Prepared for:

Anne Arundel County
Department of Public Works

Peninsula Park Expansion Lake Ogleton Tributary Construction Monitoring Report

April 2025

Prepared by:

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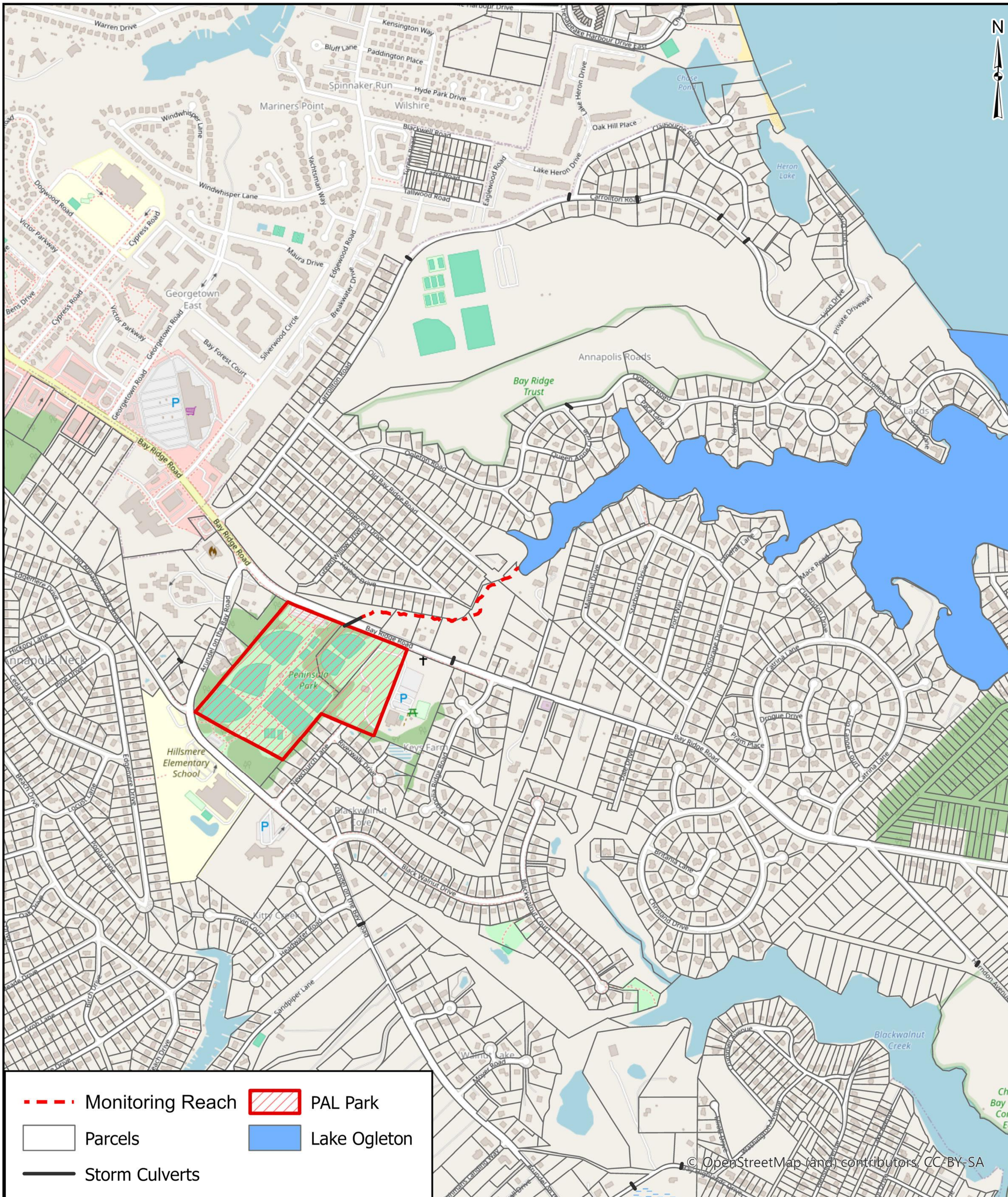
1. INTRODUCTION

1.1. Overview

The Anne Arundel County Department of Public Works (DPW) contracted BayLand Consultants & Designers, Inc. (BayLand) to perform monitoring of the Lake Ogleton Tributary in the Severn River Watershed in Annapolis, Maryland. The monitoring effort was intended to document and assess any impacts to downstream receiving waters resulting from land disturbance associated with the Phase 1 Peninsula Athletic League (PAL) Park Expansion Project.

The monitoring area included the Lake Ogleton Tributary from an outfall off Bay Ridge Road to a rock-weir structure at the tidal interface with Lake Ogleton, as well as the headwaters of Lake Ogleton. The project vicinity is shown in Figure 1. Monitoring services included topographic and bathymetric surveys before and after construction, as well as visual assessment and photographic documentation before, during, and after construction.

This report is intended to provide an overview of existing site conditions, outline the monitoring methodology utilized, and detail the results of data collection efforts.



0 500 1,000 2,000

Feet

1in = 1000 Feet

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Lake Ogleton Tributary Monitoring
Figure 1 - Vicinity Map

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1.2. Background

The PAL Park Expansion is a Capital Improvement Project (CIP) initiated by Anne Arundel County. The project involves reconfiguration of athletic fields, expansion of parking facilities, construction of stormwater management (SWM) infrastructure, and installation of associated site improvements. Phase 1 construction earthwork operations began in February 2024 and concluded in February 2025. The project experienced multiple delays during construction, resulting in an approximate six-month extension to the schedule.

The Lake Ogleton Tributary functions as the primary drainage conveyance for PAL Park. The tributary originates within the park boundary, flows beneath Bay Ridge Road, and continues downstream for approximately 1,550 linear feet (LF) before reaching a rock-weir structure near the tidal interface with Lake Ogleton.

Lake Ogleton is a tidal embayment located within the Severn River Watershed. It supports a range of recreational uses including boating, kayaking, and fishing, and plays a vital role in the ecological health of the Severn River and the larger Chesapeake Bay Watershed. Due to its recreational, ecological, and aesthetic value, protecting the waterbody is a shared priority among a variety of stakeholders including residents, watershed advocacy groups, and government agencies.

Due to stakeholder concern regarding the potential for construction-related impacts to downstream waters such as increased sedimentation, altered flow regimes, and changes in channel morphology, Anne Arundel County contracted BayLand to develop and implement a structured monitoring plan. The goal was to establish a comprehensive understanding of baseline (pre-construction) conditions and detect any physical changes to the tributary or Lake Ogleton during and after construction. The information is intended to support the evaluation of whether construction activities associated with the PAL Park Expansion have resulted in measurable physical changes to the tributary or Lake Ogleton and to inform ongoing management or mitigation decisions by Anne Arundel County and other stakeholders.

2. EXISTING CONDITIONS

BayLand conducted an existing conditions assessment to establish a documented baseline of site characteristics prior to construction. The assessment included field and desktop investigation as well as review of previous watershed studies including the 2005 *Lake Ogleton Watershed Assessment Findings Report* (BayLand, July 2005).

The 2005 assessment was conducted to identify geomorphic instabilities and sediment sources contributing to downstream water quality impairment. The study found approximately 600 LF of the Lake Ogleton Tributary to be unstable, warranting restoration efforts to reduce sediment erosion. Additionally, a chronic erosion feature was identified at the terminus of Old Bay Ridge Road where inadequate drainage infrastructure and legacy impacts from an abandoned railroad embankment had caused localized subsidence and sinkhole formation. In 2015, the embankment was breached and replaced with a step-pool stormwater conveyance (SPSC) system consisting of a series of rock-weirs and pools.

2.1. Watershed Description

The contributing drainage area to the Lake Ogleton Tributary is approximately 0.22 square miles with 32 percent impervious cover (StreamStats, April 2025) (Appendix A). The tributary is located within the Severn River Watershed (MD Basin Code 02-13-10-02), which encompasses approximately 81 square miles (51,840 acres) with 19 percent impervious area (Anne Arundel County, n.d.).

The Severn River Watershed, located in Anne Arundel County, Maryland, was first identified on the 1996 Section 303(d) List submitted by the Maryland Department of the Environment (MDE) to the U.S. Environmental Protection Agency (EPA) as impaired by nutrients, sediment, and fecal coliform in its tidal portions (MDE, 2008). In 2002, the listing was expanded to include impairments to biological communities (MDE, 2008). In response, Total Maximum Daily Loads (TMDLs) were developed and approved to address specific pollutants. TMDLs for fecal coliform in shellfish harvesting areas, including Whitehall and Meredith Creeks, Mill Creek, and the Severn River mainstem, were approved by the EPA on April 10, 2008 (MDE, 2008). A TMDL for polychlorinated biphenyls (PCBs) in shellfish areas of the Severn River was later approved on July 19, 2016 (MDE, 2016). Additionally, the Severn River Watershed is part of the broader Chesapeake Bay TMDL, which was approved on December 29, 2010, to address nutrient and sediment impairments across the Bay watershed (EPA, 2010). As of the most recent updates, TMDLs specifically addressing the biological impairments listed in 2002 have not yet been developed (MDE, 2008).

2.2. Physiography

The site is located within the Atlantic Coastal Plain physiographic province, specifically in the Annapolis Estuaries and Lowlands District (512200) (Maryland Geological Survey, 2008). This landform is characterized by relatively featureless lowlands, generally below 50 feet in elevation, along the west-central shore of the Chesapeake Bay. Compared to the Aberdeen Lowland the region exhibits a less irregular coastline, attributed to the narrower mouths of the Magothy, Severn, South, Rhode, and West Rivers.

The underlying lithology consists predominantly of fine to medium micaceous sand and gravel, with lesser amounts of silt and clay, reflecting the unconsolidated sedimentary deposits typical of the Atlantic Coastal Plain (Maryland Geological Survey, 2008).

2.3. Soils

Soils within the watershed were characterized using the United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) Web Soil Survey (Appendix B). The dominant soils include the Annapolis-Urban land complex, which is well-drained with a parent material of glauconitic loamy fluviomarine deposits, and the Patapsco-Fort Mott-Urban land complex and Downer-Hammonton-Urban land complex, which are somewhat excessively drained and composed of sandy eolian deposits over loamy fluviomarine deposits (USDA-NRCS, accessed 2025).

2.4. Tributary Description

A site walk was conducted on January 3, 2024, during which photo points and monitoring monuments for longitudinal profile and cross-section surveys were established. Additional details on the monitoring effort are provided in Section 3 including a figure depicting the monitoring locations (Figure 3). A brief summary of existing conditions observed during the site walk along with representative photographs is provided below.

The portion of the Lake Ogleton Tributary that was selected for monitoring originates northeast of PAL Park at a 60-inch by 38-inch RCCP elliptical culvert and continues downstream to a rock-weir structure at the tidal interface with Lake Ogleton.

The 60-inch by 38-inch RCCP culvert functions as the primary hydraulic conveyance for stormwater runoff originating from PAL Park (Photo 1). An additional 42-inch reinforced concrete pipe (RCP) provides secondary inflow to the tributary from the Bay Ridge Road drainage area (Photo 2). The primary RCCP outfall is equipped with a cast-in-place concrete headwall, which appeared structurally sound and exhibited no observable signs of distress or deterioration at the time of inspection. Immediately downstream of the culvert there is a one- to two-foot deep head cut, followed by approximately 80 LF of riprap lining (Photo 3). Beyond the limit of the riprap, there is an approximate four-foot-deep head cut that is propagating upstream (Photo 4).

