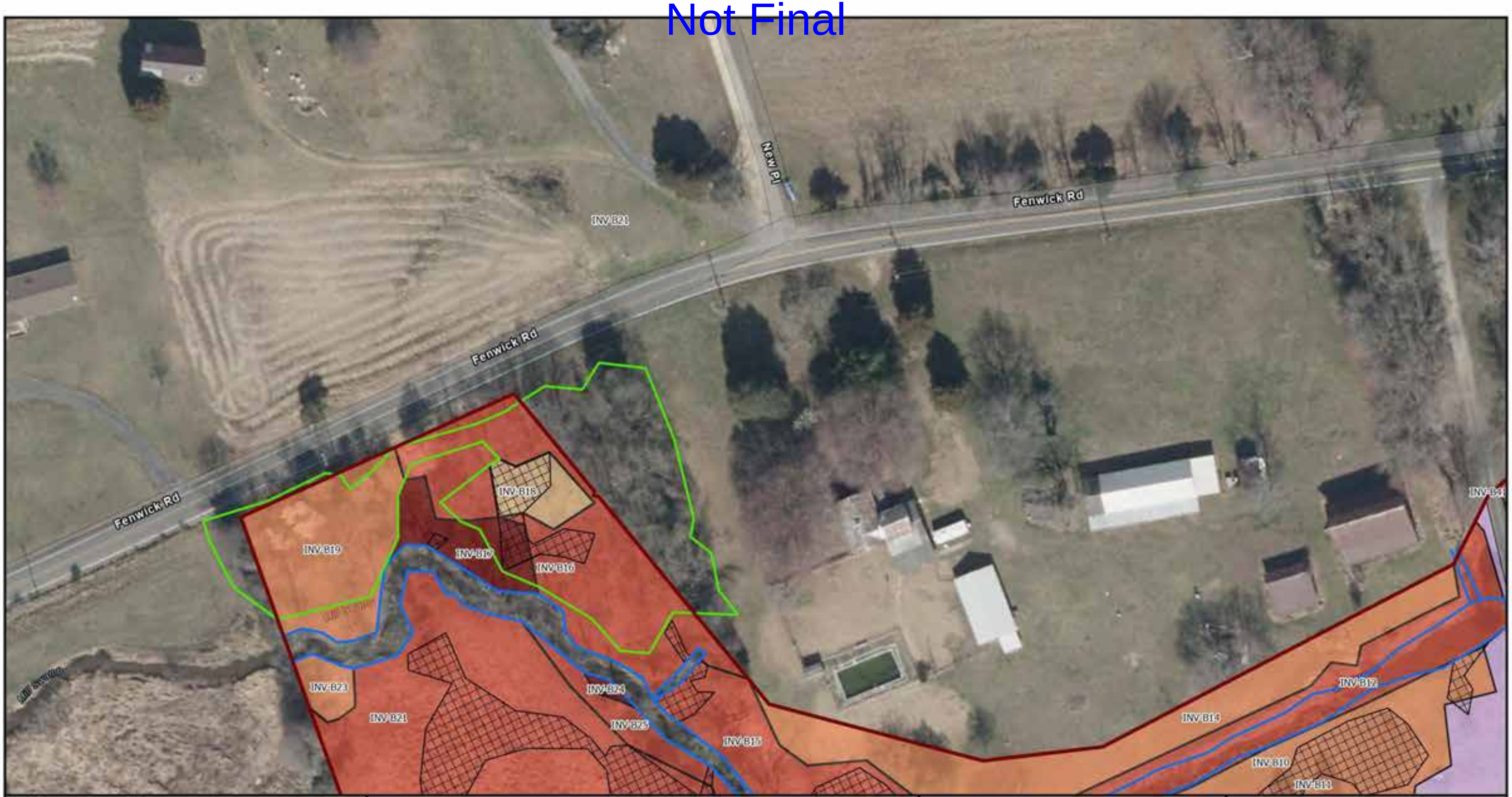
Northeastern Area (**Attachment A, Map 3**) – This section of the study area includes 27 mapped invasive zones, covering approximately 7 acres of land. Relative invasive coverage in these areas ranged from 4 to 74 percent, with an average coverage of 36 percent across the section. The majority of the dense invasive coverage appears to be located north of Mill Swamp. Japanese stiltgrass is predominant in the floodplain of this area, while Japanese stiltgrass, oriental bittersweet, Japanese wineberry(*Rubus phoenicolasius*), ground ivy, and Japanese honeysuckle extended into the forested hillsides. The invasive species observed were largely consistent with those found in the northwestern section, with several additional species identified, including Japanese wineberry, castor aralia (*Kalopanax septemlobus*), marsh dewflower (*Murdannia keisak*), porcelainberry (*Ampelopsis grandulosa*), and princess tree (*Paulownia tomentosa*). Marsh dewflower was observed dominating the herbaceous layer of INV-B45, a small oxbow wetland within the floodplain of Mill Swamp.

Southeastern Area (**Attachment A, Maps 4 & 5**) – This section of the study area includes 25 mapped invasive zones, covering approximately 12 acres of land. Relative invasive coverage in these areas ranged from 0 to 52 percent, with an average coverage of 22 percent across the section. The densest invasive coverage in this section is concentrated in the vegetated riparian buffer of the unnamed tributary to Mill Swamp. INV-A16 and A18 were most heavily dominated by invasive species.INV-A16 contains Japanese honeysuckle, oriental bittersweet, multiflora rose, and Japanese barberry, while INV-A18 includes oriental bittersweet, Chinese privet, Japanese barberry, Japanese honeysuckle, Japanese stiltgrass, and garlic mustard. A clear distinction is evident between the northern and southern portions of the area, with the northern having fairly minimal invasive coverage while invasives in the southern portion are more consistently present across a larger area. However, within the large wetland at the southern edge of the Study Area, invasives were minimally present with the exception of areas that had sparser canopy coverage. The invasive species observed were generally similar to those found in the other two sections, with the addition of common privet (*Ligustrum vulgare*), English ivy (*Hedera helix*), and border privet (*Ligustrum obtusifolium*).

*References*

MD iMAP Services. 2023. “Imagery/MD_SixInchImagery." http://geodata.md.gov/imap/services. Accessed June 11, 2025.

# ATTACHMENT A
# FIGURES



Legend

- Delineated Streams
- ▨ Delineated Wetlands
- Forest Stand Boundary
- ☐ Proposed Easement
- ▢ Mowed Turfgrass

