February 2026

MIDDLE PENINSULA PLANNING DISTRICT COMMISSION RFP #FY26-GRIT1

ANCHOR QEA

Guinea Resilience & Innovation for Tidal Wetlands (GRIT) – Phase 1 Project

Submitted by Anchor QEA

1225 West 25th Street, Suite 202
Norfolk, Virginia 23508
410.794.7779

ANCHOR QEA

February 9, 2026

Mindy Strevig, PE
Project Manager
Middle Peninsula Planning District Commission (MPPDC)
4521 Lewis B. Puller Memorial Highway
Mattaponi, Virginia 23110

Re: Guinea Resilience & Innovation for Tidal Wetlands (GRIT) – Phase 1 Project

Dear Mindy,

We understand the critical nature of the GRIT project, especially since Virginia has lost more than 40% of its wetland habitats since colonial settlement. Likewise, the Chesapeake Bay watershed has lost more than 50% of its historical wetland acreage. Human activities and associated widespread landscape alteration have resulted in increased coastal flooding, shoreline erosion, and poor water quality along Virginia's rivers and bays and have in turn transformed these from carbon sinks into carbon sources. It is therefore important to embark on a system-scale long-term vision for coastal wetland restoration, such as the GRIT project's goal of restoring up to 1,000 acres of tidal marshes, dunes, and beaches using nature-based and hybrid solutions.

Our team has a **deep understanding of the unique geographic setting and regulatory landscape of Virginia's coastal ecosystems**, which must be considered when designing a holistic and resilient restoration strategy within the Commonwealth. In addition, our team is known for bringing **innovative nature-based solutions to address difficult coastal issues**. Anchor QEA has a nearly 30-year history of implementing sustainable aquatic restoration projects. We have assembled a **well-qualified local team that is familiar with the area and knows the challenges faced by the region's coastal wetlands firsthand**.

We hope to build upon our recent and ongoing work in Virginia related to *Beneficial Use of Sediments and Thin Layer Placement*, performed for the Virginia Marine Resources Commission (VMRC) and the Elizabeth River Project (ERP). Through these projects, we have built strong trust and relationships with stakeholders and regulatory agencies in the Commonwealth, that we will leverage to effectively develop and implement this project.

Our proposal presents innovative, self-sustaining technical solutions that deliver lasting ecological and community benefits and directly support the MPPDC's vision of long-term regional resilience. If selected, we will evaluate additional industry-leading solutions (e.g., 3D printing, Natrix GIS solutions, ECOncrete) to determine whether they can be effectively integrated into the project design. Our team will also complete a desktop analysis prior to selecting specific vendors to ensure proposed products are well suited to the site's needs.

If you have any questions about our submittal, or need any additional information, please contact us at rmohan@anchorqea.com or jrieger@anchorqea.com. (*Ram Mohan, principal-in-charge, is an officer authorized to bind the company with respect to this proposal.*)

Sincerely,

Ram K Mohan

Ram Mohan, PE, PhD., F.ASCE
Principal-in-Charge/Engineer of Record

Josef Rieger

Josef Rieger
Project Manager

Table of Contents

EXECUTIVE SUMMARY

Partnering with MPPDC, we will deliver innovative, nature-based solutions to **restore Guinea Marsh and enhance its long-term resilience**.

We understand the challenges facing the Guinea Marsh system, including historic land loss from edge erosion, subsidence, and interior marsh degradation due to the combination of sea level rise (SLR), increased storm intensity, and associated climate change impact.

Based on our team's knowledge of the project area and lessons learned from innovative restoration designs across the country, we are proposing a combination of various nature-based solutions to restore the marsh into the future. Our team will work collaboratively with MPPDC staff and community stakeholders to adapt our design and deliver a constructable project within MPPDC's construction budget.

A summary of the unique differentiators and values of our team is provided in the table below for ease of reference in reviewing our proposal.

Team Strengths	Supporting Details	Section (Page) References
Understanding and Experience Related to Restoring Coastal Marshes in Virginia	We developed Virginia-specific guidance documents related to beneficial use and thin-layer placement (TLP) application of dredged material and are finishing engineering design on three TLP pilot projects—lessons learned from which will help optimize the restoration plan for GRIT project.	*Innovation and Resilience Integration* (p. 23-24), *Qualifications and Experience of the Firm and Project Team* (p. 27-28, 37) *References* (p. 41), *Other Supporting Data* (p. 42-43), *Appendix A: Resumes*
	We have collaborated and established trust with Virginia regulators and stakeholders, which will be key to the long-term success of GRIT.	*Innovation and Resilience Integration* (p. 23), *Qualifications and Experience of the Firm and Project Team* (p. 27-28, 31), *Other Supporting Data* (p. 42), *Appendix A: Resumes*
Innovative Nature-Based and Hybrid Solutions for Sustainable Resilience	We have developed an innovative series of nature-based solutions that aligns well with the unique characteristics of the Guinea Marsh system and are centered to allow key marsh migration corridors at the site.	*Project Understanding, Approach, and Methodology* (p. 7-12), Innovation and Resilience Integration (p. 22-23)
	We will carefully evaluate additional industry-leading solutions (e.g., 3D printing, Natrix GIS solutions, ECOncrete) to determine whether they can be effectively integrated into the project design.	*Project Understanding, Approach, and Methodology* (p. 11)
A Well-Qualified and Experienced Local Team	Our team includes Virginia and national experts in wetland restoration, coastal engineering, and nature-based solutions. Key team members, including our project manager, permitting lead, and community outreach expert are in Norfolk or Chesapeake.	*Qualifications and Experience of the Firm and Project Team* (p. 27-31), *Response Capability* (p. 40), *Appendix A: Resumes*
	We know how to identify and address issues early in design, informing phasing and preventing costly delays during design and construction.	*Schedule and Deliverables* (p. 25), *Qualifications and Experience of the Firm and Project Team* (p. 33-39)
	Our team has designed projects that leverage state, federal, and nonprofit grant funding, and we regularly assist clients with successful grant funding applications.	*Qualifications and Experience of the Firm and Project Team* (p. 30, 33-39), *Appendix A: Resumes*

Saltmarsh sparrow, a critically endangered species that breeds in Guinea Marsh

PROJECT UNDERSTANDING, APPROACH, AND METHODOLOGY

Grounded in a clear understanding of Virginia's accelerating coastal risks, our approach combines **science-based analysis, innovative design, and close collaboration** with MPPDC and stakeholders.

Project Understanding

At nearly 1,000 acres, Guinea Marsh is one of the largest marsh systems on the western shore of Virginia, providing extensive habitat and flood protection for upland infrastructure and landscapes. Unfortunately, Virginia is experiencing some of the fastest rates of relative SLR along the East Coast, driven by the combined effects of global SLR and land subsidence. Warming ocean temperatures, melting land-based ice, and long-term geologic settling of coastal soils have increased tidal elevations across the state, particularly within the Chesapeake Bay and its tributaries.

These changes are exacerbating coastal flooding, shoreline erosion, saltwater intrusion, and wetland loss, placing growing pressure on natural systems, infrastructure, and coastal communities. Addressing SLR in Virginia requires integrated, forward-looking strategies that enhance natural resilience while accounting for both global and region-specific drivers.

Urgency of Wetland Loss and the Need for Strategic Protection

Recent studies project a significant loss in coastal wetland area in Virginia, with the Virginia Coastal Resilience Master Plan predicting almost 90% of existing wetlands lost by 2080. Other resources suggest many of Virginia's marshes may be able to compensate for these losses through upland migration, although this is dependent on topography and upland land use.

The Guinea Marsh system is no different, with portions of the marsh retreating at rates approaching 5 feet per year, making the area well suited for large-scale living shoreline and other nature-based restoration approaches. Restoring and stabilizing this tidal marsh system would strengthen coastal resilience, enhance water quality, and provide meaningful protection for nearby upland properties and Virginia's other

critical arteries, such as the Middle Peninsula Chesapeake Bay Public Access Authority.

Many wetlands will need to be protected in-place to protect upland infrastructure and valuable assets, including agricultural land, cultural resources (historic sites, indigenous landscapes, battlefields, and more), and sensitive upland ecological zones such as maritime upland forest, which Virginia Department of Conservation and Recreation describes as "globally rare" because of coastal threats.

Mechanisms of Marsh Degradation under Relative Sea Level Rise

Guinea Marsh is affected by erosion and SLR through multiple pathways:

- **Edge retreat**, where erosion pulls soil away from the marsh's edges in a continuous, progressive manner
- **Ponding and collapse**, where open water fills wetland ponds and causes edge retreat from the interior of the marsh
- **Degradation**, where open water covers low-lying wetlands with no place to retreat

In all cases, increased flood duration results in loss of vegetation, accelerating sediment loss.

The Ecological and Economic Value of the Guinea Marsh System

Despite Guinea Marsh's ongoing environmental pressures, restoration is essential. These marshes underpin valuable fisheries, such as crabs, oysters, and menhaden; support local livelihoods; and provide habitat for threatened and endangered species, including the saltmarsh sparrow. A joint Virginia Institute of Marine Sciences (VIMS) and NOAA study conducted in 2024 estimates that Chesapeake coastal wetlands provide almost $20,000 per acre per year to local economies, mostly through flood prevention and habitat provisions for fisheries. This translates into a significant economic engine for the Middle Peninsula, underpinning why it is critical to undertake proactive intervention now via marsh restoration.

Opportunities for Restoring Guinea Marsh

Waves are eroding the existing shorelines and drawing water closer to key upland infrastructure.

The large complex of low marshes has a peppering of higher ground throughout. Focusing on these higher-ground corridors could help protect and enhance important upland areas.

Protecting and expanding recreation, such as integrating water access to allow the public to experience the marshes, would enhance public perception and long-term support for the GRIT project.

Innovative, Nature-Based Solutions for Guinea Marsh

During Phase I of GRIT, we will explore restoration strategies for Guinea Marsh with the aim of protecting and restoring up to 1,000 acres of tidal marshes, dunes, and beaches through innovative and proven techniques. Our proposed technical approaches are shown in the conceptual design on the following pages and described in this section.

These techniques represent a suite of approaches we will use to design a holistic, nature-based restoration strategy for the Guinea Marsh system. All approaches will be forward-thinking, with SLR projections incorporated in design features. Exact placement of structures and TLP zones will be dependent on site conditions and submerged aquatic vegetation (SAV) surveys. These surveys will be carried out to minimize impacts to the extensive SAV beds located offshore of the Guinea Marsh system.

The Complexities of SAV in the Chesapeake

In many cases in the Chesapeake Bay, such as at the Guinea Marsh system, former wetland areas convert to subtidal zones and are colonized by SAV, which can have impact on project implantation. We are currently under contract with the MPPDC to develop mitigation strategy for SAV.

Our approach applies multiple lines of defense, combining TLP with the protection and enhancement of existing high ground to improve resilience across the site. The upland areas, referred to as Resilience Transition Zones, function as marsh migration corridors that allow habitats to adapt to changing conditions over time. These nine sites, depicted in our concept designs, will be protected by restoring nature-based solutions around these Resilience Transition Zones to maximize the long-term resilience and persistence of upland habitats.

TLP will increase marsh elevation directly adjacent to the Resilience Transition Zones and promote healthy vegetative growth, allowing the marsh platform to better keep pace with SLR while maintaining natural hydrology and habitat function.

