RESILIENCE
AUTHORITY
Annapolis and Anne Arundel County

Annapolis Maritime Resilience Initiative (AMRI)

Phase I Report - December 2025

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Phase I Report
December, 2025

RESILIENCE AUTHORITY
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Acknowledgements

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This report was prepared by the AMRI project team, led by the Resilience Authority of Annapolis and Anne Arundel County in collaboration with the City of Annapolis, Council Fire, GreenVest, and Biohabitats.

The planning effort described in this report involved coordination with partnering agencies and organizations whose contributions were essential to the success of the project. The AMRI team gratefully acknowledge the participation of the following partners, whose involvement helped ensure that the findings and proposed actions are grounded in both local context and collective expertise:

Annapolis Maritime Museum

Anne Arundel Watershed Stewards Academy

Blacks of the Chesapeake

Breaking Boundaries Environmental

Chesapeake Bay Trust

Eastport Business Association

Eastport Civic Association

Eastport Yacht Club

Severn River Association

Severn Riverkeeper

United States Naval Academy

University of Maryland

I. Executive Summary

The Annapolis Maritime Resilience Initiative (AMRI) is a community-scale planning effort focused on addressing flooding resilience in the Spa Creek and Back Creek watersheds in and around the Eastport Peninsula in Annapolis, Maryland. Led by the Resilience Authority of Annapolis and Anne Arundel County, in collaboration with the City of Annapolis, GreenVest, and Council Fire, this first phase of the AMRI partnership focused on identifying sites of concern within the Study Area and advancing a portfolio of prioritized and vetted nature-based resilience projects grounded in both technical analysis and community input. This project is made possible through a grant from the National Fish and Wildlife Foundation (NFWF), with support from the National Oceanic and Atmospheric Administration (NOAA), which has provided Phase I funding to develop conceptual designs for ten sites.

Over the course of an 18-month process, the project team evaluated 38 sites of concern identified through extensive public engagement coupled with field assessments, previous reports and historical data review. These sites were screened using a multi-criteria prioritization framework that considered climate vulnerability, ecological and hydrological function, equity, community interest, feasibility, and alignment with broader resilience goals.

This report presents the ten sites selected for preliminary concept design:

- **ASPCA**
- **Mariner's Point**
- **Tyler Avenue**
- **Harborview**
- **Truxtun Park**
- **Melrob Court**
- **1309 Bay Ridge Avenue**
- **Ambridge Pond / Timber Creek**
- **Georgetown Grove**
- **Georgetown East Elementary**

Together, these ten sites reflect a diverse range of landscape types, mechanisms of flooding, and intervention strategies. The proposed site improvement designs include shoreline stabilization, stormwater retrofits, stream restoration, green infrastructure corridors, and bioretention areas, among others. Each site was selected based on its potential to reduce risk, deliver ecological and social co-benefits, and advance equitable outcomes, particularly in historically underserved communities within the Study Area.

For each selected site, this report provides a conceptual design, planning-level cost estimate, summary of anticipated benefits, and implementation considerations. The ten percent concept designs are intended to guide future fundraising, design, and permitting to advance to subsequent AMRI phases.

This Phase I Report also documents the broader AMRI planning framework, including community engagement strategy, site evaluation methodology, and alignment with local and regional resilience plans. The process and tools developed through this initiative were intentionally designed to be replicable and support future resilience planning efforts across the Resilience Authority's jurisdiction and beyond.

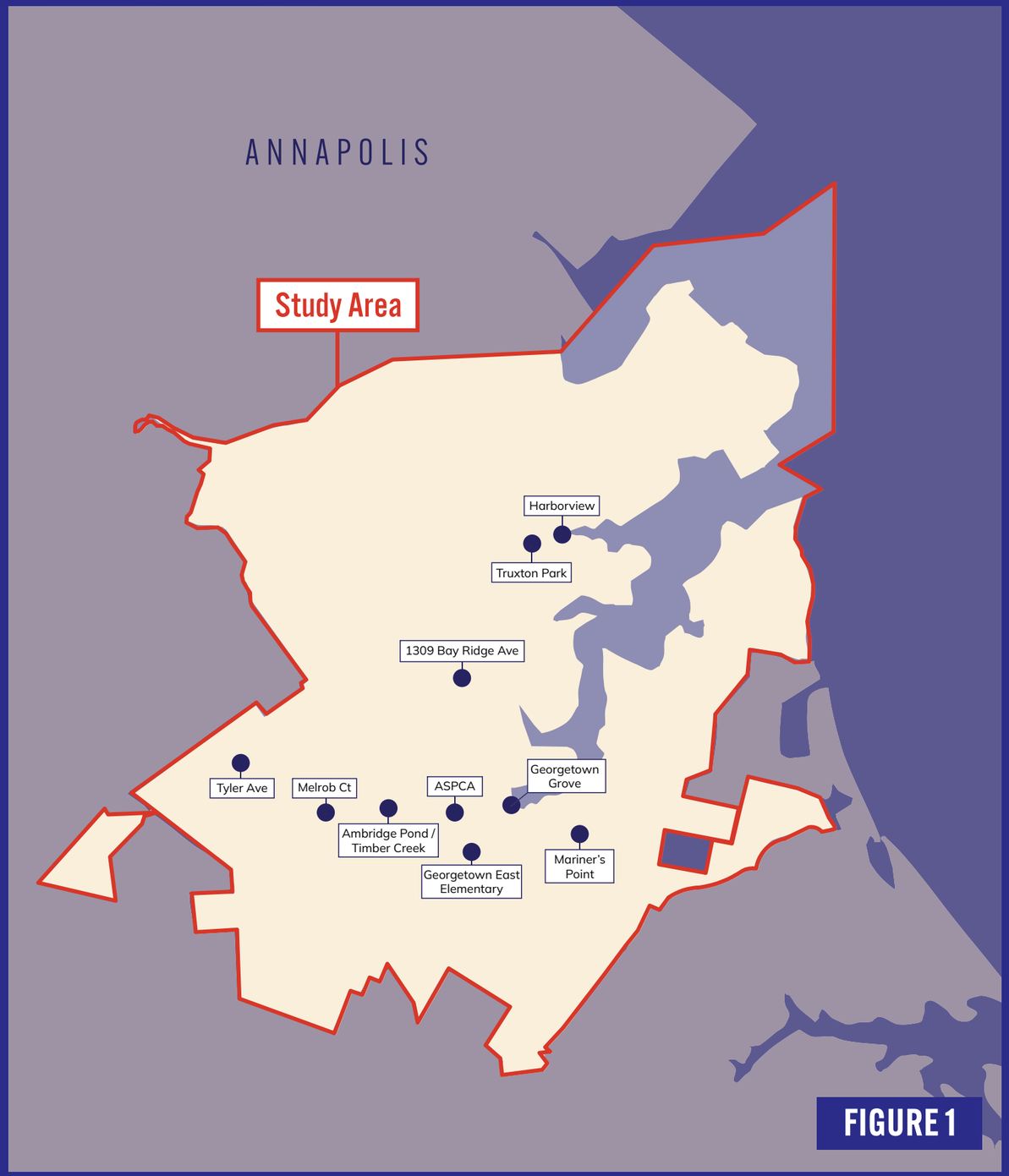


FIGURE 1

II. Project Background and Context

Overview and Strategic Approach of the Annapolis Maritime Resilience Initiative

AMRI is a nature-based resilience planning effort focused on addressing the increasing climate-related threats facing the Spa Creek and Back Creek watersheds in and around the Eastport peninsula in Annapolis, Maryland. Sea level rise (SLR), flooding, and shoreline and stream bank erosion are becoming significant challenges to this area, threatening infrastructure, private property, local businesses, neighborhoods, and the environment. Established through a partnership between the Resilience Authority of Annapolis and Anne Arundel County and the City of Annapolis, with support from implementation partners GreenVest and Council Fire, AMRI aims to improve environmental, economic, and social resilience across these communities while protecting critical infrastructure and public assets.

The AMRI team's approach reflects a fundamental departure from fragmented or ad hoc resilience efforts. Rather than executing isolated interventions, AMRI applies a coordinated, watershed-scale approach that identifies and prioritizes projects based on their collective potential to reduce risk, improve environmental function, and enhance community benefit. Planning at the community scale ensures that individual projects reinforce one another, creating a cohesive network of resilience investments whose combined effect delivers greater protection and benefit than any single effort could achieve.

Throughout AMRI Phase I, trusted messengers and local organizations played key roles in engaging the community and ensuring that diverse perspectives were both represented and valued. Additionally, AMRI's outreach strategy focused on lowering barriers to participation by providing bilingual materials, childcare, and culturally relevant engagement opportunities. Through this approach, AMRI shifted the focus of resilience planning from a top-down technical exercise to a locally-informed process driven by community insight and lived experience.

Ultimately, the AMRI planning approach responds to a growing recognition that climate adaptation must be pursued in ways that are inclusive, place-based, and community-informed. By centering resilience planning on the communities most affected, this initiative sets a precedent for future efforts that seek to build social and infrastructure resilience in tandem.

The AMRI effort builds upon and integrates a range of previous resilience and infrastructure planning efforts, including: City of Annapolis Flood Resiliency Plan (2022); Back Creek and Spa Creek Watershed Improvement Projects – Feasibility Assessments (2019); Military Installation Resilience Review (MIRR) (2023). While each of these planning efforts generated important data and recommendations, they primarily focused on either infrastructure resilience, regulatory compliance, or site-specific needs. AMRI integrates these prior efforts within a broader community-scale framework that emphasizes equitable investment, environmental co-benefits, and local engagement. This report provides a mechanism to coordinate and align these existing initiatives within a unified, strategic approach to climate adaptation.

The AMRI Phase I Report is the culmination of an 18-month site assessment and preliminary design process grounded in both technical analysis and community engagement. Through a robust outreach effort, 38 sites of concern were identified within the Study Area. With the long-term goal of addressing all identified vulnerabilities, the project team conducted an evaluation of climate risk, technical feasibility, and stakeholder priorities to select a set of sites most suitable for near-term intervention. This plan presents a portfolio of 10 priority projects, each supported by a conceptual design, that together represent urgent and actionable opportunities to advance resilience in the area. These sites complement one another and other existing partner initiatives making the collective effort much more significant and beneficial than the individual projects.

In addition to its site-specific outcomes, the AMRI Phase I planning effort also serves as a pilot for the Resilience Authority's broader operational model. The strategies, tools, and processes developed through this initiative are intended to be replicable, transferable, and scalable, supporting future resilience investments across Annapolis, Anne Arundel County, and the broader Chesapeake Bay region.

III. Study Area Profile: Physical and Social Context

The AMRI Study Area includes the Annapolis neighborhoods between Spa and Back Creeks, extending to the Eastern bank of Back Creek and inland toward Beechwood Hill, as defined by City Wards 6, 7, and 8. This includes the Eastport peninsula and adjacent neighborhoods, as well as associated waterfront areas and upstream contributing zones.

Much of the built environment within the Study Area was developed prior to the adoption of modern stormwater regulations, resulting in extensive impervious surfaces and degraded natural buffers. These historic land use patterns have contributed to frequent flooding, stream and shoreline erosion, and limited natural infiltration. In parallel, the area contains valuable community assets, cultural landmarks, and ecological resources that merit protection and restoration through well-coordinated resilience strategies.

The need for integrated, equitable resilience planning in the Spa Creek and Back Creek watersheds is both urgent and well-documented. These communities face overlapping climate-related threats, including recurrent flooding, erosion of natural shorelines and streambanks, and long-term sea level rise. Aging infrastructure, limited green space, and historic land use patterns have left many areas highly exposed to storm events and tidal surges.

These impacts are not experienced equally. The boundaries of the Study Area were shaped by demographic analysis and community insight, which identified areas with significant populations of low-income households, racially diverse populations, and non-English-speaking residents. Residents from historically underserved communities within the Study Area often have limited access to the resources, information, and decision-making channels needed to adapt. These intersecting factors indicate heightened vulnerability to both social inequities and environmental stressors. AMRI was designed to address these disparities through an inclusive engagement approach and a clear emphasis on equity in site selection and project design.

FIGURE 2

Vulnerability Assessment

The Study Area is a Resilience Authority and City of Annapolis priority due to its proximity to the Chesapeake Bay and the vulnerability of the communities to climate threats. While supporting the area's recreational accessibility, economy, ecological benefits, and aesthetic appeal, community infrastructure and property within the Study Area is threatened by storm surge, sea level rise (SLR), climate change, subsidence, erosion, flooding, and absence of local stormwater collection and conveyance systems. As shown on Figure 3, numerous public and private properties, including community gathering spaces and private businesses are within the Study Area and at risk of ongoing damage due to the effects of the identified threats.

The AMRI Team completed desktop and field analyses of the Study Area and identified several threats to critical community infrastructure, including but not limited to flooding, sea level rise, and erosion. As part of this effort, the AMRI team:

- Executed a robust community engagement and outreach plan to identify at-risk locations for consideration in development of a potential project list (see Section IV for additional details).
- Reviewed existing watershed management plans and feasibility studies to understand previous and ongoing work that may be related to sites identified.
- Assessed feasibility of potential projects to address at-risk locations by reviewing existing site uses and landowner preferences, construction access points, on-site utilities, and topography. Data was analyzed along with the risk characterization and potential co-benefits described above to identify the best opportunities for remediation / mitigation.
- Evaluated desired program outcomes including resilience, open space / access, recreation, ecological uplift, stormwater management (SWM), and education.
- Performed field assessment of high-risk areas, shorelines, and riparian areas to confirm site-level resiliency risk.
- Identified field-level logistical constraints (e.g., existing site use, owner preference, access, topography etc.) for each area at risk.
- Analyzed relevant nature-based solutions (NBS) to address risks and impairments in the Study Area (vulnerable infrastructure, public safety concerns, erosion hotspots, areas of frequent flooding, subsidence areas, trails, and waterfront access, etc).
- Coordinated with implementation partners working in the Study Area to minimize redundancy and amplify efforts.

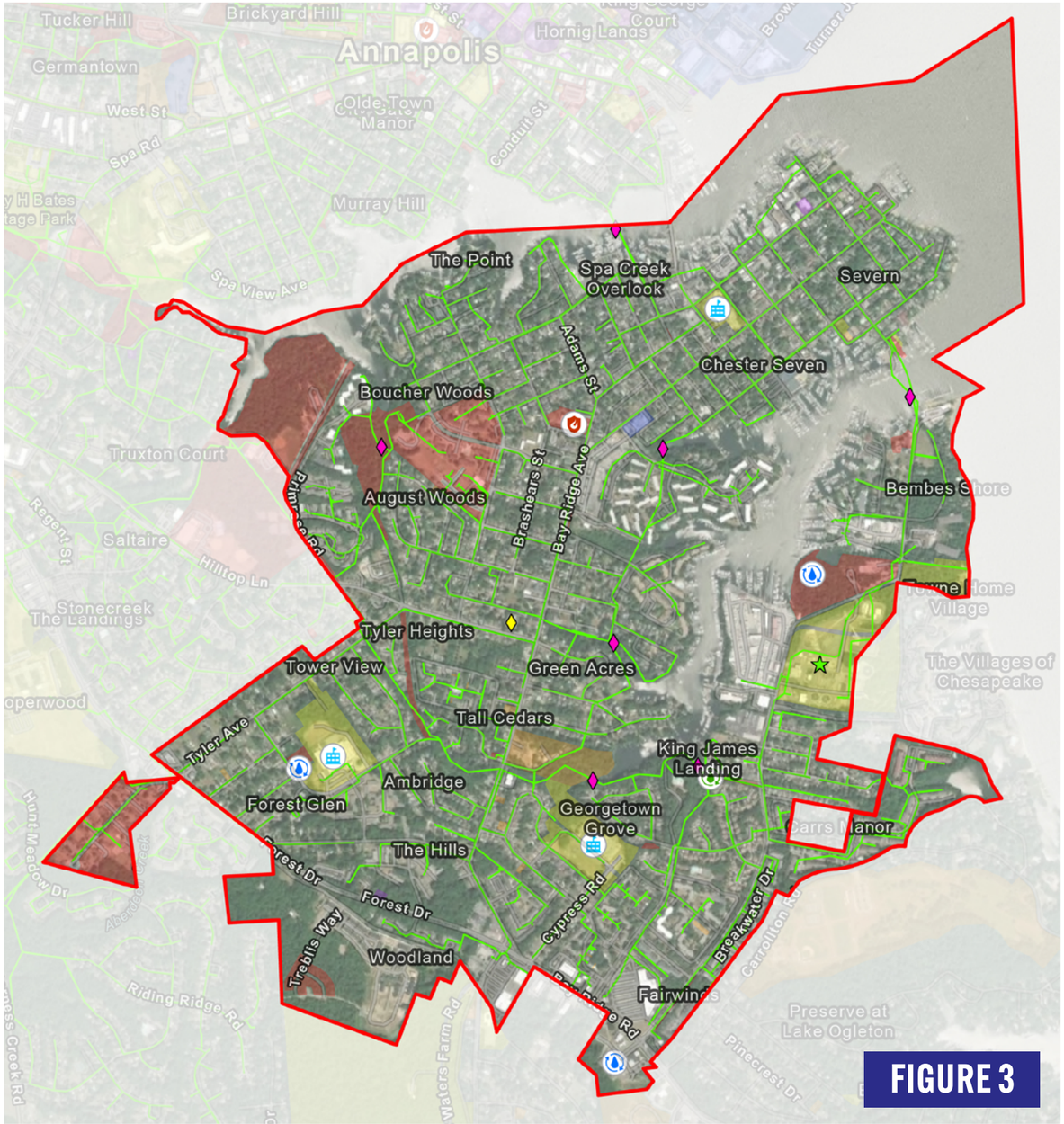


FIGURE 3

Expected SLR inundation (Figure 4a) currently impacts and continues to threaten Eastport Elementary School, numerous local sewers and sewer lines, and public and private property, such as neighborhood homes, local area parks, and community resources like the American Society for the Prevention of Cruelty to Animals (ASPCA). As displayed on the Maryland Department of Natural Resources Maryland Coastal Atlas and Figure 4b, much of the AMRI area is subject to Storm Surge as minimal as Category 1 hurricanes, with nearly half of the peninsula at risk during a Category 4 event. The data source also shows extreme vulnerability to SLR, with properties beyond 5th street becoming entirely inaccessible after 5-10 ft of inundation. While some of Eastport's upland neighborhoods are likely to remain dry, there would be limited throughways allowing travel and emergency services in and out of the area. Additionally, much of the inland areas of Eastport and associated coastal properties range from Low to Very High in the "Coastal Resiliency Assessment Community Flood Risk Areas" layer. Of particular note is that while many areas lack necessary data to be displayed on this layer, no present areas are classified as "Very Low" risk.

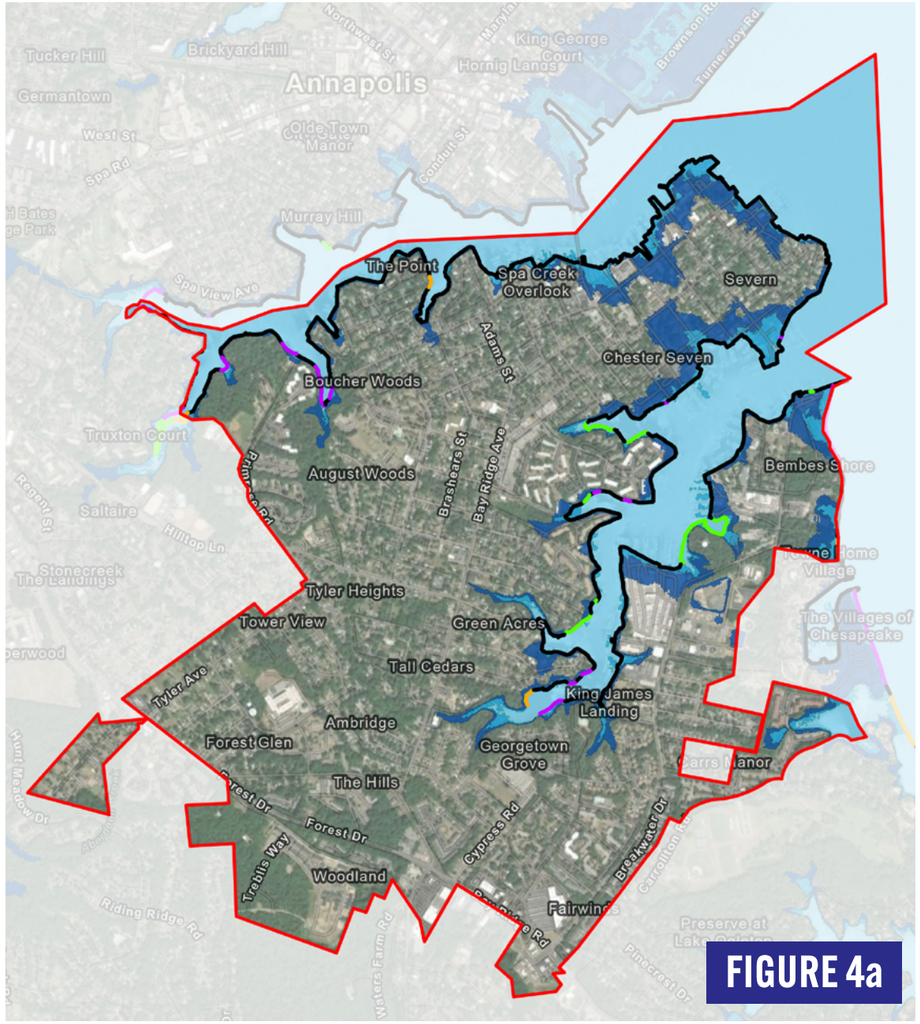


FIGURE 4a

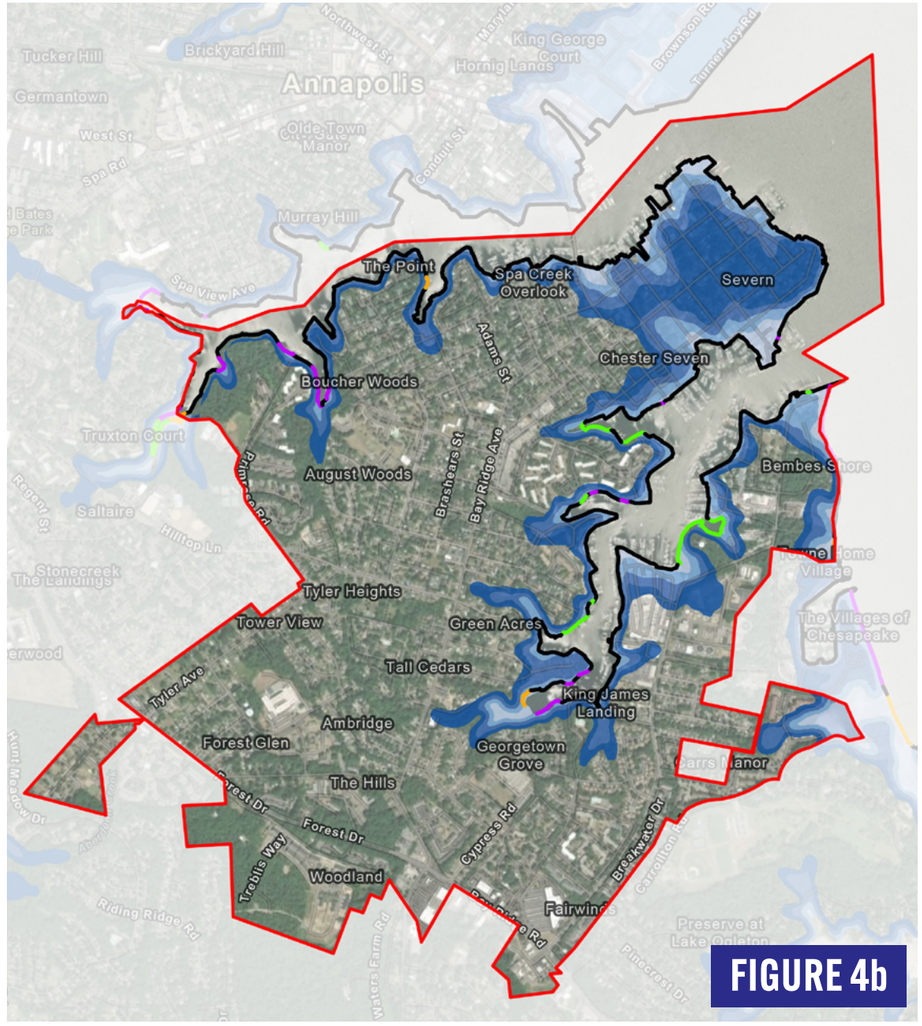


FIGURE 4b

10-Years Shoreline Erosion Level
- Accretion
- Low
- Protected
- Slight

Phase I Study Area

Sea Level Rise Vulnerability
- 0 to 2 Foot Inundation
- 2 to 5 Foot Inundation
- 5 to 10 Foot Inundation

1 Inch = 1,500 Feet
0 750 1,500

10-Years Shoreline Erosion Level
- Accretion
- Low
- Protected
- Slight

Phase I Study Area

Hurricane Storm Surge
- Category 1
- Category 2
- Category 3
- Category 4

1 Inch = 1,500 Feet
0 750 1,500

IV. Community Engagement and Stakeholder Input

Summary of Stakeholder Mapping and Engagement Strategy

AMRI is grounded in an equity-driven, community-centered engagement approach. Building upon the framework outlined in the AMRI Community Engagement Plan (Appendix G), our strategy prioritized outreach to historically underserved communities in the Eastport and Back Creek areas, communities that face greater climate vulnerability due to systemic inequities.