Avg. Relative % Invasive Cover

- ▢ 0 - 1
- ▢ 2 - 10
- ▢ 11 - 25
- ▢ 26 - 50
- ▢ 51 - 85

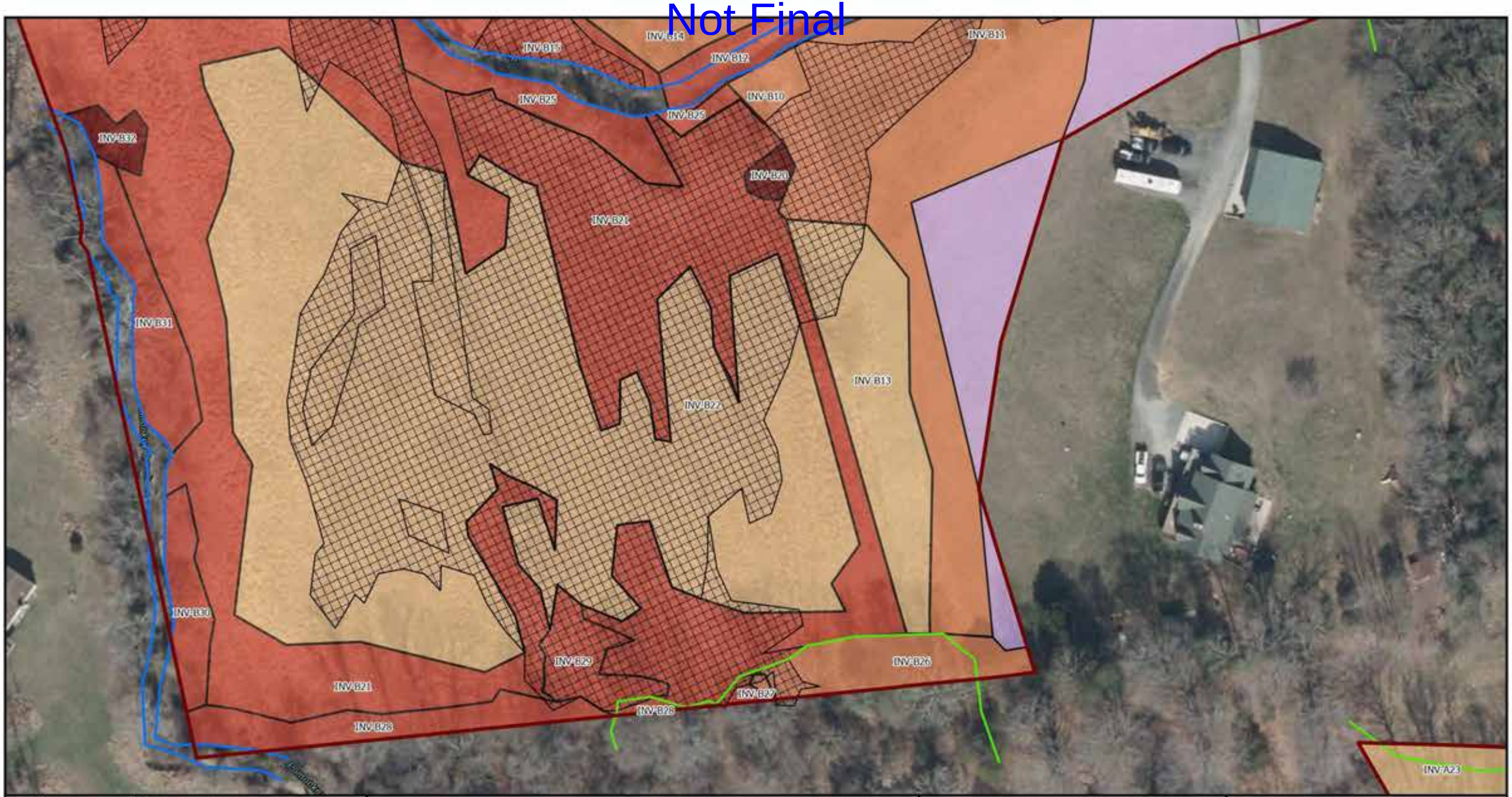
CREATED BY: JPG
SOURCE: MD IMAP, ESRI

0 30 60 120 Feet
1" = 60'

# INVASIVE SURVEY MAP 1

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



Legend

- Delineated Streams
- ▨ Delineated Wetlands
- Forest Stand Boundary
- Proposed Easement
- Mowed Turfgrass

Avg. Relative % Invasive Cover

- 0 - 1
- 2 - 10
- 11 - 25
- 26 - 50
- 51 - 85

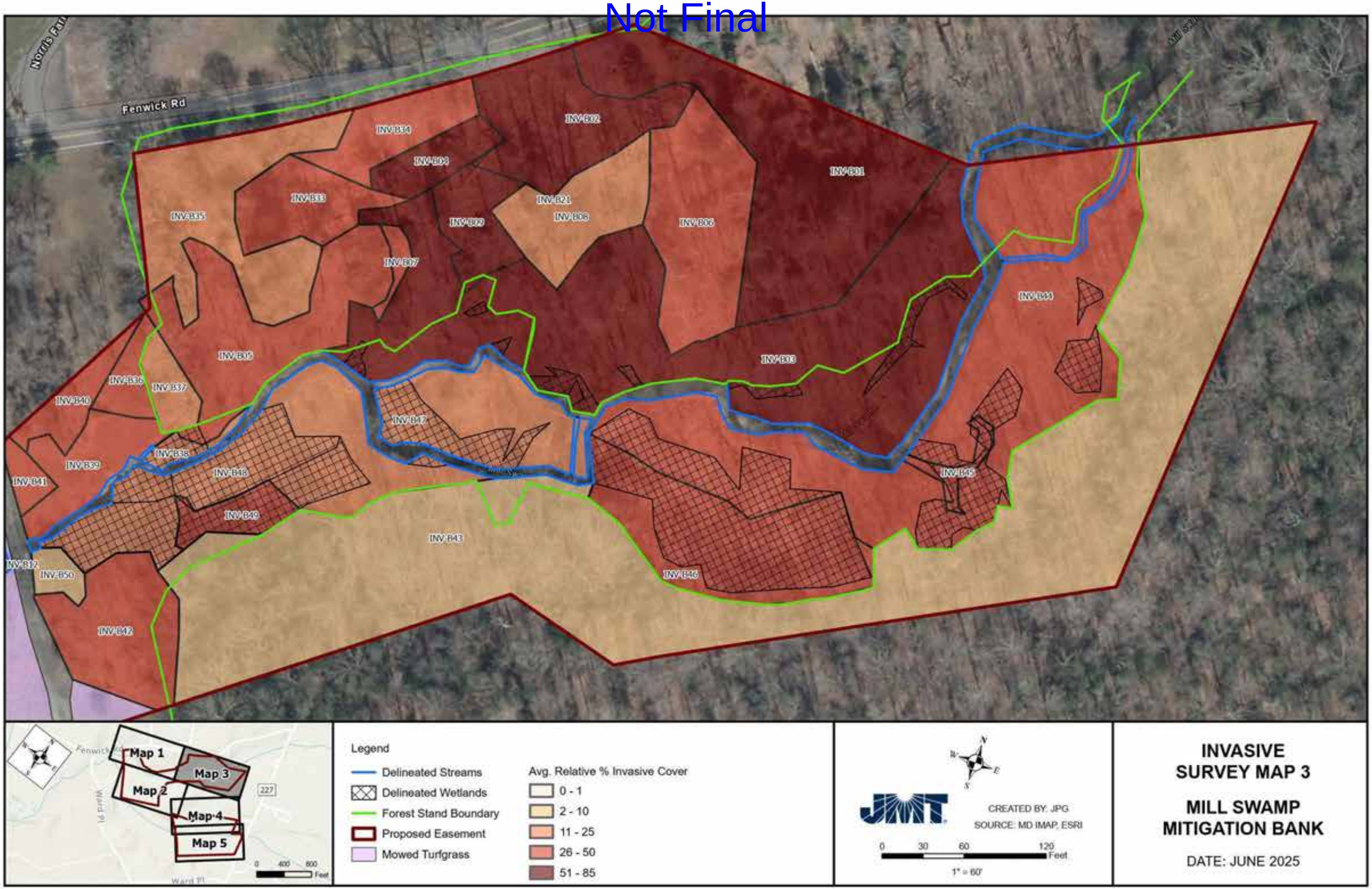
CREATED BY: JPG
SOURCE: MD IMAP, ESRI

0 30 60 120 Feet
1" = 60'

## INVASIVE SURVEY MAP 2

## MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



CREATED BY: JPG
SOURCE: MD IMAP, ESRI

# INVASIVE SURVEY MAP 3

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025

Not Final

Legend

- Delineated Streams
- ▨ Delineated Wetlands
- Forest Stand Boundary
- ☐ Proposed Easement
- Mowed Turfgrass