This layered natural defense system will help protect properties owned by and adjacent to the Middle Peninsula Chesapeake Bay Public Access by reducing flood exposure; stabilizing shorelines; and preserving safe, resilient access to the waterfront, while also enhancing long-term ecological function and public value of the site.

GUINEA MARSH CONCEPTUAL DESIGN OPTIONS

Our analysis indicates that the Guinea Marsh system can be optimally restored by treating them as three regions with tailored strategies. The northern region would use breakwaters, oyster structures, and coir logs with TLP to support marsh migration; the middle region would use permeable sills, marsh mounds, and oyster castles to reduce wave energy; and the southern region would rely on oysterbreaks with targeted TLP to protect lower-energy shorelines and higher-elevation properties. The following pages include our proposed conceptual designs for each of the three areas.

Legend:

- Resilience Transition Zone
- Near Shore Breakwaters/Rock
- Oyster Castle Sill Structures
- Marsh Mounds
- Thin Layer Placement Cells
- Coir Log(s)
- Near Shore Rock Sill

Legend:

- Resilience Transition Zone
- Oyster Castle Sill Structures
- Marsh Mounds
- Thin Layer Placement Cells
- Near Shore Rock Sill

Legend:

- Resilience Transition Zone
- Thin Layer Placement Cells
- Natrx Oysterbreak System

Potential Nature-Based Solutions

Resilience Transition Zones, areas of upland maritime forest surrounded by high marsh, support a holistic, ecosystem-based restoration design. These areas are important structural components of the Guinea Marsh system, increasing the longevity of the eroding marsh system. Our design focuses on nine sites, which will serve as the backbone for our restoration approach.

Thin-Layer Placement (TLP) involves raising marsh elevation through the controlled release of sediment onto the marsh platform, in lifts ranging from less than 1 inch to 1 foot. We propose using dredged material from the MPPDC local dredging program which is estimated to yield around 600,000 cy of material to increase elevations around nine transition zones. In our current concept design, we propose 13 locations for TLP.

Living shorelines are a proven technique in Virginia and include several types of interventions. All proposed shoreline approaches use nature-based techniques, including reef development, vegetation planting, dune enhancement, and more. The types of living shorelines we would incorporate at the Guinea Marsh system are described and depicted in this section.

If selected, we will evaluate additional industry-leading solutions (e.g., 3D printing, Natrix GIS solutions, ECOncrete) to determine whether they can be effectively integrated into the project design. We would also complete a desktop analysis prior to selecting specific vendors to ensure proposed products are well suited to the site's needs. However, we recognize the established partnership between Natrix and the MPPDC and will consider this relationship as part of the evaluation process.

Oyster Castles

These interlocking blocks made from concrete blends provide surfaces in the nearshore environment for oyster spat to settle on, leading to the development of oyster reefs. We would propose seven locations for oyster castle sill structures to attenuate incoming waves while also containing dredged material placed for TLP.

Coir Logs

These nearshore sill structures made from biodegradable coconut fiber can be installed in shallow water parallel to the shoreline to dampen wave energy and reduce erosion. They are typically installed in lower-energy locations. A total of two internal creek locations were identified for coir log placement. These sills would be placed to confine TLP and extend the existing marsh edge.

Natrx Oysterbreak System

These systems operate similar to oyster castles as an interlocking structure designed to promote oyster recruitment while attenuating incoming waves. They are customizable and can withstand higher wave energy than coir logs and oyster castles. Two Natrx Oysterbreak systems are proposed around two TLP locations.

Rock Sills

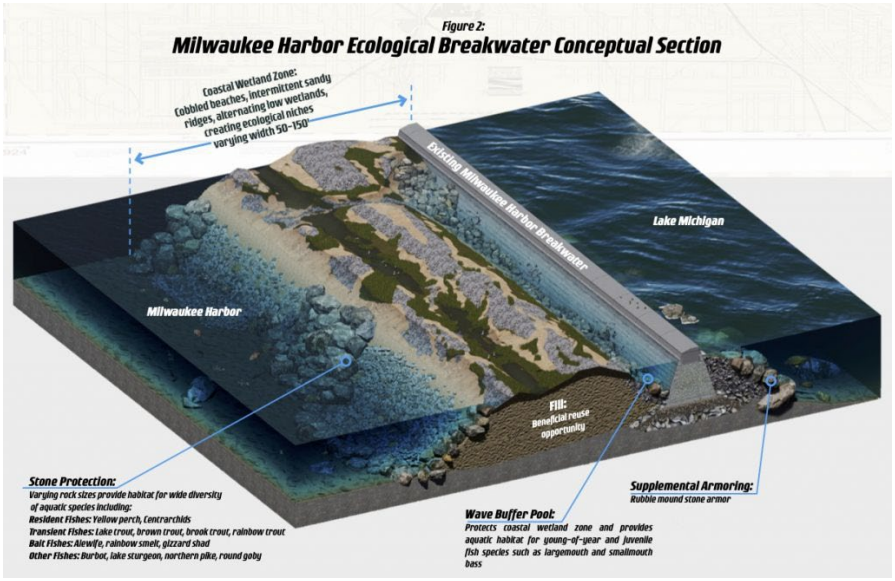
These nearshore permanent rock structures can provide habitat for finfish, algae, invertebrates, and oysters in addition to SAV. A total of four higher-energy locations would receive this type of marsh edge application.

Marsh mounds are small, raised features that can be constructed using dredged material within tidal marshes or just offshore, creating local areas of higher elevation. When created offshore, these structures attenuate wave energy and slowly erode, passively moving sediment to the inland marsh platform.

Marsh mounds support diverse marsh habitat and mimic the natural behavior of fringing marsh islands, which protect the shoreline of mainland marsh platforms. Our concept design includes one location with 10 proposed marsh mounds offshore of one of the TLP sites.

Breakwaters are offshore or nearshore structures designed to reduce erosional impacts and are typically located in high-energy environments. When placed in the nearshore environment, breakwaters can be incorporated as part of a living shoreline. Four high-energy locations were identified for breakwater siting.

We would also like to explore the use of a new design to place dredged material on the landward side of the breakwater structure to allow habitat to develop there. This approach was recently developed for another project and may have some application in this setting.

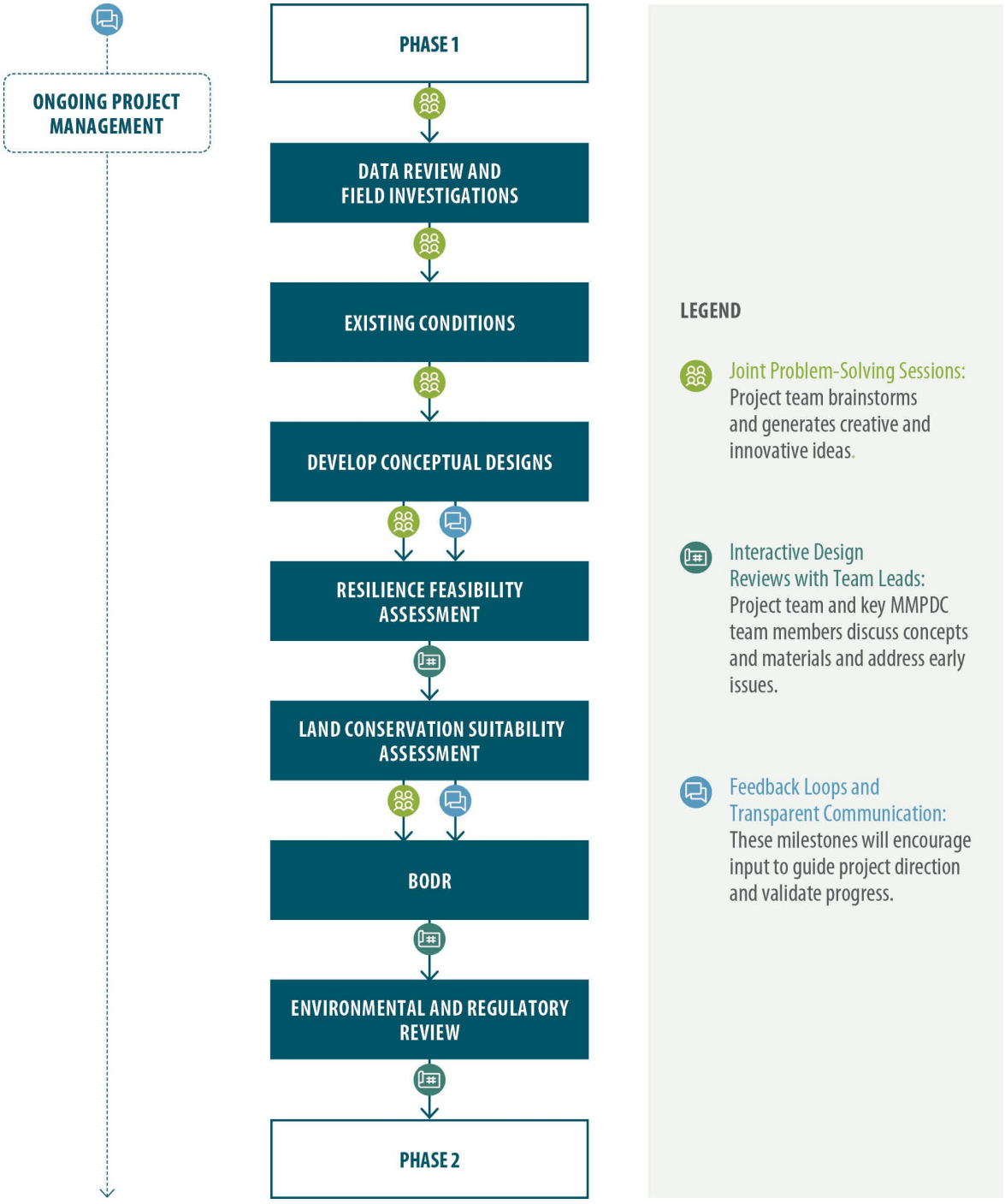


An Innovative Approach to Breakwater Design

Anchor QEA is designing an ecological breakwater, by selectively using dredged fill placement behind the leeward side of a USACE breakwater. The project will add ecological features behind what would otherwise have been a hard engineered solution, thus introducing a valuable nature-based solution feature to a robust coastal protection system. We will consider a similar approach behind breakwaters proposed for GRIT, where applicable.

Technical Approach and Methodology

Below is a summary of project implementation steps followed by our detailed methodology. This approach enables us to deliver environmentally beneficial and cost-effective projects on schedule and within budget. We understand the current grant funding is for Phase 1. Our team will approach Phase 1 through various techniques including desktop analysis, modeling, field work, design, and permit development while undergoing QA/QC throughout the process. We will also provide project team coordination, timely reporting, and stakeholder engagement woven throughout the process.



Task 1: Project Initiation, Work Plan, Coordination, QA/QC, and Reporting

We will initiate the project through a kickoff meeting with MPPDC Team, and the broader project team to confirm goals, roles, communication protocols, and expectations. Following this, we will review existing data, reports, and surveys to develop a project work plan detailing the project approach, design milestones, anticipated draft and final submittals, and coordination needs.

The work plan will be submitted for MPPDC's review, feedback, and approval and will incorporate adaptive management considerations as needed over the project duration to reflect changes in site conditions, regulatory requirements, or MPPDC priorities.