Photo 1 – 60-inch x 38-inch RCCP elliptical outfall

Photo 2 – 42-inch RCP outfall


Photo 3 – Riprap protection, oriented downstream


Photo 4 – Head cut in channel, oriented upstream

Downstream of the head cut the tributary consists of a single-thread channel characterized by channel incision and bank erosion (Photos 5 and 6) (Figure 3, Photo Points 1, 2, 3, and 4). Progressive downcutting has increased in-channel discharge capacity, reduced floodplain attenuation, diminished hydraulic complexity, and stressed floodplain vegetation due to prolonged disconnection. Bank heights range from approximately 0.5 to 4 feet and are composed primarily of fine to medium sand and silt. LO Cross Sections 1, 2, and 3 are located along this portion of the reach.

Where the valley gradient decreases and the floodplain widens, reduced stream power facilitates greater lateral exchange between the channel and floodplain. There is increased deposition within the stream bed and bank heights range from approximately 0.5 to 1.0 feet, allowing for more frequent overbank flows and enhanced floodplain connectivity (Photo 7) (Figure 3, Photo Points 5 and 6). LO Cross Sections 4 and 5 are situated within this segment of the reach.

Further downstream the tributary transitions into a reach characterized by aggradation driven by the local sediment supply upstream (Photo 8) (Figure 3, Photo Point 7), before it reaches a backwater pool. LO Cross Section 6 is located within this portion of the reach.

The backwater pool is formed by the upstream-most rock-weir structure of the SPSC system that was installed in 2015. The rock-weir structure is a low-profile grade control feature composed of stacked rock and concrete blocks (Photo 9) (Figure 3, Photo Point 8). The concrete blocks are exhibiting signs of physical deterioration, including surface cracking, which may compromise their structural integrity over time. Continued monitoring is recommended to evaluate the progression of degradation and determine if maintenance or replacement is necessary.

A corrugated plastic pipe (CPP) has been installed through the weir to regulate water levels and prevent excessive ponding or upstream flooding associated with beaver activity. The pool upstream of the weir functions as a sediment sink, capturing fine sediments and organic material under base flow conditions. However, during high-flow storm events, sediment is likely transported through the weir to the downstream SPSC system (Photo 10).


Photo 5 – Reach representative photograph, oriented downstream


Photo 6 – Raw, vertical left bank, oriented downstream


Photo 7 – Reach representative photograph, oriented downstream


Photo 8 – Reach representative photograph, oriented downstream


Photo 9 – Rock-weir


Photo 10 – SPSC System downstream of rock-weir oriented downstream

2.5. Sediment Supply and Transport

In the Coastal Plain physiographic region, bedload sediment is primarily sourced from fluvially eroding channel banks, as documented by Gellis et al. (2006). Field investigations conducted along the tributary confirmed that sediment recruitment within the reach is predominantly driven by localized bank instability and in situ erosion processes.

2.6. Bankfull Discharge

Channel-forming or dominant discharge is the flow that transports the greatest quantity of sediment over time and shapes the average morphological characteristics of a stream channel. Bankfull discharge (Q_{bf}) is commonly used as a surrogate for dominant discharge to determine channel dimensions and hydraulic characteristics.

Q_{bf} is typically estimated using one or a combination of methods, including effective discharge (Q_{eff}), which represents the flow that moves the most sediment over time; bankfull field indicator discharge (Q_{fi}), which relies on field identification of bankfull features; recurrence interval discharge (Q_{ri}), which is a statistical flow event that typically occurs every one to two years; and regional curves (Q_{rc}), which establish empirical relationships between bankfull discharge and drainage area.

For the subject tributary the bankfull field indicator method (Q_{fi}) was employed to estimate Q_{bf} offering a site-specific evaluation of channel-forming flow conditions. Bankfull indicators were identified in the field during the site reconnaissance and used to inform channel parameters.

2.7. Stream Evolution Model (SEM)

Channel Evolution Models (CEMs) have historically been used to conceptualize how single-thread alluvial channels respond to disturbance through predictable sequences of morphological adjustment. Schumm et al. (1984) introduced a five-stage model describing channel succession from a stable configuration (Stage I), through incision (Stage II), widening (Stage III), aggradation and planform adjustment (Stage IV), to a new stable state at a lower elevation (Stage V). Simon and Hupp (1986) later added a sixth stage to represent a phase preceding incision. Thorne (1999) proposed an additional late-stage transition from straight or braided to meandering channels.

Cluer and Thorne (2014) further advanced these concepts by introducing the Stream Evolution Model (SEM) which integrates ecosystem function with channel evolution (Figure 2). Unlike traditional linear CEMs, the SEM presents evolution as a cyclical process and accounts for pre-disturbance multi-threaded systems, incorporating a precursor stage and two successor stages to represent later-stage changes.

For the subject tributary, the Cluer and Thorne SEM stage was identified to characterize its geomorphic condition and to inform interpretations of channel structure, vegetation, habitat, and ecosystem function.

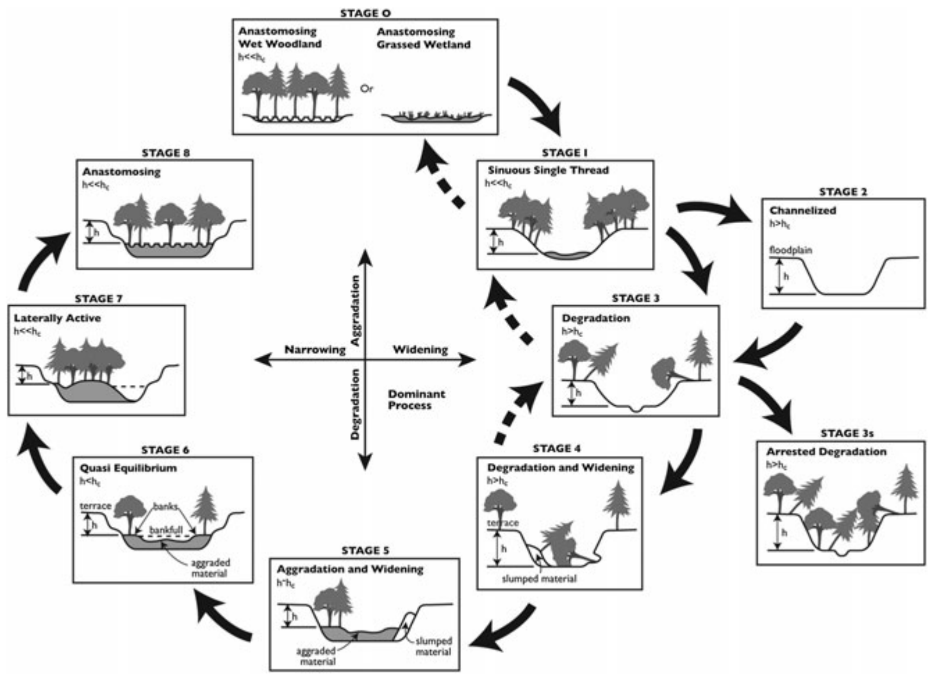

Figure 4. Stream Evolution Model based on combining the Channel Evolution Models in Figures 1–3, inserting a precursor stage to better represent pre-disturbance conditions, adding two successor stages to cover late-stage evolution and representing incised channel evolution as a cyclical rather than a linear phenomenon. Dashed arrows indicate 'short-circuits' in the normal progression, indicating for example that a Stage 0 stream can evolve to Stage 1 and recover to Stage 0, a Stage 4-3-4 short-circuit, which occurs when multiple head cuts migrate through a reach and which may be particularly destructive. Arrows outside the circle represent 'dead end' stages, constructed and maintained (2) and arrested (3s) where an erosion-resistant layer in the local lithology stabilizes incised channel banks

Figure 2 – Stream Evolution Model (Cluer and Thorne, 2014)

Most of the tributary can be considered in Cluer and Thorne 2014 SEM Stage 4 – Degradation and Widening. The reach exhibits active incision, unstable retreating banks, and a lack of floodplain connectivity. At this stage, the channel contains a wide range of flood peaks, while groundwater recharge and hyporheic exchange are largely impaired. Hydraulic diversity is low due to ongoing channel scour, and the system lacks the capacity to retain woody material. Sediment inputs increase significantly as bank retreat destabilizes channel margins. The aquatic plant community is impaired due to continued bed degradation, while riparian vegetation is often lost as the channel widens. In-stream habitat is limited, and habitat complexity is further reduced by bed degradation, resulting in low biodiversity. Water clarity, nutrient cycling, and thermal regulation also continue to be compromised in this stage, leaving the ecosystem highly vulnerable to disturbance.

3. MONITORING METHODOLOGY

Pre- and post-construction monitoring assessments were conducted in January 2024 and February 2025, respectively. These assessments included visual evaluations, photographic documentation, topographic and bathymetric surveys, and characterization of bed material. During the construction period, monthly and post-rainfall event site visits were performed consisting of visual assessments and photographic documentation to track site conditions and identify potential issues. Post-rainfall monitoring was initiated within 48 hours of precipitation events exceeding 1.00 inch in total accumulation.

3.1. Local Precipitation

Precipitation data analysis was performed using measurements from the National Oceanic and Atmospheric Administration (NOAA) Automated Surface Observing System (ASOS) at the Annapolis United States Naval Academy (Station ID: USW00013752) (NOAA, 2024) to correlate storm events with observed site conditions.

3.2. Photographic Documentation

Eight photograph locations were established along the tributary in January 2024 to serve as fixed reference points for comparative analysis in subsequent monitoring visits. The locations are shown in Figure 3 and photographs are included in Appendix C.

Photographic documentation was conducted during each site visit to establish a comprehensive visual record of existing conditions and overall channel stability. The collected images were analyzed to assess changes in bank stability and signs of degradation potentially associated with upstream construction activity. Imagery was also used to identify vegetation displaced or undermined by altered flow conditions and to monitor the floodplain for evidence of encroachment or disturbance resulting from construction-related impacts.

3.3. Geomorphology

Geomorphic assessment was conducted at the site pre- and post- construction. Field data collection activities were based on the methods described in *Stream Channel Reference Sites: An Illustrated Guide to Field Technique* (Harrelson et al., 1994).

3.3.1. Longitudinal Profile Survey

A representative longitudinal profile was surveyed along the tributary at the location shown in Figure 3 to characterize the slope and morphology of the stream. The field run topographic survey included recorded bed elevations, water depths, bed features along the thalweg.

3.3.2. Cross-Section Survey and Channel Dimension Analysis

Six cross-section locations (LO-1 to LO-6) were established along the tributary using monuments consisting of rebar and yellow caps at the locations shown in Figure 3. A cross-section survey was conducted to determine channel dimensions and hydraulic characteristics of the stream channel.

Using data collected from the cross-section survey, as well as the longitudinal profile survey and field-based bankfull determinations, bankfull channel dimension parameters were determined. For this monitoring study, the following parameters were analyzed:

- Cross-sectional area (A_{bkf})
- Bankfull channel width (W_{bkf})
- Maximum bankfull depth (D_{max})
- Mean bankfull depth (D_{bkf})
- Width-to-depth ratio (W_{bkf}/D_{bkf})

Given the observed instability of the tributary, the analysis prioritized key bankfull channel geometry metrics to establish baseline conditions and monitor changes over time. These parameters are essential for evaluating hydraulic performance and assessing geomorphic responses to storm events and upstream land disturbances. Long-term monitoring can reveal trends in erosion, sedimentation, and channel efficiency, and will help determine whether the geomorphic evolution diverges from existing conditions or anticipated trends outlined in Section 2.