Avg. Relative % Invasive Cover

- 0 - 1
- 2 - 10
- 11 - 25
- 26 - 50
- 51 - 85

JMT

CREATED BY: JPG
SOURCE: MD IMAP, ESRI

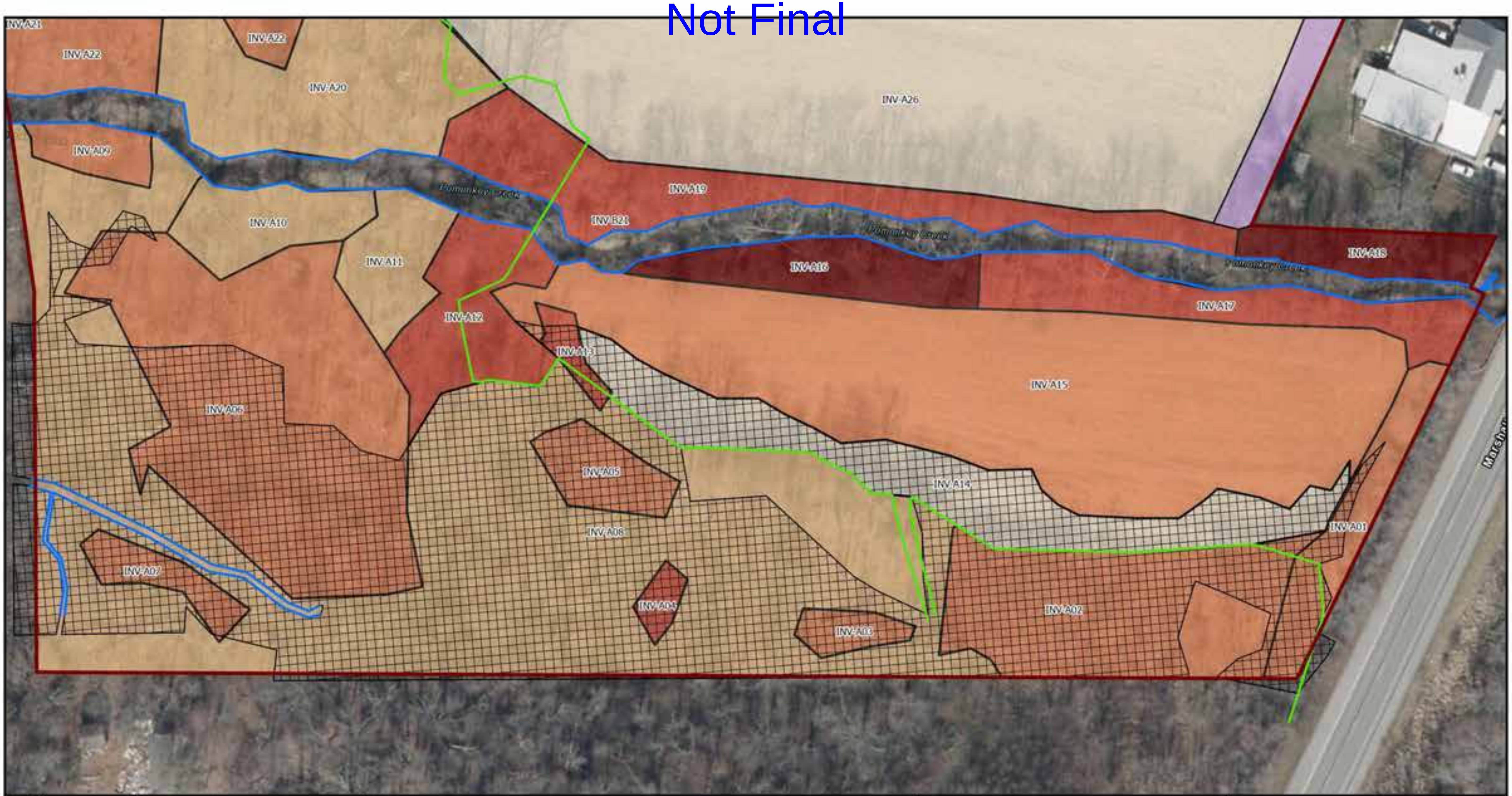
0 30 60 120 Feet

1" = 60'

## INVASIVE SURVEY MAP 4

## MILL SWAMP MITIGATION BANK

DATE: JUNE 2025



Legend

- Delineated Streams
- ☒ Delineated Wetlands
- Forest Stand Boundary
- ☐ Proposed Easement
- ☐ Mowed Turfgrass

Avg. Relative % Invasive Cover

- ☐ 0 - 1
- ☐ 2 - 10
- ☐ 11 - 25
- ☐ 26 - 50
- ☐ 51 - 85

CREATED BY: JPG
SOURCE: MD IMAP, ESRI

0 30 60 120
Feet
1" = 60'

# INVISIVE SURVEY MAP 5

# MILL SWAMP MITIGATION BANK

DATE: JUNE 2025

# ATTACHMENT B
# DATASHEETS

## Mill Swamp Invasives Survey

Survey Area: INV-A01
\# of Veg. Strata: 4
Staff: EM, JG
Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 90% | 0% |
| Saplings/Shrubs | 15% | 40% | 38% |
| Herbaceous | 10% | 30% | 33% |
| Woody Vines | 0% | 15% | 0% |
| Average Percent Relative Invasive Cover: | | | 18% |

**Observed Invasive Species***

***Rosa multiflora*** , *Ligustrum vulgare*, ***Lonicera japonica***

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-A02
\# of Veg. Strata: 4
Staff: EM, JG
Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 50% | 90% | 56% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 20% |

**Observed Invasive Species***

***Microstegium vimineum*** , *Rosa multiflora*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-A03 # of Veg. Strata: 4
Staff: EM, JG Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 50% | 0% |
| Saplings/Shrubs | 0% | 20% | 0% |
| Herbaceous | 40% | 90% | 44% |
| Woody Vines | 0% | 10% | 0% |
| Average Percent Relative Invasive Cover: | | | 11% |

**Observed Invasive Species***

***Microstegium vimineum***

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A04 # of Veg. Strata: 2
Staff: EM, JG Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 30% | 80% | 38% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 31% |

**Observed Invasive Species***

***Microstegium vimineum***

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-A05 # of Veg. Strata: 4
Staff: EM, JG Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 20% | 30% | 67% |
| Herbaceous | 20% | 80% | 25% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 23% |

**Observed Invasive Species***

*Microstegium vimineum, Lonicera japonica,* ***Rosa multiflora***

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A06 # of Veg. Strata: 4
Staff: EM, JG Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 0% | 20% | 0% |
| Herbaceous | 50% | 100% | 50% |
| Woody Vines | 0% | 10% | 0% |
| Average Percent Relative Invasive Cover: | | | 13% |

**Observed Invasive Species***

***Microstegium vimineum*** *, Lonicera japonica, Rosa multiflora*

*Most prevalent invasive species are bolded

**Mill Swamp Invasives Survey**

Survey Area: INV-A07 # of Veg. Strata: 3
Staff: EM, JG Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 50% | 0% |
| Saplings/Shrubs | 0% | 10% | 0% |
| Herbaceous | 30% | 80% | 38% |
| Woody Vines | 0% | 0% | - |
| | | Average Percent Relative Invasive Cover: | 13% |

**Observed Invasive Species***

***Microstegium vimineum* , *Lonicera japonica***

*Most prevalent invasive species are bolded

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**Mill Swamp Invasives Survey**

Survey Area: INV-A08 # of Veg. Strata: 4
Staff: EM, JG Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 5% | 90% | 6% |
| Woody Vines | 0% | 5% | 0% |
| | | Average Percent Relative Invasive Cover: | 8% |

**Observed Invasive Species***

*Microstegium vimineum, Lonicera japonica, Rosa multiflora*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-A09 # of Veg. Strata: 3
Staff: EM, JG Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 5% | 25% | 20% |
| Herbaceous | 25% | 90% | 28% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 16% |

**Observed Invasive Species***

*Berberis thunbergii, Celastrus orbiculatus,* ***Lonicera japonica, Microstegium vimineum***

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A10 # of Veg. Strata: 3
Staff: EM, JG Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 90% | 0% |
| Saplings/Shrubs | 0% | 10% | 0% |
| Herbaceous | 20% | 100% | 20% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 7% |

**Observed Invasive Species***

***Celastrus orbiculatus*** *, Rosa multiflora,* ***Loncera japonica*** *,* ***Microstegium vimineum***

*Most prevalent invasive species are bolded

**Mill Swamp Invasives Survey**

Survey Area: INV-A11 # of Veg. Strata: 3
Staff: EM, JG Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 0% | 10% | 0% |
| Herbaceous | 5% | 100% | 5% |
| Woody Vines | 0% | 0% | - |

Average Percent Relative Invasive Cover: 2%

**Observed Invasive Species***

*Lonicera japonica*

*Most prevalent invasive species are bolded

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**Mill Swamp Invasives Survey**

Survey Area: INV-A12 # of Veg. Strata: 4
Staff: EM, JG Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 20% | 30% | 67% |
| Herbaceous | 30% | 90% | 33% |
| Woody Vines | 5% | 10% | 50% |

Average Percent Relative Invasive Cover: 38%

**Observed Invasive Species***

*Celastrus orbiculatus*, ***Rosa multiflora, Lonicera japonica, Microstegium vimineum*** , *Berberis thunbergii*