Throughout the project, we will provide ongoing coordination and technical support, including attendance at monthly coordination meetings and quarterly progress briefings with the project team. We will also attend and support at least two in-person community or stakeholder engagement events in a technical expert role.

We will prepare and submit monthly progress reports summarizing key accomplishments, upcoming activities, issues, and schedule status. At the end of the project, we will compile and submit a final technical data package that consolidates all final datasets, analyses, and technical deliverables generated. A final report will also be prepared that synthesizes all deliverables from all project tasks, documenting project implementation, outcomes, key findings, and lessons learned to inform future projects in the Middle Peninsula and further afield.

Deliverables:

- Approved project work plan and schedule
- Monthly progress reports
- Final technical data package
- Final report

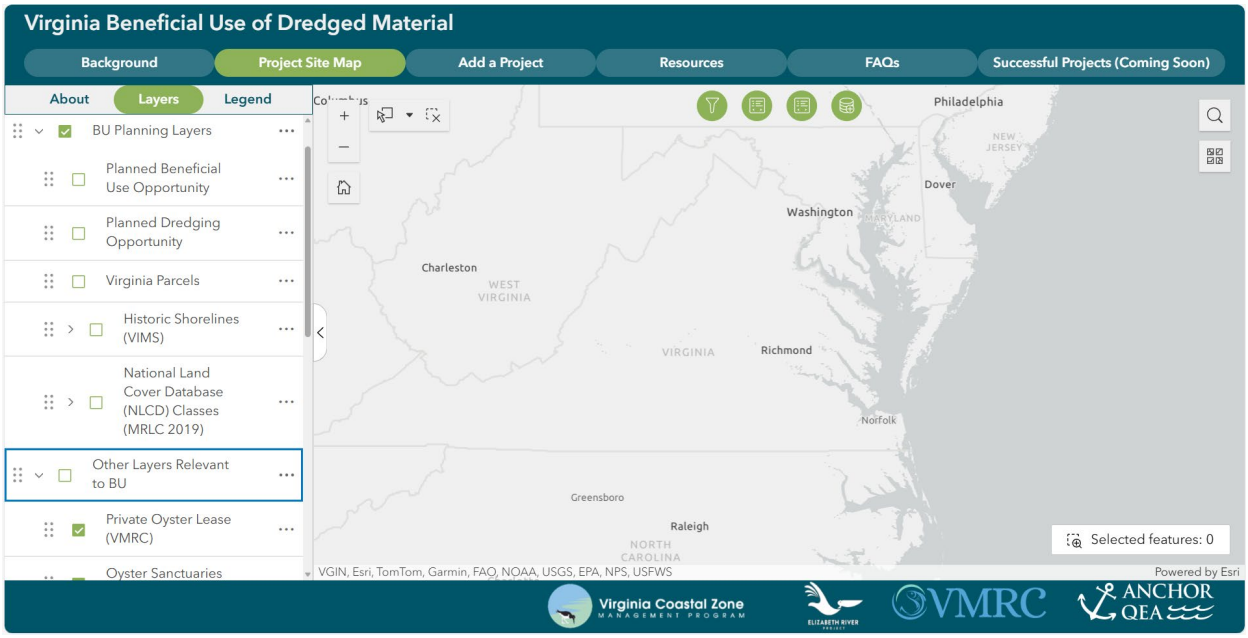
Anchored in Quality

Anchor QEA's quality policy outlines six key quality elements aligned with our core values, vision, mission, and strategic plan, that define how leadership and employees champion a culture of quality. These principles are not abstract, they're integrated into our work across our organization. Quality is built in from the beginning; it's not just a box we check at the end.

Task 2: Comprehensive Existing Conditions Report (ECR)

We will develop a thorough site understanding that will serve as the foundation for subsequent designs, using a combination of desktop analysis and field-based data collection to fill identified knowledge gaps. The desktop analysis will involve an assessment of site conditions including:

- SAV and other sensitive ecological features using VIMS and VMRC datasets
- Vegetation community and condition using VIMS Wetland Condition Assessment Tool, USGS unvegetated-vegetated ratio (UVVR) data, and more
- Shoreline erosion assessments using VIMS shoreline erosion tool
- Cultural resources using the Virginia Department of Historic Resources' Virginia Cultural Resources Information System
- Bathymetry and topography
- Aerial imagery and any existing LiDAR
- Hydrologic modeling
- SLR projections for the site



Proven Expertise with Regional Tools

Our team is deeply familiar with the breadth of tools available for geospatial and coastal planning in Virginia, as well as national and regional tools with relevance to the Commonwealth. The Virginia BUDM GIS tool developed in 2025 by Anchor QEA for the ERP consolidates over 50 spatial datasets from VIMS, VMRC, NOAA, USGS, USFWS and more for streamlined desktop analysis. This tool will be used to track TLP locations, assess potential MPPDC-proposed dredging projects, and inform selection of the most effective nature-based solutions for the surrounding environment.

The desktop assessment will consolidate and synthesize existing information, while also identifying data gaps. The team will then determine how to fill these gaps, with some of them being filled by field sampling.

Following the identification of any data gaps and needs, the team will develop a field data collection plan. Resultant field datasets will be QC following our high internal standards and provided to the project team. More information is provided on possible field data collection under Task 8.

Throughout the process, we will regularly coordinate with MPPDC, Carlexson Consulting, DWR, and project stakeholders to ensure the resultant ECR fits projects objectives and stakeholder needs. The ECR development process will occur in a stepwise manner, with checkpoints for feedback occurring at each step.

Once all data are compiled, an outline and table of contents will be submitted for initial team review and approval (Checkpoint 1), followed by draft data figures and maps for technical review by MPPDC, Carlexson Consulting, and DWR (Checkpoint 2). A draft ECR will then be circulated for broader partner review (Checkpoint 3), with consolidated comments incorporated into the final ECR (Checkpoint 4). Results from this task will provide the needed information about what data needs to be collected as part of Task 8.

Deliverable: Draft and final comprehensive ECR, including supporting maps and associated metadata, datasets, and recommendations for key data to be collected as part of Task 8

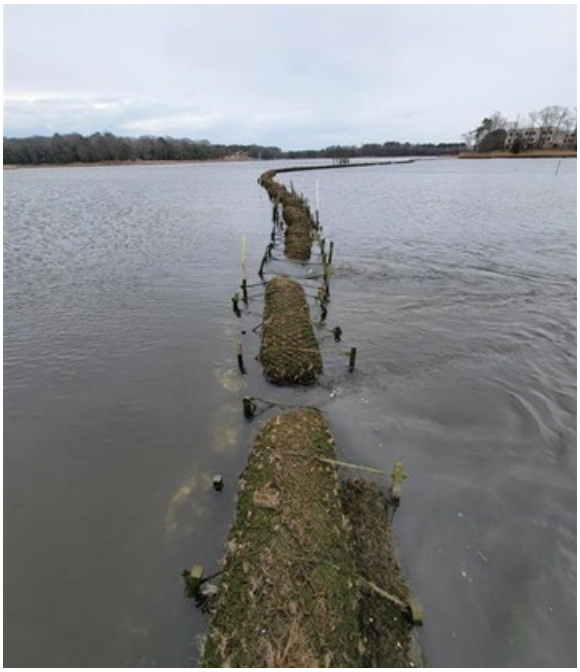
Task 3: Conceptual Design Development

We recognize the challenges posed by restoring an area as large as the Guinea Marsh system, with a mosaic of land ownership types, ecological zones, regulatory considerations based on SAV coverage and oyster leases, and erosion rates. To accommodate this, we propose to develop three or more conceptual design alternatives, each approaching the Guinea Marsh system as a three-component system with a northern, middle, and southern region, with different potential strategies for restoring each region:

- **Northern edge:** Nearshore breakwater, oyster castles, and coir logs would provide protection, augmented by TLP to provide elevational uplift to drowning marshes near wooded areas of higher ground that will function as marsh migration corridors.
- **Middle region:** Permeable rock sills, marsh mounds, and oyster castles would be designed to break the waves and protect the shorelines facing higher forces. These protective measures will be placed near TLP locations on the edges of the high ground.
- **Southern edge:** Natrx Oysterbreaks would provide shore protection along regions of lower-energy exposure, augmented by TLP around properties with higher elevation.

This holistic, systems-based approach combines traditional strategies like breakwaters and sills with innovative techniques, including TLP, Natrx Oysterbreak systems, and marsh mounds. These techniques work with the existing geography and ecology to prevent further erosion and encourage sediment accretion, while increasing marsh elevation through TLP.

We have also identified several Resilience Transition Zones that will provide structure for the eroding marsh system and serve as the backbone for future marsh migration. These corridors will allow marshes to adapt as sea levels rise.

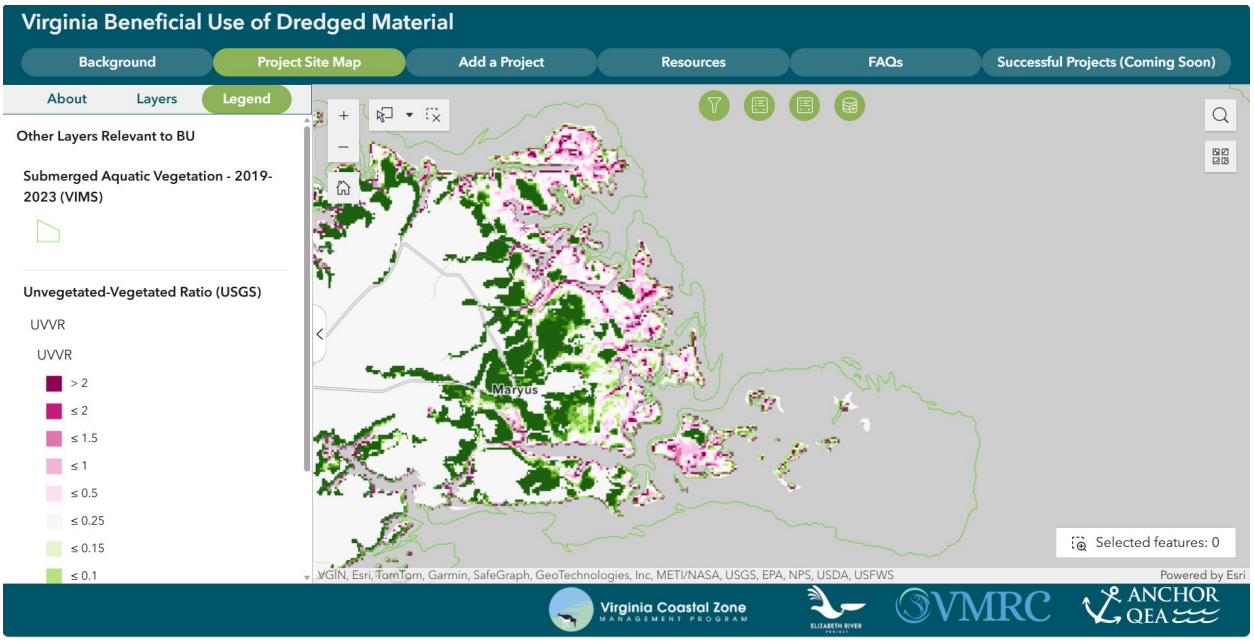


Oyster shell bags used alongside coir logs for containment of TLP in Anchor QEA's restoration project in Millsboro, Delaware

Our conceptual designs will be further refined by data collected during the ECR and conversations with MPPDC and the project team to establish project goals and priorities. Designs may include combinations of various types of containment, sediment placement, plantings, and strategically placed structural elements with living shoreline components (sills, breakwaters, or oyster features) intended to enhance resilience, limit further erosion, and improve habitat function.