3.3.3. Bed Material Characterization

To evaluate changes in dominant grain size within the channel, bed material was assessed using the modified Wolman pebble count methodology, following the approach outlined by Rosgen (1996). Two representative pebble counts were conducted across the full extent of the tributary, once during the pre-construction phase on January 3, 2024 and once during the post-construction phase on February 5, 2025.

3.4. Lake Ogleton Bathymetric Survey

BayLand utilized high-resolution bathymetric survey techniques to monitor and quantify sediment deposition dynamics at the tidal convergence zone of Lake Ogleton. A 43,145-square-foot area located downstream of the SPSC system was surveyed during the pre- and post-construction phases. The surveys were conducted to evaluate changes in bed elevation and perform sedimentation analysis.

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Lake Ogleton
Tributary Monitoring
Figure 3 - Monitoring Locations Map

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4. RESULTS

4.1. Local Precipitation

Per NOAA rain gage station Annapolis – United States Naval Academy ASOS, MD (Station ID: USW00013752), there were 10 precipitation events exceeding one inch of total rainfall during the monitoring period from January 1, 2024 to February 1, 2025. (NOAA, 2024) (Table 4-1).

Table 4-1 – Precipitation Events Greater than 1" at NOAA Site USW00013752

Date	Precipitation (inches)
1/6/2024	1.15
1/9/2024	2.23
1/28/2024	1.11
3/23/2024	2.22
4/3/2024	1.23
5/4/2024	1.36
6/30/2024	1.00
7/14/2024	1.01
8/17/2024	2.43
9/22/2024	1.47

Total monthly precipitation recorded at the NOAA rain gage station Annapolis – United States Naval Academy ASOS (Station ID: USW00013752) from project initiation in January 2024 through substantial completion on February 1, 2025, is provided in Table 4-2. Cumulative precipitation over this period totaled 39.6 inches.

Table 4-2 – Total Precipitation per Month at NOAA Site USW00013752	
Month	**Total Precipitation (inches)**
January 2024	5.90
February	1.46
March	5.41
April	2.61
May	3.52
June	1.35
July	3.79
August	7.46
September	2.28
October	0.30
November	1.86
December	2.48
January 2025	1.20
Total	39.62

4.2. Photographic Documentation

Appendix C provides photographic documentation collected before, during, and after the monitoring period. Baseline observations indicated that the upstream most +/-600 LF of the tributary exhibited signs of instability prior to construction, including visible erosion along channel banks.

Monitoring throughout the project duration confirmed that while some changes were observed such as increased lateral bank retreat, the changes were consistent with baseline channel instability rather than indicative of direct impacts from construction activities, except for observations noted during the April 4, 2024, monitoring visit.

During the April 4, 2024 monitoring visit, elevated turbidity levels were observed following a high-intensity rainfall event that coincided with active grading operations at the upstream construction site. The volume and velocity of stormwater runoff exceeded the capacity of the installed erosion and sediment control measures, leading to their failure and increased sediment delivery to the stream. The issue was promptly identified and addressed in coordination with project stakeholders. At the subsequent monitoring visit, no long-term impacts to the channel were observed.

4.3. Geomorphology

4.3.1. Longitudinal Profile Survey

The pre- and post-construction monitoring longitudinal profile survey results are shown in Figure 4-1, and the longitudinal bed slope and water surface slope are summarized in Table 4-3.

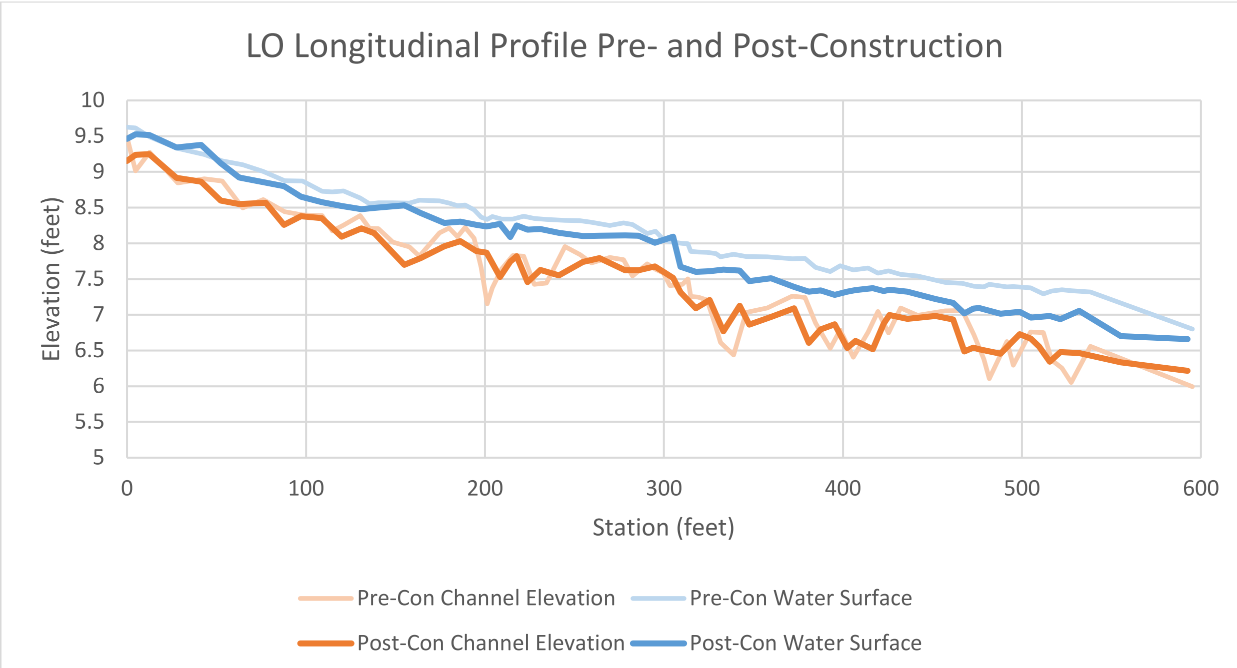

Figure 4-1 – LO Longitudinal Profile Pre- and Post-Construction

Table 4-3 – LO Longitudinal Profile		
Parameter	**Pre-Construction**	**Post Construction**
Overall bed slope, ft/ft	0.0053 ft/ft	0.0050 ft/ft
Overall water surface slope, ft/ft	0.4300 ft/ft	0.4700 ft/ft

Post-construction monitoring data indicates that there was a slight reduction in overall bed slope compared to pre-construction conditions, accompanied by an increase in water surface slope. The change in bed slope is reflective of the ongoing channel degradation at the upstream end that has decreased the bed elevation and sediment deposition at the downstream end that has raised the elevation, resulting in a flatter longitudinal gradient. However, the geomorphic changes may have also increased flow resistance leading to the steeper water surface slope.

4.3.2. Cross-Section Survey and Channel Dimension Analysis

Cross-section survey results and channel dimension parameters for each section are shown in Tables 4-4 to 4-9 and Figures 4-2 to 4-7.

LO Cross Section 1

Table 4-4 – Channel Dimension Parameters Cross Section 1		
Parameter	**Pre-Construction Conditions**	**Post Construction Conditions**
Cross-sectional area (A_{bkf})	1.9	3.5
Bankfull channel width (W_{bkf})	4.7	5.4
Maximum bankfull depth (D_{max})	0.5	0.7
Mean bankfull depth (D_{bkf})	0.4	0.6
Width/Depth Ratio (W_{bkf}/D_{bkf})	11.5	8.3

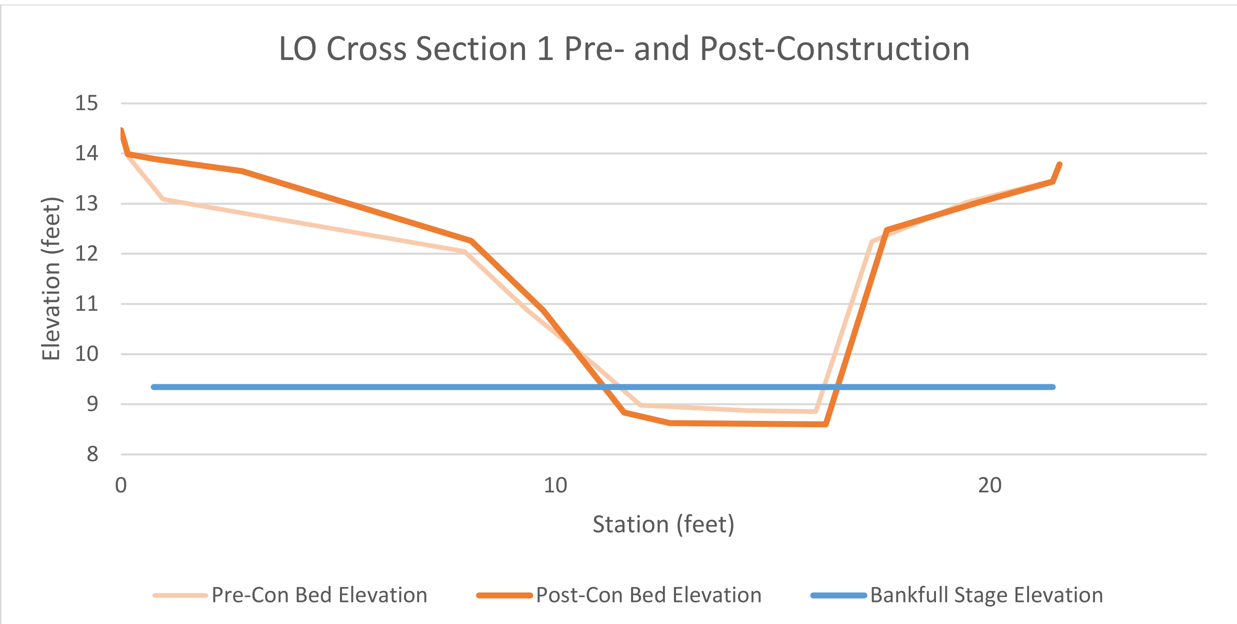

Figure 4-2 – LO Cross Section 1

At LO Cross Section 1, located near the upstream end of the reach, the cross-sectional area and channel depth increased from pre-construction conditions due to lateral retreat of the right bank and bed degradation. The cross-sectional area increased due to a 15% increase in channel width and a 0.2-foot increase in both maximum and mean depth. As a result, the width-to-depth ratio decreased by approximately 28%. The results corroborate the existing conditions assessment (Section 2) that indicated this portion of the channel is actively degrading and widening.