*Most prevalent invasive species are bolded

**Mill Swamp Invasives Survey**

Survey Area: INV-A13
# of Veg. Strata: 2
Staff: EM, JG
Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 20% | 40% | 50% |
| Herbaceous | 40% | 100% | 40% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 45% |

**Observed Invasive Species***

***Rosa multiflora, Microstegium vimineum***

*Most prevalent invasive species are bolded

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**Mill Swamp Invasives Survey**

Survey Area: INV-A14
# of Veg. Strata: 1
Staff: EM, JG
Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 0% | 100% | 0% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 0% |

**Observed Invasive Species***

N/A

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-A15 # of Veg. Strata: 2

Staff: EM, JG Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 15% | 100% | 15% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 20% |

**Observed Invasive Species***

*Rosa multiflora, Lespedeza sp.*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A16 # of Veg. Strata: 4

Staff: SG, JG Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 10% | 10% | 100% |
| Herbaceous | 15% | 40% | 38% |
| Woody Vines | 30% | 45% | 67% |
| Average Percent Relative Invasive Cover: | | | 51% |

**Observed Invasive Species***

*Berberis thunbergii*, ***Celastrus orbiculatus*** , *Rosa multiflora*, ***Lonicera japonica***

*Most prevalent invasive species are bolded

Not Final

## Mill Swamp Invasives Survey

Survey Area: INV-A17
# of Veg. Strata: 4
Staff: SG, JG
Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 10% | 10% | 100% |
| Herbaceous | 5% | 20% | 25% |
| Woody Vines | 8% | 20% | 40% |
| Average Percent Relative Invasive Cover: | | | 41% |

**Observed Invasive Species***

*Berberis thunbergii*, ***Celastrus orbiculatus***, *Lonicera japonica*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A18
# of Veg. Strata: 4
Staff: SG, JG
Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 20% | 20% | 100% |
| Herbaceous | 30% | 70% | 43% |
| Woody Vines | 20% | 30% | 67% |
| Average Percent Relative Invasive Cover: | | | 52% |

**Observed Invasive Species***

***Celastrus orbiculatus***, *Ligustrum obtusifolium*, ***Berberis thunbergii***, *Lonicera japonica*, ***Microstegium vimineum,*** *Alliaria petiolata, Hedera helix*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-A19 # of Veg. Strata: 4
Staff: SG, JG Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 20% | 30% | 67% |
| Herbaceous | 30% | 80% | 38% |
| Woody Vines | 20% | 30% | 67% |

Average Percent Relative Invasive Cover: 43%

**Observed Invasive Species***

*Berberis thunbergii*, ***Celastrus orbiculatus*** , *Lonicera japonica, Ligustrum obtusifolium*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A20 # of Veg. Strata: 4
Staff: SG, JG Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 0% | 5% | 0% |
| Herbaceous | 10% | 80% | 13% |
| Woody Vines | 0% | 15% | 0% |

Average Percent Relative Invasive Cover: 3%

**Observed Invasive Species***

***Lonicera japonica***

*Most prevalent invasive species are bolded

Not Final

## Mill Swamp Invasives Survey

Survey Area: INV-A21 # of Veg. Strata: 4
Staff: SG, JG Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 10% | 15% | 67% |
| Herbaceous | 30% | 70% | 43% |
| Woody Vines | 5% | 10% | 50% |
| Average Percent Relative Invasive Cover: | | | 40% |

**Observed Invasive Species***

*Berberis thunbergii*, ***Celastrus orbiculatus*** , *Lonicera japonica*, ***Microstegium vimineum***

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-A22 # of Veg. Strata: 4
Staff: SG, JG Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 60% | 0% |
| Saplings/Shrubs | 5% | 10% | 50% |
| Herbaceous | 5% | 85% | 6% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 14% |

**Observed Invasive Species***

***Celastrus orbiculatus*** , *Berberis thunbergii*, ***Lonicera japonica***

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-A23 # of Veg. Strata: 4
Staff: SG, JG Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 0% | 15% | 0% |
| Herbaceous | 5% | 20% | 25% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 6% |

**Observed Invasive Species***

***Lonicera japonica***

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-A24 # of Veg. Strata: 1
Staff: SG, JG Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | | | |
| Saplings/Shrubs | | | |
| Herbaceous | | | |
| Woody Vines | | | |
| Average Percent Relative Invasive Cover: | | | 0% |

**Observed Invasive Species***

Mowed turfgrass area, removed from the analysis.

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-A25
# of Veg. Strata: 4
Staff: SG, JG
Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 85% | 0% |
| Saplings/Shrubs | 5% | 15% | 33% |
| Herbaceous | 10% | 30% | 33% |
| Woody Vines | 10% | 20% | 50% |
| Average Percent Relative Invasive Cover: | | | 29% |

**Observed Invasive Species***

***Lonicera japonica*** , *Celastrus orbiculatus, Berberis thunbergii*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-A26
# of Veg. Strata: 2
Staff: SG, JG
Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 0% | 30% | 0% |
| Herbaceous | 0% | 90% | 0% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 0% |

**Observed Invasive Species***

None

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B01 # of Veg. Strata: 4
Staff: RF, DP Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 75% | 0% |
| Saplings/Shrubs | 60% | 70% | 86% |
| Herbaceous | 90% | 95% | 95% |
| Woody Vines | 5% | 5% | 100% |
| Average Percent Relative Invasive Cover: | | | 70% |

**Observed Invasive Species***

*Rubus phoenicolasius, Rosa multiflora, Ilex cornuta, Microstegium vimineum,* ***Celastrus orbiculatus*** *, Lonicera japonica,* ***Glechoma hederacea***

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B02 # of Veg. Strata: 3
Staff: RF, DP Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 10% | 30% | 33% |
| Saplings/Shrubs | 5% | 5% | 100% |
| Herbaceous | 90% | 100% | 90% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 74% |

**Observed Invasive Species***

*Rubus phoenicolasius,* ***Microstegium vimineum*** *, Glechoma hederacea, Ampelopsis glandulosa, Paulownia tomentosa*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B03
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 75% | 0% |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 85% | 100% | 85% |
| Woody Vines | 5% | 5% | 100% |

Average Percent Relative Invasive Cover: 53%

**Observed Invasive Species***

*Berberis thunbergii, Kalopanax septemlobus, Rubus phoenicolasius, Rosa multiflora,* ***Microstegium vimineum*** *, Lonicera japonica*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B04
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 20% | 0% |
| Saplings/Shrubs | 90% | 95% | 95% |
| Herbaceous | 10% | 15% | 67% |
| Woody Vines | 10% | 10% | 100% |

Average Percent Relative Invasive Cover: 65%

**Observed Invasive Species***

***Rubus phoenicolasius*** *, Microstegium vimineum, Lonicera japonica, Celastrus orbiculatus*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B05 # of Veg. Strata: 4
Staff: RF, DP Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 85% | 0% |
| Saplings/Shrubs | 3% | 60% | 5% |
| Herbaceous | 70% | 95% | 74% |
| Woody Vines | 10% | 10% | 100% |
| Average Percent Relative Invasive Cover: | | | 45% |

**Observed Invasive Species***

*Berberis thunbergii, Microstegium vimineum,* ***Celastrus orbiculatus*** *, Rosa multiflora, Lonicera japonica*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B06 # of Veg. Strata: 4
Staff: RF, DP Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 10% | 30% | 33% |
| Herbaceous | 75% | 90% | 83% |
| Woody Vines | 5% | 10% | 50% |
| Average Percent Relative Invasive Cover: | | | 42% |

**Observed Invasive Species***

*Rubus phoenicolasius,* ***Celastrus orbiculatus*** *, Kalopanax septemlobus, Lonicera japonica, Microstegium vimineum*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B07
# of Veg. Strata: 3
Staff: RF, DP
Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 25% | 0% |
| Saplings/Shrubs | 100% | 100% | 100% |
| Herbaceous | 2% | 10% | 20% |
| Woody Vines | 0% | 0% | - |
| | | Average Percent Relative Invasive Cover: | 40% |