Concurrent with the AMRI Phase I activities funded by NFWF, the City of Annapolis initiated a Federal Emergency Management Agency (FEMA) funded flood mitigation planning effort focused on Eastport. To ensure information sharing, maximize efficiencies with available funding, and reduce confusion and engagement fatigue for local stakeholders, the initial phases of community outreach were coordinated across both initiatives.

Stakeholders were identified through a combination of partner networks, neighborhood-level demographic and environmental data (previously accessed through the Environmental Protection Agency's Environmental Justice Screening Tool), and direct outreach to local organizations. Trusted messengers, civic associations, faith-based partners, nonprofit groups, and local institutions such as churches, HOAs, and schools played a central role in our mapping and engagement strategy.

Our process followed the IAP2 Spectrum of Public Participation, moving from "inform" to "empower" through adaptive, responsive, and feedback-driven engagement. We emphasized relationship-building, accessibility, language equity, and cultural relevance throughout.

Key Themes and Needs Identified by the Community and Partners

Across the many points of engagement, several consistent themes emerged:

- Flooding is familiar and disruptive. Many participants shared personal experiences with stormwater backups, shoreline erosion, and blocked access during high tides.
- Desire for NBS. There was widespread support for green infrastructure, tree planting, living shorelines, and increased waterfront access.
- Need for visibility and education. Participants expressed a desire for clearer communication on how resilience investments are prioritized and how they can get involved.
- Community ownership matters. Residents want to see themselves reflected in the planning process, not just as beneficiaries, but as co-creators.
- Youth and families are eager to engage. Children and families showed enthusiasm for contributing to a shared vision of a resilient Annapolis, especially through drawing and storytelling.

Engagement Events Summary

Throughout AMRI Phase I, we hosted or participated in a variety of public engagement events ranging from formal presentations to family-friendly outreach at community events. The team implemented a multi-pronged approach to connect with a broad cross-section of community members, civic leaders, and key implementation stakeholders. Each activity was designed to meet residents where they are and ensure their input shapes the project's direction.

Core activities included one-on-one stakeholder interviews, public meetings, presentations to neighborhood associations and community groups, and participation in local events to raise awareness and gather input. These touchpoints were instrumental in shaping both the content and direction of the project, ensuring that community voices helped inform priorities from the outset. In total, the AMRI team engaged more than 300 community members and representatives from 10 local implementation partner organizations and agencies through in-person interactions. Hundreds more received updates and opportunities to provide input through digital outreach, including email communications and an online community survey.

Public meetings were designed to be welcoming and accessible, with features such as bilingual materials, interactive maps, and childcare. Special attention was paid to reaching underrepresented voices, including Spanish-speaking residents and families in flood-prone neighborhoods (see Appendix B for additional details). Additionally, targeted outreach to local businesses helped ensure this important perspective was captured and represented in the planning process. Full details on the timeline of public outreach events can be found in Appendix B.

Coordination meetings were held with implementation partners working in the Study Area to promote strong communication, catalog efforts already underway, and minimize redundant efforts. These meetings also helped establish the foundation for ongoing collaboration so that project implementation remains intentional, aligned, and impactful across the Study Area.

Grassroots Flyering and Community Visibility

In addition to formal meetings and events, AMRI's outreach strategy included an intensive grassroots flyering campaign. With the goal of increasing awareness and encouraging broad participation, especially among underrepresented communities, we distributed bilingual flyers across Eastport and the Back Creek watershed. Flyers were distributed at places like: Hispanic grocery stores and restaurants; libraries; schools; community centers; clubs; churches; and public bulletin boards in apartment complexes and local businesses.

This flyering strategy helped reach community members who may not be on email lists or active in civic organizations. This visibility work helped reinforce trust, improve turnout, and diversify participant demographics.

Community Survey and Digital Engagement

In parallel, the team developed digital tools to extend the project's reach. A dedicated webpage offered timely updates and served as a central platform to encourage participation in a community survey. An email list was cultivated through in-person and online interactions, enabling targeted outreach and ongoing communication. Email engagement exceeded nonprofit benchmarks, indicating strong public interest and connection to the project (details available in Appendix B).

A bilingual community survey to gather input on resident experiences with flooding, erosion, and resilience priorities was a key part of the overall engagement strategy. A total of 49 surveys were completed, six of which were in Spanish (see results details in Appendix C). Survey insights helped validate the anecdotal feedback gathered during events and included the following highlights:

- Many residents reported experiencing or witnessing nuisance flooding, particularly during strong storms.
- Key impacts noted included:
    - Transportation challenges (e.g., road closures).
    - Disrupted access to parks and public spaces.
    - Loss of income or business operations for some respondents.
    - Damages to homes and personal property, as well as street-end parks and public access points.
- A majority of Spanish-language respondents indicated they weren't sure how flooding would affect them but wanted to learn more, highlighting the need for continued education and plain-language resources.
- Proposed solutions included daily cleaning of storm drains, better safety near water, and more access to information.
- Several participants expressed interest in staying involved, and email addresses were collected for future outreach.

The survey, in combination with interactive stations and stakeholder meetings, deepened our understanding of community needs and directly informed the prioritization and design phases of AMRI Phase I.

Reflections and Key Outcomes

Through these engagement efforts, AMRI has achieved both quantitative reach and qualitative depth. Key accomplishments include:

- Successful engagement of underrepresented groups, especially Spanish-speaking families and business owners.
- Valuable site-specific feedback via interactive mapping and MyCoast demos.
- Creative and inclusive activities that welcomed children, elders, and stakeholders with varying levels of technical understanding.
- High interest in nature-based solutions, public access improvements, and long-term maintenance planning.

V. Nature Based Solutions: Opportunities and Constraints

When developing the list of projects for consideration under AMRI Phase I, the Team evaluated a variety of NBS, including stream restoration, shoreline stabilization, SWM, and more. The purview of AMRI solutions was open-ended, including green infrastructure, grey infrastructure, and combined approaches. Any NBS that would restore local conditions, provide ecological uplift, and address community concerns was on the table for consideration.

The community's primary areas of concern revolved around a lack of suitable SWM and shoreline stabilization. In most cases, existing SWM was insufficient, resulting in nuisance flooding and increased stream erosion. By retrofitting existing or implementing new SWM Best Management Practices (BMPs), these community threats could be mitigated at the source. Proper SWM is critical during storm events through the capture, treatment, and conveyance of high velocity waters to reduce flooding, runoff, erosion, and associated sediment and nutrient loading. Similarly, due to Spa and Back Creeks' direct connection to the Chesapeake Bay and its high energy systems, waterfront properties are at severe risk of coastal erosion. Living shorelines and beach replenishment projects restore and stabilize the waterfront properties to arrest the pre-existing rate of erosion and return the coastline to a more resilient condition.

Potential restoration sites were identified through project team expertise, community input, and review of local planning documents, including the City of Annapolis's SWM Inventory and Watershed Improvement Plan, and were then evaluated using the Site Selection Matrix described in Section VI.

VI. Site Selection Process

The AMRI team developed a Site Selection Matrix to rank the identified potential projects within AMRI boundaries. The Matrix was developed over several iterations and team meetings, informed by baseline data collection, desktop analyses, and community input to ensure key considerations were part of the evaluation criteria. Primary considerations included technical and regulatory feasibility, efficacy, cost effectiveness, social impact, accessibility, and other cobenefits. The final Site Selection Matrix scored 38 discrete sites within the AMRI Phase I area to advance a suite of 10 resilience projects through preliminary schematic design. The full Matrix can be found in Appendix D of this report.

The 20 evaluation criteria in the final Site Selection Matrix were further categorized into four priority categories: Potential Resilience Impact, Green Infrastructure Network Potential, Project Feasibility, and Social Impact. Each criterion was allowed a raw score from 1-5, and weighted according to the AMRI Team's consensus based on alignment with jurisdictional, resiliency, and community priorities. A brief description of each category is below, with additional details found in Appendix D. Weighted total scores for each site can range from 50-250.

- **Potential Resilience Impact (weighted subtotal: 20-100):** These criteria assess the project's support of community resiliency goals and durability in the face of climate change.
- **Green Infrastructure Network Potential (weighted subtotal: 6-30):** Criteria in this category assess the ecological uplift and environmental benefit of each project.
- **Project Feasibility (weighted subtotal: 6-30):** Feasibility criteria evaluate the complexity and difficulty of design, permitting, and implementation of each project to ensure advancement is a worthwhile investment.
- **Social Impact (weighted subtotal: 18-90):** These criteria strongly weigh community considerations including socioeconomic, educational, and recreational opportunities for each project, including public access points to the water.

Each criterion was scored by project designer Biohabitats, based on desktop analyses and field investigations. The output of the Site Selection Matrix resulted in an unbiased ranking of all potential projects, with higher scores favoring NBS and SWM solutions that would support all four criteria categories.

The AMRI Team sorted all 38 sites considered by weighted total score in descending order, then pared the list down to the 10 sites recommended for advancement under Phase I through a series of meetings among the project team. It is important to note that additional considerations beyond weighted total score included alignment with existing plans or projects, funding availability and eligibility, and landowner support. While these were not official criteria contributing to the scoring matrix, these aspects were considered by the team on a qualitative basis to reflect community priorities and avoid duplicated efforts.

Close coordination with the City of Annapolis and other implementation partners revealed that many of the sites identified by the community were already being addressed through existing efforts, including a parallel FEMA-funded flood mitigation planning effort in Eastport. As such, five sites received weighted total scores that ranked them within the top 10, but they were not selected for 10% design under this initiative because designs already exist and/or are being prioritized for development by other implementation partners. A more detailed explanation of each highly-ranked site that did not advance to 10% design as part of AMRI Phase I can be found in Appendix E.

The sites selected for 10% design as part of AMRI Phase I, as outlined in the summary table below, were chosen based on the weighted total score ranking, compounded by the qualitative factors above. While the 10 recommended sites are listed by weighted total score ranking, the order is not meant to infer priority for implementation. Each project listed below, as well as the other sites not selected for design as part of Phase I, are priorities for the AMRI team and the community and should be advanced as funding and resources allow.

Table 1: Summary Table - Sites Selected for 10% Design

Weighted Total Score Ranking*	Site Name	Weighted Total Score (50-250)	Project Type	Funding Scale ($, $$, $$$, $$$$)**
1	**ASPCA**	205	Stormwater conveyance, stream and wetland restoration	$$$$
2	**Mariner's Point**	194	Living shoreline, regenerative steppool conveyance, and floodplain reconnection	$$$$
5	**Tyler Avenue**	170	Bioswale, vegetative stormwater conveyance, native plantings	$
6	**Harborview**	169	Regenerative stormwater conveyance, wetland restoration, shoreline stabilization	$$$$
7	**Truxtun Park**	168	Beach replenishment, shoreline stabilization	$$$
11	**Melrob Court**	159	Bioretention basin	$$
12	**1309 Bay Ridge Avenue**	156	Bioretention area and native planting	$$
13	**Ambridge Pond/ Timber Creek**	155	Restoration and hydrological connection of stream/wetland complex and repair of SWM facility	$$
14	**Georgetown Grove**	155	Living shoreline, native species habitat	$$$$
15	**Georgetown East Elementary**	154	Stream restoration, critical infrastructure protection	$$

**Additional scoring details available in Appendix D. Missing weighted total score rankings (3, 4, 8, 9, 10) were not included because these sites are being addressed by partner efforts already underway, as further described in Appendix E.*

***Funding scale symbols correlate as follows:*
***$:** up to $500,000, **$$:** $500,000-$1,000,000, **$$$:** $1,000,001-$1,500,000, **$$$$:** $1,500,001+*

Please Note: This table reflects planning level estimates for design, permitting, and construction based on best available information at the time of report development (December 2025) and are subject to change. Additional design and permitting efforts may provide new information and/or alter anticipated approaches, resulting in differing implementation cost estimates.

Figure 5: Potential Project Location Map

ID	Project Name
A	Shearwater
B	Hawkins Cove
C	Horn Point Park
D	1st Stand Chester Ave
E	George Washington Davis Park
F	Second Street Water Access
G	Annapolis Sailing School
H	Chester Ave Water Access
I	Harborview
J	Ellen Moyer Park
K	Green Acres
L	Georgetown Grove
M	Ambridge Pond/Timber Creek
N	ASPCA
O	Georgetown East Elementary
P	Mariner's Point
Q	Eastport - Living Shoreline 1
R	Severn Ave SEP
S	Eastport - Living Shoreline 3

ID	Project Name
T	Jeremy's Way Street End Park
U	The Tecumseh/2nd St Spa Creek
V	5th Street Ferry Boat Landing
W	Annapolis Neck Cemetary
X	Mt Moriah AME Church
Y	Georgetown Plaza
Z	Blackwell Road
AA	Baywoods of Annapolis
AB	Tyler Ave
AC	Billy Jon Alley
AD	Truxton Park
AE	1309 Bay Ridge Ave (Church)
AF	Melrob Ct
AG	Bricin St & Janwall St
AH	Bay Ridge Plaza
AI	Giant Parking Lot
AJ	Giant Parking Lot
AK	Fairwinds of Annapolis

Legend

- Recommended Potential Project
- Evaluated Potential Project
- Phase I Study Area
- FEMA 100-Year Floodplain

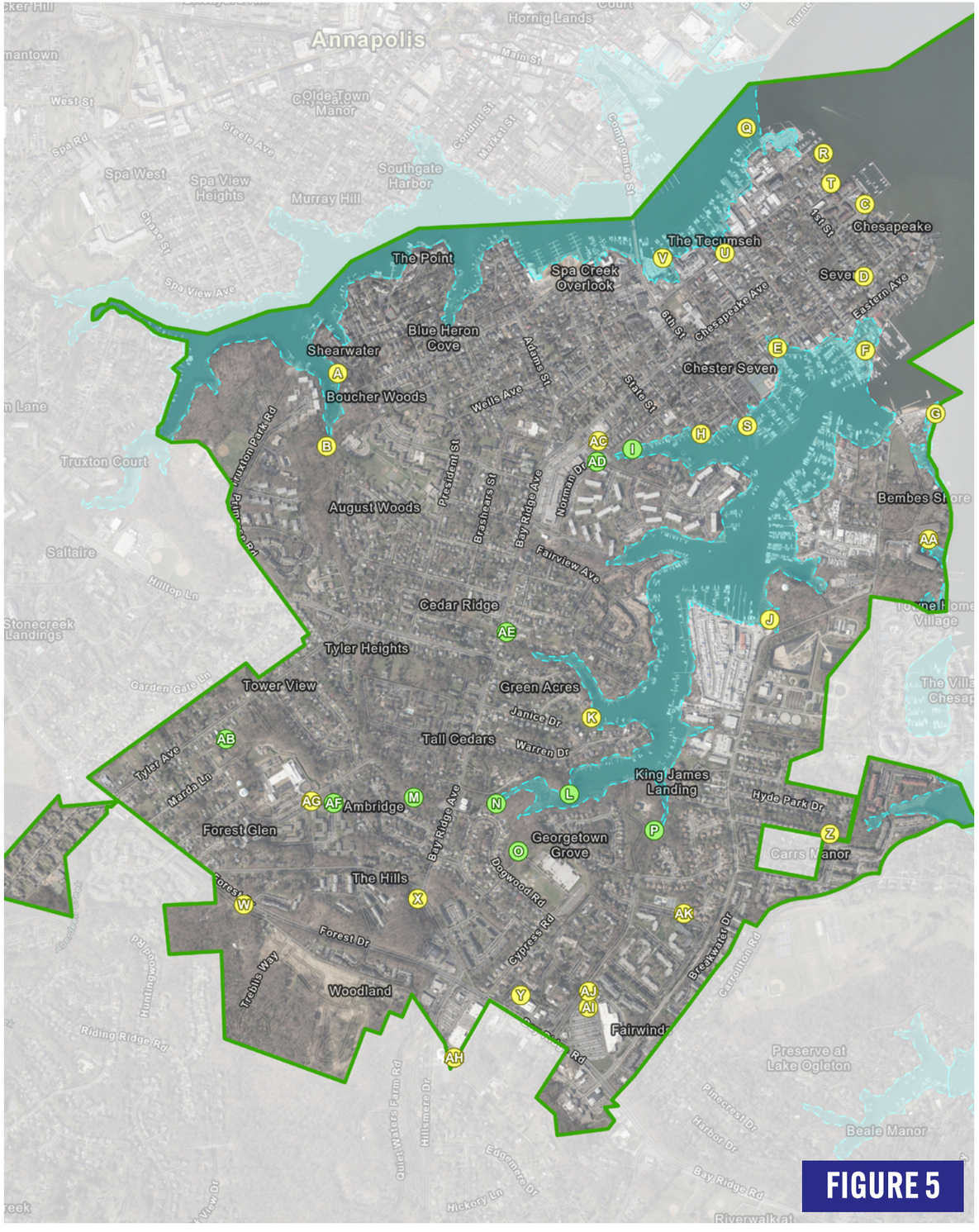


FIGURE 5

VII. Site Profiles and Preliminary Design Concepts

ASPCA

Summary of Site Conditions and Project Types

The ASPCA site regularly experiences nuisance flooding during storm events due to the eroded nature of the shoreline and stream corridor. The current conditions also pose a health and safety hazard, with exposed sewer infrastructure at risk of failure due to current lack of protection and existing site dynamics. The work proposed will include a stormwater conveyance system and stream and wetland restoration.

Justification for Selection

The ASPCA site had the highest weighted total score of 205, reflecting its strong alignment with community priorities and the identified scoring criteria. The project had a very high Potential Resilience Impact score and a perfect Green Infrastructure Network Potential score. Further, the site will protect critical community infrastructure with restoring the conditions surrounding the sewer line, and provide increased coastal resiliency to this waterfront property. Additional project benefits supporting its selection include nuisance flood attenuation, forested riparian and wetland habitat improvements, and publicly-accessible trail improvements.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the ASPCA (stream and wetland restoration) will likely require 5-10 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to a long-term management phase with the selection and assignment of a long-term steward to manage the site in perpetuity. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of stream areas, noting any areas of instability, erosion, or issues with in-stream structure function,
- Assessment of cross-sections along the stream area and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

SWM

Flood Risk Reduction

Community Resiliency

Asset Protection

The ASPCA Project will protect critical infrastructure, including sewer main lines that criss-cross the stream valley area and extend onto AACPS property at Georgetown East Elementary. The added floodplain storage will also reduce nuisance flooding to the area.

Other Anticipated Benefits

Water Quality Improvements

Educational Opportunities

Public Access to Open Space

Habitat Restoration

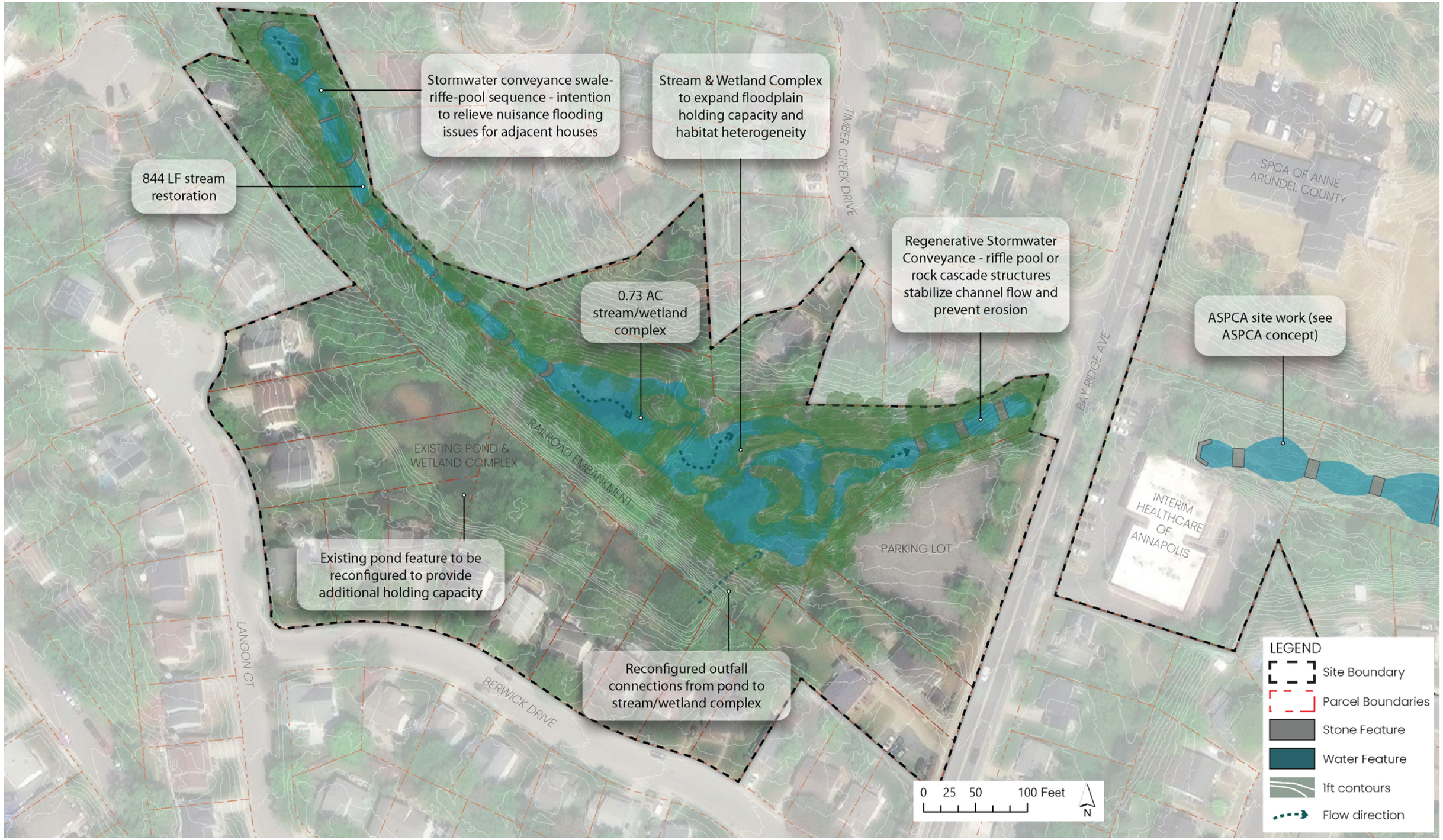
In addition to the proposed SWM and flood risk attenuation, the project will improve water quality with a reduction in sediment loading that is currently filling the headwaters area at the mouth of Back Creek. The project would also enhance and create wildlife habitat, create local jobs, provide the potential for environmental education, enhance outdoor spaces, and enhance existing infrastructure within the project area by improving the trail network used by ASPCA staff and volunteers.