LO Cross Section 2

Table 4-5 – Channel Dimension Parameters Cross Section 2		
Parameter	**Pre-Construction Conditions**	**Post Construction Conditions**
Cross-sectional area (A_{bkf})	2.2	3.4
Bankfull channel width (W_{bkf})	5.2	5.5
Maximum bankfull depth (D_{max})	0.5	0.7
Mean bankfull depth (D_{bkf})	0.4	0.6
Width/Depth Ratio (W_{bkf}/D_{bkf})	12.5	8.9

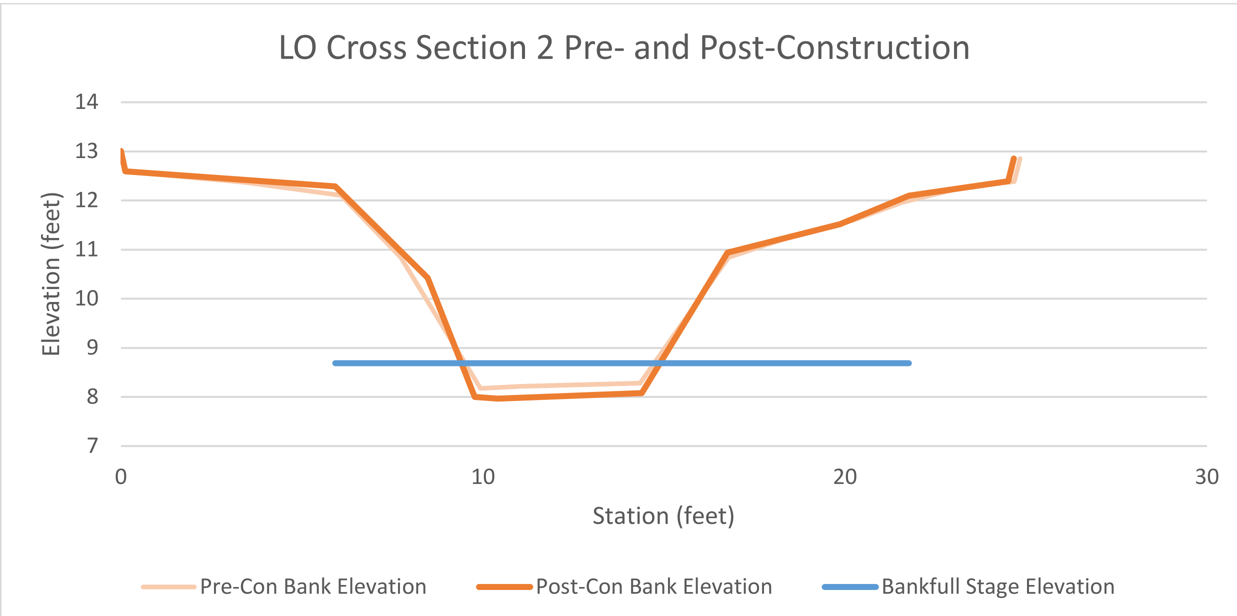

Figure 4-3 – LO Cross Section 2

Similar to LO Cross Section 1, LO Cross Section 2 exhibited an increase in cross-sectional area. Unlike Cross Section 1 where lateral bank retreat contributed significantly to the increase, the observed increase at Cross Section 2 is primarily due to vertical adjustment. Mean and maximum channel depths both increased by 0.2 feet, while channel width increased by only 6%. The deepening resulted in a 29% decrease in the width-to-depth ratio, further supporting evidence of active incision.

LO Cross Section 3

Table 4-6 – Channel Dimension Parameters Cross Section 3		
Parameter	**Pre-Construction Conditions**	**Post Construction Conditions**
Cross-sectional area (A_{bkf})	1.9	2.6
Bankfull channel width (W_{bkf})	6.2	6.4
Maximum bankfull depth (D_{max})	0.5	0.6
Mean bankfull depth (D_{bkf})	0.3	0.4
Width/Depth Ratio (W_{bkf}/D_{bkf})	20.2	15.7

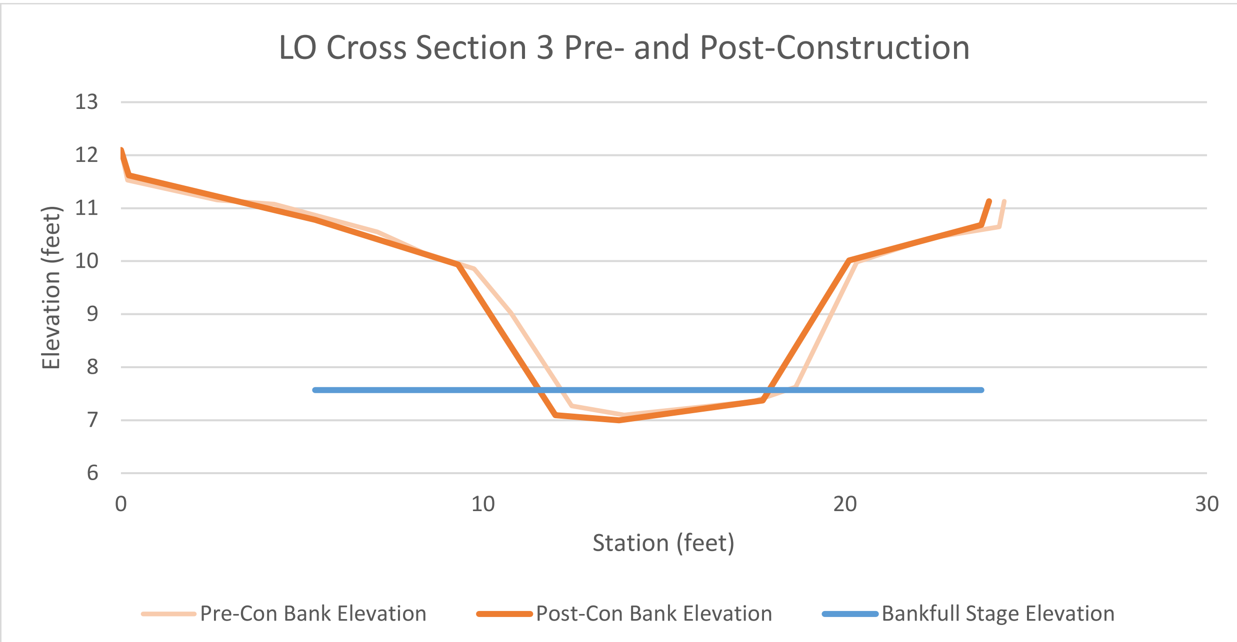

Figure 4-4 – LO Cross Section 3

At LO Cross Section 3 adjustments were observed on both banks, with lateral retreat of the left bank and minor aggradation along the right bank. Overall, the cross-sectional area increased, primarily driven by a 0.1-foot increase in both mean and maximum channel depths since channel width increased by only 3%. As a result, the width-to-depth ratio decreased by approximately 22%, consistent with a channel undergoing progressive vertical adjustment and confined flow conditions.

LO Cross Section 4

Table 4-7 – Channel Dimension Parameters Cross Section 4		
Parameter	**Pre-Construction Conditions**	**Post Construction Conditions**
Cross-sectional area (A_{bkf})	1.2	0.4
Bankfull channel width (W_{bkf})	4.6	3.3
Maximum bankfull depth (D_{max})	0.5	0.2
Mean bankfull depth (D_{bkf})	0.3	0.1
Width/Depth Ratio (W_{bkf}/D_{bkf})	17.5	30.3

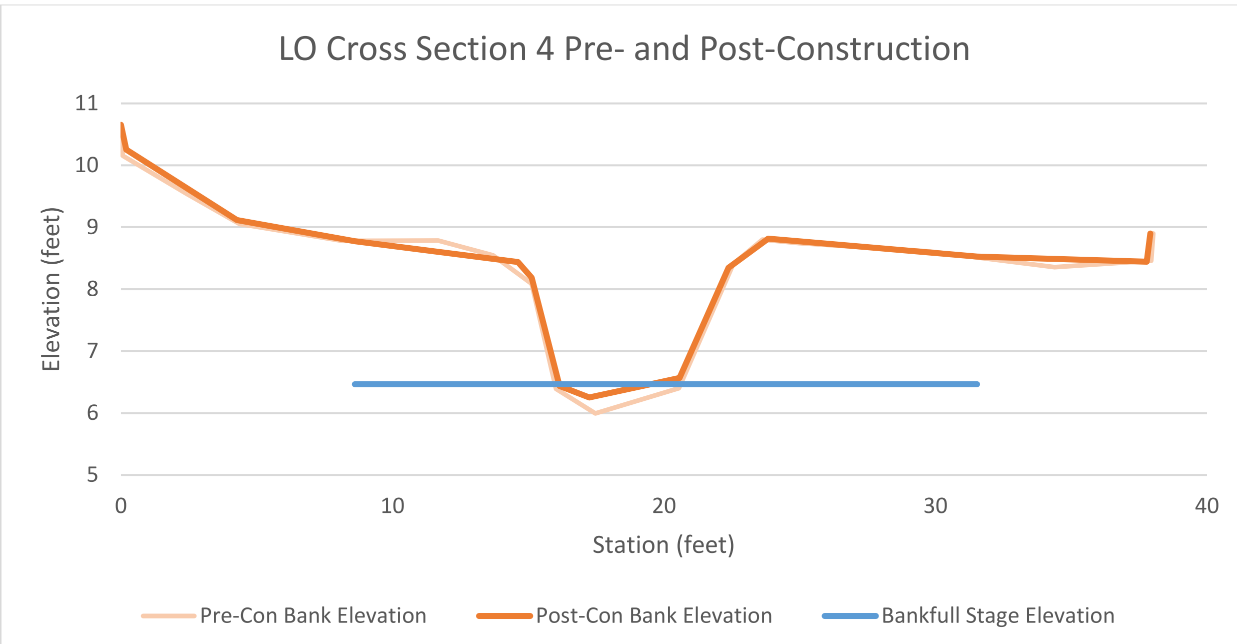

Figure 4-5 – LO Cross Section 4

LO Cross Section 4 is located along a section of the tributary where the valley gradient decreases and floodplain connectivity improves. Post-construction monitoring at this location revealed a reduction in cross-sectional area, primarily driven by a 28% decrease in bankfull channel width and decreases in maximum and mean channel depths of 0.3 feet and 0.2 feet, respectively. The width-to-depth ratio increased by approximately 73%. These morphological changes are consistent with localized deposition, likely resulting from diminished flow energy and reduced sediment transport capacity associated with the lower valley slope and increased floodplain engagement.

LO Cross Section 5

Table 4-8 – Channel Dimension Parameters Cross Section 5		
Parameter	**Pre-Construction Conditions**	**Post Construction Conditions**
Cross-sectional area (A_{bkf})	1.6	1.3
Bankfull channel width (W_{bkf})	5.5	4.2
Maximum bankfull depth (D_{max})	0.6	0.6
Mean bankfull depth (D_{bkf})	0.3	0.3
Width/Depth Ratio (W_{bkf}/D_{bkf})	20.0	13.1

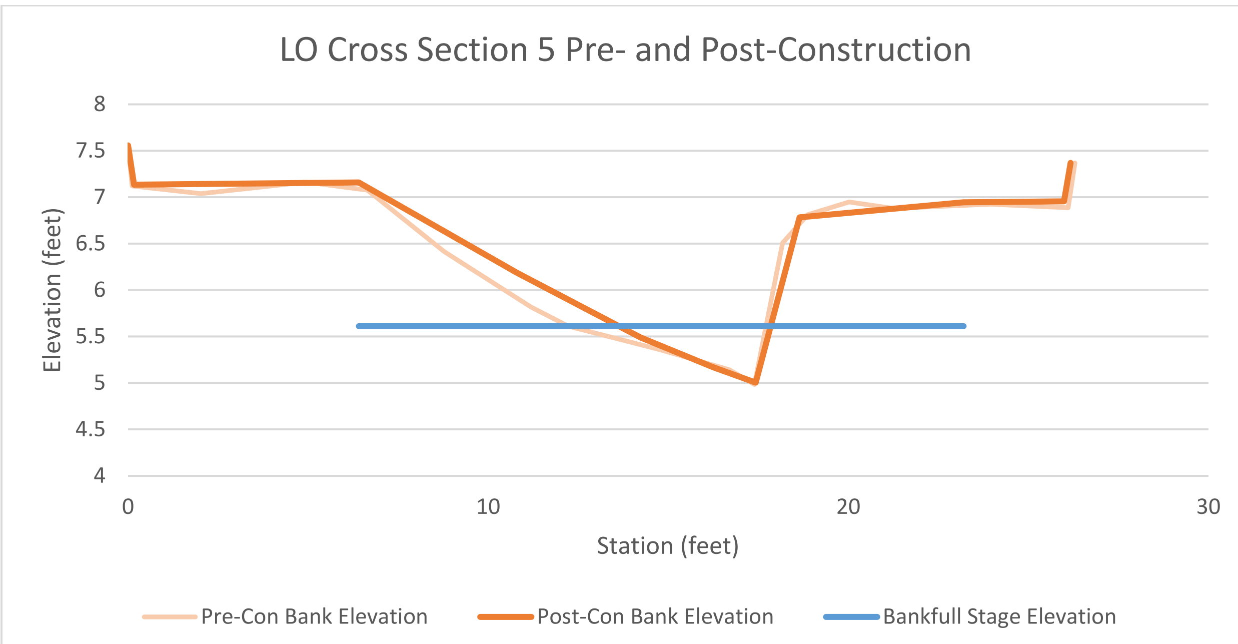

Figure 4-6 – LO Cross Section 5

At LO Cross Section 5, post-construction monitoring indicated a reduction in cross-sectional area. This change was primarily attributed to a 24% decrease in bankfull channel width, resulting from aggradation along the left bank. Both maximum and mean channel depths remained unchanged, indicating that vertical channel dimensions were stable during the monitoring period. Consequently, the width-to-depth ratio decreased by approximately 35%, reflecting a narrowing of the active channel cross-section without evidence of incision.