**Observed Invasive Species***

***Rubus phoenicolasius*** , *Microstegium vimineum*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B08
# of Veg. Strata: 3
Staff: RF, DP
Date: 5/20/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 95% | 0% |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 10% | 15% | 67% |
| Woody Vines | 0% | 5% | 0% |
| | | Average Percent Relative Invasive Cover: | 22% |

**Observed Invasive Species***

***Celastrus orbiculatus***

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B09
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/20/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 45% | 0% |
| Saplings/Shrubs | 5% | 5% | 100% |
| Herbaceous | 85% | 90% | 94% |
| Woody Vines | 5% | 5% | 100% |

Average Percent Relative Invasive Cover: 74%

**Observed Invasive Species***

*Rubus phoenicolasius*, ***Celastrus orbiculatus*** , *Microstegium vimineum*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B10
# of Veg. Strata: 3
Staff: RF, DP
Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 5% | 0% |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 30% | 98% | 31% |
| Woody Vines | 0% | 0% | - |

Average Percent Relative Invasive Cover: 19%

**Observed Invasive Species***

*Pyrus calleryana, Microstegium vimineum, Glechoma hederacea, Rosa multiflora, Lonicera japonica, Persicaria perfoliata (minimal).*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B11
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 40% | 0% |
| Saplings/Shrubs | 5% | 75% | 7% |
| Herbaceous | 50% | 85% | 59% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 16% |

**Observed Invasive Species***

***Lonicera japonica* ,  *Microstegium vimineum*** , *Rosa multiflora, Glechoma hederacea*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B12
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 20% | 0% |
| Saplings/Shrubs | 15% | 70% | 21% |
| Herbaceous | 50% | 100% | 50% |
| Woody Vines | 3% | 5% | 60% |
| Average Percent Relative Invasive Cover: | | | 33% |

**Observed Invasive Species***

***Glechoma hederacea, Rosa multiflora*** , *Lonicera japonica, Celastrus orbiculatus, Microstegium vimineum*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B13 # of Veg. Strata: 2
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 0% | 75% | 0% |
| Herbaceous | 15% | 95% | 16% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 8% |

**Observed Invasive Species***

***Microstegium vimineum*** *, Glechoma hederacea*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B14 # of Veg. Strata: 2
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 20% | 0% |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 20% | 95% | 21% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 11% |

**Observed Invasive Species***

***Glechoma hederacea***

*Most prevalent invasive species are bolded

Not Final

## Mill Swamp Invasives Survey

Survey Area: INV-B15 # of Veg. Strata: 4

Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 10% | 0% |
| Saplings/Shrubs | 5% | 25% | 20% |
| Herbaceous | 75% | 100% | 75% |
| Woody Vines | 18% | 20% | 90% |
| Average Percent Relative Invasive Cover: | | | 46% |

**Observed Invasive Species***

***Lonicera japonica* , *Glechoma hederacea* , *Microstegium vimineum*,** *Rosa multiflora, Celastrus orbiculatus, Ligustrum sinense, Potentilla indica*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B16 # of Veg. Strata: 4

Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 90% | 0% |
| Saplings/Shrubs | 7% | 15% | 47% |
| Herbaceous | 60% | 85% | 71% |
| Woody Vines | 0% | 10% | 0% |
| Average Percent Relative Invasive Cover: | | | 29% |

**Observed Invasive Species***

***Lonicera japonica* , *Microstegium vimineum*** , *Celastrus orbiculatus, Potentilla indica, Berberis thunbergii, Rosa multiflora*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B17 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 20% | 0% |
| Saplings/Shrubs | 25% | 30% | 83% |
| Herbaceous | 80% | 95% | 84% |
| Woody Vines | 2% | 5% | 40% |
| Average Percent Relative Invasive Cover: | | | 52% |

**Observed Invasive Species***

***Microstegium vimineum*** , *Lonicera japonica, Elaeagnus umbellata, Rosa multiflora, Ligustrum sinense*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B18 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 80% | 0% |
| Saplings/Shrubs | 0% | 5% | 0% |
| Herbaceous | 15% | 65% | 23% |
| Woody Vines | 0% | 10% | 0% |
| Average Percent Relative Invasive Cover: | | | 6% |

**Observed Invasive Species***

***Microstegium vimineum*** , *Lonicera japonica, Phalaris arundinacea*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B19 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 75% | 0% |
| Saplings/Shrubs | 25% | 65% | 38% |
| Herbaceous | 30% | 100% | 30% |
| Woody Vines | 5% | 15% | 33% |
| Average Percent Relative Invasive Cover: | | | 25% |

**Observed Invasive Species***

***Lonicera japonica*** *,* ***Rosa multiflora*** *, Celastrus orbiculatus, Hedera helix, Potentilla indica, Ligustrum sinense, Microstegium vimineum (minimal)*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B20 # of Veg. Strata: 1
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 85% | 100% | 85% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 85% |

**Observed Invasive Species***

*Microstegium vimineum (minimal), Lonicera japonica,* ***Phalaris arundinacea***

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B21 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 3% | 0% |
| Saplings/Shrubs | 10% | 40% | 25% |
| Herbaceous | 40% | 100% | 40% |
| Woody Vines | 5% | 5% | 100% |
| Average Percent Relative Invasive Cover: | | | 41% |

**Observed Invasive Species***

***Lonicera japonica*** , *Microstegium vimineum (minimal), Celastrus orbiculatus, Rosa multiflora, Berberis thunbergii*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B22 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 1% | 0% |
| Saplings/Shrubs | 0% | 98% | 0% |
| Herbaceous | 5% | 30% | 17% |
| Woody Vines | 0% | 10% | 0% |
| Average Percent Relative Invasive Cover: | | | 4% |

**Observed Invasive Species***

***Celastrus orbiculatus***

*Most prevalent invasive species are bolded

Not Final

### Mill Swamp Invasives Survey

Survey Area: INV-B23 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 40% | 0% |
| Saplings/Shrubs | 7% | 15% | 47% |
| Herbaceous | 45% | 90% | 50% |
| Woody Vines | 0% | 3% | 0% |
| Average Percent Relative Invasive Cover: | | | 24% |

**Observed Invasive Species***

***Microstegium vimineum*** *, Rosa multiflora, Lonicera japonica*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B24 # of Veg. Strata: 3
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 5% | 0% |
| Saplings/Shrubs | 5% | 5% | 100% |
| Herbaceous | 60% | 80% | 75% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 58% |

**Observed Invasive Species***

***Microstegium vimineum*** *, Rosa multiflora, Lonicera japonica, Celastrus orbiculatus*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B25 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 90% | 0% |
| Saplings/Shrubs | 20% | 30% | 67% |
| Herbaceous | 7% | 15% | 47% |
| Woody Vines | 2% | 5% | 40% |
| Average Percent Relative Invasive Cover: | | | 38% |

**Observed Invasive Species***

*Lonicera japonica*, ***Rosa multiflora***, *Ligustrum sinense, Celastrus orbiculatus*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B26 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 5% | 60% | 8% |
| Herbaceous | 8% | 10% | 80% |
| Woody Vines | 2% | 15% | 13% |
| Average Percent Relative Invasive Cover: | | | 25% |

**Observed Invasive Species***

*Elaeagnus umbellata, Celastrus orbiculatus*, ***Lonicera japonica***, *Glechoma hederacea, Rosa multiflora, Hedera helix*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B27
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 95% | 0% |
| Saplings/Shrubs | 0% | 20% | 0% |
| Herbaceous | 50% | 80% | 63% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 16% |

**Observed Invasive Species***

***Alliaria petiolata*** , *Microstegium vimineum, Lonicera japonica*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B28
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 60% | 0% |
| Saplings/Shrubs | 10% | 30% | 33% |
| Herbaceous | 15% | 30% | 50% |
| Woody Vines | 2% | 5% | 40% |
| Average Percent Relative Invasive Cover: | | | 31% |

**Observed Invasive Species***

***Lonicera japonica*** , ***Celastrus orbiculatus*** , *Alliaria petiolata, Potentilla indica, Berberis thunbergii, Lonicera sp. (minimal), Rosa multiflora, Elaeagnus umbellata*

*Most prevalent invasive species are bolded

Not Final

### Mill Swamp Invasives Survey

Survey Area: INV-B29
# of Veg. Strata: 2
Staff: RF, DP
Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 3% | 25% | 12% |
| Herbaceous | 75% | 98% | 77% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 44% |