Currently, the ASPCA natural areas are used primarily as walking paths for volunteers at the facility to exercise the dogs in their care. The project would enhance the value of these natural areas for wildlife including birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species. There is no public access proposed as part of the plan, but public access could be incorporated into the plan if the ASPCA desired. Educational signage could be placed along walking paths to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region.

Funding Scale: $$$$

Implementation Pathways

- **Recommended Next Steps**
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowner for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - Joint Permit Application
  - City of Annapolis Grading Permit
  - Maryland Tidal Wetlands Permit
  - Federal Tidal Wetlands Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowner at the site.

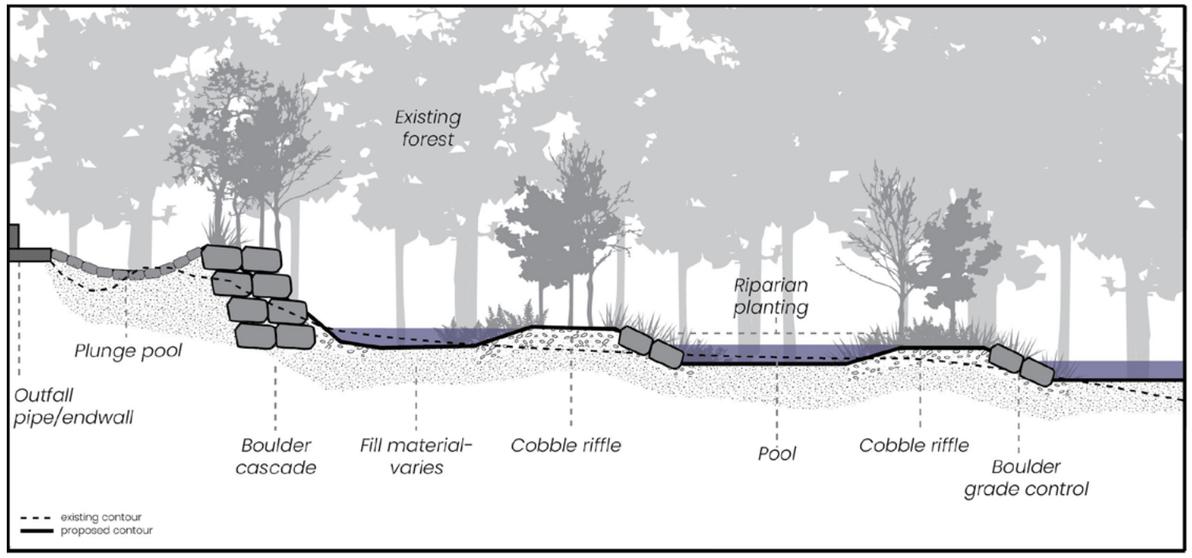

Stormwater conveyance swale-riffe-pool sequence - intention to relieve nuisance flooding issues for adjacent houses
Stream & Wetland Complex to expand floodplain holding capacity and habitat heterogeneity
844 LF stream restoration
0.73 AC stream/wetland complex
Regenerative Stormwater Conveyance - riffle pool or rock cascade structures stabilize channel flow and prevent erosion
ASPCA site work (see ASPCA concept)
Existing pond feature to be reconfigured to provide additional holding capacity
Reconfigured outfall connections from pond to stream/wetland complex
TIMBER CREEK DRIVE
BAY RIDGE AVE
SPCA OF ANNE ARUNDEL COUNTY
EXISTING POND & WETLAND COMPLEX
RAILROAD EMBANKMENT
PARKING LOT
INTERIM HEALTHCARE OF ANNAPOLIS
LANGON CT
BERWICK DRIVE
0 25 50 100 Feet
N
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
1ft contours
Flow direction

PROJECT NARRATIVE

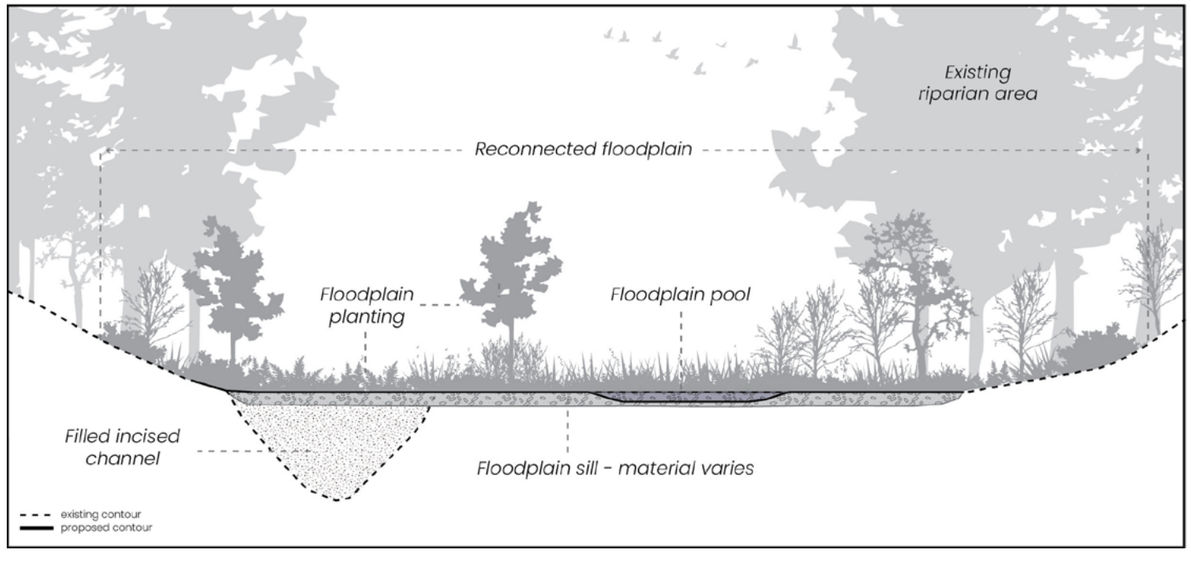
Downstream from the Ambridge/Timber Creek site, the ASPCA site provides an opportunity for stream and valley-wide regenerative stormwater conveyance (RSC) design to capitalize on forested floodplain areas, which have developed as terrace features adjacent to a highly incised channel. Proposed work would consist of both single-thread and valley-wide RSC features to maximize stream/floodplain contact, enhance riparian habitat, and maximize water quality treatment and flood capacity. Anticipated project benefits include approximately 1,234 linear feet of stream restoration and 0.66 acre of marsh restoration at the tidal interface at Back Creek. Post-construction monitoring is anticipated to consist of a five-year period to annually evaluate swale/stream performance to verify stability and prevention of erosive flows, establishment of native vegetative communities, and potential invasive species management at the tidal interface to treat Phragmites.

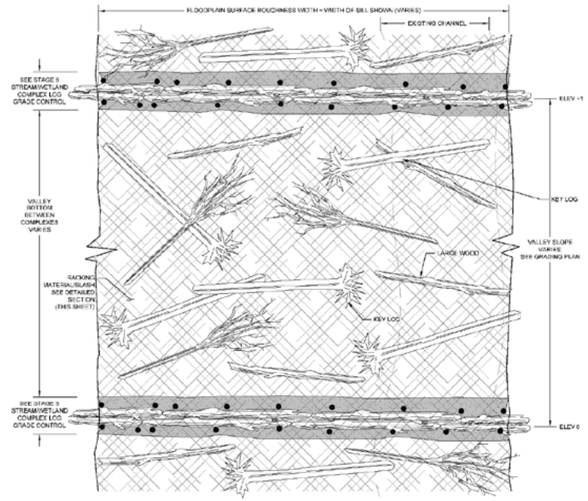
TYPICAL DETAILS AND SECTIONS

Rock Cascade - Riffle/Pool Sequence - Typical Section

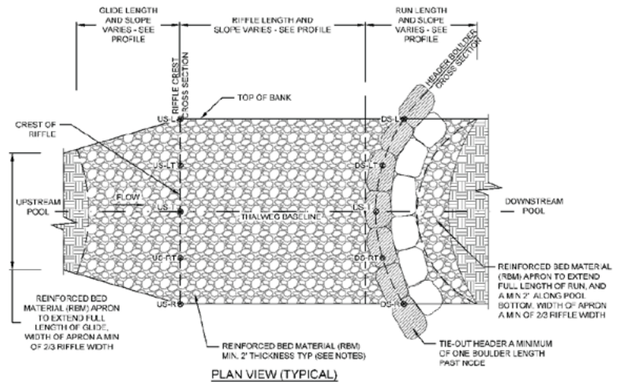


Valley-Wide Regenerative Stormwater Conveyance - Typical Section

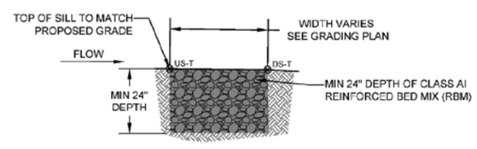




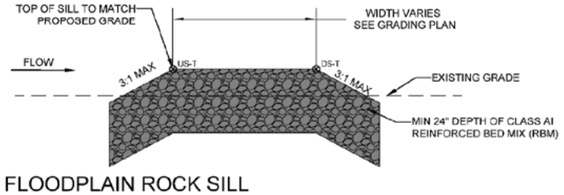
Stream/Wetland Complex Surface Roughness - Plan View



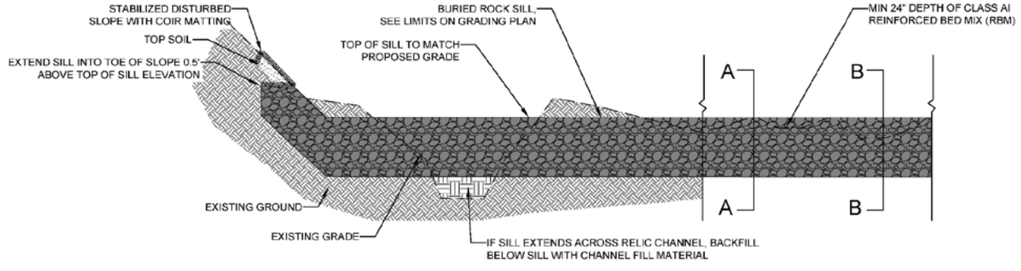
Riffle - Plan View



FLOODPLAIN ROCK SILL
SECTION A-A" (AT GRADE)
NOT TO SCALE



FLOODPLAIN ROCK SILL
SECTION B-B" (ABOVE GRADE)
NOT TO SCALE



Floodplain Rock Sill - Section View

Mariner's Point

Summary of Site Conditions and Project Types

The Mariner's Point project area includes an incised, forested valley channel leading to the tidal tributary of Back Creek. The proposed project includes living shoreline, stream restoration with regenerative step pool conveyance, and floodplain reconnection to promote coastal resiliency and habitat availability.

Justification for Selection

This project's weighted total score ranked second overall due to its high Potential Resiliency Impact and Social Impact scores, combined with a perfect Green Infrastructure Network Potential score. The AMRI Team identified this new project opportunity due to its strong potential for valley wide stormwater conveyance and shoreline improvements.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the Mariner's Point will likely require 5 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to a long-term management phase with the selection and assignment of a long-term steward to manage the site in perpetuity. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of stream areas, noting any areas of instability, erosion, or issues with in-stream structure function,
- Assessment of cross-sections along the stream and shoreline areas and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

SWM

Community Resiliency

Asset Protection

The Project will increase floodplain connection and SWM capacity and protect critical infrastructure, including a sewer lift station to the east of the project. The restored living shoreline will also create a natural buffer against erosion and storm events, improving community resiliency to SLR and storm surge.

Other Anticipated Benefits

Water Quality Improvements

Public Access to Open Space

Habitat Restoration

The proposed restoration will reduce sediment loading to Back Creek, increasing water quality. The restored system and improved ecological function will also create and enhance wildlife habitat for birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species. Currently, the Mariner's Point natural areas are not used by the community nor the public for passive recreation or access. There is no public access proposed as part of the plan, but public access could be incorporated into the plan if the community desired.

Funding Scale: $$$$

Implementation Pathways

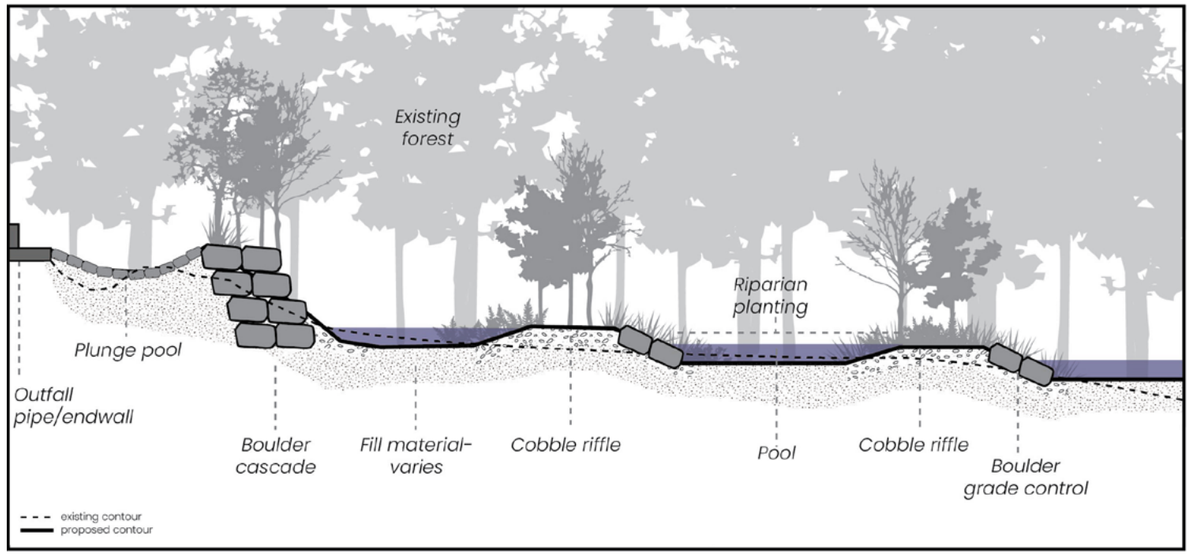
- **Recommended Next Steps**
  - Collect Additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the community for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - Joint Permit Application (JPA)
  - City of Annapolis Grading Permit
  - Maryland Tidal Wetlands Permit
  - Federal Tidal Wetlands Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the community at the site.

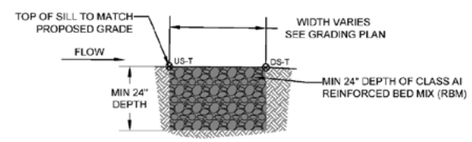

A valley-wide regenerative stormwater conveyance approach uses log or rock sills to spread water across the floodplain. This reconnects channelized streams to the floodplain, creating microtopography and preventing channel incision.
Riffle-Pool sequence stabilizes channel flow and prevents erosion
180 LF living shoreline
Floodplain pools provide additional stormwater management capacity and provide important wildlife habitat and wetland microtopography.
Living shoreline - Creates a natural buffer against shoreline erosion and weather events, retains sediment, provides multi-tiered wildlife habitat, and restores native plant communities.
Step Pool Conveyance - Rock Cascade structures stabilize channel flow and prevent erosion
1,029 LF stream restoration
MOORING POINT CT
WINDWHISPER LN
MARINER'S POINT COMMUNITY CENTER
GEORGETOWN RD
Back Creek
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
Living Shoreline Low
Living Shoreline Mid
Living Shoreline Upl
1ft contours
Flow direction
100 yr floodplain
0 25 50 100 Feet
N

PROJECT NARRATIVE

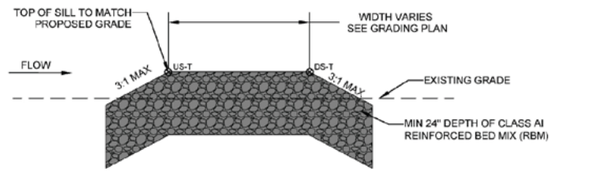
The Mariner's Point site presents an opportunity to proviide meaningful stream, wetland, and shoreline restoration. The proposed concept consists of a single-thread regenerative stormwater conveyance (RSC) feature at the upstream extent of the site, which will expand into a valley-wide RSC feature where the floodplain adjacent to the stream expands to maximize both flood attentuation and ecological restoration. At the mouth of the stream's tidal interface, shoreline restoration is proposed to provide a stable interface with the backwater conditions at Back Creek. Anticipated project benefits include approximately 1,029 linear feet of stream restoration and 180 linear feet of shoreline restoration. Post-construction monitoring is anticipated to consist of a five-year period to annually evaluate stream performance to verify stability and prevention of erosive flows, establishment of native vegetative communities, and potential invasive species management at the tidal interface to treat Phragmites.

Rock Cascade

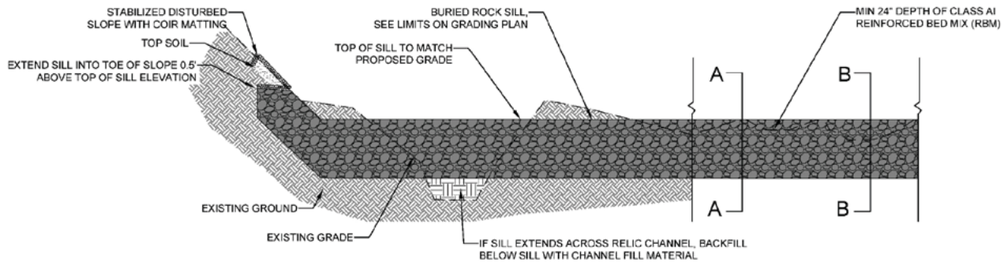




FLOODPLAIN ROCK SILL
SECTION A-A" (AT GRADE)
NOT TO SCALE

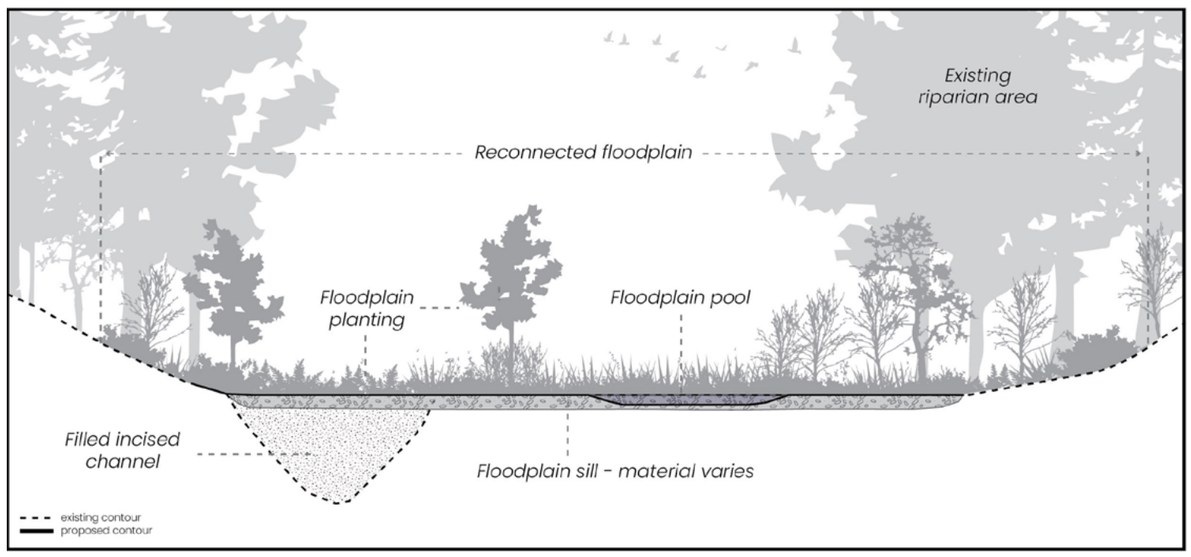


FLOODPLAIN ROCK SILL
SECTION B-B" (ABOVE GRADE)
NOT TO SCALE

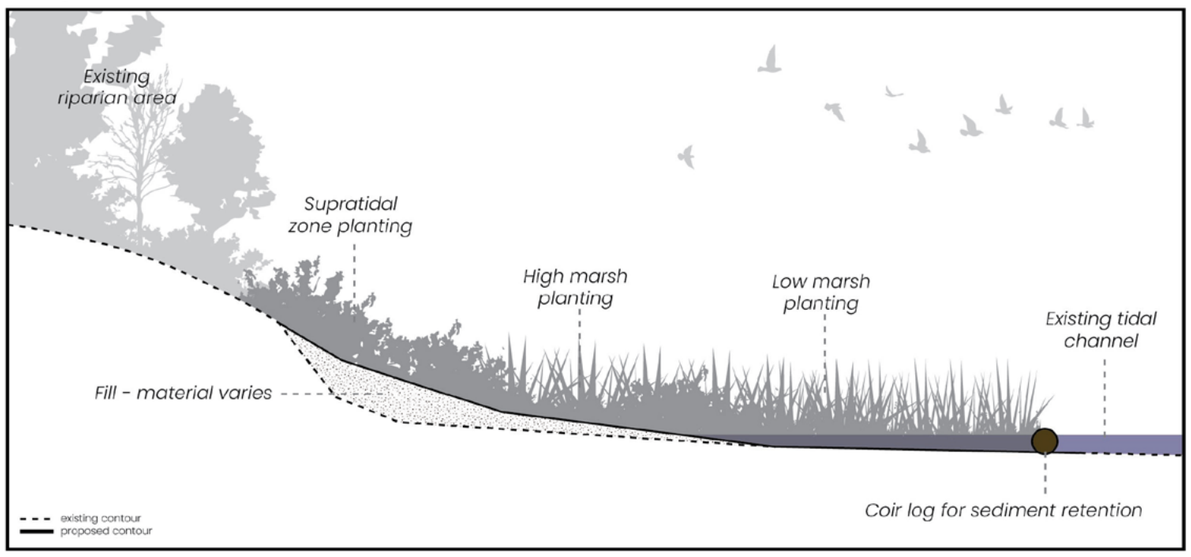


Floodplain Rock Sill - Section View

Valley-Wide Regenerative Stormwater Conveyance - Typical Section



Living Shoreline - Typical Section



Tyler Avenue

Summary of Site Conditions and Project Types

The Tyler Avenue site consists of an existing drainage channel on a residential property which leads to an open overland grass and forested area. The presence of the existing swale allows for a modified design opportunity mimicking existing conditions and drainage patterns incorporating a bioswale, planting of native shrubs, and vegetative stormwater conveyance.