LO Cross Section 6

Table 4-9 – Channel Dimension Parameters Cross Section 6		
Parameter	**Pre-Construction Conditions**	**Post Construction Conditions**
Cross-sectional area (A_{bkf})	5.2	4.6
Bankfull channel width (W_{bkf})	11.6	11.1
Maximum bankfull depth (D_{max})	0.5	0.6
Mean bankfull depth (D_{bkf})	0.4	0.4
Width/Depth Ratio (W_{bkf}/D_{bkf})	25.7	26.8

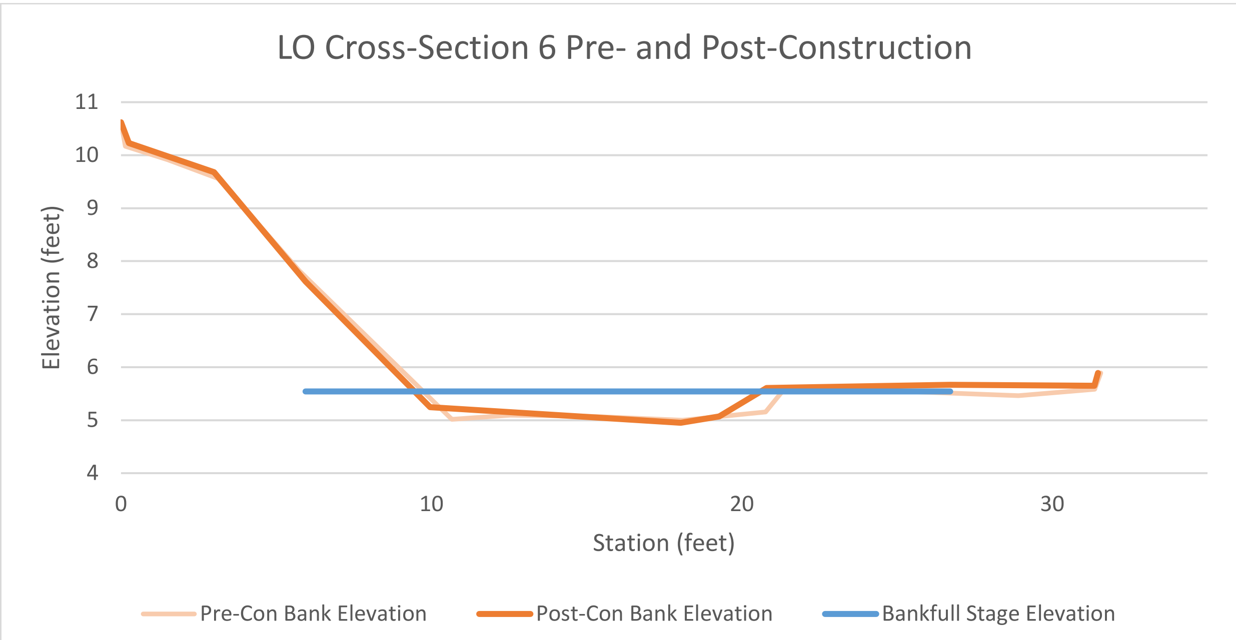

Figure 4-7 – LO Cross Section 6

LO Cross Section 6 is located upstream of the backwater influence from the riffle-weir structure within a laterally active section of the tributary. Post-construction monitoring documented minor morphological adjustments at LO Cross Section 6. Channel width decreased by approximately 4%, largely due to sediment deposition along the right bank. Although mean depth remained constant, maximum channel depth increased by 0.1 foot, likely reflecting localized scour adjacent to areas of deposition. The changes led to a slight reduction in cross-sectional area and a 4% increase in the width-to-depth ratio.

4.4. Bed Material Characterization

A comparison of pre- and post-construction pebble count data is provided in Table 4-10. The D50 (median grain size) decreased from 2.2 mm (very fine gravel) to 0.22 mm (fine sand). Similarly, D35 and D65 values changed 0.49 mm (medium sand) to 0.11 mm (very fine sand) and from 6.2 mm (coarse sand) to 0.71 mm (very fine sand), respectively. Conversely, the upper percentiles of the grain size distribution D84 and D95 increased from 10 mm (medium gravel) to 22 mm (coarse gravel) and from 25 mm (coarse gravel) to 73 mm (small cobble), respectively.

The apparent divergence in the grain size distribution characterized by finer modal sizes and coarser tail-end particles is typical of the natural variability in sediment supply and transport conditions. The observed increase in coarse material may result from periodic high-flow events mobilizing bedload or scouring finer sediments to expose coarse substrate. Conversely, the increase in finer particles is likely due to the deposition of sand-sized material in low-energy depositional zones, sourced from ongoing bank erosion in the upstream reach. During the existing conditions assessment, streambanks were observed to consist predominantly of sandy material suggesting a readily available supply of fine sediment contributing to the fining trend.

Table 4-10 – Pre- and Post- Construction Pebble Count Results	
Parameter	**Grain Size**
Pre-Construction	
D_{35}	0.49 mm
D_{50}	2.2 mm
D_{65}	6.2mm
D_{84}	10 mm
D_{95}	25 mm
Post-Construction	
D_{35}	0.11 mm
D_{50}	0.22 mm
D_{65}	0.71 mm
D_{84}	22 mm
D_{95}	73 mm

4.5. Lake Ogleton Bathymetric Survey

Sedimentation analysis was conducted using the bathymetric survey provided in Appendix D. Results indicate minor changes within the 43,145-square-foot area surveyed at the headwaters of Lake Ogleton. The post-construction comparison revealed a near balance with approximately 78 cubic yards of sediment deposited and 121 cubic yards of sediment removed. The depositional and erosional features throughout the surveyed area were likely driven by natural variations in flow velocity, turbulence, and sediment transport processes near the tidal convergence zone. The spatial distribution and magnitude of changes aligns with the pre-existing geomorphic instability of the tributary and background sediment dynamics and does not suggest that there was sediment deposition associated with construction-related disturbance.

5. CONCLUSION

The Lake Ogleton Tributary and Lake Ogleton are critical to the health and function of the Severn River Watershed. Protecting the physical stability and water quality of the system is essential to preserving its long-term environmental and societal value. Monitoring results indicate that construction activities did not result in measurable or sustained physical impacts to downstream waters. While changes were observed in the channel such as incision, bank erosion, and sediment redistribution, the changes are consistent with the pre-existing geomorphic instability and characteristic of an inherently unstable system, driven by long-term historical influences and broad watershed-scale processes. Additionally, although elevated turbidity levels were noted during the rainfall event on April 4, 2024, erosion and sediment control measures at PAL park were promptly remediated and no long-term impacts to the channel were observed as a result of the event.

Continued monitoring of the riffle-weir structure at the upstream end of the SPSC system is recommended. The SPSC system plays a critical role in attenuating flow energy and reducing sediment transport to Lake Ogleton. The concrete blocks comprising part of the weir show signs of deterioration and may require maintenance or replacement in the future to preserve the system’s integrity and effectiveness.

In addition to maintaining the SPSC system, consideration should be given to restoring the upstream-most ±600 LF of the Lake Ogleton Tributary. The reach is degrading, and restoration would reduce sediment inputs to the downstream system and improve overall water quality. It would also enhance habitat value, increase floodplain connectivity, and support broader watershed goals related to resilience and nutrient reduction.

6. REFERENCES

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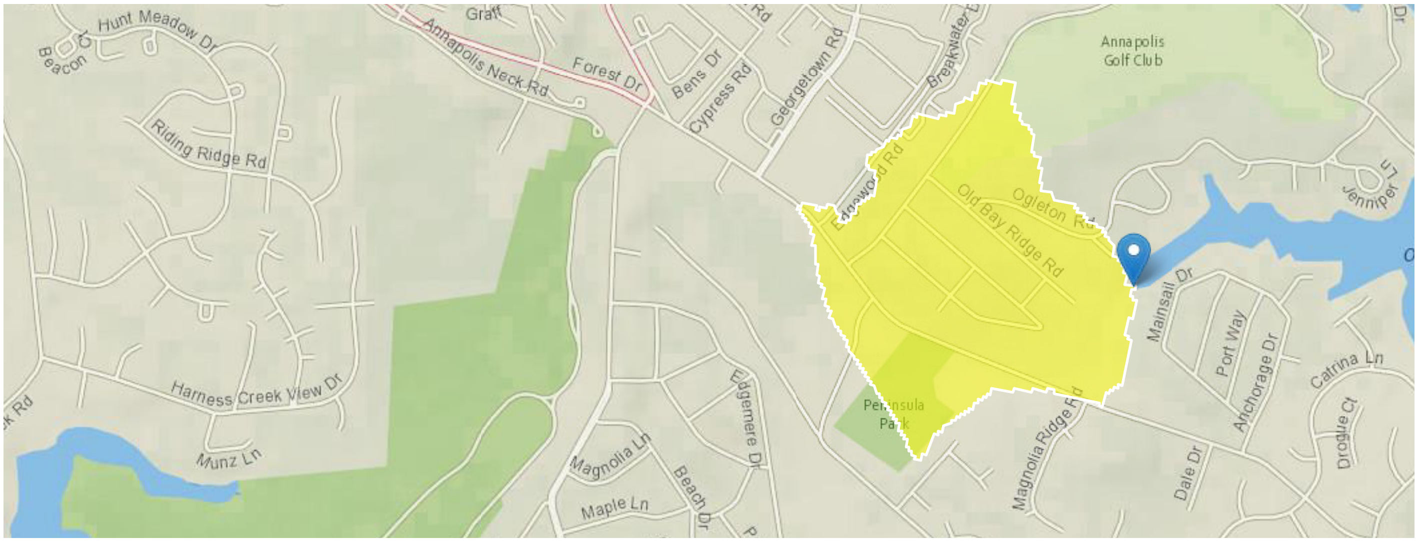
APPENDIX A

Lake Ogleton Watershed StreamStats Report

Lake Ogleton Tributary StreamStats Report (April 2025)