Innovative concepts, such as passive dispersal of material using wave action, SAV habitat enhancements, and creation of marsh mound islands to attenuate waves and feed sediment to the mainland marsh and more may be considered.

Using the significant amount of geospatial data available for coastal planning in Virginia, we will refine our conceptual designs using site suitability rankings for areas within the marsh system, allowing us to prioritize sites for restoration activity based on feasibility and need. More information is provided on-site suitability modeling under Task 6.



As part of our work to design innovative projects around the Guinea Marsh system, we will use the Virginia Beneficial Use of Dredged Material (BUDM) GIS tool to help guide our designed efforts. The tool features SAV and UVVR layers, centered on the Guinea Marsh system, as seen above.

Building on information gathered for the ECR, each alternative will reflect site-specific conditions while incorporating best practices as outlined in previous guidance documents for the state of Virginia that our team has developed (*Beneficial Use Options and Considerations for Dredged Material in Coastal Virginia*, completed May 2025 and *Wetland Restoration Using Thin Layer Placement: Best Management Practices for the Commonwealth of Virginia*, completed December 2025).

Each alternative will be evaluated for a variety of factors, including but not limited to those listed in the following table, and compared to the other alternatives in a tabular form as well as in a written report (design alternatives summary memorandum). Other metrics of comparison will be developed in conversation with the project team.

ALTERNATIVE FACTORS

Ecological Enhancement	Habitat benefits reaped by each alternative, including potential fish and bird habitat gains, expected species composition following restoration, and SAV and oyster impacts and benefits
Longevity and Resilience	Performance over time, including consideration of each alternative's resilience toward storm events and SLR projections
Anticipated Performance	Expected outcomes and benefits of each project alternative
Constructability	Feasibility of the alternative and any anticipated challenges to construction access or site limitations (e.g., site access or utilities)
Relative cost	Costs associated with project constructability and design adaptability to a range of SLR scenarios

The conceptual design drawings and the design alternatives summary memorandum will be presented to the project team and community members during a design review workshop, where the project team will determine preferred approaches and paths forward. Anchor QEA will take into consideration feedback from the project team to make sure local voices are reflected throughout the design process.

Deliverables:

- Conceptual design drawings
- Design alternatives summary memorandum
- Design review workshop notes

Task 4: Basis of Design Report (BODR)

The results of Tasks 2 and 3 will be synthesized in a comprehensive BODR, which will advance the conceptual design selected during the design review workshop to a more refined framework, clearly describing the design objectives, assumptions, and criteria, including physical and ecological considerations, regulatory needs, and aspects of climate resilience featured in the selected design. The BODR will support the conceptual design approach by including results and methods from technical analyses, modeling, and cost estimates, as well as present a phased implementation approach with stepwise sequence of restoration activities from baseline monitoring to post construction.

The BODR will include a project risk matrix that identifies key technical, regulatory, environmental, and implementation risks, along with proactive mitigation strategies. The BODR will also include an adaptive monitoring framework, which will describe how post-construction monitoring data could be used to inform future phases of monitoring, collect information for lessons learned and applicability to future projects in the Middle Peninsula and Virginia more broadly, and support long-term performance and resilience of the project.

Value Engineering

Anchor QEA will bring together a team of contractors during the BODR process, ideally at 60% design, to review and evaluate the constructability aspects of the proposed design and identify data gaps. We use such processes, augmented by our internal team of construction experts, to develop designs that are bid-ready and avoid surprises down the road.

The draft BODR will be reviewed with the project team in the BODR review meeting, and feedback will be solicited from regional stakeholders prior to finalization. Recognizing the complexity and skepticism around marsh restoration in Virginia, particularly with innovative techniques like marsh mounds and TLP, we know that detailed reporting and planning is necessary to advance projects. The final BODR will serve as a technical foundation to support decision-making, funding applications, permitting, and progression to detailed design.

Deliverables: Draft and final BODR

Task 5: Resilience Feasibility Assessment

Coastal systems are dynamic and fluid, and restoration interventions can be seen as buying time for the wetland system, but no solution is permanent. We will assess the technical (hydrological, geomorphological and ecological) and economic feasibility of selected interventions in terms of longevity and climate adaptability, using a coastal processes modeling approach to assess anticipated resilience benefits under various SLR scenarios, with consideration of marsh elevation, shoreline stability, and the adaptability of the system through habitat change and marsh migration.

This assessment will consider how the selected design approach responds to current and future stressors, including SLR, storm surge, and changing sediment dynamics, while maintaining ecological function and constructability. Feasibility will be evaluated based on relative costs, anticipated longevity, adaptability over time, and the ability of each alternative to meet restoration objectives under a range of climate scenarios. The results of this assessment will inform selection of resilient design approaches that balance ecological benefits, long-term performance, and implementation practicality.

We will also consider site-specific constraints, such as constructability, material availability and potential sources (including upcoming dredging projects for BUDM approaches), and the logistics of implementation to determine the feasibility of various proposed interventions, including TLP using dredged material, marsh mounds, the inclusion of hard structures and living shorelines, and more. Following these analyses, a draft resilience feasibility assessment report will be presented to the project team, and feedback will be incorporated into the final resilience feasibility assessment report.

Deliverables: Draft and final resilience feasibility assessment report

Task 6: Land Conservation Suitability Assessment

Our team developed the Virginia BUDM GIS tool for the ERP, which we are in the process of transferring to Hampton Roads Planning District Commission (HRPDC) for public use. The tool is designed to help project teams and localities identify and assess restoration sites for BUDM. It contains information including parcels, historical shorelines, regulatory SAV boundaries, oyster leases, wetland UVVR ratios, SLR risk, and more.

We used this tool to successfully identify three sites for TLP pilot projects in Norfolk, which are currently in their initial design phases. As the architects of this tool, we are well-equipped to assess suitable land for beneficial use and will use the considerable geospatial data available in Virginia through VIMS and other organizations to develop a site suitability ranking assessing the project site based on multiple factors, including land use and zoning, ownership, topography and elevation, projected inundation under SLR scenarios, and ecological parameters (e.g., USGS wetland UVVR, proximity to sensitive ecological features, use by threatened and endangered species).

Using heatmaps to pinpoint ideal areas for wetland restoration

Anchor QEA has experience developing similar site suitability maps for Ducks Unlimited spanning the coast of Texas, where datasets such as SAV presence, existing land use, distance from dredged material sources, and more were weighted based on their suitability for restoration and then summed for a total site suitability score, presented spatially as a heatmap.

Criteria, including those mentioned above, will be classified based on suitability for beneficial use and spatially integrated within a GIS framework to develop relative suitability rankings, resulting in the development of an interactive, web-based site suitability heatmap for project team use across the Guinea Marsh system.

Draft mapping products and ranking results will be shared with the project team to confirm evaluation criteria, review preliminary findings, and refine criteria as needed. Incorporating project team feedback, we will prepare a draft and final land conservation suitability assessment report that summarizes methods, results, and recommendations.

Deliverables:

- Draft and final land conservation suitability assessment report
- Interactive site suitability web map

Task 7: Environmental and Regulatory Documentation

The final stage of the project will include the development of regulatory and permitting documents. We will develop an environmental evaluation summary that outlines anticipated environmental effects associated with the proposed restoration and resilience actions, identifies potential mitigation needs (SAV), and documents regulatory requirements and possible pathways to compliance.

We recognize that successful permitting involves coordinating with agencies early and often, so we will begin by identifying likely regulatory approval pathways, including coordination needs with local groups and state and federal agencies (e.g., DWR, U.S. Army Corps of Engineers [USACE], and state coastal or environmental agencies), and outline anticipated permits, authorizations, and review processes.

Using the information garnered in pre-application meetings with applicable organizations, we will develop environmental evaluation materials, including a draft environmental review summary and draft joint permit application (JPA) package, and provide these to MPPDC, DWR, and the project team for review to align with agency expectations prior to submission or further processing.

Deliverables:

- Draft environmental review summary
- Draft JPA package

REQUIRED PERMITS AND ISSUING AGENCIES

Agency	Regulatory Role	Anticipated Approach	Relevance to Project Implementation
USACE	Federal permitting for impacts to waters and wetlands	Nationwide Permits 13 (Bank Stabilization), 27 (Aquatic Habitat Restoration, or 54 (Living Shorelines); Individual Permit if required	Multiple permit pathways available for shoreline erosion control and TLP; early coordination will confirm eligibility and address seasonal restrictions related to anadromous fish
Virginia Department of Historic Resources and Tribal Coordination	Review of cultural and historic resources	Agency and Tribal consultation	Coordination will ensure compliance with state and federal cultural resource requirements and determine if additional studies are necessary
VMRC	State tidal wetlands and subaqueous lands permitting	Individual Permit with public hearing	TLP and project fetch exceed general permit thresholds: VRMC authorization will establish the primary state approval
Virginia Department of Environmental Quality (DEQ)	State water quality certification	Permit waiver anticipated	DEQ typically waives certification when VRMC issues a permit, streamlining the approach process
Gloucester County Wetlands Board	Local wetlands oversight	Permit waiver anticipated	Waiver likely if project is located on government-owned property, reducing permitting burden

Task 8: Field Services (Optional)

Following completion of the ECR, the extent of field work needed to develop a comprehensive understanding of the site will be determined in conversation with MPPDC, Carlexson Consulting, and the project team. Targeted field data collection would be performed in priority areas to support development of restoration designs. This effort would focus on documenting existing site elevations and tidal benchmarks necessary to inform design decisions. Measurements will include verification of key tidal reference points, such as lower and upper tidal limits and elevated tide thresholds relevant to permitting considerations.

Data collection would be conducted at a level of detail appropriate to support regulatory coordination and improve the likelihood of timely permit approval. The information gathered would establish a reliable foundation for evaluating constructability, resilience, and long-term performance of proposed restoration alternatives.

Because of the boom-and-bust nature of *Ruppia maritima* and other SAV in the Chesapeake region, SAV surveys will likely be needed to establish the most up-to-date habitat information, along with delineation of high and low marsh zones for design considerations. We also anticipate geotechnical data and sediment characterization will be required for sediments.

A sampling and analysis plan and quality assurance project plan would be put in place for any necessary field work. All resultant field datasets, photographs, and video would be provided to MPPDC, along with full activity reports for each period of field work.

Deliverables (if applicable)**:**

- Sampling and analysis plan
- Quality assurance project plan
- Field datasets, photographs, videos, and field reports

Natural recruitment of vegetation in an Anchor QEA-designed 46-acre marsh, 1.5 years after construction

INNOVATION AND RESILIENCE INTEGRATION

Our approach to restoring Guinea Marsh includes at least **seven innovative nature-based techniques**, many of which will be a first for the State of Virginia.

We have successfully designed, permitted, and constructed more than $150 million in living shoreline projects nationwide, many of which share key physical, ecological, and regulatory characteristics with Guinea Marsh. Our track record with innovative, nature-based strategies for marsh resilience and enhancement fit the complex challenges of marsh restoration at the Guinea Marsh system. We will incorporate these solutions throughout the project by applying proven natural and nature-based features (NNBF), adaptive design principles, and close coordination with regional resilience and dredging programs.