Justification for Selection

The Tyler Avenue site ranked moderate to moderately-high across all criteria priorities. Utilizing existing site conditions and drainage patterns while incorporating a bioswale for increased soil infiltration provides an opportunity for reduction of runoff into a natural flow path. The site location also provides an opportunity to expand the project onto the adjoining elementary school property for a larger chain of treatment facilities, connecting it with existing bioretention features.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the Tyler Avenue site will likely require 2 years of formal regulatory maintenance and monitoring, and will likely generate credit as a SWM BMP, which requires inspections on a triennial basis. Success metrics are anticipated to include:

- The percent cover of native vegetation (in planted areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., English ivy),
- Visual assessment of the bioswale, noting any areas of instability and/or erosion,
- Assessment of woody species establishment.

Priority Resilience Benefits

SWM

Flood Risk Reduction

Community Resiliency

The Tyler Avenue site is located on private residential property and has experienced nuisance flooding due to poor drainage during storm events. The proposed bioswale would alleviate this nuisance flooding by channeling runoff into a natural flow path and planting vegetation to update stormwater while providing stability and reducing erosion on site.

Other Anticipated Benefits

Water Quality Improvements

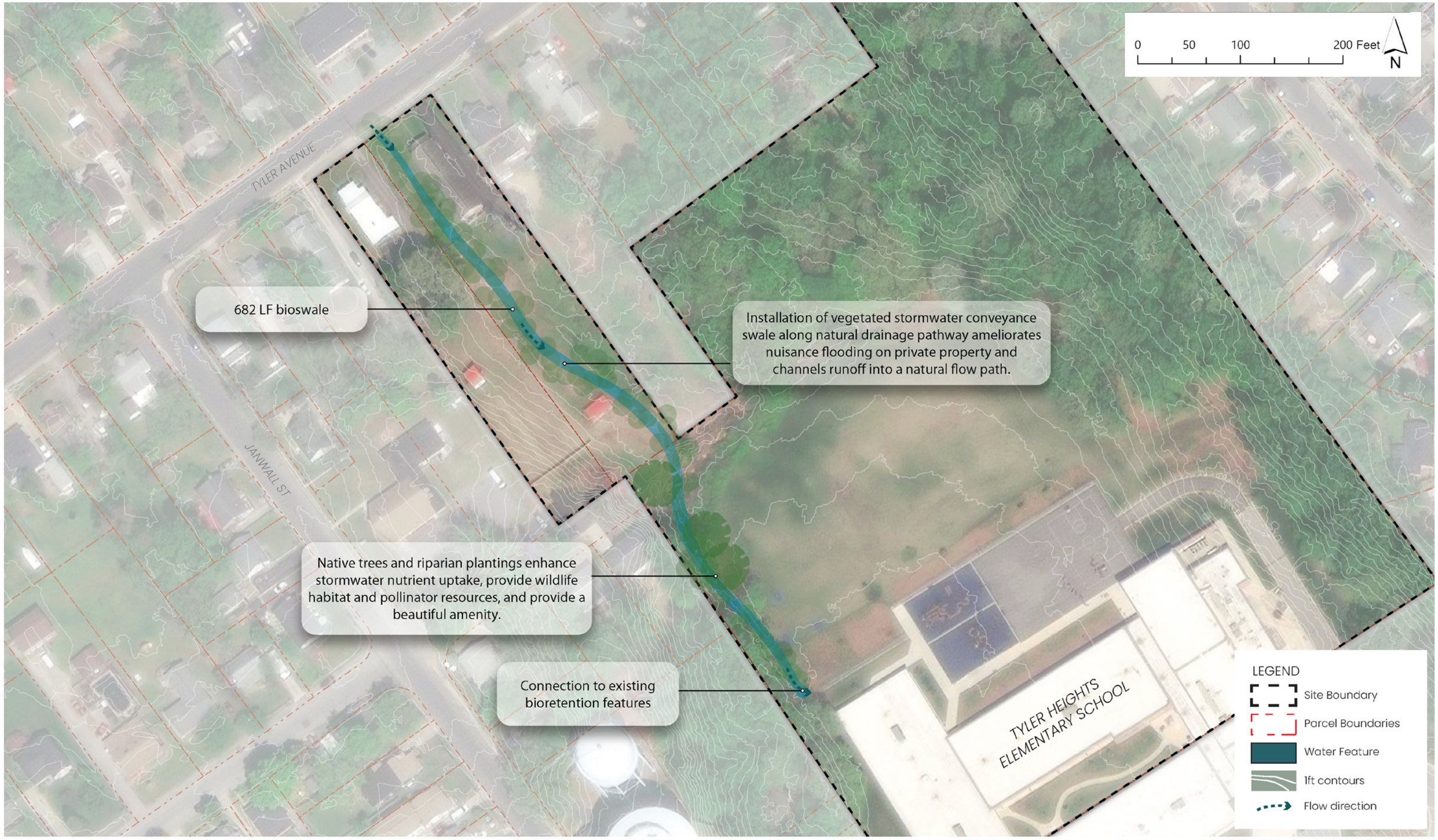
Habitat Restoration

Enhancing this headwater system and treating stormwater before it moves downstream to tidal waters, will improve water quality and enhance and create wildlife habitat. Native plantings will further enhance the value of the site for wildlife including birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species. There is no public access proposed as part of the plan. Native woody species planted as part of the project would increase tree canopy in the City of Annapolis and provide additional nutrient update, pollinator habitat, and aesthetic improvements.

Funding Scale: $

Implementation Pathways

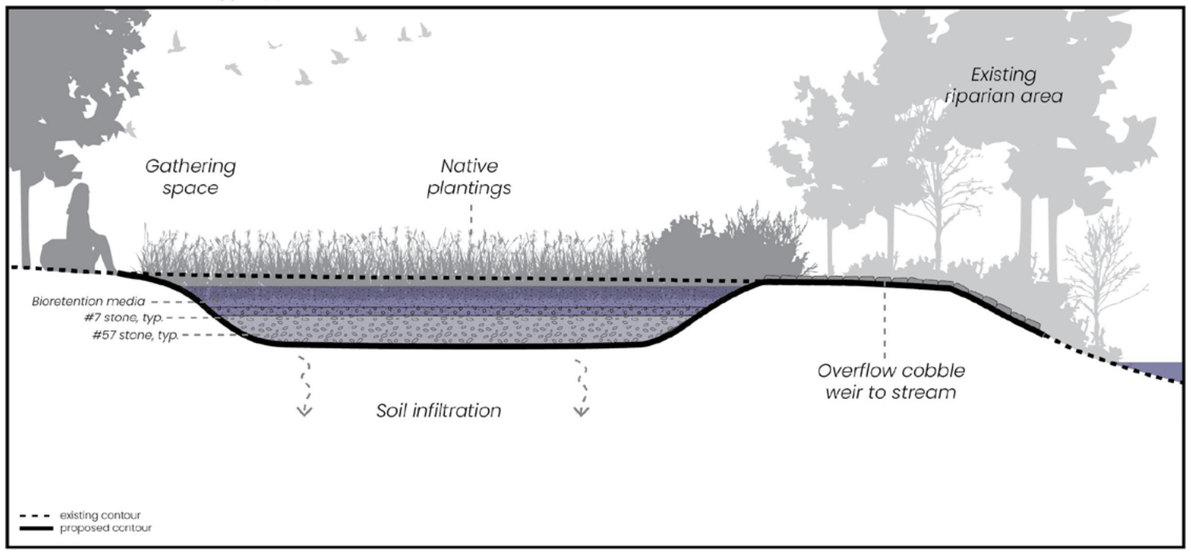
- **Recommended Next Steps**
  - Collect Additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowners for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - City of Annapolis Grading Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowners at the site which may include private landowners on the residential parcels and Anne Arundel County Public Schools for downstream portions of this project area.

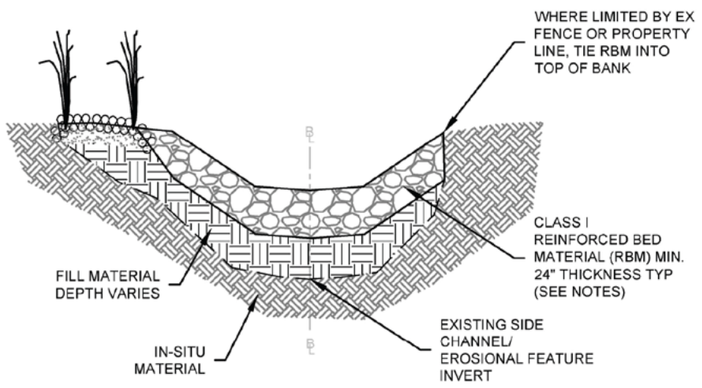

0
50
100
200 Feet
N
TYLER AVENUE
JANWALL ST
682 LF bioswale
Installation of vegetated stormwater conveyance swale along natural drainage pathway ameliorates nuisance flooding on private property and channels runoff into a natural flow path.
Native trees and riparian plantings enhance stormwater nutrient uptake, provide wildlife habitat and pollinator resources, and provide a beautiful amenity.
Connection to existing bioretention features
TYLER HEIGHTS ELEMENTARY SCHOOL
LEGEND
Site Boundary
Parcel Boundaries
Water Feature
1ft contours
Flow direction

PROJECT NARRATIVE

Problematic drainage within a historically developed area off Tyler Avenue has presented nuissance flooding issues to single family residential lots just north of Tyler Heights Elementary School, which resides in the headwaters of Back Creek near the Ambridge/Timber Creek site. Proposed conceptual design consists of establishing a vegetated bioswale to convey storm flows, with underlaying soil media to promote infiltration of surface waters to groundwater. The school site has resulted in manipulations to natural drainage; as such, a stable tie-out to natural features may required within school property. Anticipated benefits consist of approximately 2,867 linear feet/269 square feet of bioretention area. Monitoring criteria will consist of annual inspections by the City of Annapolis to evaluate drainage performance and continued native plan community establishment.

Bioretention Basin - Typical Section





TYPICAL SWALE STABILIZATION NOTES:

1. PREPARE THE SUBGRADE OF PLUNGE POOL TO THE REQUIRED SUBGRADE. COMPACT ANY FILL REQUIRED IN THE SUBGRADE USING AN EXCAVATOR BUCKET.
2. USE A MINIMUM DEPTH OF 24" OF CLASS I RBM WITHIN LIMITS SHOWN AS DEPICTED ON THE GRADING PLAN.
3. SEE TYPICAL SECTION FOR DIMENSIONS OF SWALE.
4. SEE PROFILE FOR THALWEG SLOPE, ELEVATIONS, AND TIE-OUT TO MAIN STREAM CHANNEL.
5. SEE GENERAL STRUCTURE NOTES AND THE ROCK AND LOG GRADE CONTROL STRUCTURE CONSTRUCTION NOTES FOR ADDITIONAL INFORMATION.
6. IF OTHER ADDITIONAL SECONDARY AND/OR MINOR CHANNELS ARE DISCOVERED DURING CONSTRUCTION, USE THIS TYPICAL DETAIL TO STABILIZATION AT THE DIRECTION OF FAIRFAX COUNTY.

Swale Stabilization - Typical Section

Harborview Stream/Shoreline

Summary of Site Conditions and Project Types

Existing conditions at the Harborview site consist of forested floodplain and riparian areas with a large stormwater outfall that collects runoff from a highly developed (i.e., impervious) drainage area with little to no modern SWM facilities upstream. There is a highly incised channel downstream of the outfall that is continuing to erode, with 4-6' high vertical banks. This site is well suited to implement a regenerative stormwater conveyance, restore and enhance tidal and non-tidal wetlands, and implement shoreline stabilization/ living shoreline features.

Justification for Selection

Threats to existing infrastructure, incising within the existing channel, and ongoing erosion highlight the importance and urgency required for advancing this project, which is underwritten by its high Potential Resilience Impact score. Due to its connection with Back Creek, the site possesses strong potential for restoration and ecological uplift. The site also provides for ample area to create natural buffers against further erosion.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the Harborview site (stream and shoreline restoration) will likely require 5 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to a long-term management phase with the selection and assignment of a long-term steward to manage the site in perpetuity. If the site is used to provide credit for a TMDL SWM (MS4) permit, inspections will need to occur on a triennial basis to continue to claim credit. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of stream areas, noting any areas of instability, erosion, or issues with in-stream structure function,
- Assessment of cross-sections along the stream and shoreline area and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

SWM

Community Resiliency

Asset Protection

The project will provide significant improvements to stormwater management in the surrounding drainage area. Runoff from the Eastport Shopping Center, Nautilus Point, and adjacent neighborhoods that currently enters Back Creek untreated, will now be conveyed through the restored system including a regenerative stormwater conveyance and wetland complex, increasing infiltration and nutrient cycling. Further, an existing sewer main will be protected from coastal erosion and SLR.

Other Anticipated Benefits

Water Quality Improvements

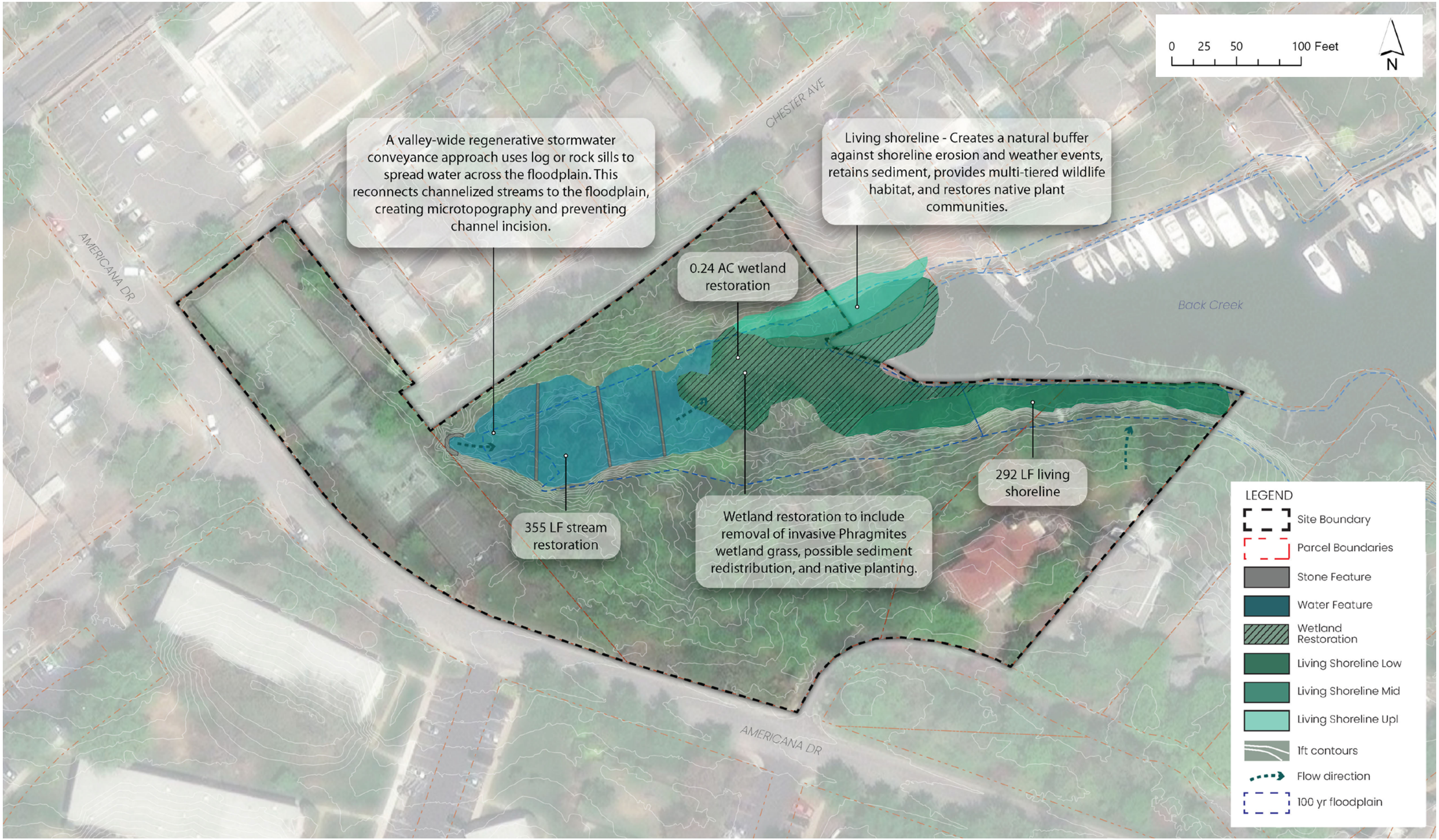
Habitat Restoration

Currently, the Harborview site is not used by the public nor the community, and serves as a protected natural area that conveys stormwater flows from the Eastport Shopping Center, Nautilus Point, and neighborhoods in Eastport to Back Creek. However, the site is overrun with non-native invasive species and community members have organized volunteer invasive management events in the past to attempt to control non-native species. Additional vegetation management would greatly improve the conditions on this site. The project would enhance the value of the natural areas for wildlife including birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species. There is no public access proposed as part of the plan, but public access could be incorporated into the plan if the Harborview community desired. Educational signage could be placed along natural surface walking paths to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region.

Funding Scale: $$$$

Implementation Pathways

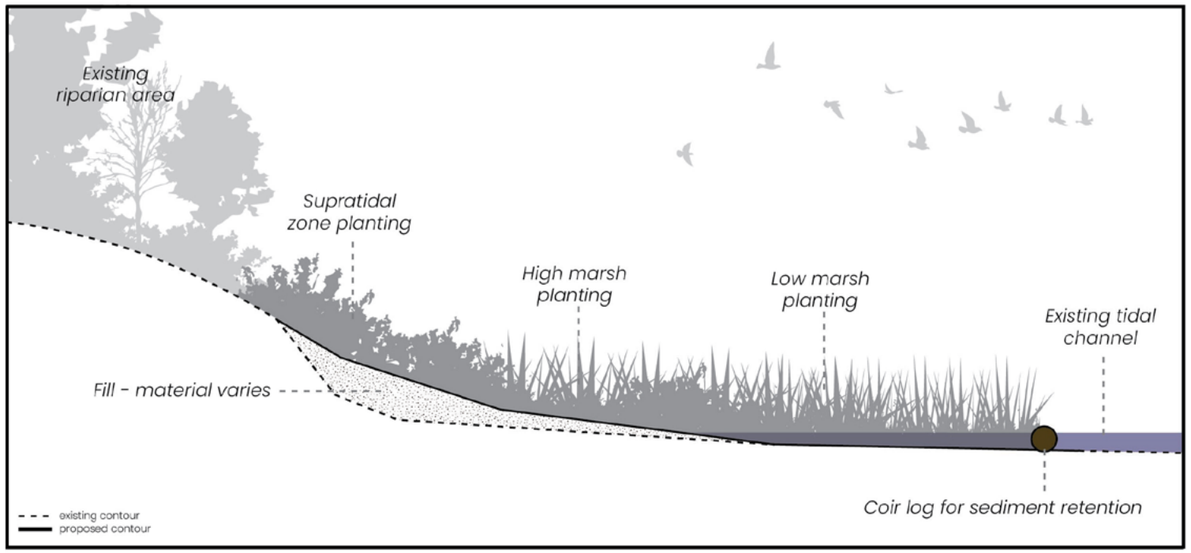
- **Recommended Next Steps**
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowners for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
  - Incorporate survey and designs for proposed development at Eastport shopping center (Eastport Sail Lofts) and related mitigation plans into the Harborview concept to promote compatibility and sustainability of both projects.
- **Regulatory Requirements and Permitting Considerations**
  - Joint Permit Application (JPA)
  - City of Annapolis Grading Permit
  - Maryland Tidal Wetlands Permit
  - Federal Tidal Wetlands Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowners at the site.


0 25 50 100 Feet
N
CHESTER AVE
AMERICANA DR
Back Creek
A valley-wide regenerative stormwater conveyance approach uses log or rock sills to spread water across the floodplain. This reconnects channelized streams to the floodplain, creating microtopography and preventing channel incision.
Living shoreline - Creates a natural buffer against shoreline erosion and weather events, retains sediment, provides multi-tiered wildlife habitat, and restores native plant communities.
0.24 AC wetland restoration
355 LF stream restoration
Wetland restoration to include removal of invasive Phragmites wetland grass, possible sediment redistribution, and native planting.
292 LF living shoreline
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
Wetland Restoration
Living Shoreline Low
Living Shoreline Mid
Living Shoreline Upl
1ft contours
Flow direction
100 yr floodplain

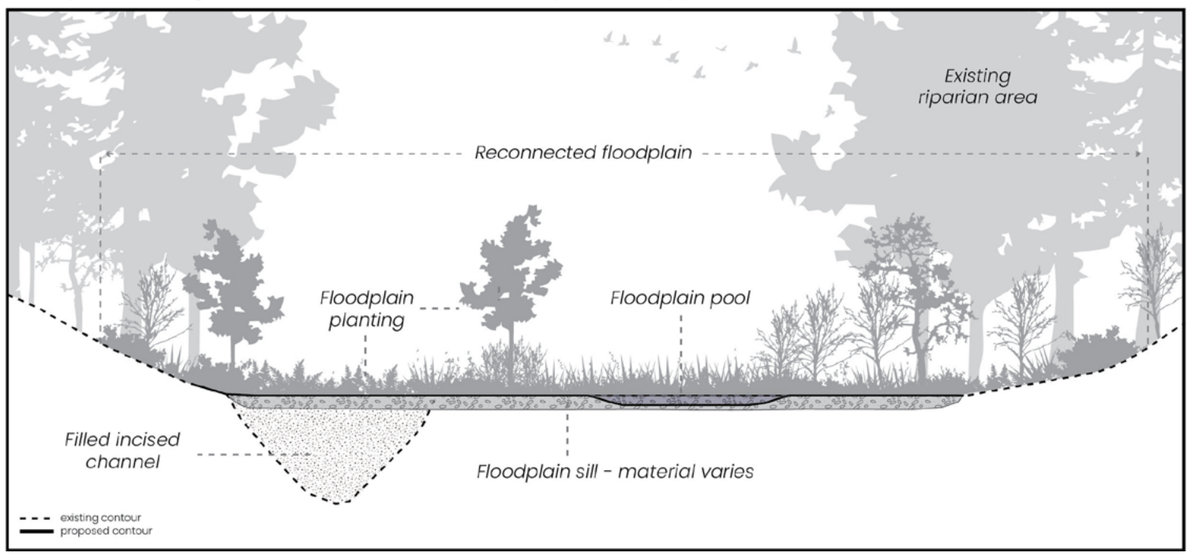
PROJECT NARRATIVE

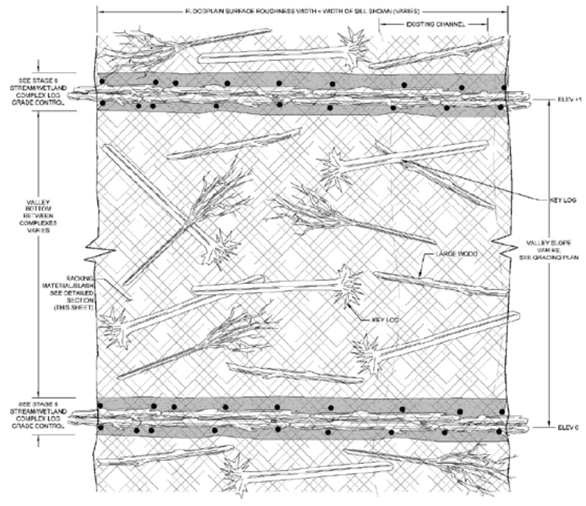
Harborview provides an excellent opportunity for stream, wetland, and shoreline restoration. Proposed conceptual design entails conveying flow from an existing culvert to a valley-wide regenerative stormwater conveyance feature just upstream of tidal waters, which will maixmize using existing, natural floodplain features to abate stormwater flows over a wide floodplain surface. Anticipated benefits include approximately 355 linear feet of stream restoration, 0.24 acre of wetland restoration, and 292 linear feet of shoreline restoration at the mouth of a significant tributary to Back Creek. Post-construction monitoring is anticipated to consist of a five-year period to annually evaluate stream performance to verify stability and prevention of erosive flows, establishment of native vegetative communities. Invasive species management will be required at the mouth of Back Creek to prevent Phragmites establishment.