**Observed Invasive Species***

*Alliaria petiolata*, ***Microstegium vimineum, Phalaris arundinacea***

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B30
# of Veg. Strata: 4
Staff: RF, DP
Date: 5/23/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 50% | 0% |
| Saplings/Shrubs | 10% | 25% | 40% |
| Herbaceous | 10% | 40% | 25% |
| Woody Vines | 50% | 65% | 77% |
| Average Percent Relative Invasive Cover: | | | 35% |

**Observed Invasive Species***

*Lonicera japonica*, ***Celastrus orbiculatus*** *, Rosa multiflora, Alliaria petiolata, Privet sp.*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B31 # of Veg. Strata: 4
Staff: RF, DP Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 30% | 0% |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 3% | 10% | 30% |
| Woody Vines | 60% | 70% | 86% |
| Average Percent Relative Invasive Cover: | | | 35% |

**Observed Invasive Species***

*Lonicera japonica*, ***Celastrus orbiculatus*** , *Rosa multiflora*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B32 # of Veg. Strata: 3
Staff: RF, DP Date: 5/23/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 5% | 20% | 25% |
| Herbaceous | 60% | 100% | 60% |
| Woody Vines | 5% | 5% | 100% |
| Average Percent Relative Invasive Cover: | | | 62% |

**Observed Invasive Species***

*Microstegium vimineum*, ***Phalaris arundinacea*** , *Rosa multiflora, Lonicera japonica*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B33 | # of Veg. Strata: 3

Staff: RF, DP | Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 40% | 0% |
| Saplings/Shrubs | 10% | 50% | 20% |
| Herbaceous | 60% | 80% | 75% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 32% |

**Observed Invasive Species***

***Celastrus orbiculatus*** , *Microstegium vimineum, Lonicera japonica, Rubus phoenicolasius*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B34 | # of Veg. Strata: 3

Staff: RF, DP | Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 35% | 0% |
| Saplings/Shrubs | 15% | 30% | 50% |
| Herbaceous | 45% | 60% | 75% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 42% |

**Observed Invasive Species***

***Lonicera japonica*** , *Celastrus orbiculatus, Rubus phoenicolasius, Rosa multiflora*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B35 # of Veg. Strata: 3
Staff: RF, DP Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 98% | 0% |
| Saplings/Shrubs | 0% | 20% | 0% |
| Herbaceous | 3% | 5% | 60% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 20% |

**Observed Invasive Species***

***Celastrus orbiculatus***

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B36 # of Veg. Strata: 4
Staff: RF, DP Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 35% | 0% |
| Saplings/Shrubs | 3% | 10% | 30% |
| Herbaceous | 80% | 95% | 84% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 29% |

**Observed Invasive Species***

*Celastrus orbiculatus, Rosa multiflora,* ***Lonicera japonica*** *,* ***Microstegium vimineum*** *, Alliaria petiolata (minimal)*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B37 # of Veg. Strata: 4
Staff: RF, DP Date: 6/2/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 85% | 0% |
| Saplings/Shrubs | 0% | 45% | 0% |
| Herbaceous | 70% | 85% | 82% |
| Woody Vines | 0% | 3% | 0% |
| Average Percent Relative Invasive Cover: | | | 21% |

**Observed Invasive Species***

*Celastrus orbiculatus, Rosa multiflora,* ***Lonicera Japonica*** *, Microstegium vimineum*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B38 # of Veg. Strata: 3
Staff: RF, DP Date: 6/2/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 5% | 0% |
| Saplings/Shrubs | 0% | 65% | 0% |
| Herbaceous | 18% | 25% | 72% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 24% |

**Observed Invasive Species***

***Murdannia keisak***

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B39
# of Veg. Strata: 3
Staff: RF, DP
Date: 6/2/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 5% | 0% |
| Saplings/Shrubs | 0% | 7% | 0% |
| Herbaceous | 85% | 100% | 85% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 28% |

**Observed Invasive Species***

***Glechoma hederacea*** *,* ***Microstegium vimineum*** *, Rosa multiflora, Celastrus orbiculatus, Lonicera japonica*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B40
# of Veg. Strata: 4
Staff: RF, DP
Date: 6/2/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 3% | 10% | 30% |
| Herbaceous | 70% | 95% | 74% |
| Woody Vines | 0% | 15% | 0% |
| Average Percent Relative Invasive Cover: | | | 26% |

**Observed Invasive Species***

*Glechoma hederacea, Microstegium vimineum, Rosa multiflora,* ***Lonicera japonica*** *, Potentilla indica, Celastrus orbiculatus (minimal)*

*Most prevalent invasive species are bolded

# Not Final

**Mill Swamp Invasives Survey**

Survey Area: INV-B41
# of Veg. Strata: 1
Staff: RF, DP
Date: 6/2/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 0% | - |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 30% | 100% | 30% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 30% |

**Observed Invasive Species***

***Glechoma hederacea*** *, Microstegium vimineum, Potentilla indica (minimal)*

*Most prevalent invasive species are bolded

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**Mill Swamp Invasives Survey**

Survey Area: INV-B42
# of Veg. Strata: 4
Staff: RF, DP
Date: 6/2/2025

| **Stratum** | **% Absolute Invasive Cover** | **% Absolute Total Cover** | **% Relative Invasive Cover** |
|---|---|---|---|
| Trees | 0% | 70% | 0% |
| Saplings/Shrubs | 5% | 25% | 20% |
| Herbaceous | 35% | 50% | 70% |
| Woody Vines | 1% | 5% | 20% |
| Average Percent Relative Invasive Cover: | | | 28% |

**Observed Invasive Species***

***Celastrus orbiculatus*** *, Microstegium vimineum, Rosa multiflora*

*Most prevalent invasive species are bolded

Not Final

### Mill Swamp Invasives Survey

Survey Area: INV-B43
# of Veg. Strata: 4
Staff: RF, DP
Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 90% | 0% |
| Saplings/Shrubs | 0% | 40% | 0% |
| Herbaceous | 3% | 20% | 15% |
| Woody Vines | 0% | 2% | 0 |
| Average Percent Relative Invasive Cover: | | | 4% |

**Observed Invasive Species***

***Celastrus orbiculatus*** *, Microstegium vimineum (minimal)*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B44
# of Veg. Strata: 3
Staff: RF, DP
Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 65% | 0% |
| Saplings/Shrubs | 0% | 20% | 0% |
| Herbaceous | 82% | 90% | 91% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 30% |

**Observed Invasive Species***

***Microstegium vimineum*** *, Lonicera japonica, Celastrus orbiculatus, Ligustrum sinense (minimal)*

*Most prevalent invasive species are bolded

Not Final

### Mill Swamp Invasives Survey

Survey Area: INV-B45 # of Veg. Strata: 2
Staff: RF, DP Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 60% | 0% |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 70% | 85% | 82% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 41% |

**Observed Invasive Species***

***Murdannia keisak*** , *Microstegium vimineum (minimal)*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B46 # of Veg. Strata: 3
Staff: RF, DP Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 5% | 0% |
| Saplings/Shrubs | 0% | 5% | 0% |
| Herbaceous | 75% | 98% | 77% |
| Woody Vines | 0% | 0% | - |
| Average Percent Relative Invasive Cover: | | | 26% |

**Observed Invasive Species***

*Microstegium vimineum,* ***Murdannia keisak*** , *Rosa multiflora (minimal)*

*Most prevalent invasive species are bolded

### Mill Swamp Invasives Survey

Survey Area: INV-B47
# of Veg. Strata: 4
Staff: RF, DP
Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 45% | 0% |
| Saplings/Shrubs | 0% | 15% | 0% |
| Herbaceous | 90% | 95% | 95% |
| Woody Vines | 0% | 2% | 0 |
| Average Percent Relative Invasive Cover: | | | 24% |

**Observed Invasive Species***

***Microstegium vimineum*** , *Murdannia keisak (minimal)*

*Most prevalent invasive species are bolded

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### Mill Swamp Invasives Survey

Survey Area: INV-B48
# of Veg. Strata: 4
Staff: RF, DP
Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 55% | 0% |
| Saplings/Shrubs | 0% | 35% | 0% |
| Herbaceous | 85% | 95% | 89% |
| Woody Vines | 0% | 5% | 0% |
| Average Percent Relative Invasive Cover: | | | 22% |