Region ID: MD
Workspace ID: MD20250401124632390000
Clicked Point (Latitude, Longitude): 38.94549, -76.47682
NHD Stream GNIS Name of Click Point: Stream name not found
Time: 2025-04-01 08:46:53 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
ADJCOEFF	Coefficient to adjust estimates for percentage of carbonate rock in Western Maryland	0	dimensionless
BSLDEM10ff	Mean basin slope computed from 10 m DEM in feet per foot	0.0302	foot per foot
DRNAREA	Area that drains to a point on a stream	0.22	square miles
FOREST	Percentage of area covered by forest	33.3	percent
FOREST_MD	Percent forest from Maryland 2010 land-use data	5.16	percent
IMPERV	Percentage of impervious area	32.1	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	63.3	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	14.1	percent
LIME	Percentage of area of limestone geology	0	percent
PRECIP	Mean Annual Precipitation	44.6	inches
SOILCorD	Percentage of area of Hydrologic Soil Type C or D from SSURGO	99.7	percent
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	0	percent
STATSGOD	Percentage of area of Hydrologic Soil Type D from STATSGO	3.33	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Western Coastal Plain 2010 AHMMD]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.41	349.6
IMPERV	Percent Impervious	32.1	percent	0	36.8

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
SOILCorD	Percent SSURGO Soil Type C or D	99.7	percent	13	74.7

Peak-Flow Statistics Disclaimers [Peak Western Coastal Plain 2010 AHMMD]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Western Coastal Plain 2010 AHMMD]

Statistic	Value	Unit
80-percent AEP flood	46.5	ft^3/s
66.7-percent AEP flood	64.2	ft^3/s
50-percent AEP flood	86.5	ft^3/s
20-percent AEP flood	178	ft^3/s
10-percent AEP flood	274	ft^3/s
4-percent AEP flood	465	ft^3/s
2-percent AEP flood	664	ft^3/s
1-percent AEP flood	935	ft^3/s
0.5-percent AEP flood	1300	ft^3/s
0.2-percent AEP flood	1970	ft^3/s

Peak-Flow Statistics Citations

Thomas, Jr., W.O. and Moglen, G.E.,2010, An Update of Regional Regression Equations for Maryland, Appendix 3 in Application of Hydrologic Methods in Maryland, Third Edition, September 2010: Maryland State Highway Administration and Maryland Department of the Environment, 38 p. (http://gishydro.eng.umd.edu/HydroPanel/hydrology_panel_report_3rd_edition_final.pdf)

Bankfull Statistics

Bankfull Statistics Parameters [Atlantic Plain D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.30888	1086.8715

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.07722	59927.7393

Bankfull Statistics Parameters [VA MD Coastal Plain bankfull SIR2007 5162]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.28	113

Bankfull Statistics Disclaimers [Atlantic Plain D Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Atlantic Plain D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	5.94	ft
Bieger_D_channel_depth	0.657	ft
Bieger_D_channel_cross_sectional_area	3.82	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	7.27	ft
Bieger_USA_channel_depth	0.873	ft
Bieger_USA_channel_cross_sectional_area	7.54	ft^2

Bankfull Statistics Disclaimers [VA MD Coastal Plain bankfull SIR2007 5162]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [VA MD Coastal Plain bankfull SIR2007 5162]

Statistic	Value	Unit
Bankfull Width	6.01	ft
Bankfull Depth	0.757	ft
Bankfull Area	4.56	ft^2
Bankfull Streamflow	11.4	ft^3/s

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bieger_D_channel_width	5.94	ft
Bieger_D_channel_depth	0.657	ft
Bieger_D_channel_cross_sectional_area	3.82	ft^2
Bieger_USA_channel_width	7.27	ft
Bieger_USA_channel_depth	0.873	ft
Bieger_USA_channel_cross_sectional_area	7.54	ft^2
Bankfull Width	6.01	ft
Bankfull Depth	0.757	ft
Bankfull Area	4.56	ft^2
Bankfull Streamflow	11.4	ft^3/s

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

Krstolic, J.L., and Chaplin, J.J.2007, Bankfull regional curves for streams in the non-urban, non-tidal Coastal Plain Physiographic Province, Virginia and Maryland: U.S. Geological Survey Scientific Investigations Report 2007–5162, 48 p. (https://pubs.usgs.gov/sir/2007/5162/pdf/SIR2007-5162.pdf)

NHD Features of Delineated Basin

NHD Streams Intersecting Basin Delineation Boundary

This functionality attempts to find the stream name at the delineation point. The name of the nearest intersecting National Hydrography Dataset (NHD) stream is selected by default to appear in the report above. NHD streams do not correspond to the StreamStats stream grid and may not be accurate. If you would like a different stream to appear in the above section, please make a selection below.

No NHD streams intersect the delineated basin.

Watershed Boundary Dataset (WBD) HUC 8 Intersecting Basin Delineation Boundary

This functionality attempts to find the intersecting HUC 8 of the delineated watershed. HUC boundaries do not correspond to the StreamStats data and may not be accurate.

HUC 8	Name
02060004	Severn

NHD Hydrologic Features Citations

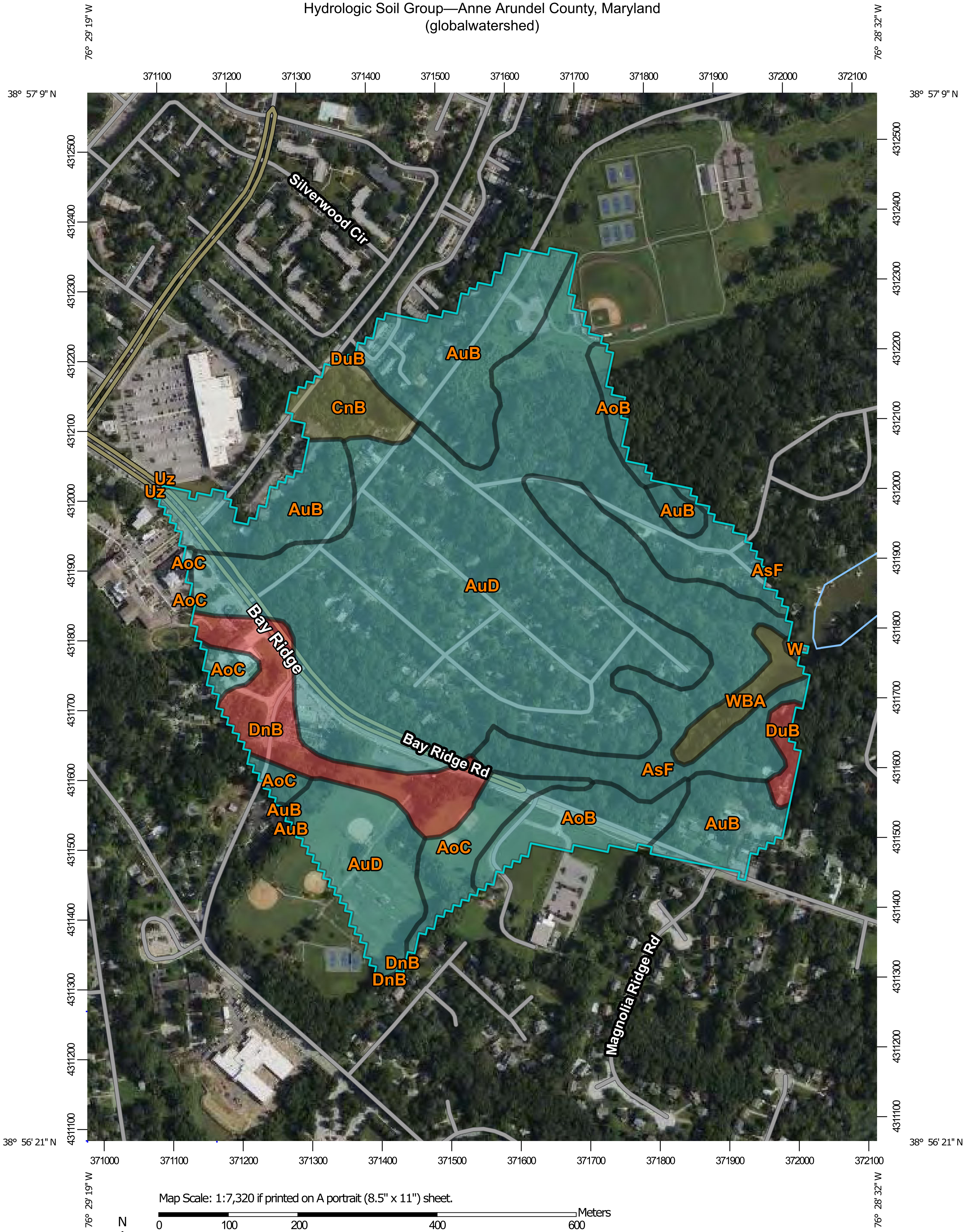
U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6. (https://hydro.nationalmap.gov/arcgis/rest/services/nhd/MapServer/6)
U.S. Geological Survey, 2022, USGS TNM - National Hydrography Dataset, accessed July 21, 2022 at URL https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4. (https://hydro.nationalmap.gov/arcgis/rest/services/wbd/MapServer/4)

Application Version: 4.28.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

APPENDIX B

Lake Ogleton Watershed Soils

Hydrologic Soil Group—Anne Arundel County, Maryland
(globalwatershed)



Map Scale: 1:7,320 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 350, 700, 1400, 2100

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

- 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: Anne Arundel County, Maryland
Survey Area Data: Version 23, 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: Jun 20, 2022—Aug 13, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AoB	Annapolis loamy sand, 2 to 5 percent slopes	C	6.6	4.7%
AoC	Annapolis loamy sand, 5 to 10 percent slopes	C	6.2	4.4%
AsF	Annapolis fine sandy loam, 25 to 40 percent slopes	C	16.4	11.7%
AuB	Annapolis-Urban land complex, 0 to 5 percent slopes	C	22.6	16.2%
AuD	Annapolis-Urban land complex, 5 to 15 percent slopes	C	72.3	51.7%
CnB	Colemantown-Urban land complex, 0 to 5 percent slopes	C/D	3.6	2.5%
DnB	Donlonton fine sandy loam, 2 to 5 percent slopes	D	8.6	6.2%
DuB	Donlonton-Urban land complex, 0 to 5 percent slopes	D	1.1	0.8%
Uz	Urban land	D	0.0	0.0%
W	Water		0.1	0.1%
WBA	Widewater and Issue soils, 0 to 2 percent slopes, frequently flooded	C/D	2.4	1.7%
Totals for Area of Interest			**139.9**	**100.0%**