Taking an Innovative, Yet Sustainable Approach

Our carefully selected cutting-edge techniques work in concert with nature to effectively regenerate ecosystem services and habitat connectivity. The project's innovative aspects build from the marsh's history to inform its future: our conceptual designs use remaining islands of existing high ground as scaffolding to support habitat enhancement and long-term ecosystem resilience.

Innovative interventions include the use of **ecological breakwaters**, designed to reduce erosive forces on the fringing edge of the marsh while also providing habitat for SAV, fish, and oysters. Additionally, our approach involves **TLP through BUDM** from MPPDC's dredging program. Other innovative aspects of our approach include installation of **marsh mounds**, which provide offshore foraging habitat for birds and other wildlife while using passive dispersal by currents to nourish sediment-starved inland marsh systems. Many of these techniques, such as ecological breakwaters and marsh mounds, have not yet been used in Virginia but have been proven to successfully restore eroding marshes and elsewhere in the region.

Selecting Solutions for Virginia's Unique Ecosystem

Coastal restoration projects in Virginia must consider the changing landscape, as Virginia's shorelines are subject to some of the highest rates of relative SLR on the east coast. Projects must account for not only present conditions, but also future scenarios. Our conceptual designs consider the future of Virginia's shorelines and

contain innovative techniques that will add sediment to the system by mimicking natural depositional pathways, including passive dispersal of sediment by currents through marsh mounds and sediment accretion TLP.

Virginia's high rates of erosion have led to the development of numerous goals for restoring and protecting coastal ecosystems in the Commonwealth and the wider Chesapeake region. Among these are Virginia's Coastal Resiliency Master Plan (CRMP), which emphasizes nature-based solutions to addressing long-term wetland vulnerability under SLR. The CRMP prioritizes tidal wetland restoration, living shorelines, and shoreline stabilization that includes habitat development as techniques to increase coastal resilience, and these are **techniques that are incorporated into our conceptual design for Guinea Marsh**.

A Background Built on Best Practices from Lessons Learned

The innovative approach described above will be informed by the team's prior experience, including the following representative projects, which will be drawn upon during execution of this effort.

Virginia-Specific Decision Support for Marsh Restoration and Beneficial Use

Integration with regional resilience and local dredging programs is a core element of our approach. In the Chesapeake Bay region, Anchor QEA has been instrumental in advancing innovative marsh restoration strategies that align dredging activities with coastal resilience goals.

In Virginia, we conducted stakeholder interviews and facilitated workshops to identify barriers and opportunities for expanding BUDM, incorporating input from regulatory agencies, resource managers, and industry stakeholders to make actionable recommendations. We will use this information to formulate our design approach and associated permitting efforts. In addition, we will build on this effort, use a web-based GIS decision-support tool that helps practitioners identify vulnerable marshes, evaluate restoration suitability, and link potential restoration sites with nearby dredged material sources, effectively matchmaking dredging with beneficial use opportunities.

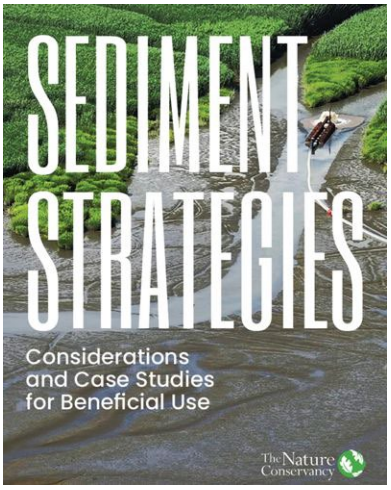
The tool integrates datasets relevant to climate adaptation and project feasibility, including historical shoreline change, marsh condition metrics, SAV, oyster resources, marsh migration corridors, and land use and land cover.

Anchor QEA team members have also developed two Virginia-specific guidance documents on using dredged material for restoration. *Beneficial Use Options and Considerations for Dredged Material in Coastal Virginia*, developed for VMRC (publication expected in March 2026), presents strategies for BUDM specifically for the Commonwealth of Virginia, with recommendations for advancing the practice in Virginia.

Wetland Restoration Using Thin Layer Placement: Best Management Practices for the Commonwealth of Virginia, developed for the ERP, presents guidance on the use of TLP as a marsh restoration strategy in Virginia. In addition to the document, Anchor QEA has worked with ERP to design three pilot marsh restoration projects in the Elizabeth River, which are in their preliminary (30%) design phases.

Leadership in Beneficial Use Strategy Guidance in the Chesapeake Bay

More regionally, our team has contributed to the development of innovative restoration guidance on the Maryland side of the Chesapeake Bay.

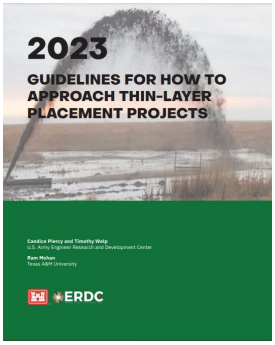


Sediment Strategies: Considerations and Case Studies for Beneficial Use, developed for The Nature Conservancy, is a visually driven, practitioner-focused guide that supports marsh restoration using dredged material. The document functions as an accessible reference for beneficial use, synthesizing regulatory, design, and implementation considerations and presenting case studies that were distilled to key lessons learned through direct engagement with project stakeholders.

Published in late August 2025, *Sediment Strategies* played a central role in a recent workshop hosted by The Nature Conservancy and the Maryland Department of Natural Resources, engaging county, state, and local planners and practitioners focused on advancing innovative reuse and BUDM practices in Maryland.

Proven National Leadership in Nature-Based Solutions

Our team has also played a leading role in developing guidance that advances the application of nature-based solutions at regional and national scales. Because of our extensive experience creating and sustaining marsh footprints using BUDM, Anchor QEA staff were selected to help develop USACE's 2023 engineering publication *Guidelines for How to Approach Thin-Layer Placement Projects*.



We were also heavily involved in the development of the *International Guidelines on Natural and Nature-Based Features for Flood Risk Management* and the forthcoming *Engineering With Nature + Landscape Architecture* and *Engineering With Nature Proving Grounds Project Handbook* for the USACE San Francisco, Philadelphia, Mobile, and Great Lakes Districts.

These efforts ensure that our approach reflects current best practices for climate-resilient, nature-based shoreline and flood-risk management.

Thin layer placement at marsh restoration site in Georgia

SCHEDULE AND DELIVERABLES

Recognizing that regulatory and site conditions can sometimes challenge even the best developed plans, we have built **flexibility and foresight** into our schedule.

Regulatory and ecological conditions at the site pose potential risks to schedule completeness. We will optimize project timelines and manage risk to scheduled activities in the following ways:

Project Schedule Buffer and Task Sequencing

We have built in a 1-month buffer at the end of the project period and have designed the schedule so that all tasks, with the exception of the environmental and regulatory review package, are completed by the end of November.

Field Work Scope and Early Conditions Review

The extent of field work required depends on the results of the ECR. We will complete the ECR within 3 months of project kickoff to ensure adequate time for any necessary field work.

Weather and Tidal Constraints on Field Work

Additionally, field work completion can depend on satisfactory weather and tide conditions. We will ensure our team is equipped for all forecasted weather conditions, and if a shutdown is required due to a storm or high-water event, plans will be in place for alternative scheduling.

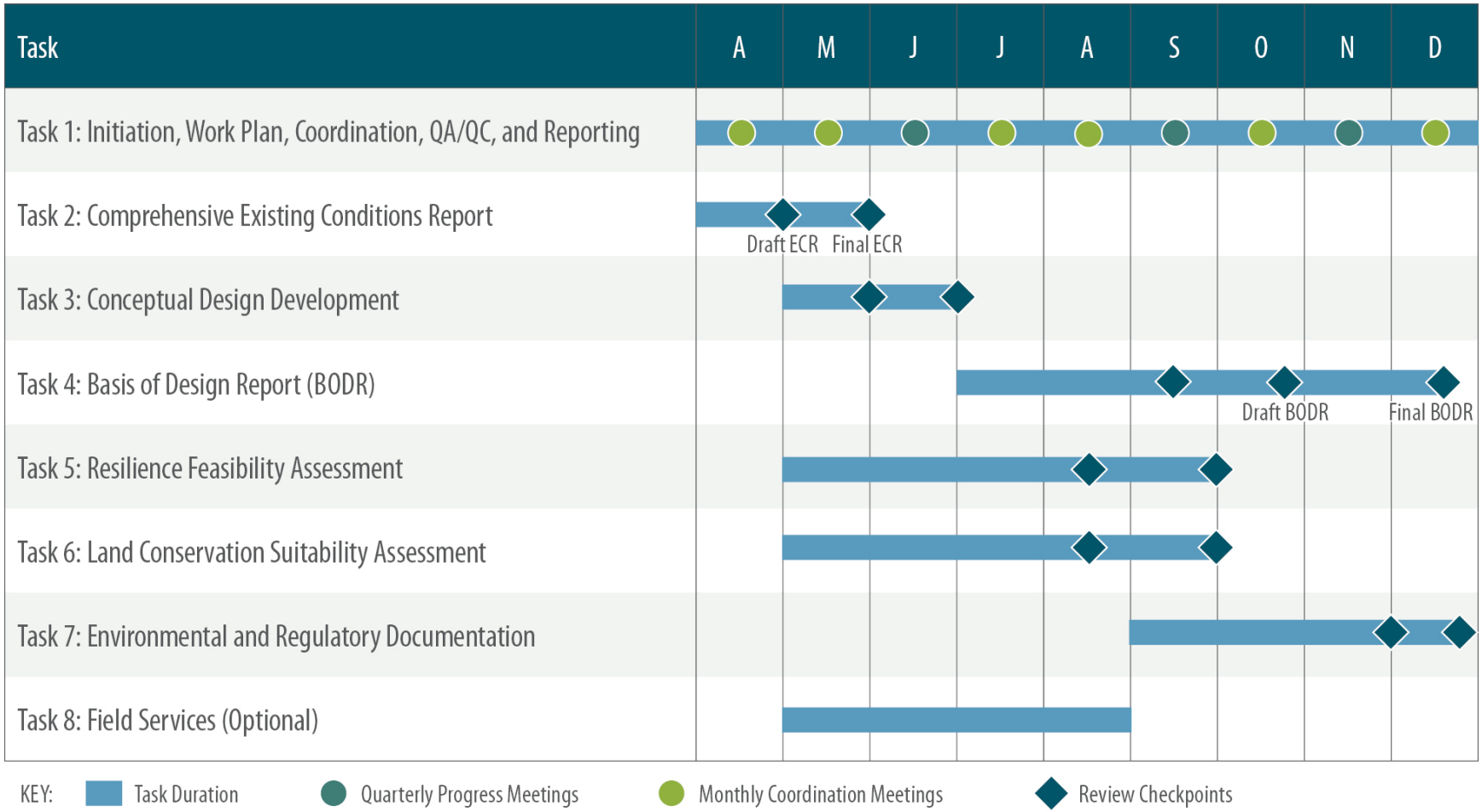
Regulatory Coordination and Permitting Timelines

Regulatory review timelines can be long for innovative approaches without precedent in Virginia. We will ensure coordination with regulatory agencies and stakeholders early and often to ensure we present a complete, effective permitting package. Pre-application meetings will be held prior to permit submittal with relevant organizations.