**Observed Invasive Species***

***Microstegium vimineum*** , *Lonicera japonica (minimal)*

*Most prevalent invasive species are bolded

## Mill Swamp Invasives Survey

Survey Area: INV-B49
# of Veg. Strata: 2
Staff: RF, DP
Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 5% | 0% |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 82% | 97% | 85% |
| Woody Vines | 0% | 0% | - |

Average Percent Relative Invasive Cover: 42%

**Observed Invasive Species***

***Murdannia keisak*** , *Microstegium vimineum*

*Most prevalent invasive species are bolded

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## Mill Swamp Invasives Survey

Survey Area: INV-B50
# of Veg. Strata: 2
Staff: RF, DP
Date: 6/2/2025

| Stratum | % Absolute Invasive Cover | % Absolute Total Cover | % Relative Invasive Cover |
|---|---|---|---|
| Trees | 0% | 10% | 0% |
| Saplings/Shrubs | 0% | 0% | - |
| Herbaceous | 15% | 75% | 20% |
| Woody Vines | 0% | 0% | - |

Average Percent Relative Invasive Cover: 10%

**Observed Invasive Species***

***Glechoma hederacea*** , *Microstegium vimineum (minimal)*

*Most prevalent invasive species are bolded

# ATTACHMENT C

# PHOTO DOCUMENTATION

Photo 1: INV-A01, facing north.

Photo 2: INV-A02, facing west.

Photo 3: INV-A03, facing east.

Photo 4: INV-A04, facing west.

Photo 5: INV-A05, facing east.

Photo 6: INV-A06, facing north.

Photo 7: INV-A07, facing East.

Photo 8: INV-A08, facing east.

Photo 9: INV-A09, facing east.

Photo 10: INV-A10, facing west.

Photo 11: INV-A11, facing southwest.

Photo 12: INV-A12, facing north.

Photo 13: INV-A13, facing east.

Photo 14: INV-A14, facing east.

Photo 15: INV-A15, facing west.

Photo 16: INV-A16, facing west.

Photo 17: INV-A17, facing west.

Photo 18: INV-A18, facing west.

Photo 19: INV-A19, facing west.

Photo 20: INV-A20, facing west.

Photo 21: INV-A21, facing east.

Photo 22: INV-A22, facing northwest.

Not Final

Photo 23: INV-A23, facing west.

Photo 24: Mowed turfgrass, formerly INV-A24, facing south.

Photo 25: INV-A25, facing east.

Photo 26: INV-A26, facing east.

Photo 27: INV-B01, facing northwest.

Photo 28: INV-B02, facing northwest.

Photo 29: INV-B03, facing east.

Photo 30: INV-B04, facing west.

Photo 31: INV-B05, facing northeast

Photo 32: INV-B06, facing northeast.

Photo 33: INV-B07, facing southwest.

Photo 34: INV-B08, facing southwest.

Photo 35: INV-B09, facing south.

Photo 36: INV-B10, facing northwest.

Photo 37: INV-B10, facing west.

Photo 38: INV-B11, facing southeast.

Photo 39: INV-B12, facing northeast.

Photo 40: INV-B13, facing southeast.

Photo 41: INV-B14, facing northeast.

Photo 42: INV-B15, facing east.

Photo 43: INV-B16, facing southeast.

Photo 44: INV-B17, facing south.

Photo 45: INV-B18, facing northeast.

Photo 46: INV-B19, facing northwest.

Photo 47: INV-B20, facing west.

Photo 48: INV-B21, facing northeast.

Photo 49: INV-B21, facing west.

Photo 50: INV-B22, facing south.

Photo 51: INV-B23, facing north.

Photo 52: INV-B24, facing east.

Photo 53: INV-B25, facing east.

Photo 54: INV-B26, facing northeast.

Photo 55: INV-B27, facing south.

Photo 56: INV-B28, facing east.

Photo 57: INV-B28, facing south.

Photo 58: INV-B29, facing west.

Photo 59: INV-B30, facing south.

Photo 60: INV-B30, facing west.

Photo 61: INV-B31, facing northwest.

Photo 62: INV-B32, facing southeast.

Photo 63: INV-B33, facing southeast.

Photo 64: INV-B34, facing northeast.

Photo 65: INV-B35, facing southwest.

Photo 66: INV-B36, facing north.

Photo 67: INV-B37, facing east.

Photo 68: INV-B38, facing north.

Photo 69: INV-B39, facing northeast.

Photo 70: INV-B40, facing g north.

Photo 71: INV-B41, facing southwest.

Photo 72: INV-B42, facing northeast.

Photo 73: INV-B43, facing west.

Photo 74: INV-B44, facing south.

Photo 75: INV-B45, facing west.

Photo 76: INV-B46, facing west.

Photo 77: INV-B47, facing south.

Photo 78: INV-B48, facing west.

Photo 79: INV-B49, facing east.

Photo 80: INV-B50, facing southwest.

# APPENDIX E.12
# HISTORIC AND CULTURAL RESOURCES

2022 00477

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RECEIVED
JAN 24 2022
By

January 19, 2022

Maryland Historical Trust
Division of Historical and Cultural Programs
100 Community Place
Crownsville, MD 21032-2023

Attn: Ms. Beth Cole
Administrator, Review and Compliance

RE. Mill Swamp Ecological Uplift Project
Charles County, Maryland
JMT Job No. 19-03123-000

Dear Ms. Cole,

Johnson, Mirmiran & Thompson (JMT) is proposing stream and wetland mitigation activities to enhance overall water quality and stream stability along Mill Swamp in Charles County, Maryland. Practices to be implemented include stream restoration, wetland buffer enhancement, and wetland buffer preservation. Implementation of these practices will require disturbance to active stream channels and/or wetlands; however, the end result will be improvements to water quality in the drainage area.

Previously, your office reviewed the original limits of the project area. A response was received from your office on August 18, 2021, in which it was stated that "the Maryland Historical Trust has determined that there are no historic properties affected by this undertaking" (see attached). Since the time of that response, the project area has been revised to include two additional parcels, as shown on the updated map included for your reference. Please accept this correspondence as a request for an evaluation for the presence of any historical sites, archeological sites, or unique features within the two parcels not previously reviewed by your office. Based on your review, we request an opinion as to whether an archeological investigation is warranted. If additional information is required, please do not hesitate to contact me at 443-862-4038 or GBoone@jmt.com

Very truly yours,

JOHNSON, MIRMIRAN & THOMPSON, INC.

Ginny Boone
Environmental Scientist

The Maryland Historical Trust has determined that there are no historic properties affected by this undertaking.

Dixie Henry Date 2/17/2022

Cc:
Scott Woodall, P.E. (JMT)
Mike Calvin, P.E. (JMT)

Enclosures

BH 2/17/22

# APPENDIX E.13
# THREATENED AND ENDANGERED SPECIES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To:
Project Code: 2025-0096889
Project Name: Mill Swamp Mitigation Bank

05/14/2025 19:13:51 UTC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

**Migratory Birds**: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

# OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

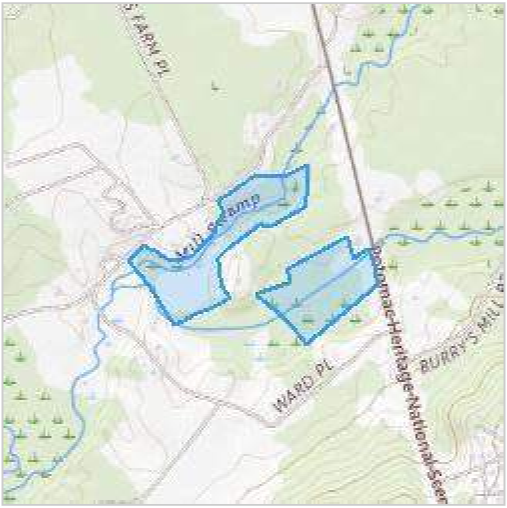
**Chesapeake Bay Ecological Services Field Office**
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
(410) 573-4599