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

APPENDIX C

Photographic Documentation

Cross-Section Photographs

Cross Section 1: Pre-Construction


Cross Section 1 - Left Bank


Cross Section 1 - Downstream


Cross Section 1 - Right Bank


Cross Section 1 - Upstream

Cross Section 1: Post-Construction


Cross Section 1 - Left Bank


Cross Section 1 - Downstream


Cross Section 1 - Right Bank


Cross Section 1 - Upstream

Cross Section 2: Pre-Construction


Cross Section 2 - Left Bank


Cross Section 2 - Downstream


Cross Section 2 - Right Bank


Cross Section 2 - Upstream

Cross Section 2: Post-Construction

Cross Section 2 - Left Bank

Cross Section 2 - Downstream

Cross Section 2 - Right Bank

Cross Section 2 - Upstream

Cross Section 3: Pre-Construction


Cross Section 3 - Left Bank


Cross Section 3 - Downstream


Cross Section 3 - Right Bank


Cross Section 3 - Upstream

Cross Section 3: Post-Construction

*Cross Section 3 - Left Bank**

*Cross Section 3 – Downstream**

*Cross Section 3 - Right Bank**

*Cross Section 3 – Upstream**

*Note photos taken April 2025

Cross Section 4: Pre-Construction

Cross Section 4 - Left Bank

Cross Section 4 - Downstream

Cross Section 4 - Right Bank

Cross Section 4 - Upstream

Cross Section 4: Post-Construction


*Cross Section 4 - Left Bank**


*Cross Section 4 – Downstream**


Cross Section 4 – Right Bank


*Cross Section 4 – Upstream**

*Note photos taken April 2025

Cross Section 5: Pre-Construction


Cross Section 5 - Left Bank


Cross Section 5 - Downstream


Cross Section 5 - Right Bank


Cross Section 5 - Upstream

Cross Section 5: Post-Construction


Cross Section 5 - Left Bank


Cross Section 5 - Downstream


Cross Section 5 - Right Bank


Cross Section 5 - Upstream

Cross Section 6: Pre-Construction

Cross Section 6 - Left Bank

Cross Section 6 - Downstream

Cross Section 6 - Right Bank

Cross Section 6 - Upstream

Cross Section 6: Post-Construction

Cross Section 6 - Left Bank

Cross Section 6 - Downstream

Cross Section 6 - Right Bank

Cross Section 6 - Upstream

Photo-Point Photographs

Photo Point 1


Photo Point 1 – Pre-Construction (January 5, 2024)


Photo Point 1 – During Construction (January 29, 2024)

Photo Point 1 – During Construction (February 13, 2024)

Photo Point 1 – During Construction (March 11, 2024)

Photo Point 1 – During Construction (March 25, 2024)

Photo Point 1 – During Construction (April 4, 2024)

Photo Point 1 – During Construction (May 6, 2024)

Photo Point 1 – During Construction (May 15, 2024)

Photo Point 1 – During Construction (June 6, 2024)


Photo Point 1 – During Construction (July 12, 2024)

Photo Point 1 – During Construction (August 9, 2024)

Photo Point 1 – During Construction (September 18, 2024)

Photo Point 1 – During Construction (November 21, 2024)

Photo Point 1 Upstream – During Construction (December 12, 2024)

Photo Point 1 – Post Construction (February 5, 2025)

Photo Point 2

Photo Point 2 – Pre-Construction (January 5, 2024)

Photo Point 2 – During Construction (January 29, 2024)

Photo Point 2 – During Construction (February 13, 2024)

Photo Point 2 – During Construction (March 11, 2024)

Photo Point 2 – During Construction (March 25, 2024)

Photo Point 2 – During Construction (April 4, 2024)

Photo Point 2 – During Construction (May 6, 2024)

Photo Point 2 – During Construction (May 15, 2024)

Photo Point 2 – During Construction (June 6, 2024)


Photo Point 2 – During Construction (July 12, 2024)

Photo Point 2 – During Construction (August 9, 2024)

Photo Point 2 – During Construction (September 18, 2024)


Photo Point 2 – During Construction (November 21, 2024)

Photo Point 2 – During Construction (December 12, 2024)


Photo Point 2 – Post Construction (February 5, 2025)

Photo Point 3

Photo Point 3 – Pre-Construction (January 5, 2024)

Photo Point 3 – During Construction (January 29, 2024)

Photo Point 3 – During Construction (February 13, 2024)

Photo Point 3 – During Construction (March 11, 2024)

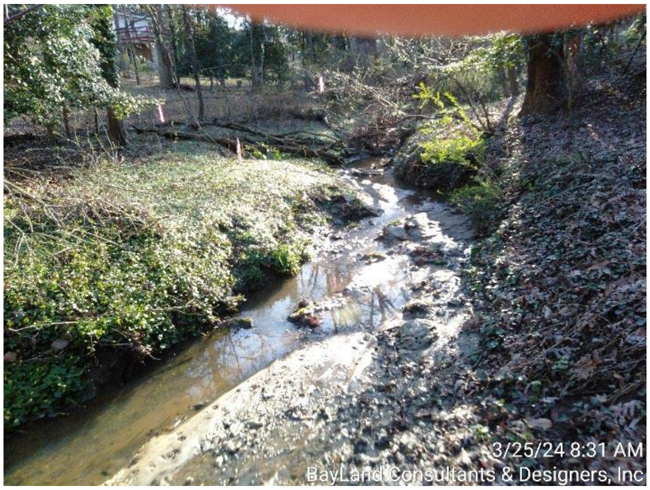


Photo Point 3 – During Constuction (March 25, 2024)

Photo Point 3 – During Construction (April 4, 2024)

Photo Point 3 – During Construction (May 6, 2024)

Photo Point 3 – During Construction (May 15, 2024)

Photo Point 3 – During Construction (June 6, 2024)

Photo Point 3 – During Construction (July 12, 2024)

Photo Point 3 – During Construction (August, 9 2024)

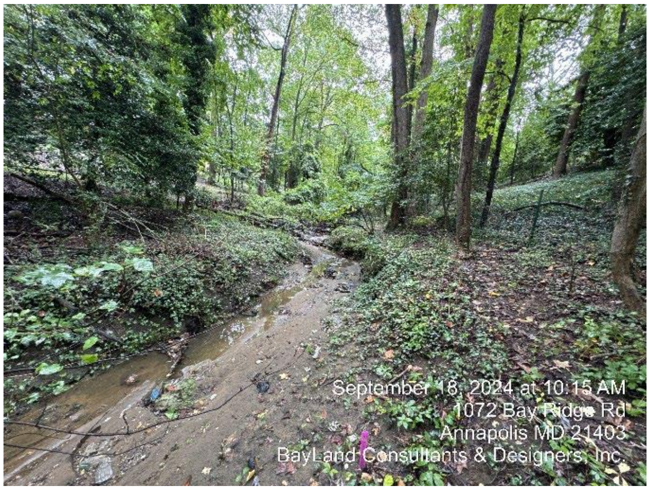


Photo Point 3 – During Construction (September 18, 2024)

Photo Point 3 – During Construction (November 21, 2024)

Photo Point 3 – During Construction (December 12, 2024)

Photo Point 3 – Post Construction (February 5, 2025)

Photo Point 4

Photo Point 4 – Pre-Construction (January 5, 2024)

Photo Point 4 – During Construction (January 29, 2024)

Photo Point 4 – During Construction (March 5, 2024)

Photo Point 4 – During Construction (March 11, 2024)

Photo Point 4 – During Construction (March 25, 2024)

Photo Point 4 – During Construction (April 4, 2024)

Photo Point 4 – During Construction (May 6, 2024)

Photo Point 4 – During Construction (May 15, 2024)

Photo Point 4 – During Construction (June 6, 2024)

Photo Point 4 – During Construction (July 12, 2024)

Photo Point 4 – During Construction (August 9, 2024)

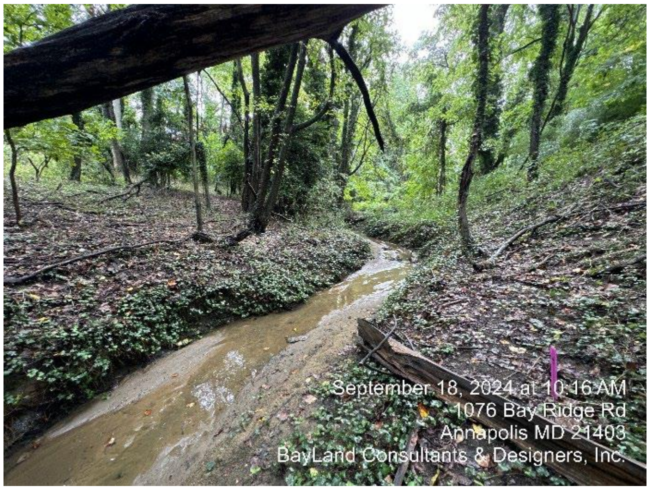


Photo Point 4 – During Construction (September 18, 2024)

Photo Point 4 – During Construction (November 21, 2024)

Photo Point 4 – During Construction (December 12, 2024)

Photo Point 4 – Post Construction (February 5, 2025)

Photo Point 5


Photo Point 5 – Pre-Construction (January 5, 2024)


Photo Point 5 – During Construction (January 29, 2024)

Photo Point 5 – During Construction (February 13, 2024)

Photo Point 5 – During Construction (March 11, 2024)

Photo Point 5 – During Construction (March 25, 2024)

Photo Point 5 – During Construction (April 4, 2024)

Photo Point 5 – During Construction (May 6, 2024)

Photo Point 5 – During Construction (May 15, 2024)

Photo Point 5 – During Construction (June 6, 2024)

Photo Point 5 – During Construction (July 12, 2024)

Photo Point 5 – During Construction (August 9, 2024)

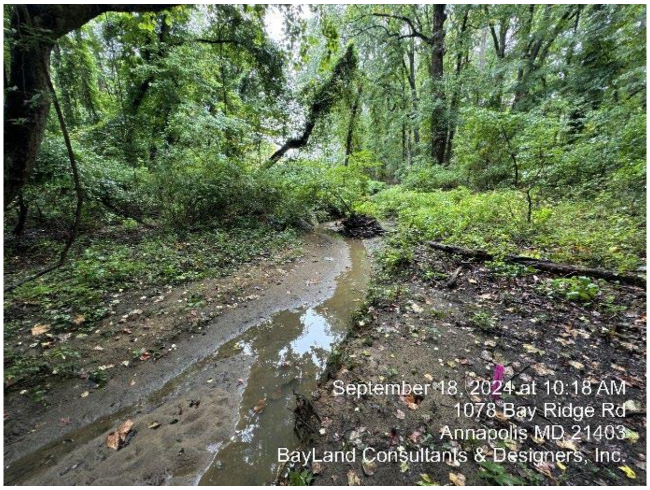


Photo Point 5 – During Construction (September 18, 2024)

Photo Point 5 – During Construction (November 21, 2024)

Photo Point 5 – During Construction (December 12, 2024)

Photo Point 5 – Post Construction (February 5, 2025)

Photo Point 6


Photo Point 6 – Pre-Construction (January 5, 2024)


Photo Point 6 – During Construction (February 8, 2024)

Photo Point 6 – During Construction (February 13, 2024)

Photo Point 6 – During Construction (March 11, 2024)

Photo Point 6 – During Construction (March 25, 2024)

Photo Point 6 – During Construction (April 4, 2024)

Photo Point 6 – During Construction (May 6, 2024)

Photo Point 6 – During Construction (May 15, 2024)

Photo Point 6 – During Construction (June 6, 2024)

Photo Point 6 – During Construction (July 12, 2024)

Photo Point 6 – During Construction (August 9, 2024)

Photo Point 6 – During Construction (September 18, 2024)

Photo Point 6 – During Construction (November 21, 2024)

Photo Point 6 – During Construction December 12, 2024)

Photo Point 6 – Post Construction (February 5, 2025)

Photo Point 7


Photo Point 7 – Pre-Construction (January 5, 2024)


Photo Point 7 – During Construction (February 8, 2024)

Photo Point 7 – During Construction (February 13, 2024)

Photo Point 7 – During Construction (March 11, 2024)

Photo Point 7 – During Construction (March 25, 2024)

Photo Point 7 – During Construction (April 4, 2024)

Photo Point 7 – During Construction (May 6, 2024)

Photo Point 7 – During Construction (May 15, 2024)

Photo Point 7 – During Construction (June 6, 2024)


Photo Point 7 – During Construction (July 12, 2024)

Photo Point 7 – During Construction (August 9, 2024)