Stakeholder Review and Comment Resolution Process

Stakeholder review timelines can similarly extend beyond expected ranges, and responses to received comments may require a considerable amount of effort, depending on the breadth of requested changes. We will provide a table through which stakeholders can provide their comments, with a blank column in place for our responses, to expedite the process.

Proposed Schedule



Living shoreline
breakwater construction at
700-acre marsh in Texas

QUALIFICATIONS AND EXPERIENCE OF THE FIRM AND PROJECT TEAM

Our proposed team members are **experts in their fields** and have the experience and necessary skills to undertake all aspects of the work.

As project manager, **Josef Rieger** will be the primary point of contact and oversee delivery to keep the project on schedule and within budget. From his office in Norfolk, he will be responsible for overall coordination, schedule and budget management, integration of technical inputs into project deliverables, and regulatory and stakeholder engagement efforts.

Joe will bring his 24 years of experience in developing sustainable approaches to shoreline, marsh, and natural resource stability. His long-standing history of planning, designing, and implementing large-scale restoration projects in the Hampton Roads/Chesapeake Bay region, as well as the strong relationships and trust he has built with stakeholders and regulators in Virginia, will benefit this project.

Ram Mohan, PhD, PE, F.ASCE, will be principal-in-charge and engineer of record. He will provide technical oversight and support coordination across disciplines, ensuring consistency between design development, field efforts, and permitting strategy.

Ram has more than 40 years of experience in coastal engineering and ecosystem restoration projects involving most major estuarine and riverine systems in the United States. He has written several national guidance documents for restoration and resilience. Ram is one of the country's foremost experts on TLP, having co-authored the USACE National Guidance on TLP and acting as principal-in-charge for the Virginia BUDM guidance and TLP pilot project design.

Walt Dinicola, PE, F. ASCE, will be a technical advisor for BUDM. He will review dredging plans, dredged material sources, and recommend best ways to beneficially use dredged material.

A Vice President of the Western Dredging Association, Walt has 30 years of experience implementing innovative shoreline restoration techniques as well as beneficial use technologies on multiple projects throughout the country.

Subconsultants

Regular coordination meetings will be held with subconsultants to align schedules, confirm data needs, and address emerging technical or regulatory issues. Joe will make sure to facilitate clear communication, efficient collaboration, and rapid resolution of questions as they arise. This coordinated management approach will ensure field data collection, stakeholder engagement, permitting strategy, and design development proceed in parallel and inform one another, reducing project risk and supporting development of practical, resilient restoration solutions.

Old Dominion University

As part of the project team, we have included Old Dominion University's Institute for Coastal Adaptation and Resilience, with direct support from Andrew Larkin, to support public outreach and stakeholder education efforts. He brings extensive experience working with diverse communities throughout the Middle Peninsula and broader Tidewater region. Andrew's deep regional knowledge and trusted relationships will help ensure effective engagement and meaningful incorporation of stakeholder input throughout the project.

Joe has worked extensively with Andrew over the years on many projects, including the oyster restoration in the Lafayette River that restored more than 20 acres of oyster habitat.

Bay Environmental

One of the primary challenges associated with this project is navigating the permitting process. To address this, we have engaged the Virginia-based firm Bay Environmental, one of the most experienced local permitting firms in the region. Their team has successfully permitted more than 200 projects throughout southeastern Virginia and brings extensive knowledge of regulatory requirements, processes, and agency expectations, along with long-standing relationships within the regulatory community.

Bay Environmental, a certified small business, is widely recognized as one of the leading firms in Virginia for navigating regulatory processes and securing permits.

Bay Environmental will work closely with the design team from the outset to help identify and avoid potential permitting challenges, provide early regulatory insight, and offer constructability feedback to ensure proposed designs are both feasible and implementable. This integrated approach will support efficient permitting and reduce project risk while maintaining alignment with restoration and resilience objectives.

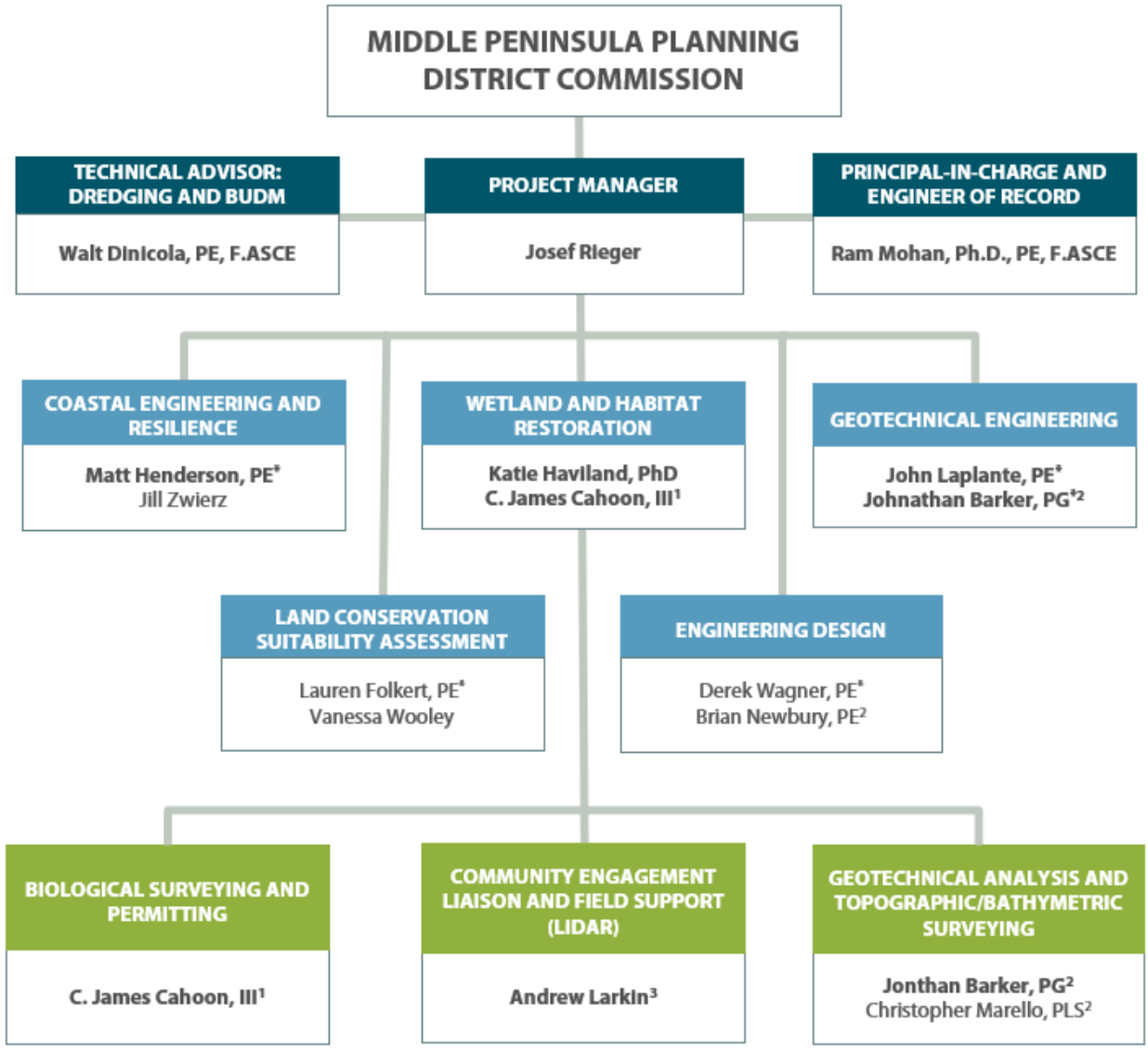
Joe has also worked with Bay Environmental for more than 15 years, including on the restoration of more than 10 shoreline projects in the Elizabeth River.

Gahagan & Bryant Associates (GBA)

GBA will support the field data collection program and development of engineering designs and cost estimates. Their team will conduct detailed bathymetric and topographic surveys to characterize existing site conditions and provide the elevation data necessary to inform design and construction of the proposed shoreline and marsh restoration approaches at Guinea Marsh. This data will be used to evaluate constructability, refine design elevations, and support coordination with regulatory agencies. GBA has been doing this type of work in the Chesapeake Bay since 1974.

In addition to survey and data collection services, GBA brings extensive experience in dredging operations and sediment reuse. This expertise will directly support development of a feasible dredging and reuse strategy for TLP locations, including evaluation of potential sediment sources, placement methods, and constructability considerations. GBA's integrated understanding of survey data, dredging practices, and sediment management will help ensure the proposed restoration approaches are technically sound, cost-effective, and aligned with both permitting requirements and long-term performance objectives.

Organizational Chart



Legend:
* Out-of-state licensure
Bold: Key staff
1. Bay Environmental (SWaM certified) 2. GBA 3. Old Dominion University

Local Economic Participation

We know MPPDC places a high value on contributions made to the local resilience and coastal economy. We have carefully selected team members and partners based in Virginia, including our project manager, **Josef Rieger** (Norfolk, VA), **Bay Environmental**, a SWaM-certified small business (Chesapeake, VA), and **Old Dominion University** (Norfolk, VA).

Roles and Experience of Proposed Team Members

Our proposed team members were selected to bring MPPDC a cohesive team with the specific skills needed to deliver the scope of work. The following table includes information on our proposed team members' roles, qualifications, and benefits they bring to the project. Key staff resumes are included in **Appendix A**.

Name and Role	Qualifications and Benefit to the Project
Key Staff	
Josef Rieger Project Manager	• 24 years of experience on large-scale, innovative, nature-based projects • Project manager for VA TLP guidance, VMRC BU guidance and design of three TLP demonstration projects for ERP • Leads teams of restoration specialists, delivering innovative solutions that strengthen environmental resilience • Brings expertise in securing multimillion-dollar grants, executing strategic initiatives, and fostering lasting partnerships with frontline communities
Ram Mohan, PhD, PE, F. ASCE Principal-in-Charge and Engineer of Record	• National expert in dredging, coastal resilience, and wetland restoration • Virginia-licensed engineer with 40 years of experience advising federal, state, and local authorities on marsh restoration and resilience • Author of multiple national guidance documents, including USACE TLP Guidance and multiple EWN guidance, and lead author of VA TLP and BU guidance documents
Walter Dinicola, PE, F. ASCE Technical Advisor: Dredging and BUDM	• Virginia-licensed engineer with 30 years of experience in coastal and dredging engineering and innovative reuse and BUDM • Design experience includes dredging, navigation channels, coastal structure design and modeling, EWN, and coastal protection • Awarded the 2024 Dredger of the Year by the Western Dredging Association
Matt Henderson, PE* Coastal Engineering and Resilience Lead	• Licensed engineer with nearly 30 years of experience evaluating coastal conditions and developing sustainable approaches and designs to ensure stability of shorelines, coastal infrastructure, and natural resources • Specialized areas of expertise include coastal resilience evaluation and adaptation planning; coastal and estuarine hydrodynamics; wave, hurricane, and surge modeling; and coastal protection designs
Katie Haviland, PhD Wetland/Habitat Restoration Lead	• Scientist with nearly 10 years of habitat restoration expertise focusing in coastal vegetated ecosystem integrity, coastal sediment biogeochemistry, and sediment transport • Work bridges field-based research and technical analysis to inform restoration strategies that improve ecological function, water quality, and shoreline resilience • Contributing author to VA TLP and BU guidance documents
John Laplante, PE* Geotechnical Engineering Lead	• Licensed engineer with more than 30 years of experience leading and overseeing geotechnical investigations for high-profile projects, including coastal protection, shoreline stabilization, and wetland restoration • Anticipates challenges and plans mitigation strategies during the design phase before construction