## PROJECT SUMMARY

| | |
|---|---|
| Project Code: | 2025-0096889 |
| Project Name: | Mill Swamp Mitigation Bank |
| Project Type: | Mitigation Development/Review - Mitigation or Conservation Bank |
| Project Description: | Johnson, Mirmiran & Thompson (JMT) is proposing stream and wetland mitigation activities to enhance overall water quality and stream stability along Mill Swamp in Charles County, Maryland. Practices to be implemented include stream restoration, wetland enhancement and restoration, and wetland buffer preservation. |

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.65405125,-77.07891663463836,14z



Counties: Charles County, Maryland

# ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

| NAME | STATUS |
|---|---|
| Northern Long-eared Bat *Myotis septentrionalis*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9045 | Endangered |
| Tricolored Bat *Perimyotis subflavus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/10515 | Proposed Endangered |

## INSECTS

| NAME | STATUS |
|---|---|
| Monarch Butterfly *Danaus plexippus*<br>There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/9743 | Proposed Threatened |

## CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

# USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

# WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1A
- PSS1C
- PFO1E

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1F

RIVERINE

- R5UBH

# IPAC USER CONTACT INFORMATION

| | |
|---|---|
| Agency: | Private Entity |
| Name: | Erin Markel |
| Address: | 40 Wight Avenue |
| City: | Hunt Valley |
| State: | MD |
| Zip: | 21009 |
| Email | emarkel@jmt.com |
| Phone: | 4104593959 |

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Wes Moore, Governor
Aruna Miller, Lt. Governor
Josh Kurtz, Secretary
David Goshorn, Deputy Secretary

June 18, 2025

Ms. Erin  Markel
Johnson, Mirmiran & Thompson, Inc.
40 Wight Avenue
Hunt Valley, MD 21030

**RE: Environmental Review for Mill Swamp Mitigation Bank, off Fenwick Road, Charles County, Maryland**

Dear Ms. Markel:

The Wildlife and Heritage Service has no official records for State or Federal listed, candidate, proposed, or rare plant or animal species within the project area shown on the map provided. As a result, we have no specific concerns regarding potential impacts to such species or recommendations for protection measures at this time.

We would like to point out, however, that our remote analysis suggests that the forested area on this property contains Forest Interior Dwelling Species (FIDS) habitat, especially for birds. Populations of many bird species which depend on this type of forested habitat are declining in Maryland and throughout the Eastern United States. The declines in FIDS populations have been attributed in part to the loss and fragmentation of forests due largely to urbanization, agriculture, and some forest management practices. The key to maintaining suitable breeding habitat for FIDS, and halting or reversing their declines, is the protection of extensive, unbroken forested areas throughout the region. The conservation of FIDS habitat throughout Maryland is strongly encouraged by the Wildlife and Heritage Service.

If the project changes in the future such that the limits of proposed disturbance or overall site boundaries are modified, please provide us with revised project maps and we will provide you with an updated evaluation. Thank you for allowing us the opportunity to review this project.  If you should have any further questions regarding this information, please contact me at lori.byrne@maryland.gov or at (410) 260-8573.

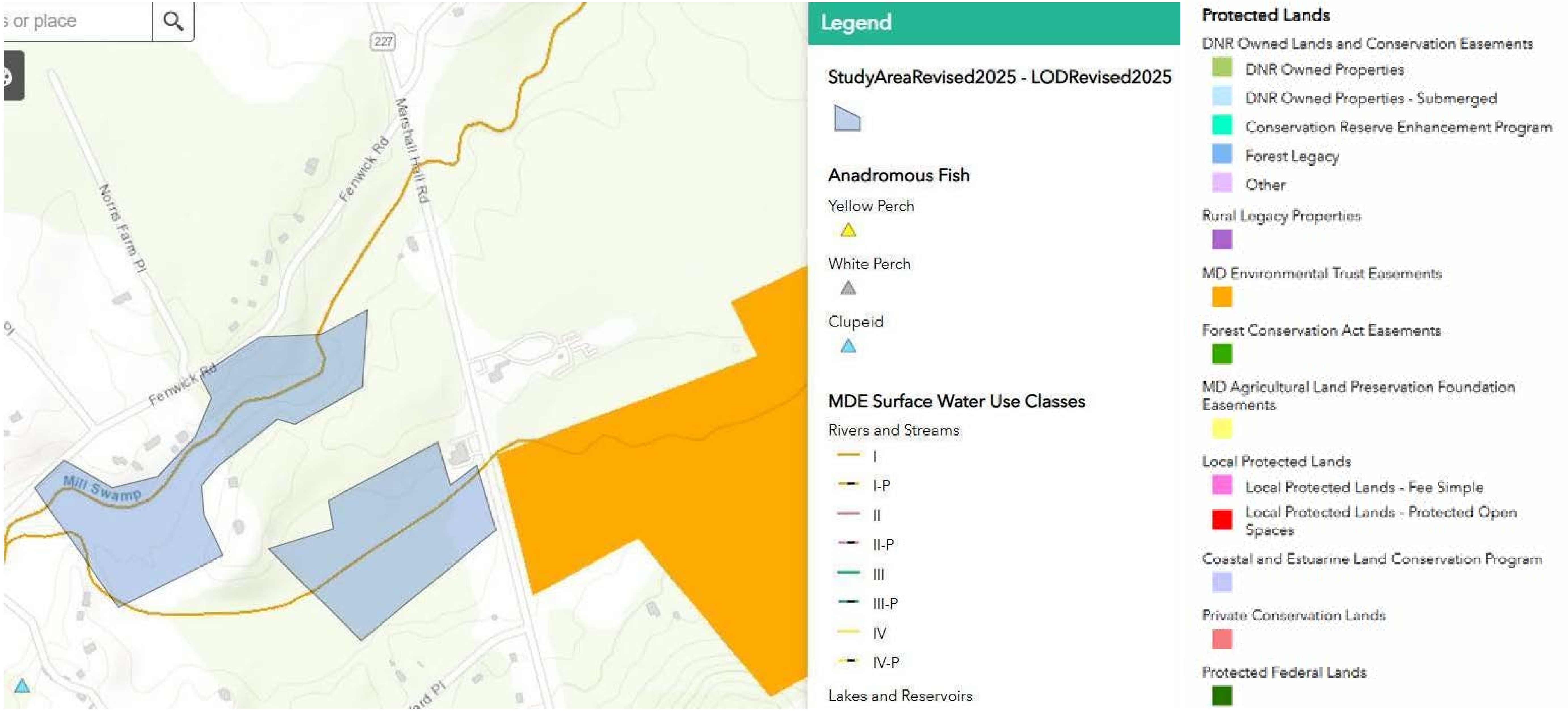
Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2025.1093.ch

MDNR Environmental Review Program Aquatic Reesources Pre-Screening Tool (May 14, 2025)



MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Jeannie Haddaway-Riccio, Secretary
Allan Fisher, Deputy Secretary

January 28th, 2022

Ginny Boone
JMT
40 Wight Ave.,
Hunt Valley MD, 21030

Subject: Fisheries Scoping Information for the Mill Swamp Ecological Uplift Project
Charles County, Maryland
JMT Job No. 19-03123-000

Dear Ginny;
The above referenced project site has been rereviewed taking into account the expanded project limits to determine fisheries species near the proposed project areas. The project proposes to perform stream restoration, wetland buffer enhancement and buffer preservation within the Mill Swamp Creek stream corridor.

This project will impact Mill Swamp and an unnamed tributary to Mill Swamp which are classified as a Use I streams with records of anadromous fish within the watershed. For any proposed in-stream work, no work should be allowed from March 1st through June 15th of any given year to protect any spawning fish including anadromous species. The Department would ask that the applicant strictly adhere to the approved sediment and erosion control plan during all construction activities.

Species documented by our Maryland Biological Stream Survey in this, and other nearby streams can be accessed via the MDDNR web page at http://streamhealth.maryland.gov.

Please note that this fisheries review is for scoping purposes only and does not constitute a full environmental review by the Department of Natural Resources Environmental Review Program. Once a final permit application has been submitted with a full set of plans to MDE, a determination will be made if further review by the MDDNR Environmental Review Program is warranted.

If you have any further questions, please feel free to contact me at 410 260-8736.

Sincerely;

Christopher Aadland

Christopher Aadland
Environmental Review Program