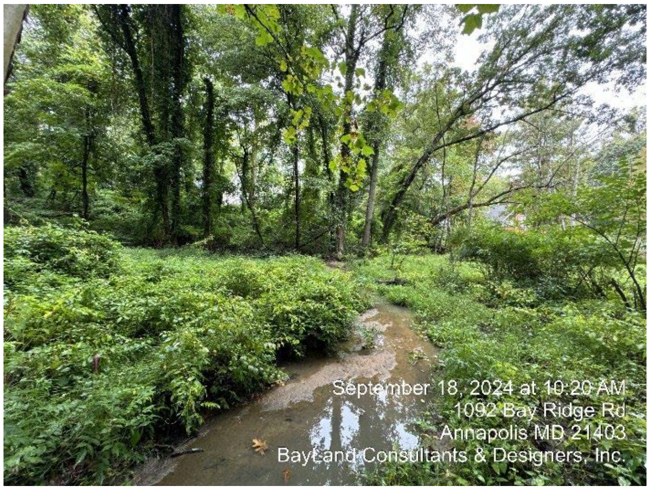


Photo Point 7 – During Construction (September 18, 2024)

Photo Point 7 – During Construction (November 21, 2024)

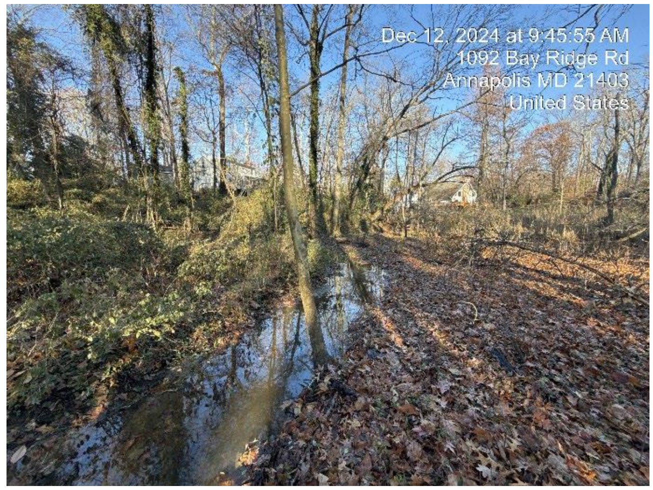


Photo Point 7 – During Construction (December 12, 2024)

Photo Point 7 – Post Construction (February 5, 2025)

Photo Point 8


Photo Point 8 – Pre-Construction (January 5, 2024)


Photo Point 8 – During Construction (January 29, 2024)

Photo Point 8 – During Construction (February 13, 2024)

Photo Point 8 – During Construction (March 11, 2024)

Photo Point 8 – During Construction (March 25, 2024)

Photo Point 8 – During Construction (April 4, 2024)

Photo Point 8 – During Construction (May 6, 2024)

Photo Point 8 – During Construction (May 15, 2024)

Photo Point 8 – During Construction (June 6, 2024)

Photo Point 8 – During Construction (July 12, 2024)

Photo Point 8 – During Construction (August 9, 2024)

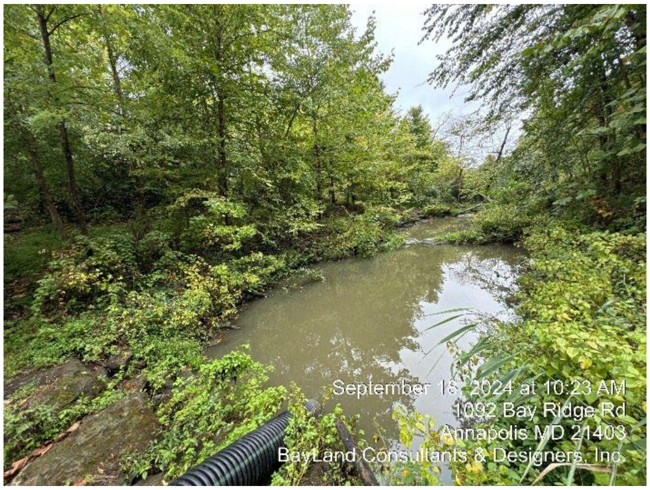


Photo Point 8 – During Construction (September 18, 2024)

Photo Point 8 – During Construction (November 21, 2024)

Photo Point 8 – During Construction (December 12, 2024)

Photo Point 8 – Post Construction (February 5, 2025)

APPENDIX D

Sedimentation Analysis

Cut/Fill Report

Generated: 2025-01-16 16:41:56

By user: Karen

Drawing: \\bayl-eng\DRWG\5_20102_PENINSULA_PRK_LAKE_OGLETON_TRIB_CMONITOR\CAD Files\Archive\Approved Topo\\\bayl-eng\DRWG\5_20102_PENINSULA_PRK_LAKE_OGLETON_TRIB_CMONITOR\CAD Files\Archive\Approved Topo\2024_LAKE OGLETON_PENINSULA_VOL.dwg

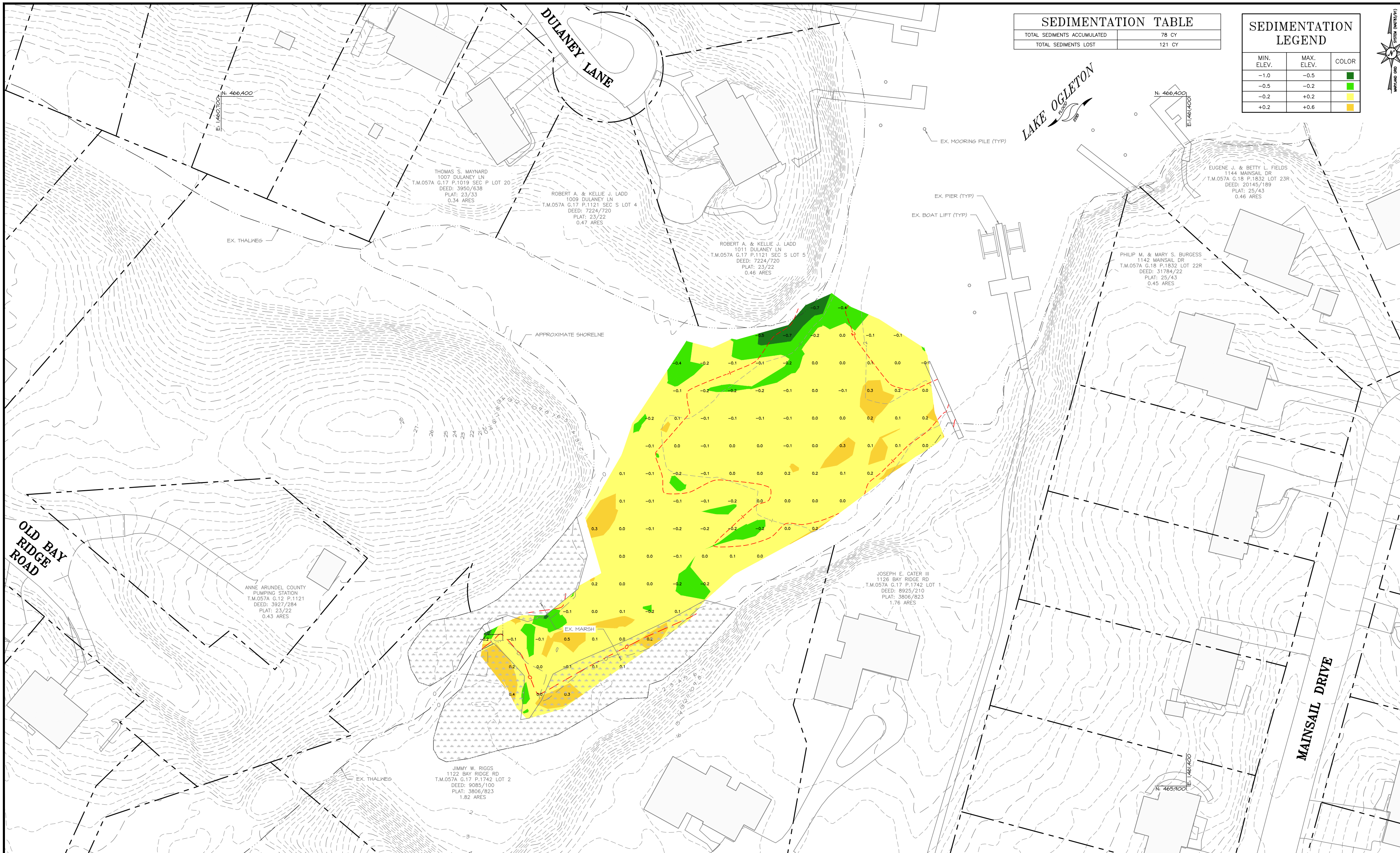
Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
2024_LAKE OGLETON PENINSULA_VOL	full	1.000	1.000	43144.74	120.66	77.54	43.12<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	43144.74	120.66	77.54	43.12<Cut>

* Value adjusted by cut or fill factor other than 1.0



SEDIMENTATION TABLE

TOTAL SEDIMENTS ACCUMULATED	78 CY
TOTAL SEDIMENTS LOST	121 CY

SEDIMENTATION LEGEND

MIN. ELEV.	MAX. ELEV.	COLOR
−1.0	−0.5	
−0.5	−0.2	
−0.2	+0.2	
+0.2	+0.6	

NOTES

1. HYDROGRAPHIC SURVEYS WERE PERFORMED BY BAYLAND CONSULTANTS & DESIGNERS, INC. ON JANUARY 11, 2024 AND DECEMBER 17, 2024.
2. HORIZONTAL AND VERTICAL CONTROL ESTABLISHED FROM REAL TIME KINEMATIC (RTK) GLOBAL POSITIONING SYSTEM (GPS).
3. HORIZONTAL CONTROL IS BASED UPON THE MARYLAND STATE COORDINATE SYSTEM (NAD83/1991).
4. ELEVATIONS SHOWN ARE IN FEET AND REFER TO NORTH AMERICAN VERTICAL DATUM (NAVD88).
5. CONTOUR SHOWN OUTSIDE LIMIT OF SURVEY ARE BASED ON ANNE ARUNDEL CONTY 2020 GIS TOPOGRAPHY.
6. PROPERTY LINES SHOWN ARE BASED ON ANNE ARUNDEL COUNTY CADASTRAL DATA.
7. TOTAL SEDIMENT QUANTITIES ARE APPROXIMATE AND CALCULATED IN FEET BASED ON JANUARY AND DECEMBER 2024 CONDITIONS SURVEY.

0 15 30 60
1 INCH = 30 FEET

BayLand Consultants & Designers, Inc.
"Integrating Engineering and Environment"
7455 New Ridge Road, Suite T
Hanover, Maryland 21076
Phone: (410) 694-9401
Fax: (410) 694-9405
www.baylandinc.com

BAYLAND JOB NO. 5_20102
Appendix D-2

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

REVISED DATE	BY	APPROVED	DATE	APPROVED	DATE
		CHIEF ENGINEER		PROJECT MANAGER	
		APPROVED	DATE	APPROVED	DATE
		ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY	

SCALE:	1" = 30'	
DESIGNED BY:	XX	1/16/25
DRAWN BY:	XX	1/16/25
CHECKED BY:	XXX	1/16/25
SHEET NO.	1 OF 1	
PROJECT NO.	9_99999	
PROPOSAL NO.	9_99999	

PENINSULA PARK EXPANSION LAKE OGLETON TRIBUTARY MONITORING

SEDIMENTATION ANALYSIS

\\bayl-eng\DRWG\5_20102_PENINSULA_PRK_LAKE_OGLETON_TRIB_CMONITOR\CAD Files\Sheet Files\5_20102_VOL01