Name and Role	Qualifications and Benefit to the Project
Key Staff	
C. James Cahoon, III (Bay Environmental) Wetland/Habitat Restoration Support and Biological Surveying and Permitting Lead	• Virginia-certified wetland delineator with nearly 30 years of environmental management experience • Manages environmental assessments; wetland assessments, delineations, and permitting; compliance, planning, and permitting; and living shoreline design, permitting, and construction
Jonathan Barker, PG* (GBA) Geotechnical Engineering and Geotechnical Analysis Support	• Licensed geologist with more than 25 years of experience in coastal geology and geomorphology; dredging; restoration design; construction management; and geologic, geophysical, and geotechnical investigations • Experience also includes geotechnical investigations involving vibracoring, standard penetration test borings, and geologic laboratory analysis
Andrew Larkin (Old Dominion University) Community Engagement Liaison and Field Support Lead	• Skilled coastal resilience and habitat restoration professional with nearly 30 years of experience leading community-based, regional, and national initiatives and fostering partnerships across governmental, academic, and non-profit sectors • Proven ability to translate complex environmental policies into actionable strategies, with a strong track record in stakeholder engagement and public and legislative outreach • Connects ODU research and coastal resilience expertise with Virginia communities facing risks from flooding, erosion, and other coastal hazards • While at NOAA, he chaired the Habitat Restoration Committee of York River Roundtable, where he facilitated collaboration among local governments, agencies, and stakeholders to tackle complex coastal and watershed issues
Technical Support	
Lauren Folkert, PE* Land Conservation Suitability Assessment Lead	• Coastal engineer with 10 years of experience on coastal and dredging-related projects throughout the Mid-Atlantic • In-depth knowledge of coastal resilience and land conservation considerations
Jill Zwierz Coastal Engineering and Resilience Support	• Engineer-in-training with 3 years of experience supporting a variety of shoreline projects • Proficient in coastal modeling techniques and data analysis
Vanessa Wooley Land Conservation Suitability Assessment Support	• Experience using integrated data analysis and drone imagery to identify, evaluate, and prioritize areas suitable for conservation and restoration
Brian Newbury, PE* (GBA) Engineering Design Support	• Virginia-licensed engineer with 16 years of experience on dredging and dredging-related projects throughout the Mid-Atlantic region • Experience includes dredging, dredged material management, geotechnical engineering as it relates to dredging and dredged material containment facility construction, environmental dredging and processing/dewatering of sediments, cost estimation, and dredging production analysis
Christopher Marello, PLS (GBA) Topographic/Bathymetric Surveying Lead	• Virginia-licensed surveyor with more than 20 years survey experience working in coastal Virginia and nearby states • Experience includes the collection of singlebeam and multibeam bathymetric soundings, side-scan sonar imaging, subbottom profile collection, and marine magnetometer surveys

* Out-of-state licensure

Experience of Firm

Our team has designed, permitted, and constructed more than 400 similar coastal restoration and resilience projects throughout North America. We understand the intricacies involved in these types of projects and how to navigate the challenges that arise. We also bring extensive experience in wetland delineation, assessment, restoration design, permitting, and construction across the Mid-Atlantic.

Our projects emphasize adaptive design strategies, such as elevation capital, sediment augmentation, and habitat mosaics, to allow wetlands to evolve over time while maintaining resilience and ecosystem services. Years of post-construction monitoring at restoration sites prove that our designs provide long-term protection and can withstand extreme weather events, such as hurricanes.

The following table features a selection of our most recent shoreline restoration and resilience projects along the East and Gulf Coasts. Expanded descriptions of the most relevant projects are included on the following pages.

Project Name	Living Shorelines/ Breakwaters/Reefs	Marsh/Habitat Restoration	BUDM/TLP	Environmental Review/Permitting	Coastal Analysis	Geotechnical Analysis
Little Beaver Island Coastal and Wetland Habitat Improvement (NY)	●	●		●	●	
Sunken Meadow State Park Salt Marsh Restoration (NY)		●	●	●	●	
West Barrier Bar Park Living Shoreline and Resiliency (NY)	●	●	●	●	●	●
Shooting Island Living Shoreline (NJ)	●	●		●	●	●
Edwin B. Forsythe National Wildlife Refuge Marsh Restoration (NJ)		●	●	●	●	●
Millsboro Wetlands Restoration (DE)	●	●	●	●	●	●
Assawoman Wildlife Area Marsh Restoration (DE)		●	●	●	●	
North Point State Park Waterfront Improvement (MD)	●	●			●	
Elizabeth River Project TLP Design (3 sites) (VA)		●	●	●	●	
Hancock County Marsh Living Shoreline (MS)	●	●	●	●	●	●
Ocean Springs Beach and Dune Restoration (MS)	●	●	●	●	●	●
Port of Gulfport Shoreline Stabilization (MS)		●	●	●	●	●
St. Louis Bay Living Shoreline (MS)	●	●		●	●	●
Dagger Point Coastal and Marine Habitat Protection and Restoration (TX)	●	●		●	●	●
Nueces Delta Shoreline Restoration (TX)	●	●	●	●	●	●
Aransas National Wildlife Refuge GIWW Shoreline Protection (TX)	●	●		●	●	●

This living shoreline, the largest in New Jersey at the time of construction, now serves as a model for nature-based shoreline protection throughout the Mid-Atlantic.

Shooting Island provides critical protection from flooding and storm surge to back-bay communities in Ocean City, New Jersey.. Prior to restoration, the island experienced significant shoreline loss due to ongoing erosive processes, SLR, and damage from Hurricane Sandy, placing adjacent bayside neighborhoods and wetland habitat at increasing risk. Timely restoration was required to stabilize the shoreline, reduce flood risk, and preserve the island's ecological function.

Anchor QEA led the planning, permitting, engineering design, and construction management for a multipart living shoreline and wetland restoration project, delivered in close coordination with USACE, NOAA, U.S. Fish and Wildlife Service, the New Jersey Department of Environmental Protection, and NFWF.

We conducted a comprehensive coastal process evaluation and developed a 2D hydrodynamic and wave model of the back-bay system to assess tides, winds, and nor'easters and other storms.

PROJECT DETAILS

Project Name: Shooting Island Living Shoreline

Location: Ocean City, New Jersey

Client: City of Ocean City

Size: 3,500 lf living shoreline; 100 acres of wetland protected

Office(s) Responsible for Project: Philadelphia, PA with support from Syracuse, NY

Budgeted Construction Cost: $2.7 to $2.9 million
Original bid/engineer's estimate range reported across submittals

Completed Construction Cost: $2.3 to $2.9 million
Multiple documents confirm completed under the original bid price and under budget, though a single reconciled final dollar value is not explicitly stated

Scheduled Construction Completion: 2019

Actual Construction Completion: March 2019
Completed on time, consistent with the planned schedule, despite adverse weather and field changes

Project Outcomes:

- An effective shore protection system successfully installed for the historically eroding marsh edges of the island
- Coordinated the design, permitting, and construction of the first living shoreline system for wetlands in Great Egg Harbor Bay, NJ
- Long-term monitoring demonstrated that the living shorelines (sill and oyster castles) successfully recruited benthic species over time

Before construction

After construction

Aerial view of the site post-construction

The completed low-crested sill calms wave action and protects the island shoreline from erosion.

The final design includes approximately 3,500 linear feet of living shoreline, consisting of a nearshore, low-crested rock sill along the island edge most exposed to wave attack and concrete oyster castle habitat blocks with embedded oyster shell along the more sheltered shoreline.

During construction, Anchor QEA collaborated closely with the contractor to adapt the oyster castle installation approach to site and seasonal conditions, including placement of block clusters on untreated wooden pallets and installation using a barge-mounted excavator, eliminating the need for hand placement in nearshore waters during winter conditions. These field adaptations improved constructability, enhanced worker safety, and minimized environmental disturbance while keeping the project on schedule and within budget.

We provide project planning, design, and strategic support related to dredging and engineering for shoreline, coastal programs, environmental, and watershed programs for Delaware Department of Natural Resources and Environmental Control (DNREC).

Anchor QEA developed recommendations for the State to assess and evaluate the chemical and physical quality of sediments proposed for dredging and deposition in Delaware. This included technical review of guidance documents, assessment of regulatory requirements and best management practices, and development of recommendations based on collaboration with various entities to establish transparent expectations between the permitting agency and applicants for all phases of dredging projects.

Additional key projects performed for this contract are described on the following page.

PROJECT DETAILS

Project Name: DNREC Coastal Engineering and Dredging Program Support (this contract includes several projects; details shown below are for the Assawoman Canal dredging and BU project task order)

Location: Coastal Delaware

Client: DNREC

Size: 100 acres (Assawoman Wildlife Area Marsh Restoration)

Office(s) Responsible for Project: Philadelphia, PA with support from Syracuse, NY

Budgeted Construction Cost: $4.7 million

Completed Construction Cost: $4.69 to $4.7 million

Scheduled Construction Completion: 2024

Actual Construction Completion: 2024

Project Outcomes:

- A multifaceted approach provided solutions for multiple projects, leading to cost savings and dozens of acres of restored wetland habitat.
- Extensive community and stakeholder engagement successfully built consensus for the proposed projects.
- All deliverables met project schedule requirements, with permitting and design for a combined dredging and novel restoration project within approximately 18 months.

Aerial diagram of TLP areas

Assawoman Wildlife Area Marsh

White Creek and Assawoman Wildlife Area Marsh Restoration

Anchor QEA provided site characterization, sediment analysis, risk screening, dredging plan design, sediment BU alternatives analysis including beach nourishment, TLP to restore and enhance nearby marshes, upland placement for redevelopment, and permitting support. As part of our pre-design alternatives analysis, we identified several BU projects that included opportunities for DNREC to partner with agencies to provide coastal resilience for various nearby shorelines while providing marsh platform enhancements to improve habitat quality.

Conceptual designs for beach and marsh restoration using BU spanned multiple restoration areas, each with varying restoration backfill placement thickness and site-specific environmental controls to optimize costs and maximize wetland restoration potential. Wetland restoration design and permitting were completed in October 2022, with the selection of Delaware's largest State-led TLP project to restore 100+ acres of wetlands at the Assawoman Wildlife Area.

Our pre-design investigations included bathymetric and topographic surveying, hydrodynamic modeling and use of GIS and other technologies, sediment sampling (with paired risk analysis), marsh health assessments, tidal evaluations, and SLR analysis to inform target restoration elevations.

The approach included solutions for the White Creek navigation dredging project, as well as the subsequent Assawoman Canal dredging project and will lead to substantial cost savings (relative to other available material management options for the combined project areas), as well as dozens of acres of restored wetland habitat. Community engagement and stakeholder involvement helped build consensus for the proposed projects.

Millsboro Dredging and Wetland Restoration

The goal of this project is to restore a degraded wetland, located along the Indian River, back to its historical shoreline footprint through BU, thereby improving the overall resilience of the shoreline and adjacent areas. Since 1968, the marsh has eroded and retreated, losing approximately 7 acres, and now exists as an intertidal mudflat that is devoid of plant life.