Living Shoreline - Typical Section

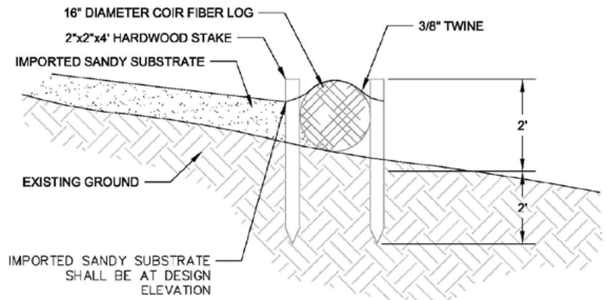


Valley-Wide Regenerative Stormwater Conveyance - Typical Section

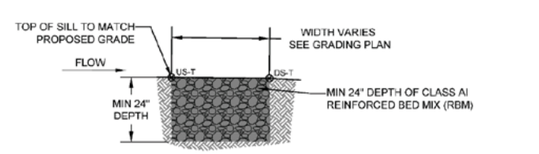




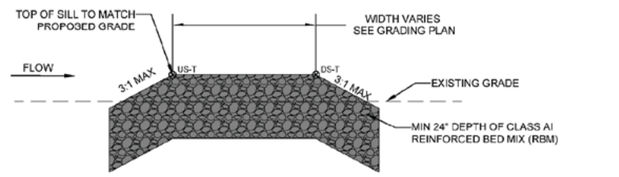
Stream/Wetland Complex Surface Roughness - Plan View



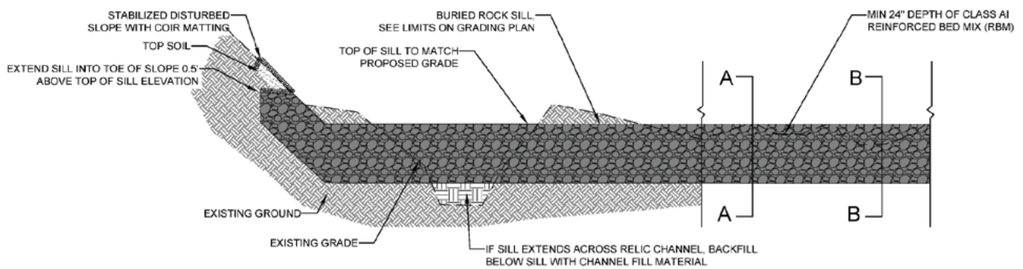
Coir Log - Section View



FLOODPLAIN ROCK SILL
SECTION A-A" (AT GRADE) NOT TO SCALE



FLOODPLAIN ROCK SILL
SECTION B-B" (ABOVE GRADE) NOT TO SCALE



Floodplain Rock Sill - Section View

Truxtun Park Boat Ramp

Summary of Site Conditions and Project Types

The existing shoreline is currently experiencing erosion; existing public access to the shoreline at Truxtun Park is unmaintained and presents potential public safety concerns. Growing bank erosion will threaten existing dock and infrastructure. The site provides opportunities for beach replenishment and shoreline stabilization.

Justification for Selection

Truxtun Park scored highly in Social Impact due to its public accessibility and recreational opportunities. The project proposes to create natural buffers against erosion and weather events, while promoting wildlife habitat and native plant communities, which are local ecological priorities. Further, the project will improve public safety in Truxtun Park to access the shoreline for recreational activities including fishing and increase aesthetic appeal for this community hub.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project type at the Truxtun Park Boat Ramp (shoreline stabilization) will likely require 5 years of formal regulatory maintenance and monitoring (based on typical tidal project monitoring requirements), and will likely conclude with a transition to a long-term management phase with the selection and assignment of a long-term steward to manage the site in perpetuity. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of shoreline areas, noting any areas of instability and/or erosion.
- Assessment of cross-sections along the shoreline area and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

Community Resiliency

Asset Protection

Currently, the project area is used primarily (on the Truxtun Park property) as a public fishing area and recreational asset for residents. The privately owned part of the project (Spa Cove Apartments) is undeveloped shoreline. The project would stabilize and protect these shorelines in the face of climate change related challenges, while reducing sediment and nutrient loading to Spa Creek.

Other Anticipated Benefits

Water Quality Improvements

Public Access to Open Space

Habitat Restoration

In addition to the proposed water quality benefits to Spa Creek and a reduction in sediment loading, the project would enhance public water access and public safety, enhance and create wildlife habitat, create local jobs, provide the potential for environmental education, enhance outdoor spaces, and enhance existing infrastructure within the project area by improving the trail network used by residents and patrons of Truxtun Park. Public safety would be enhanced on the Truxtun Park property by improving the path down to the beach replenishment area and providing improved public access to the water. There is no public access proposed as part of the plan for the Spa Cove Apartments portion of the site, but the City of Annapolis is currently proposing a project in the vicinity to enhance walkability and trail connectivity with the 'Hawkins Cove to Truxtun Park Trail' project, which would further improve equitable access in the area. Educational signage in both English and Spanish could be placed along walking paths on the Truxtun Park property to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region.

Funding Scale: $$$

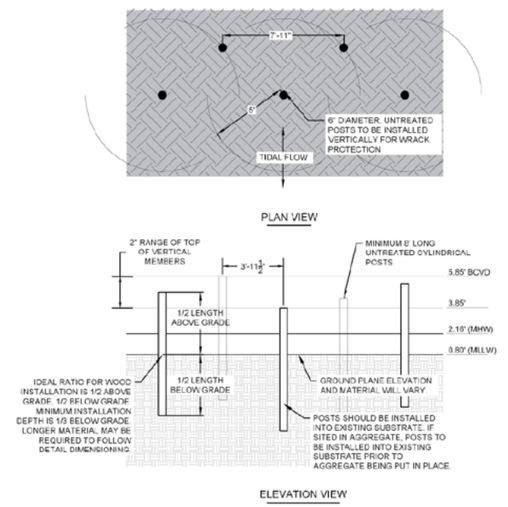
Implementation Pathways

- **Recommended Next Steps**
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowner for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - City of Annapolis Grading Permit
  - Maryland Tidal Wetlands Permit
  - Federal Tidal Wetlands Permit
- **Opportunities for Early Wins or Phased Delivery**
- Secure buy-in from the landowners at the site which include the City of Annapolis and private landowner of Spa Cove Apartments.

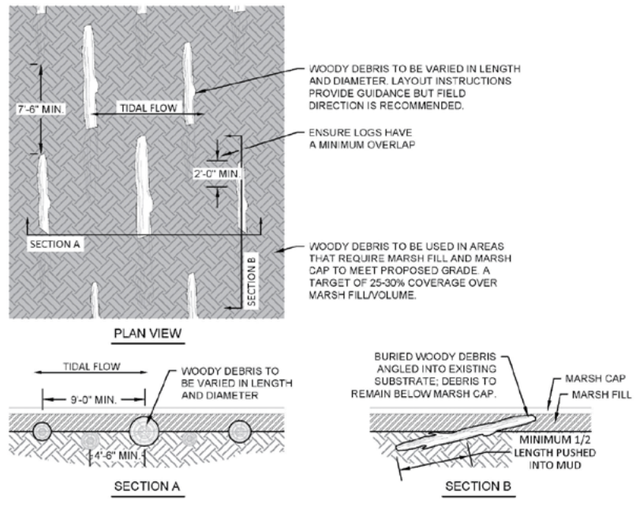

Living shoreline & sediment redistribution - Creates a natural buffer against shoreline erosion and weather events, retains sediment, provides multi-tiered wildlife habitat, and restores native plant communities.
175 LF living shoreline
Beach replenishment (150 LF)
Spa Creek
TRUXTUN PARK BOAT RAMP
PRIMROSE RD
0 25 50 100 Feet
N
LEGEND
Site Boundary
Parcel Boundaries
Living Shoreline Low
Living Shoreline Mid
Living Shoreline Upl
1ft contours
100 yr floodplain
Credits:

PROJECT NARRATIVE

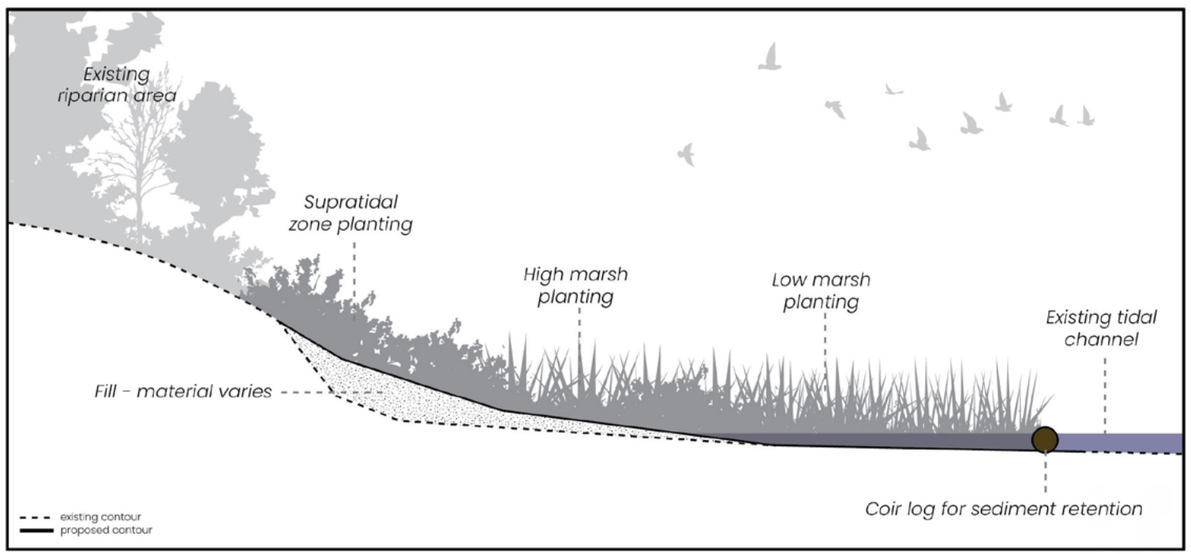
The Truxtun Park Boat Ramp site site presents viable but challenging living shoreline and beach nourishment potential. On its east side, living shoreline features may provide contiguity to Hawkins Cove, which the City of Annapolis has identified as a shoreline access point for adjacent communities. In concept, work would largely consist of backwater shoreline configuration to mitigate erosive wakes and provide for marsh plant community restoration, while the downstream/northern portions of the site would support beach replenishment to support recreational use (shoreline fishing and small watercraft access). Anticipated benefits include approximately 175 linear feet of shoreline restoration closer to Hawkins Cove and 150 linear feet of beach replinshment. Post-construction monitoring is anticipated to consist of a five-year period to annually evaluate any changes in proposed grades, establishment of native vegetative communities, and potential invasive species management at the tidal interface to treat Phragmites.

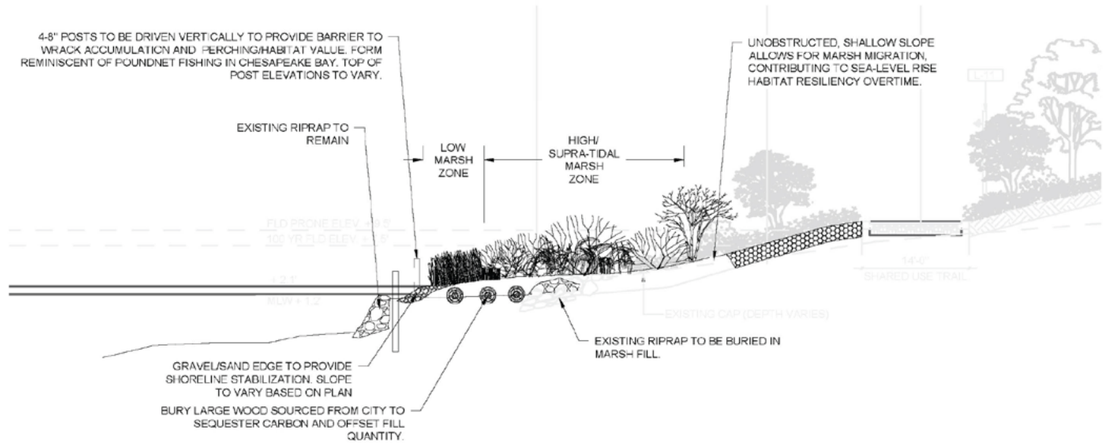


Marsh Post Protection

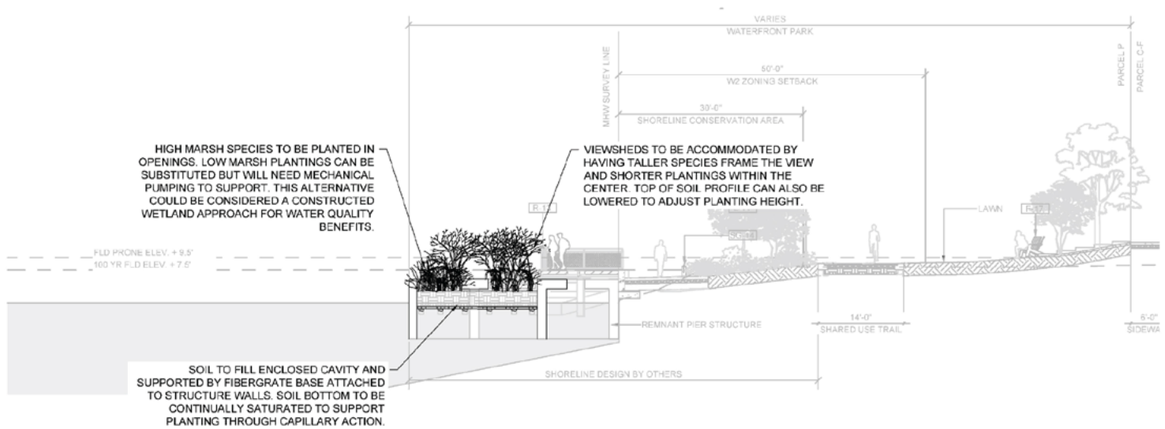


Buried Woody Debris





Shoreline Enhancement and Stabilization - alternate scenario



Shoreline Existing Structure Enhancement and Stabilization - alternate scenario

Melrob Court

Summary of Site Conditions and Project Types

The site is located on an existing upland area downstream of Tyler Heights Elementary School (THES). The current conditions are a grassy, mowed, unused area adjacent to existing parking areas that service the Quiet Waters Landing apartment complex where the facility is proposed. The proposed activities provide for downstream continuity of the "treatment train" from the Tyler Avenue project and any proposed improvements at THES, downstream to the Ambridge/Timber Creek Pond and ultimately to the ASPCA and Back Creek. The proposed project type would include replacement of existing turf with a bioretention basin, allowing for soil infiltration and establishment of native trees and riparian plantings to enhance stormwater nutrient uptake and retain sediment.

Justification for Selection

In addition to having the highest Social Impact score, this project is a key component of the 'Treatment Train' for this section of Back Creek, where activities are proposed at the very top of the watershed at Tyler Avenue all the way to Back Creek at the ASPCA. Additionally, this community does not currently have any identified SWM infrastructure. There is opportunity to eliminate nuisance flooding by retaining and slowly releasing or infiltrating runoff. The project will also provide additional wildlife habitat and pollinator resources.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project type at the Melrob Court site (SWM, bioretention) will likely require 2 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to a triennial inspection program if the site is used to generate TMDL credits to satisfy SWM permit compliance in the City of Annapolis. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of bioretention areas, noting any areas of instability, erosion, or issues with in-stream structure function.

Priority Resilience Benefits

SWM

Flood Risk Reduction

Community Resiliency

Proposed activities would transform the unused grass areas into a bioretention facility to capture stormwater flows and treat runoff before entering the storm drain system that leads to Back Creek. The project will significantly reduce nuisance flooding through adequate SWM.

Other Anticipated Benefits

Water Quality Improvements

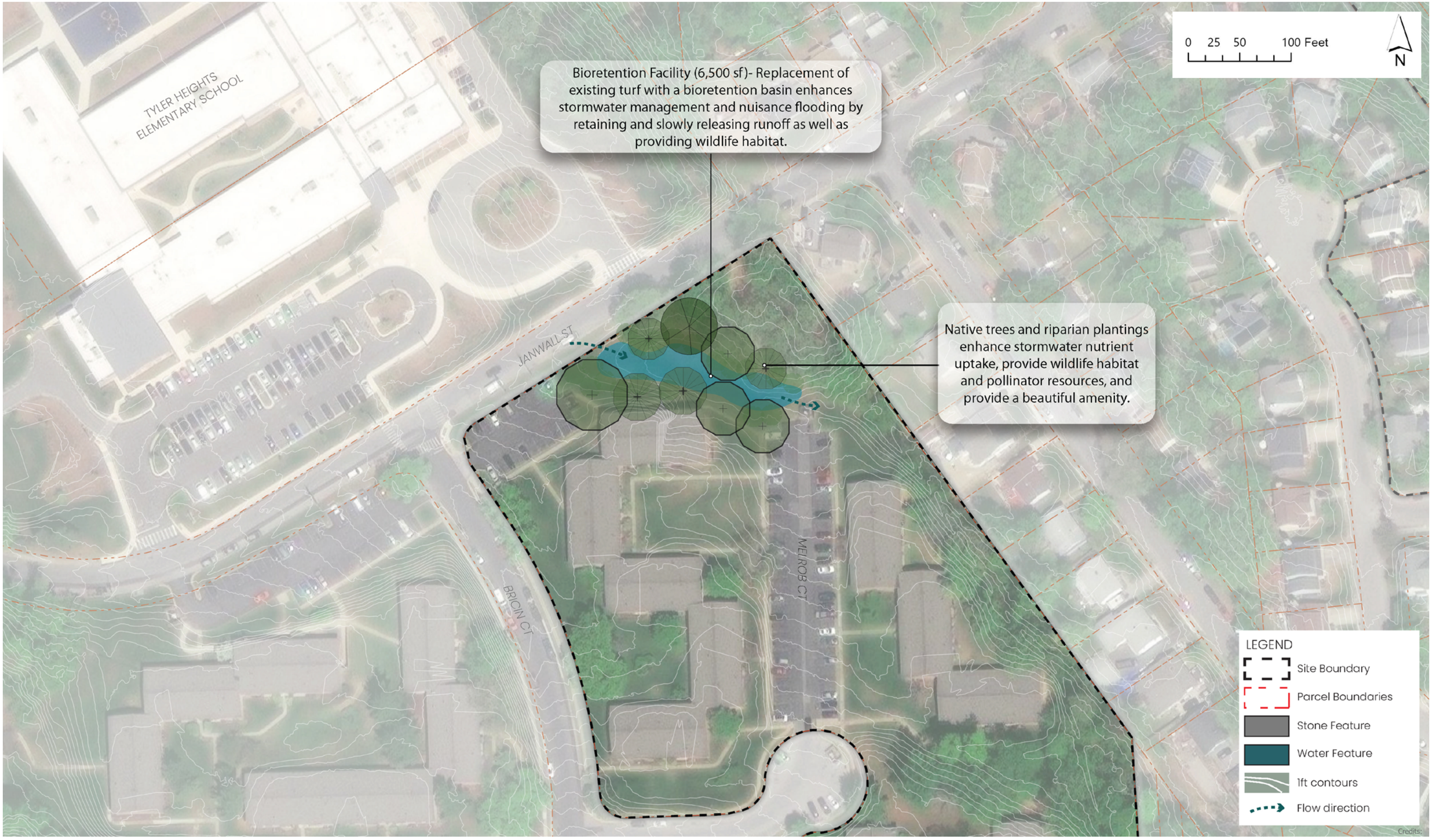
Habitat Restoration

In addition to reduced flooding and associated water quality benefits to Back Creek, the project would enhance the value of this underused area for wildlife including birds, amphibians, and reptiles. There is no public access proposed as part of the plan, but public access could be incorporated into the plan if the landowner desired. Educational signage could be placed along the border of the bioretention area to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region. Educational signage would be exceptionally beneficial due to the project's proximity to THES.

Funding Scale: $$

Implementation Pathways

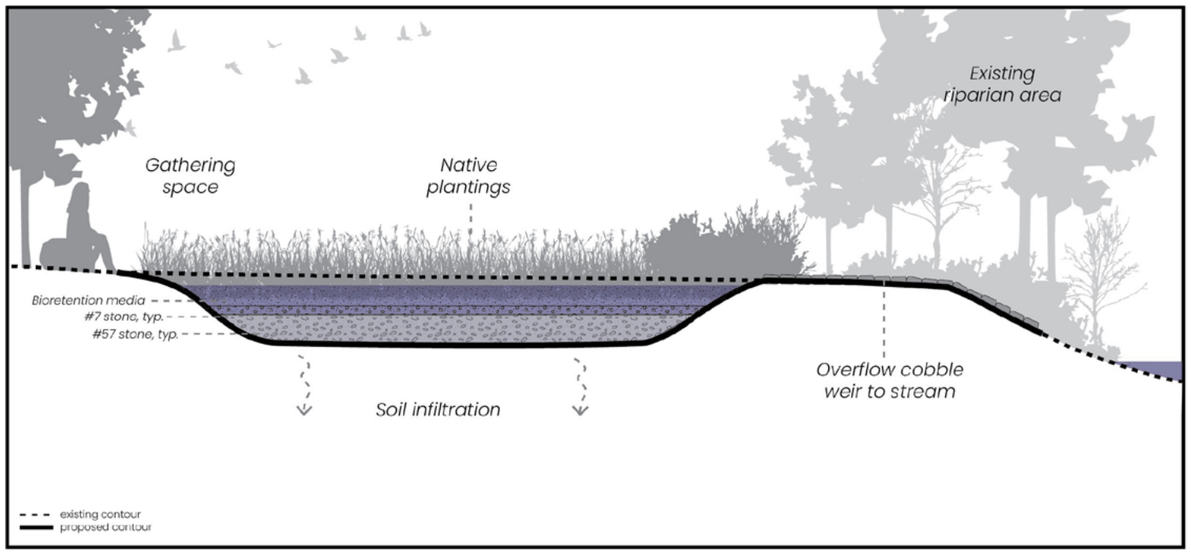
- **Recommended Next Steps**
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowner for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - City of Annapolis Grading Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowner at the site.

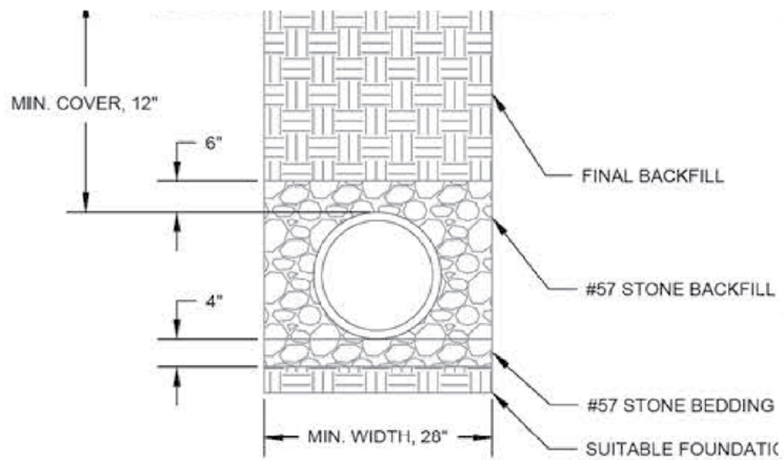

Bioretention Facility (6,500 sf)- Replacement of existing turf with a bioretention basin enhances stormwater management and nuisance flooding by retaining and slowly releasing runoff as well as providing wildlife habitat.
Native trees and riparian plantings enhance stormwater nutrient uptake, provide wildlife habitat and pollinator resources, and provide a beautiful amenity.
TYLER HEIGHTS ELEMENTARY SCHOOL
JANWALL ST
MELROB CT
BRICIN CT
0 25 50 100 Feet
N
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
1ft contours
Flow direction
Credits:

PROJECT NARRATIVE

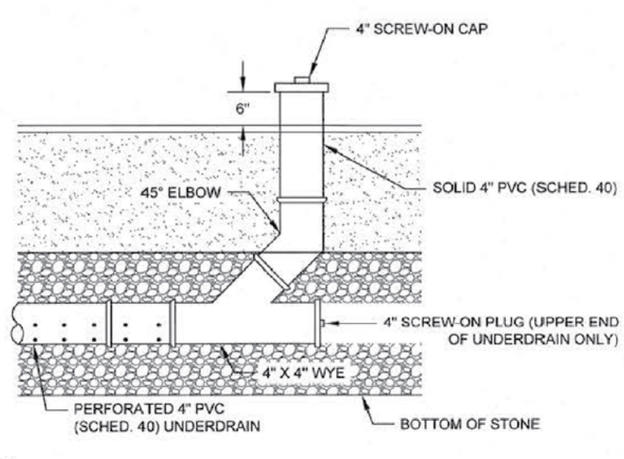
Melrob Court presents a challenging drainage scenario, where dated infrastructure design underestimated flood flow volumes and the capacities associated with these events. The proposed concept entails a bioretention facility to capture smaller stormflow events to alleviate nuisance flooding and provide water quality benefits to Back Creek and the Chesapeake Bay. Anticipated beneifts include 6,500 square feet of bioretention area to slow and treat stormflows while also providing for native plant community restoration. Project monitoring is anticipated to consist of annual City of Annapolis inspections to verify drainage and plant community performance.

Bioretention Basin - Typical Section

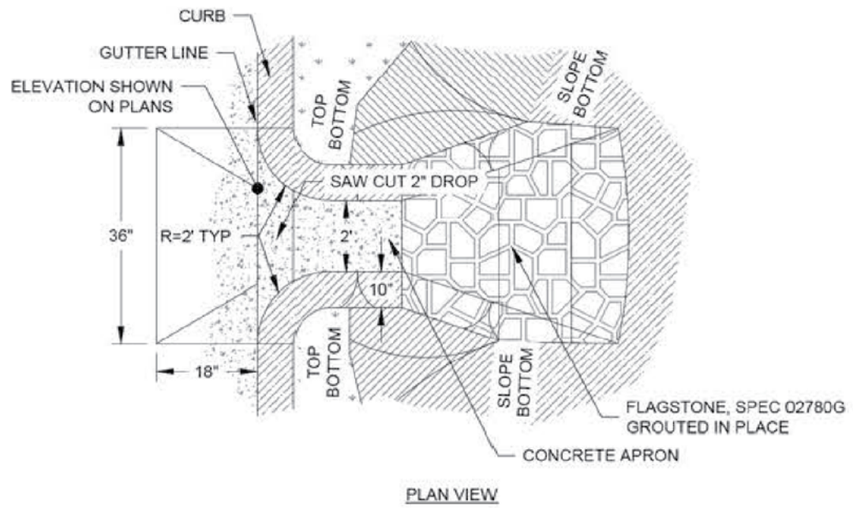




Standard Pipe Trench

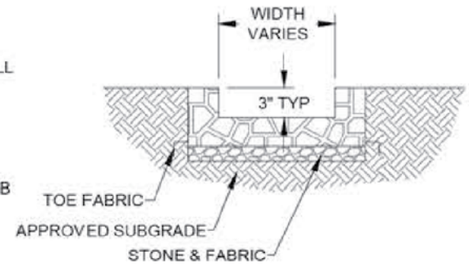


Combined Cleanout and Monitoring Well - Section View

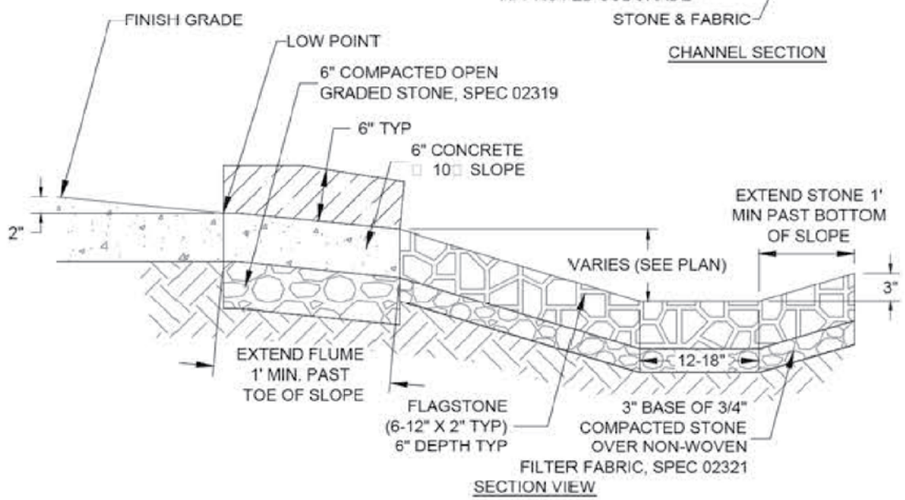


PLAN VIEW

NOTES:
1. THE FLAGSTONE END SECTION SHALL BE UNDERCUT SO THAT THE INVERT OF THE CONCRETE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL.
2. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
3. THE GEOTEXTILE FILTER FABRIC SHALL BE MIRAFI 140N OR EQUIVALENT
4. STEEL BAR FENCE SHALL BRIDGE OVER CURB CUT.



CHANNEL SECTION



SECTION VIEW

Curb Cut

1309 Bay Ridge Avenue

Summary of Site Conditions and Project Types

1309 Bay Ridge Avenue, the location of Bay Ridge Church, appears to include underused lawn space in the eastern portion of the church property. This location is surrounded heavily by impervious surfaces and parking areas that were constructed prior to modern SWM, which leads to a high volume of untreated stormwater that enters this tributary to Back Creek during storm events. The proposed project type for this site is a bioretention area with native plantings that includes an underdrain and overflow structures to maintain stability and allow stormwater flows to filter through the ground and native vegetation to process nutrients instead of rushing into Back Creek.

Justification for Selection

This project would provide a strong opportunity to convey flows from impervious surfaces to a bioretention facility allowing for increased soil infiltration, with the highest score for Project Feasibility. The additional infiltration would result in a reduction in overland flow and still allow for a gathering space that can also provide education opportunities and enhancement to the church's natural aesthetics.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project type at the Bay Ridge Church property (bioretention) will likely generate TMDL credits and therefore, be subject to triennial inspections to continue to claim credit. Inspection metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of bioretention areas, noting any areas of instability, erosion, or issues with facility function.

Priority Resilience Benefits

SWM

Flood Risk Reduction

Community Resiliency

Asset Protection

The proposed enhancements would provide measurable water quality benefits downstream to Back Creek, considering most of this subwatershed was developed prior to modern SWM requirements;it is assumed that the vast majority of stormwater runoff enters Back Creek without any treatment or retention. The increased SWM capacity will also reduce nuisance flooding and protect a sewer main that runs parallel to the tributary behind the church.

Other Anticipated Benefits

Water Quality Improvements

Educational Opportunities

Public Access to Open Space

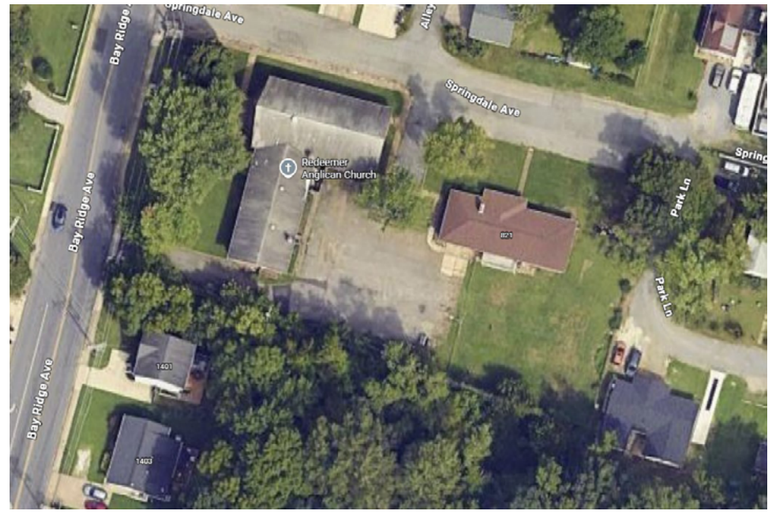
Habitat Restoration

The project will improve water quality and enhance the value of this unused area for wildlife including birds, deer, raccoons, foxes, amphibians, and reptiles. There is no public access proposed as part of the plan, but public access could be incorporated into the plan if the landowner desired. Educational signage could be placed along the boundaries of the bioretention area to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region.

Funding Scale: $$

Implementation Pathways

- **Recommended Next Steps**
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowner for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - City of Annapolis Grading Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowner at the site.

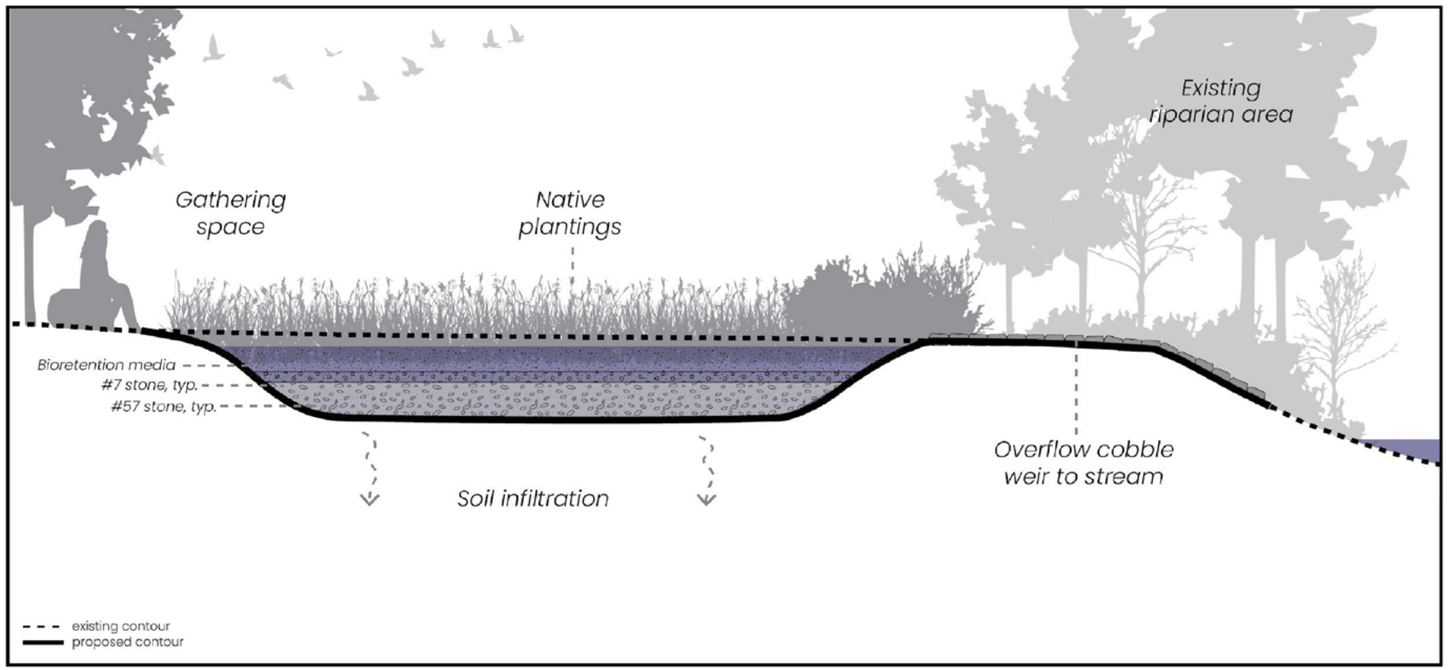


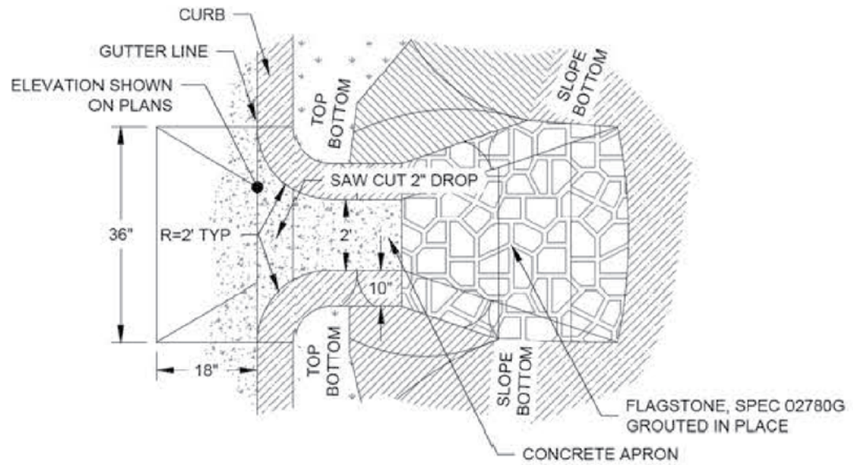

SPRINGDALE AVE
REDEEMER ANGLICAN CHURCH
BAY RIDGE AVE
Bioretention Pool - Removal of existing asphalt and replacement with a bioretention basin enhances stormwater management and nuisance flooding by retaining and slowly releasing runoff.
Cut in existing pavement leads to a stone riffle that channels stormwater runoff into the bioretention area.
Vegetated berm channels runoff from paved area into bioretention basin, diverting it temporarily from the existing stormwater drainage network.
EXISTING RIPARIAN BUFFER
Native trees and riparian plantings enhance stormwater nutrient uptake, provide wildlife habitat and pollinator resources, and provide a beautiful amenity.
5,714 SF Bioretention Area
PARK LN
Cobble overflow weir channels excess water from the bioretention basin into the existing waterway.
0 25 50 100 Feet
N
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
1ft contours
Flow direction
Credits:

PROJECT NARRATIVE

Located just east of Bay Ridge Avenue, the site at 1309 Bay Ridge Avenue presents the opportunity to convey flows from impervious surfaces, mainly parking lot and street areas, into a bioretention area within what appears to be an underused lawn space in the eastern portion of the church's property. Anticipated benefits include approximately 5,714 square feet of vegetated stormwater treatment, which would also result in aesthetic improvements within the church property with a planting plan consisting of native pollinator species tolerant of fluctuations in hydrologic conditions. The bioretention feature would ultimately drain into a tributary of Back Creek via a cobble weir to ensure stability during higher intensity storm events. Monitoring criteria are anticipated to consist of annual inspections to evaluate facility drainage performance and native vegetation establishment.

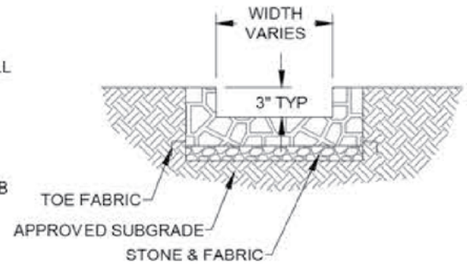
Bioretention Basin - Typical Section



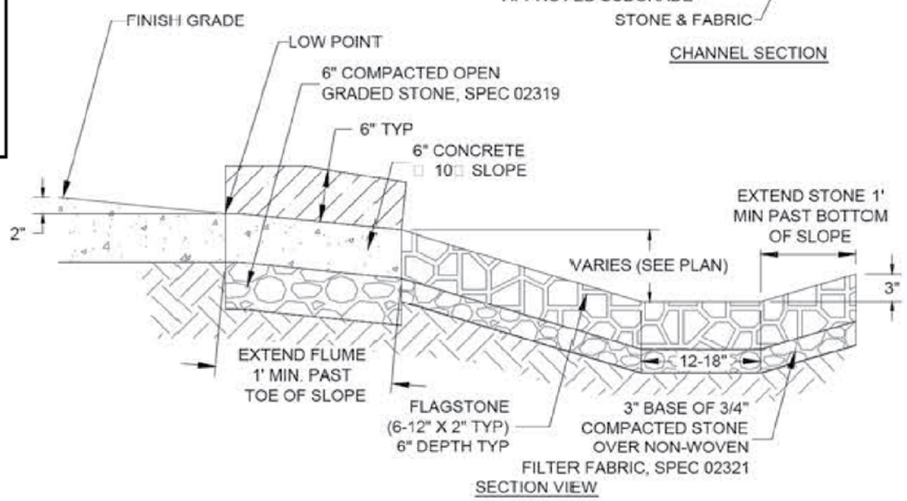


PLAN VIEW

NOTES:
1. THE FLAGSTONE END SECTION SHALL BE UNDERCUT SO THAT THE INVERT OF THE CONCRETE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL.
2. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
3. THE GEOTEXTILE FILTER FABRIC SHALL BE MIRAFI 140N OR EQUIVALENT
4. STEEL BAR FENCE SHALL BRIDGE OVER CURB CUT.

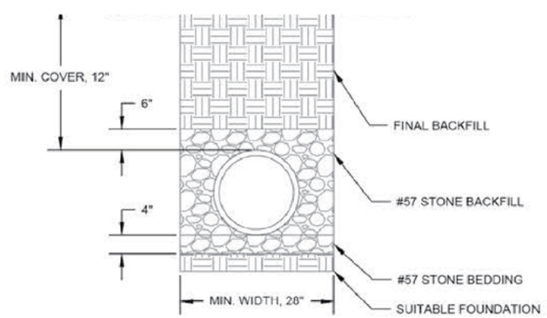


CHANNEL SECTION

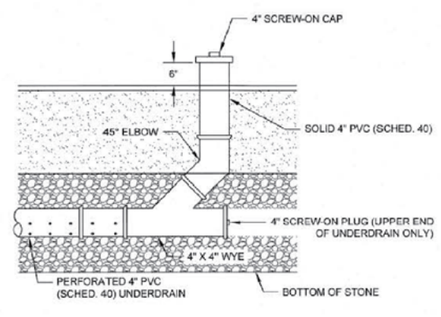


SECTION VIEW

Curb Cut



Standard Pipe Trench



Combined Cleanout and Monitoring Well - Section View

Ambridge Pond/Timber Creek

Summary of Site Conditions and Project Types

The Ambridge Pond/Timber Creek site includes a low hazard dam adjacent to an old railroad embankment and active sewer and strom drain infrastructure. The dam does not meet current standards, posing the risk of failure to adjacent properties, infrastructure, and wildlife. The Ambridge Pond project will include restoration and hydrological connection of a stream and wetland complex, in addition to reconfiguration and repair of the existing SWM facility. The former element will ensure proper stormwater conveyance to the latter.

Justification for Selection

This project ranked 13th overall by weighted total score, but was selected for advancement not only because of projects that were removed from consideration due to duplication (see Appendix E), but also due to its comprehensive approach and relationship to the ASPCA site. This project had moderately high scores for both Potential Resilience Impact and Project Feasibility, as well as moderate scores for Green Infrastructure Network Potential and Social Impact. In addition to its raw scoring, the project will reconnect the floodplain and expand the area's holding capacity for stormwater, reducing nuisance flooding and providing new habitat features.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the Ambridge/Timber Creek Pond (stream and wetland restoration) will likely require 5-10 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to triennial inspections to ensure that the SWM facilities continue to function and generate TMDL credit. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of stream and wetland areas, noting any areas of instability, erosion, or issues with in-stream structure function,
- Assessment of cross-sections along the stream area and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

SWM

Flood Risk Reduction

Community Resiliency

Asset Protection

Improvements to the existing SWM BMP and adjacent stream and wetland complex will increase stormwater storage time and associated nutrient uptake while reducing sedimentation and nutrient loading downstream to Back Creek. Additional flood storage capacity will reduce excessive runoff during storm events and reduce nuisance flooding. The project area also includes sewer mains which are currently at risk of failure due to erosion and flooding; the proposed approach will protect this critical infrastructure.

Other Anticipated Benefits

Water Quality Improvements

Habitat Restoration

In addition to the primary benefits above, the project would also enhance the value of these natural areas for wildlife including birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species. There is no public access proposed as part of the plan, but public or community access could be incorporated into the plan if the communities desired. Educational signage could be placed along potential walking paths to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region.

Funding Scale: $$

Implementation Pathways

- **Recommended Next Steps**
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, confirm the location of sewer mains in the project area, continue conversations with the landowners for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - Joint Permit Application (JPA)
  - City of Annapolis Grading Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowners at the site.

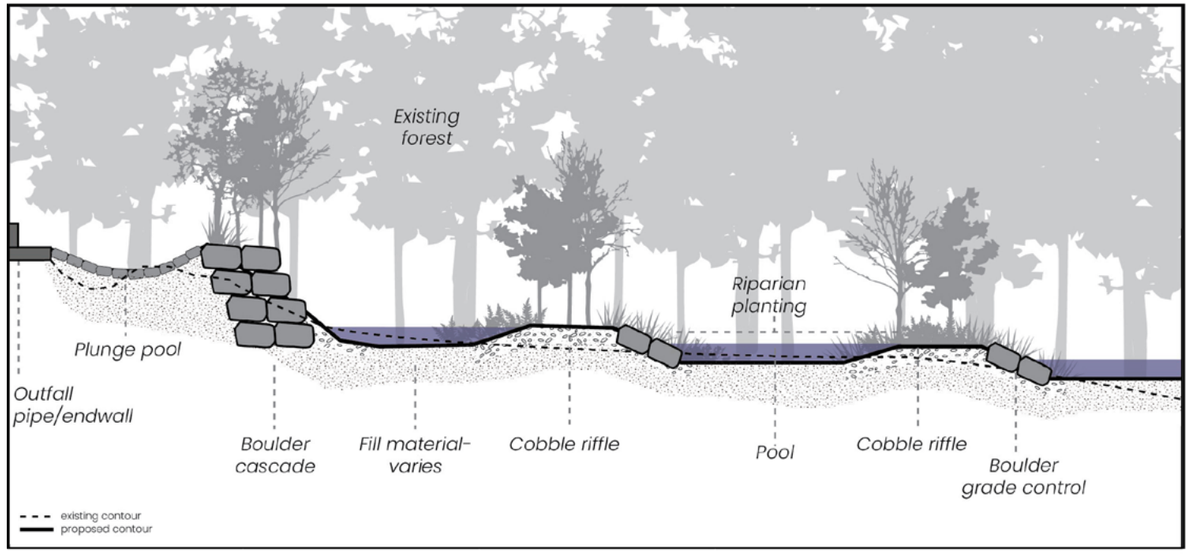

Stormwater conveyance swale-riffe-pool sequence - intention to relieve nuisance flooding issues for adjacent houses
Stream & Wetland Complex to expand floodplain holding capacity and habitat heterogeneity
844 LF stream restoration
0.73 AC stream/wetland complex
Regenerative Stormwater Conveyance - riffle pool or rock cascade structures stabilize channel flow and prevent erosion
ASPCA site work (see ASPCA concept)
Existing pond feature to be reconfigured to provide additional holding capacity
Reconfigured outfall connections from pond to stream/wetland complex
TIMBER CREEK DRIVE
BAY RIDGE AVE
SPCA OF ANNE ARUNDEL COUNTY
EXISTING POND & WETLAND COMPLEX
RAILROAD EMBANKMENT
PARKING LOT
INTERIM HEALTHCARE OF ANNAPOLIS
LANGON CT
BERWICK DRIVE
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
1ft contours
Flow direction
0 25 50 100 Feet
N

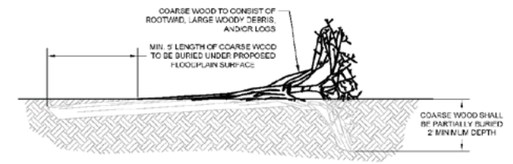
PROJECT NARRATIVE

This site consists of two main features: a dated stormwater pond mainly intended to mitigate flood flows and a complicated drainage configuration along a relict railroad grade, which also forms the embankment of the pond. Proposed conceptual design consists of a vegetated swale converging with a stream/wetland complex, reconfiguration of the pond to provide more capacity, and a regenerative stormwater conveyance to mitigate erosion, reduce nuisance flooding, and enhance riparian habitat. Anticipated benefits provide for approximately 844 linear feet of vegetated swale/stream restoration and 0.73 acre of a stream/wetland complex down gradient of the pond outfalls.. Post-construction monitoring is anticipated to consist of a five-year period to annually evaluate swale/stream performance to verify stability and prevention of erosive flows, establishment of native vegetative communities, and assessments of reconfigured pond capacity.

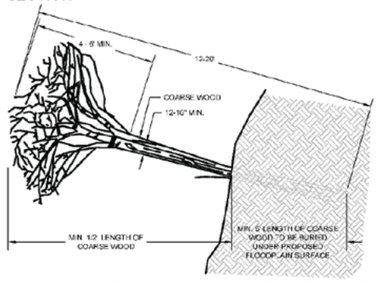
TYPICAL DETAILS AND SECTIONS

Rock Cascade - Riffle/Pool Sequence - Typical Section



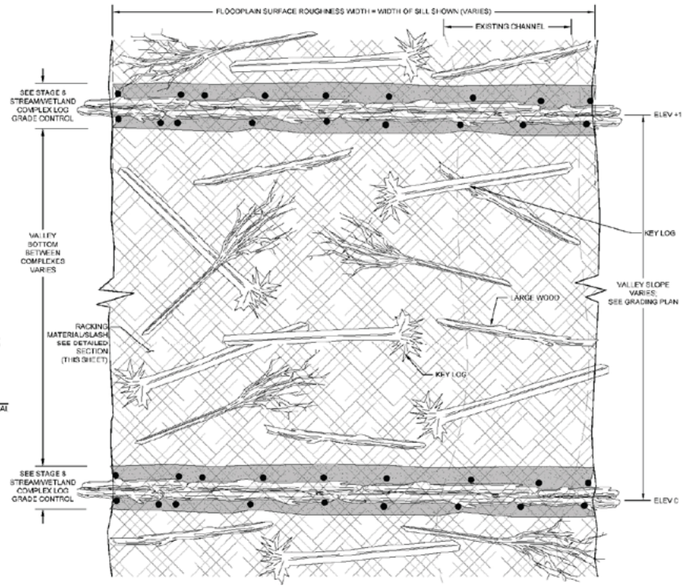


FLOODPLAIN COARSE WOOD HABITAT FEATURE
CROSS SECTION
NOT TO SCALE

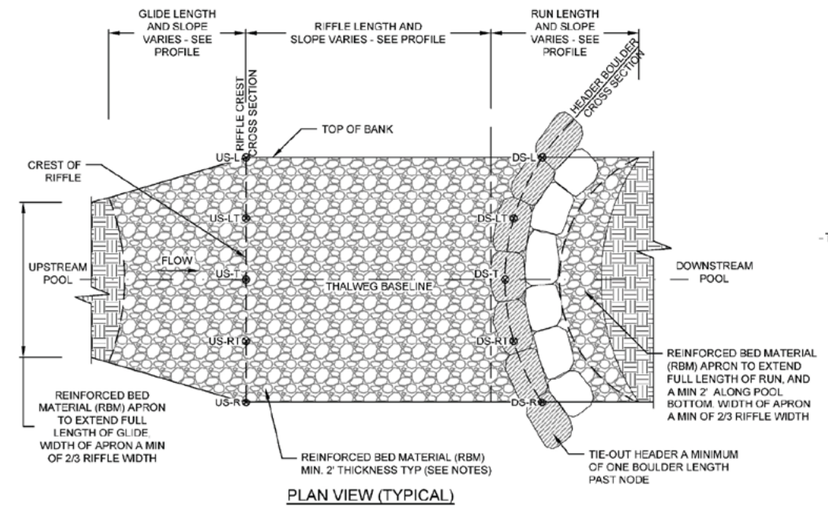


NOTES:
1. SPECIFIC LOCATIONS NOT SHOWN. COARSE WOOD SHALL BE INSTALLED WITHIN THE PROPOSED FLOODPLAIN AS DIRECTED IN THE FIELD BY FAIRFAX COUNTY.
2. CONTRACTOR SHALL PARTIALLY BURY COARSE WOOD INTO THE PROPOSED FLOODPLAIN BOTTOM AS SHOWN. MODIFICATIONS OR ANCHORING IN AREAS WHERE DISPLACEMENT IS POSSIBLE DUE TO FLOWING WATER MAY BE NECESSARY AS DETERMINED BY FAIRFAX COUNTY IN THE FIELD. CONTRACTOR SHALL MOUND FLOODPLAIN SURFACE AROUND COARSE WOOD FOR ADDITIONAL SUPPORT.

Wood Habitat Feature Example

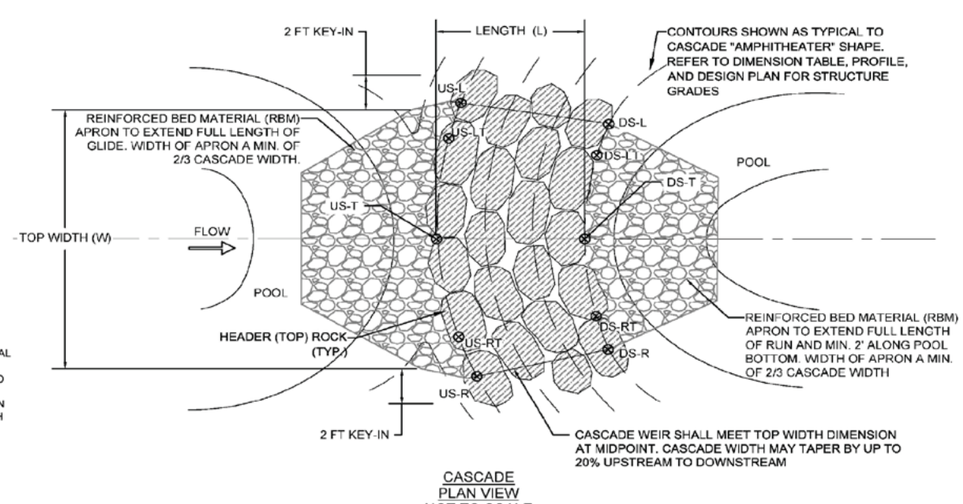


Stream/Wetland Complex Surface Roughness - Plan View



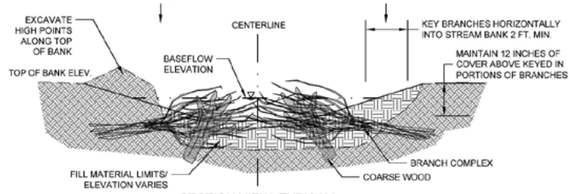
PLAN VIEW (TYPICAL)

Riffle - Plan View

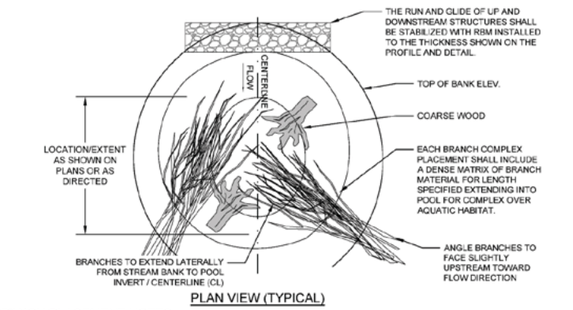


CASCADE
PLAN VIEW
NOT TO SCALE

Cascade - Plan View



SECTION VIEW (TYPICAL)



PLAN VIEW (TYPICAL)

POOL BRANCH PLACEMENT NOTES:
1. INSTALL POOL WOODY TREATMENT AT LOCATIONS SHOWN ON THE GRADING PLAN, OR AS DIRECTED BY FAIRFAX COUNTY. EACH TREATMENT SHALL INCLUDE A MINIMUM OF TWO BRANCH COMPLEXES AND 2 COARSE WOOD ELEMENTS, UNLESS OTHERWISE DIRECTED BY FAIRFAX COUNTY.
2. COARSE WOOD ELEMENT SHALL CONSIST OF TRUNKS OR LARGE LIMBS BETWEEN 12" TO 18" DBH AND MINIMUM OF 5 FT LONG. BURY COARSE WOOD A MINIMUM OF 4 FEET BELOW POOL INVERT. BASE OF ROOT FLARE/BRANCHES SHALL BE PLACED AT POOL INVERT. TOP OF ROOT BALL/BRANCHES SHALL BE COMPLETELY SUBMERGED DURING BASE FLOW.
3. BRANCH COMPLEXES SHALL CONSIST OF A DENSE MIX OF PARTIALLY BURIED BRANCHES ALONG POOL BOTTOM AS DIRECTED BY FAIRFAX COUNTY. BRANCH MATERIAL DIAMETER SHALL RANGE FROM APPROXIMATELY 2 TO 12 INCHES AND SHALL BE KEYED HORIZONTALLY INTO THE STREAM BANK A MINIMUM OF 2 FEET. BRANCHES SHALL EXTEND HORIZONTALLY TO THE POOL INVERT (APPROXIMATE CENTERLINE OF CHANNEL). PROVIDE AT LEAST 12 INCHES OF FIRMLY TAMPED COVER ABOVE BRANCH MATERIAL AT ENDS KEYED INTO BANK. VERTICALLY, BRANCH COMPLEXES SHALL BE INSTALLED A MINIMUM OF 1' BELOW POOL BED AND PROTRUDE ABOVE POOL BED A MAXIMUM OF 1'. PROTRUSION HEIGHTS SHALL VARY.
4. PLACEMENT OF POOL WOODY TREATMENT MATERIAL SHALL APPEAR NATURAL AND VARY BETWEEN POOLS.
5. MATERIAL USED AS COARSE WOOD AND BRANCH COMPLEXES SHALL HAVE A CONSIDERABLE NUMBER OF BRANCHES THAT REMAIN EXPOSED AND IN CONTACT WITH THE STREAM FLOW AFTER INSTALLATION TO TRAP LEAVES AND DETRITUS FROM STREAM FLOW.

Pool Woody Treatment

Georgetown Grove

Summary of Site Conditions and Project Types

The existing conditions at the Georgetown Grove site include shallow, invasive species-dominated marsh with low biologic integrity. The Georgetown Grove project will implement a living shoreline to protect against shoreline erosion and storm events, while promoting biodiversity and native species habitat.

Justification for Selection

This project was ranked 14 overall and selected due to its moderate to moderately-high scores across all four priority metrics. Once projects already underway were removed from consideration (see Appendix E), it fell within the highest ranking sites for advancement. Additionally, the project is located at the downstream end of the ASPCA project, extending the restored footprint to the water's edge. Tying the shoreline restoration and stabilization to the uplifted stream and wetland complex would further improve the resilience, habitat, and water quality benefits promoted by each project individually.

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any 'credit' generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the Georgetown Grove site (shoreline stabilization) will likely require 5 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to a triennial inspection program if the site is used to generate TMDL credit for SWM permit compliance. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of shoreline areas, noting any areas of instability and/or erosion,
- Assessment of cross-sections along the shoreline area and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

Community Resiliency

The proposed activities would enhance the function of the shoreline and provide a natural buffer against erosion and storm surge while retaining sediment, especially as climate change promotes more frequent and intense storm events and SLR.

Other Anticipated Benefits

Water Quality Improvements

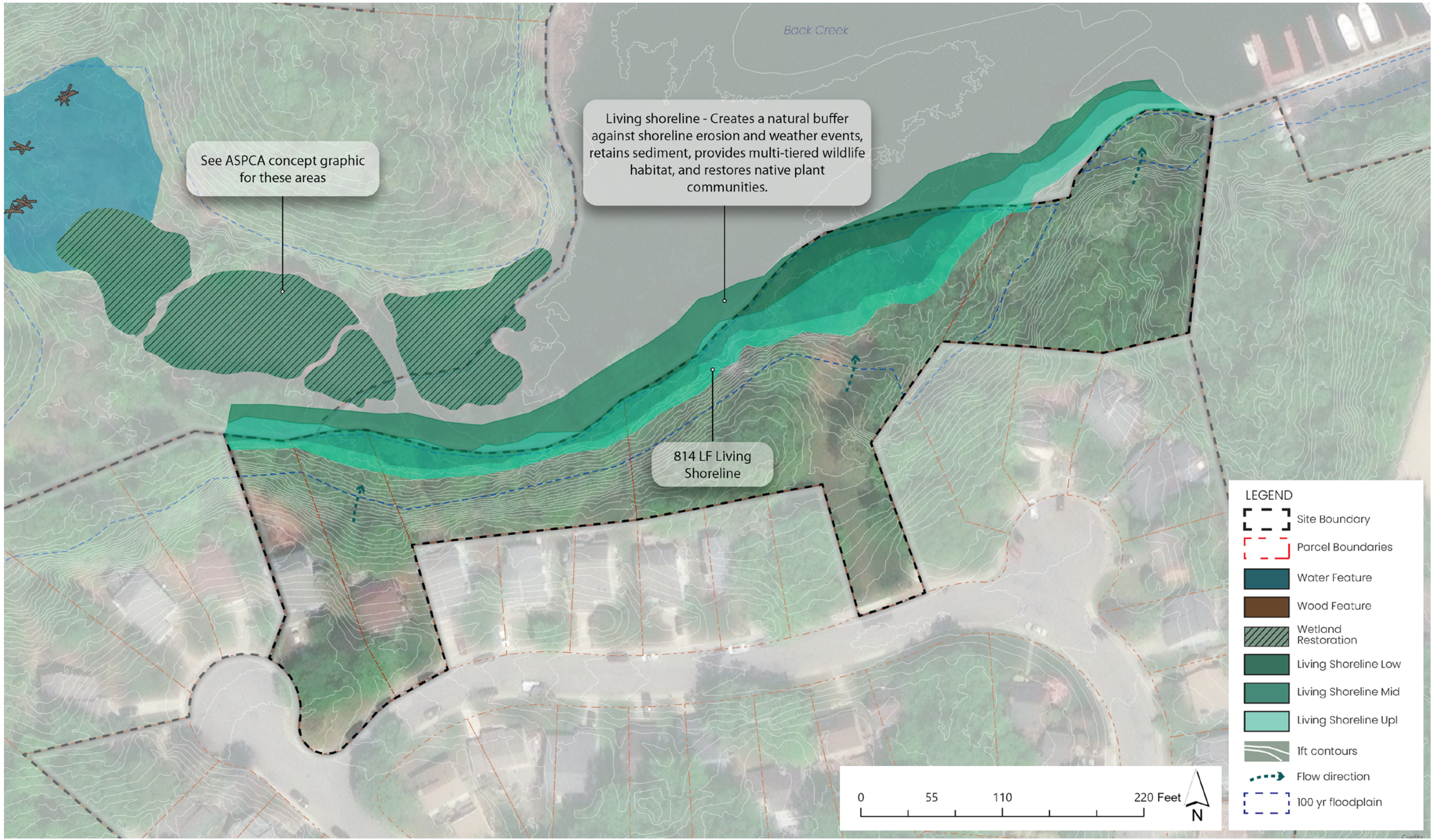
Habitat Restoration

The project would enhance the value of this area for wildlife including birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species with multi-tiered native plantings that are adaptable to changing conditions. There is no public access proposed as part of the plan, but public or community access could be incorporated into the plan if the community desired. Educational signage could be placed along walking paths to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region.

Funding Scale: $$$$

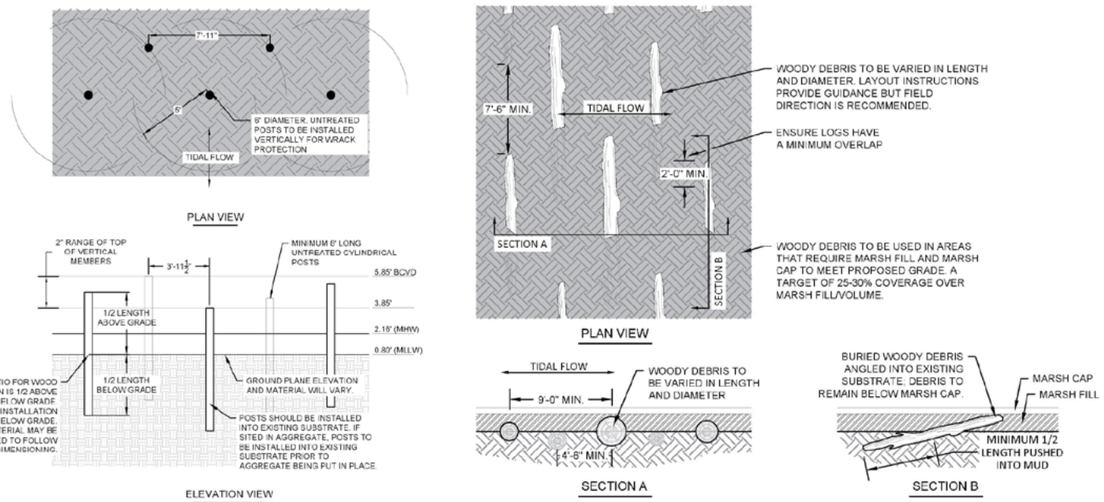
Implementation Pathways

- **Recommended Next Steps**
  - Collect additional site information including survey/topography, estimate rates of erosion and identify the correct configuration of the shoreline to meet the project goals, continue conversations with the landowner for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - City of Annapolis Grading Permit
  - Maryland Tidal Wetlands Permit
  - Federal Tidal Wetlands Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the landowners at the site.


Back Creek
See ASPCA concept graphic for these areas
Living shoreline - Creates a natural buffer against shoreline erosion and weather events, retains sediment, provides multi-tiered wildlife habitat, and restores native plant communities.
814 LF Living Shoreline
LEGEND
Site Boundary
Parcel Boundaries
Water Feature
Wood Feature
Wetland Restoration
Living Shoreline Low
Living Shoreline Mid
Living Shoreline Upl
1ft contours
Flow direction
100 yr floodplain
0
55
110
220 Feet
N

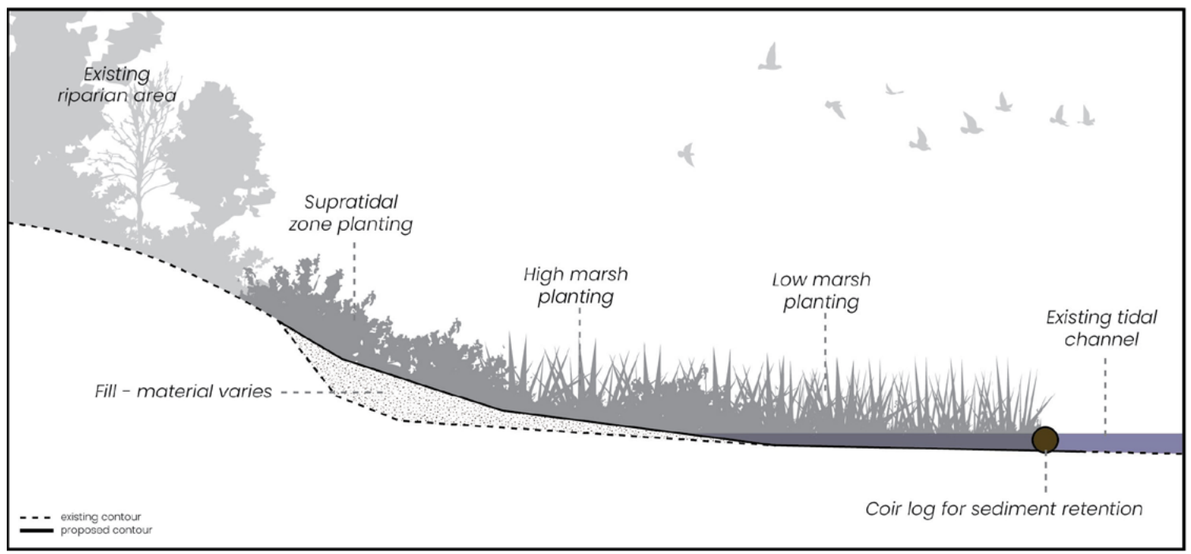
PROJECT NARRATIVE

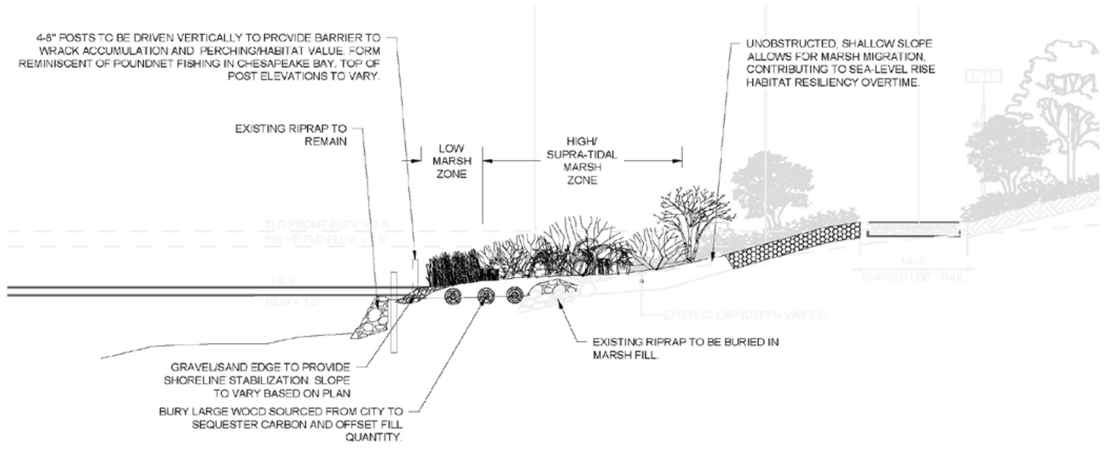
Georgetown Grove provides for potential shoreline restoration work along the tidal interface at Back Creek. This site presents potential for contiguity of a living shoreline and marsh restoration feature with the ASPCA site if both are implemented. Due to presumptive shallow bathymetry observed during field assessments along the northern shore of the Georgetown Grove community, a gradient of plant communities are proposed, ranging from low/high marsh to upland, forested riparian communities. This gradient of plant communities will significantly enhance both terrestrial and aquatic habitat, with opportunities for for habitat enhancement structures including the placement of large woody debris within marsh areas. Anticipated benefits include approximately 814 linear feet of shoreline restoration. Monitoring activities, which USACE and MDE would specify as part of permitting conditions, would likely include a five-year monitoring period where grades and vegetation establishment would need to be verified. Invasive species management would also be included as part of project maintenance to treat Phragmites.



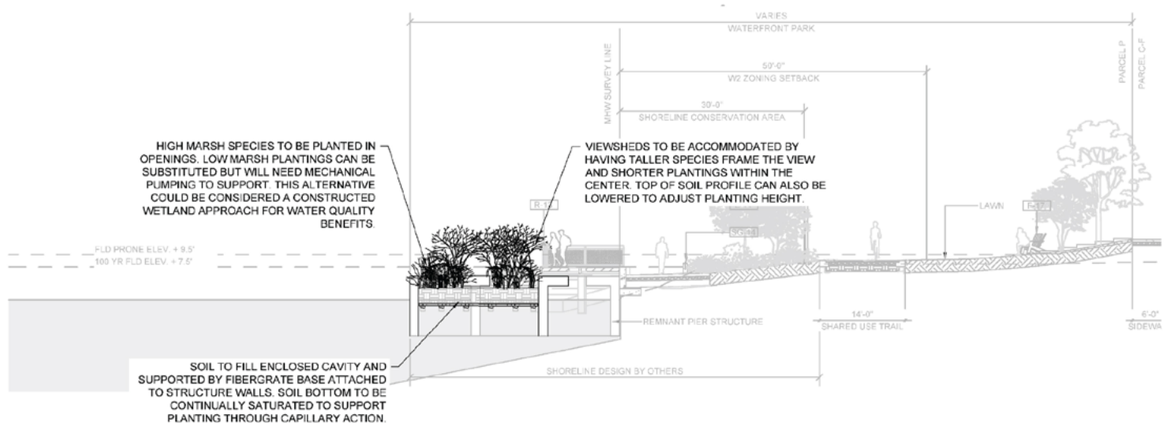
Marsh Post Protection

Buried Woody Debris





Shoreline Enhancement and Stabilization - alternate scenario



Shoreline Existing Structure Enhancement and Stabilization - alternate scenario

Georgetown East Elementary

Summary of Site Conditions and Project Types

The project area is mainly focused around the existing forested valley channel and a series of stormwater outfalls that convey untreated storm flows into incised channels leading to tidal waters of Back Creek. There are utility poles, exposed storm drain culverts, and an exposed sewer main in the project area that do not currently have any protection or reinforcement, presenting a public safety hazard in addition to potential infrastructure failure. The proposed features for this project include stream restoration and critical infrastructure protection.

Justification for Selection

The proposed site scored moderately to moderately-high across all criteria categories, illustrating its alignment with community and program priorities. The site provides opportunities for community resiliency, infrastructural protection, and safety improvements. It is also situated between the ASPCA and Georgetown Grove sites, providing continuity of the “treatment train” philosophy (e.g., linking together projects from upstream to downstream to increase the effectiveness of resilience and restoration activities).

Preliminary Success Metrics and Monitoring Considerations

Monitoring is generally dictated by permit requirements and any ‘credit’ generated by the project (e.g., credit for TMDL, compensatory mitigation, etc.). The project types at the Georgetown East Elementary School project (stream restoration) will likely require 5 years of formal regulatory maintenance and monitoring, and will likely conclude with a transition to a triennial inspection program if the site is used to generate TMDL credits to satisfy SWM permit compliance. Success metrics are anticipated to include:

- The percent cover of native vegetation (both in wetland and upland areas of the project site),
- The percent cover of non-native and invasive vegetation (e.g., Phragmites),
- Visual assessment of stream areas, noting any areas of instability, erosion, or issues with in-stream structure function,
- Assessment of cross-sections along the stream area and comparison of observed dimensions to the as-built condition.

Priority Resilience Benefits

SWM

Community Resiliency

Asset Protection

The main benefits of the project include critical infrastructure protection including a 24” sewer main, utilities, and storm drains that are currently at risk due to severe erosion. The proposed regenerative stormwater conveyance will also improve floodplain connection and stormwater storage, consolidating drainage patterns and improving system stability.

Other Anticipated Benefits

Water Quality Improvements

Educational Opportunities

Public Access to Open Space

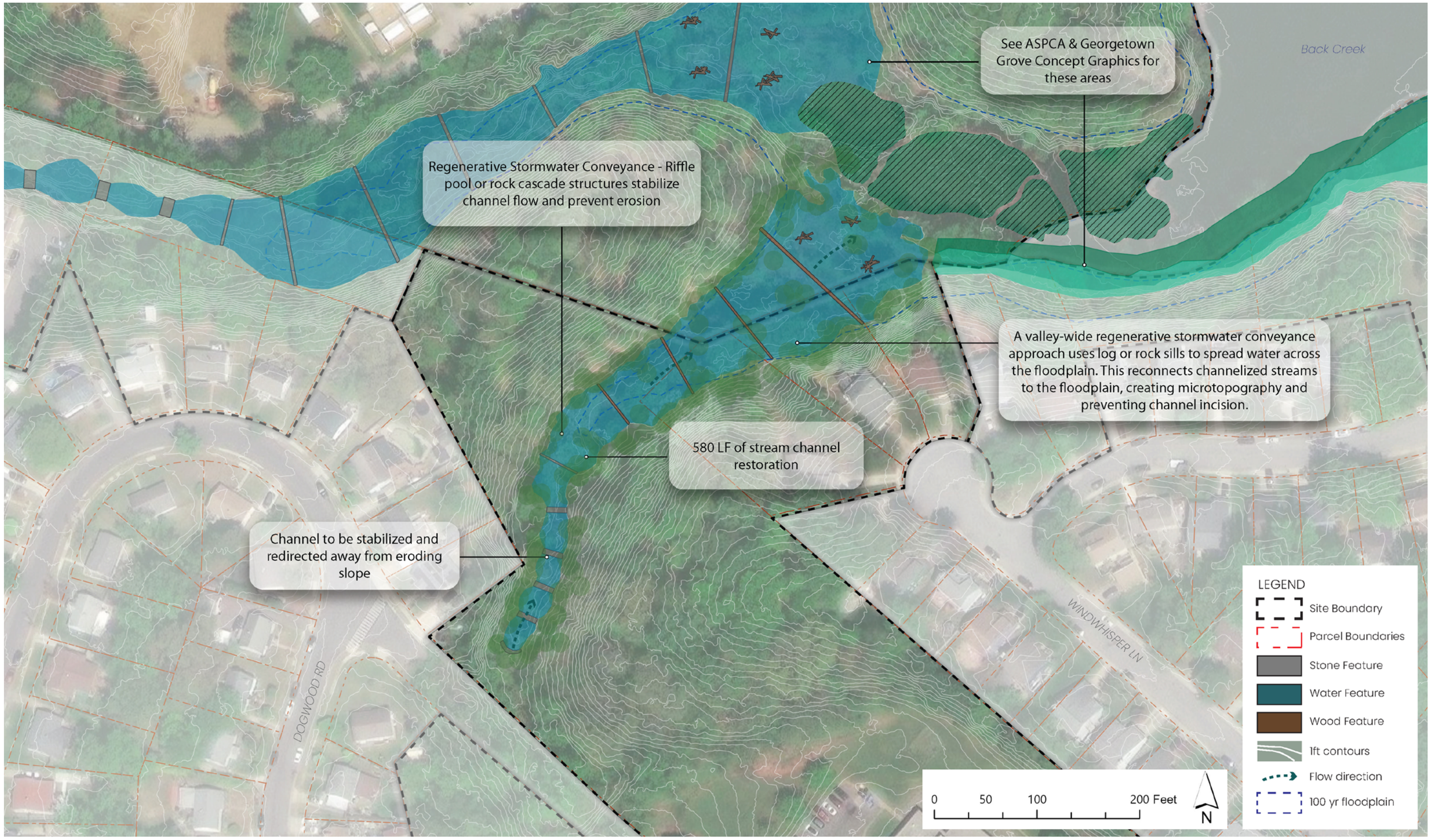
Habitat Restoration

Currently, the Georgetown East Elementary natural areas are not used by the facility. The project would enhance the value of these natural areas for wildlife including birds, deer, raccoons, foxes, amphibians, reptiles, and aquatic species. There is no public access proposed as part of the plan, but public or school access could be incorporated into the plan if the school desired with new trails to access this part of the area. Educational signage could be placed along potential walking paths to enhance understanding of the project, its benefits to the environment, and the importance of resilience and water quality in the Chesapeake Bay region. Additionally, this project could serve as a high-value educational resource for the elementary school students to learn about the environment and Chesapeake Bay.

Funding Scale: $$

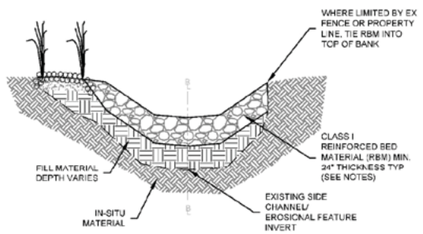
Implementation Pathways

- **Recommended Next Steps**
  - Continue discussion with the school system on access, authorizations to move forward with the project.
  - Collect additional site information including survey/topography, configuration of the storm drain network upstream and downstream, continue conversations with the landowner for access and easement needs, and seek funding for the subsequent phases of work including design and permitting, construction, and maintenance and monitoring.
- **Regulatory Requirements and Permitting Considerations**
  - Joint Permit Application (JPA) for activities in Waters of the United States (WOTUS)
  - City of Annapolis Grading Permit
- **Opportunities for Early Wins or Phased Delivery**
  - Secure buy-in from the Anne Arundel County Public School system to perform additional design activities and allow for construction to occur on AACPS property.


See ASPCA & Georgetown Grove Concept Graphics for these areas
Back Creek
Regenerative Stormwater Conveyance - Riffle pool or rock cascade structures stabilize channel flow and prevent erosion
A valley-wide regenerative stormwater conveyance approach uses log or rock sills to spread water across the floodplain. This reconnects channelized streams to the floodplain, creating microtopography and preventing channel incision.
580 LF of stream channel restoration
Channel to be stabilized and redirected away from eroding slope
DOGWOOD RD
WINDWHISPER LN
0 50 100 200 Feet
N
LEGEND
Site Boundary
Parcel Boundaries
Stone Feature
Water Feature
Wood Feature
1ft contours
Flow direction
100 yr floodplain

PROJECT NARRATIVE

Georgtown East Elementary resides at a headwater drainage feature to Back Creek, where development has encroached on pre-disturbance drainage patterns. The proposed concept consolidates drainage patterns from the school within a single regenerative stormwater conveyance (RSC) feature, which will help to concentrate stormflows into an existing perrennial stream on the northern areas of the school property at the back of private residential lots. Anticipated benefits include approximately 138 linear feet of stream restoration. Post-construction monitoring is anticipated to consist of a five-year period to annually evaluate stream performance to verify stability and prevention of erosive flows and establishment of native vegetative communities.

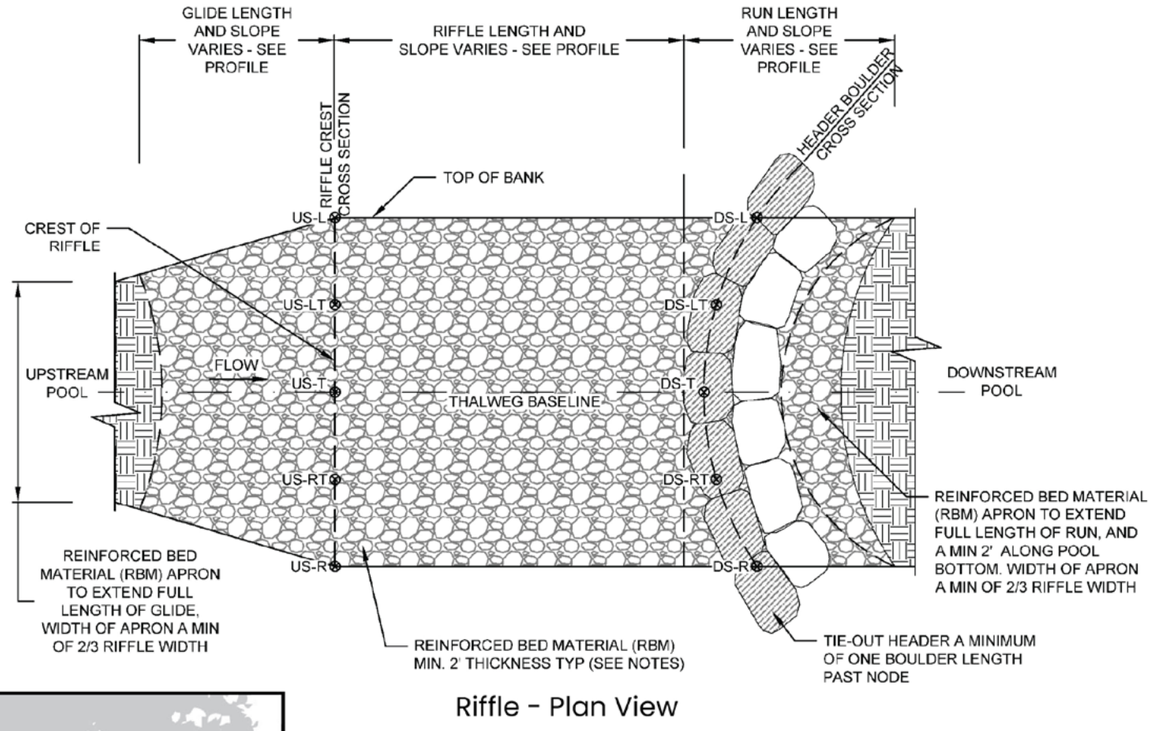


SECTION VIEW (TYPICAL)

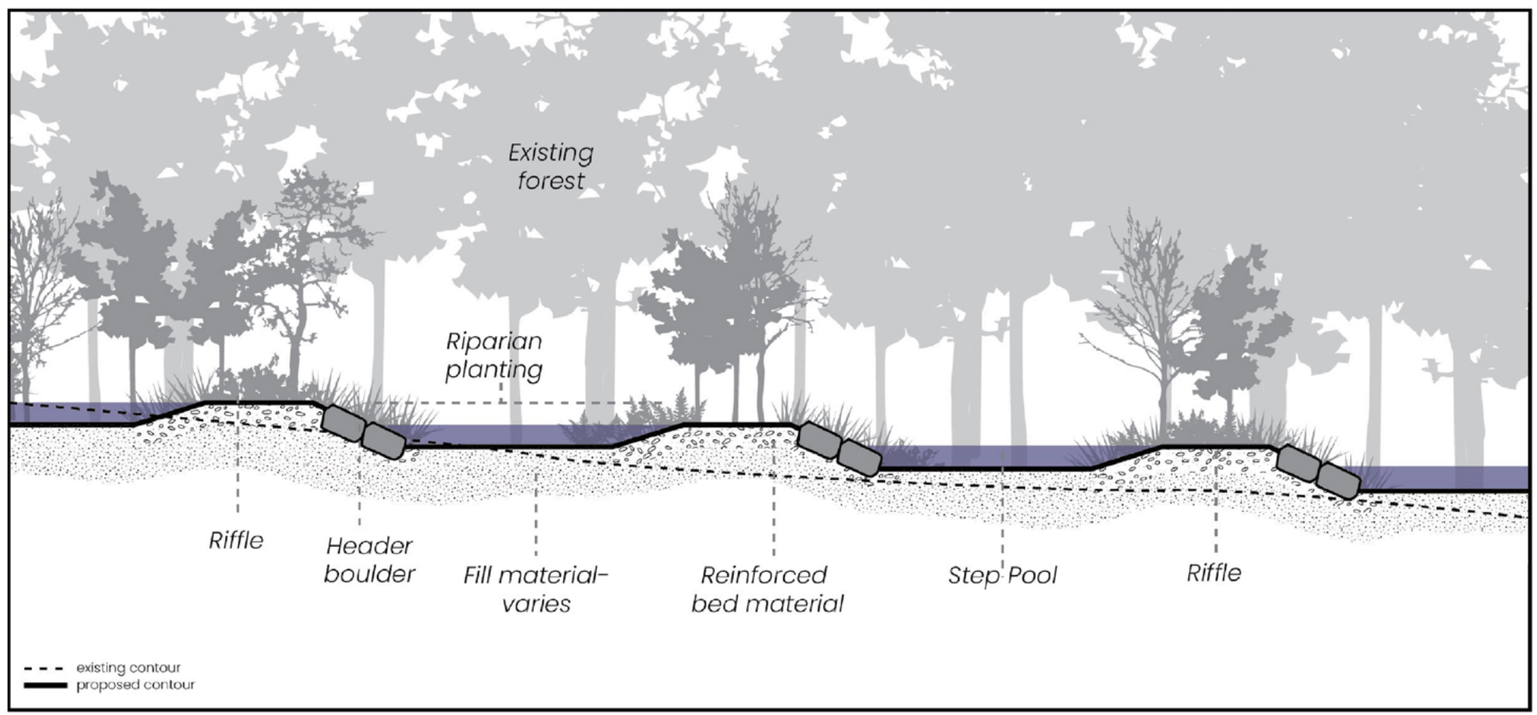
TYPICAL SWALE STABILIZATION NOTES:

1. PREPARE THE SUBGRADE OF PLUNGE POOL TO THE REQUIRED SUBGRADE. COMPACT ANY FILL REQUIRED IN THE SUBGRADE USING AN EXCAVATOR BUCKET.
2. USE A MINIMUM DEPTH OF 24" OF CLASS I RBM WITHIN LIMITS SHOWN AS DEPICTED ON THE GRADING PLAN.
3. SEE TYPICAL SECTION FOR DIMENSIONS OF SWALE.
4. SEE PROFILE FOR THALWEG SLOPE, ELEVATIONS, AND TIE-OUT TO MAIN STREAM CHANNEL.
5. SEE GENERAL STRUCTURE NOTES AND THE ROCK AND LOG GRADE CONTROL STRUCTURE CONSTRUCTION NOTES FOR ADDITIONAL INFORMATION.
6. IF OTHER ADDITIONAL SECONDARY AND/OR MINOR CHANNELS ARE DISCOVERED DURING CONSTRUCTION, USE THIS TYPICAL DETAIL TO STABILIZATION AT THE DIRECTION OF FAIRFAX COUNTY.

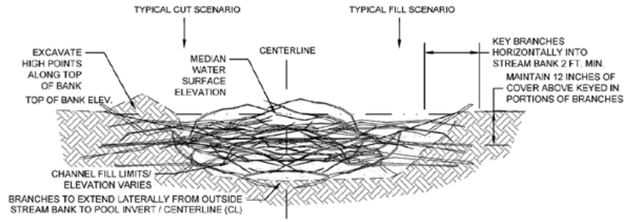
Typical Swale Stabilization



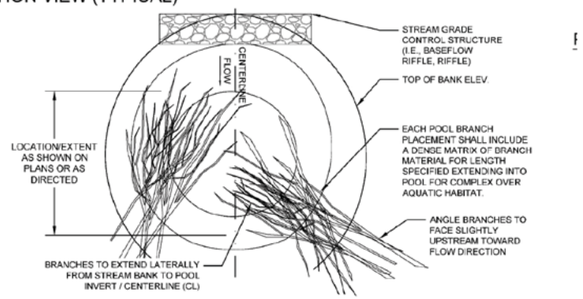
Cobble Riffle Stormwater Conveyance - Typical Section



Riffle - Plan View



POOL WOODY BRANCH PLACEMENT
SECTION VIEW (TYPICAL)
NOT TO SCALE



POOL WOODY BRANCH PLACEMENT
PLAN VIEW (TYPICAL)
NOT TO SCALE

Pool Woody Branch Example

IX. Long-Term Impact

AMRI Phase I demonstrates the power and potential of a community-scale approach to climate adaptation. Rather than relying on isolated, one-off infrastructure fixes, the AMRI team worked in partnership with local stakeholders to identify interconnected opportunities for nature-based resilience across the Spa Creek and Back Creek watersheds. This planning process integrated technical assessment, ecological analysis, and robust community engagement to produce a comprehensive inventory of sites of concern in the area as well as an initial portfolio of 10 high-impact project sites, each designed not only to reduce risk, but to deliver long-term environmental and social benefits.

This approach reflects a shift in how resilience can be envisioned and implemented. Through bilingual outreach, grassroots partnerships, public events, and stakeholder interviews, the planning process elevated the voices of residents, particularly those from historically underserved neighborhoods who are often excluded from traditional infrastructure decision-making. The result is a set of project concepts that are technically sound, community-informed, and ready for advancement into permitting, detailed design, and implementation as funding becomes available.

The long-term vision for AMRI is not confined to the contents of this plan or this initial set of projects. The AMRI team is committed to maintaining a long-term, adaptive partnership that coordinates fundraising, planning, and implementation efforts and maintains two-way communication with communities and stakeholders. The Resilience Authority will lead a coordinated monitoring effort (see Appendix F) to guide ongoing planning and implementation within the Study Area, in collaboration with the City and other partners. This effort will help ensure that AMRI continues to deliver on ecological performance, social impact, and community priorities in future phases, while enabling the partnership to communicate a clear, compelling story of impact across all nature-based resilience efforts.

Just as importantly, AMRI Phase I offers a replicable model for other jurisdictions seeking to implement integrated, equity-centered, and nature-based resilience strategies. The tools, methods, and partnerships developed through this effort – from community engagement frameworks to site prioritization matrices – can inform future resilience planning not only across the City of Annapolis and Anne Arundel County, but in coastal communities throughout the Chesapeake Bay region and beyond. As climate risks intensify and federal, state, and local funding streams evolve, AMRI stands as a demonstration of what is possible when jurisdictions and communities are intentional and aligned through shared purpose.

Appendices (LINKED BELOW)

- **A. Possible Funding Opportunities**
- **B. Community Engagement Details**
- **C. Community Survey Details**
- **D. Site Prioritization Matrix**
- **E. Highly Ranked Sites not Selected for AMRI Phase I Design**
- **F. Monitoring and Metrics**
- **G. Community Engagement Plan**

RESILIENCE
AUTHORITY
Annapolis and Anne Arundel County

resilienceauthority.org/annapolis-maritime-resilience-initiative-amri

Resilience Authority of Annapolis and Anne Arundel County • Arundel Center, 44 Calvert St., Annapolis, Maryland