The project includes dredging and BU of up to 40,000 cubic yards of borrow material to restore the wetland to targeted marsh footprints and elevations. Replanting native species will help restore 6 acres of wetland. We led the evaluation of alternatives for dredged material containment, developed construction drawings, and supported permitting. The project is now being constructed by DNREC.

We developed Virginia's first TLP guidance document and created a planning tool to support identification and implementation of future projects.

Anchor QEA is supporting the ERP in advancing the use of dredged material as a resource to mitigate the impacts of climate change and enhance resilience in coastal Virginia. We developed a TLP technical guidance document, which summarized planning and design considerations as well as the best management practices for wetland restoration using dredged material. The guidance also presents an assessment of national TLP case studies.

We also undertook field evaluations and are developing engineering designs for three TLP demonstration projects to be constructed using a future restoration grant. Lessons from these projects will further advance the practice of TLP as a wetland restoration tool in Virginia.

PROJECT DETAILS

Project Name: Elizabeth River BU Guidance, Project Tracking Tool, and TLP Demonstration Project Design

Location: Elizabeth River, DE

Client: Elizabeth River Project

Office(s) Responsible for Project: Baltimore, MD with support from Philadelphia, PA

Budgeted Cost: $450,000

Completed Cost: $450,000

Scheduled Completion: May 2026

Actual Completion: Anticipated May 2026

Project Outcomes:

TLP was advanced as a specific BU of dredged material tool to combat SLR and coastal erosion using the following:

- A technical document that identifies BMPs for planning and implementing TLP projects in Virginia
- A step-by-step guide to plan for and implement TLP projects
- A geospatial tool to match future dredging with restoration projects in need of material
- Three pilot project designs within the Elizabeth River Watershed

Prior to construction of the living shoreline, the longest in the state, the Hancock County Marsh Coastal Preserve was the fastest-eroding marsh in Mississippi, losing 7 acres of intertidal marsh annually.

A combination of structural and nonstructural features helped enhance and protect this vital ecosystem. This project is the state's longest continuous living shoreline.

Anchor QEA provided engineering design and assisted with permitting and construction inspection. We completed the pre-construction design analysis, design plans and specifications, cost estimates, phased bid packages, and permit package. Geotechnical, wind-wave, and current analyses were used to locate, size, and design the breakwater, subtidal reef, and marsh components. We also participated in multilevel concurrent project design documents review and coordinated with USACE, state regulatory agencies, and stakeholders throughout.

Biological monitoring techniques developed by Anchor QEA staff were incorporated into NOAA's Monitoring and Adaptive Management Procedures and Guidelines.

PROJECT DETAILS

Project Name: Hancock County Marsh Living Shoreline

Location: Hancock County, MS

Client: Mississippi Department of Environmental Quality

Size: 7.5-mile living shoreline; 46-acre marsh; 46-acre reef

Office(s) Responsible for Project: Ocean Springs, MS with support from Philadelphia, PA; Syracuse, NY; Seattle, WA; and Daphne, AL

Budgeted Construction Cost: $60M across all phases

Completed Construction Cost: Approximately $55M total
Phases 2 and 3 breakwaters realigned during construction, resulting in $3 million in cost savings.

Scheduled Construction Completion: 2017 to 2025 (multiphase project)

Actual Construction Completion: Design completed on schedule; construction phases generally completed on time or ahead of schedule

Project Outcomes:

- The breakwaters have weathered multiple storms and hurricanes with minimal damage. During the 3-year construction period, the project survived multiple hurricanes.
- Ongoing biological monitoring results demonstrated active benthic recolonization in the living shoreline, wave dissipation, sedimentation behind the living shoreline, and new marsh growth.
- The project received the second place PIANC Working with Nature Award.

This living shoreline protects important habitat for bird species impacted by the Deepwater Horizon Oil Spill such as white pelicans, brown pelicans, reddish egrets, black skimmers, least terns, snowy plovers, and piping plovers.

This project area, composed primarily of low-lying coastal marshes, is subject to erosion from wind and water, relative sea level rise, and sediment deprivation. For this National Fish and Wildlife Foundation-funded project, a 0.75-mile rock breakwater was implemented to reduce erosional wave energy transmitted to the shoreline. It protects and restores important habitat for bird species such as white pelicans, brown pelicans, reddish egrets, black skimmers, least terns, snowy plovers, and piping plovers impacted by the Deepwater Horizon oil spill.

Anchor QEA performed coastal modeling and permitting, developed final designs and construction documents, performed construction administration and observation, and provided recommendations for the monitoring and adaptive management plan.

PROJECT DETAILS

Project Name: Nueces Delta Shoreline Restoration

Location: San Patricio County, TX

Client: Coastal Bend Bays & Estuary Program

Size: .75-mile living shoreline breakwater

Office(s) Responsible for Project: Ocean Springs, MS with support from Horsham, PA, Syracuse, NY, and Daphne, AL

Budgeted Construction Cost: $4.5M

Completed Construction Cost: $5M
The client acquired additional funds that allowed them to add an additional 5,300 tons of rock to the project

Scheduled Construction Completion: 2023

Actual Construction Completion: 2023

Project Outcomes:

- The constructed project is protecting the existing marsh and will protect beneficial use dredged material.
- Early coordination with stakeholders led to a successful permit modification, saving time and budget.
- Despite rising costs, the lowest bid was within 10% of our opinion of probable construction cost.

Environmental surveys (performed by Anchor QEA) informed the Mid-Chesapeake Bay Island Ecosystem Restoration project

RESPONSE CAPABILITY

We know MMPDC values responsiveness. Our team is **focused**, **well-integrated**, and **dedicated** to providing the highest level of service.

We have assembled a team that is available and committed to providing all technical disciplines necessary to perform engineering services for GRIT. Our proposed team members were selected based on their technical merit, availability, and accessibility for the duration of the project.

Availability

We commit that all key staff and supporting team members will be available throughout the duration of this contract and will adjust their workload accordingly to fully administer and implement any projects we are assigned. Our proposed level of staff engagement is shown in the table to the right. These levels can be adjusted, based on discussions with MPPDC.

Proximity

Our project manager, key staff, and field staff's proximity to MPPDC will allow us to provide quick and responsive service to MPPDC on the GRIT project.

As shown in the following table, most of our team members are located in the Mid-Atlantic, with key team members strategically located in nearby Norfolk and Chesapeake. Our project manager, Joe Rieger, is in our Norfolk office, with key environmental lead, James Cahoon (Bay Environmental) in Chesapeake, and our public liaison, Andrew Larkin (ODU), in Norfolk.

TEAM PROXIMITY AND AVAILABILITY

Name	Location	Availability
Key Staff		
Josef Rieger	**Norfolk, VA**	50%
Ram Mohan	Horsham, PA	20%
Walt Dinicola	Baltimore, MD	10%
Matt Henderson	Syracuse, NY	25%
Katie Haviland	Baltimore, MD	50%
John Laplante	Seattle, WA	10%
C. James Cahoon, III	**Chesapeake, VA**	30%
Johnathan Barker	Tampa, FL	20%
Andrew Larkin	**Norfolk, VA**	10%
Technical Support		
Lauren Folkert	Baltimore, MD	40%
Derek Wagner	Horsham, PA	40%
Jill Zwierz	Baltimore, MD	40%
Vanessa Woolley	Baltimore, MD	25%
Brian Newbury	Baltimore, MD	30%
Christopher Marello	Baltimore, MD	15%

Atlantic blue crab
at restored estuary site

REFERENCES

Our clients have high regard for the **quality** of our work, **technical strength**, **cooperation**, and **responsiveness**.

The following clients have offered to speak with you about the quality of our team's work on recent and relevant projects. In all cases, these clients will be able to speak to our abilities to provide excellent client service, control costs, and maintain project schedules. Should you need any additional references or information on our qualifications, please feel free to contact us.

Contact	Project Name and Scope of Work
Ella DiPetto, Project Manager **Elizabeth River Project** 4610 Colley Avenue, Norfolk, VA 23508 757-841-0443 | edipetto@elizabethriver.org	**VA TLP Guidance, Planning Tools, and TLP Pilot Projects** Assessment of regional impact from climate change and TLP as a tool for wetland restoration and coastal resilience; includes technical document development outlining best management practices; geospatial planning tool development; and assessment, evaluation, design and permitting for three pilot projects.
Jeffrey Flood, Coastal Planner **Virginia Coastal Zone Management Program** 1111 East Main Street, Richmond, VA 23219 804-659-1918 | jefferson.flood@deq.virginia.gov	**Virginia BU Guidance** Evaluation of the state of the BUDM industry in Virginia and development of a technical framework to serve as a compendium of resources and best practices to advance BUDM and coastal resilience in Virginia.
David Koubsky, Project Manager **Coastal Virginia Conservancy** 5215 Colley Avenue, Suite 119, Norfolk, VA 23508 757-615-4005 | dkoubsky@covaconserve.org	**Technical support to local restoration and resilience projects** Conducted reviews of reef restoration projects and provided ongoing consultation for a range of environmental restoration initiatives. Also delivered design services for the remediation of contaminated sediments using activated carbon at Paradise Creek.
Isaac Hametz, Baltimore Program Director **The Nature Conservancy** 425 Barlow Place, Suite 100 Bethesda, MD 20814 732-742-7188 | Isaac.hametz@tnc.org	***Sediment Strategies: Considerations and Case Studies for Beneficial Use*** Development of basic considerations, concept designs, and alternatives for several beneficial use and restoration projects for Maryland as well as a technical summary report.

Construction of large-scale living shoreline at marsh restoration site

OTHER SUPPORTING DATA

Our team brings a unique combination of Virginia-specific tools, guidance, and technical expertise to **streamline and execute resilient restoration** at the Guinea Marsh system.

Anchor QEA is at the forefront of beneficial use practice and stakeholder communication in the Chesapeake Bay and beyond, as evidenced by our ongoing and extensive collaboration with USACE. Combined with our advanced climate risk assessment capabilities and our Chesapeake Bay coastal processes model, we have the tools, expertise, and experience needed to move forward the restoration of Guinea Marsh.

Reduced time and money required for ECR and baseline data acquisition

Because of our familiarity with Virginia's geospatial data through our development of the Virginia BUDM GIS tool (which was finalized in 2025 after multiple rounds of stakeholder review but is not yet publicly available) **we can quickly carry out geospatial analysis of the Guinea Marsh system, saving MPPDC time and money.**

The tool includes VIMS SAV maps, historical shorelines, land use, parcel data, and more, consolidated in a single web map to expedite desktop analysis of the site. Additionally, the tool will contain upcoming dredging opportunities once it is published later this year.

As a value-added service, we will add all of MPPDC's upcoming dredging projects to the tool using the input form.

Familiarity with the most up-to-date guidance on BUDM and TLP in Virginia to ensure best management practices are always used.

We will apply the guidance included in the two documents we authored in 2025: *Beneficial Use Options and Considerations for Dredged Material in Coastal Virginia*, completed May 2025 and *Wetland Restoration Using Thin Layer Placement: Best Management Practices for the Commonwealth of Virginia*, completed December 2025.

This will ensure the project **is completed using relevant, timely guidance tailored for Virginia's unique geography and complex regulatory landscape.**

Access to cutting-edge BUDM knowledge and ability to relay complex topics to stakeholders

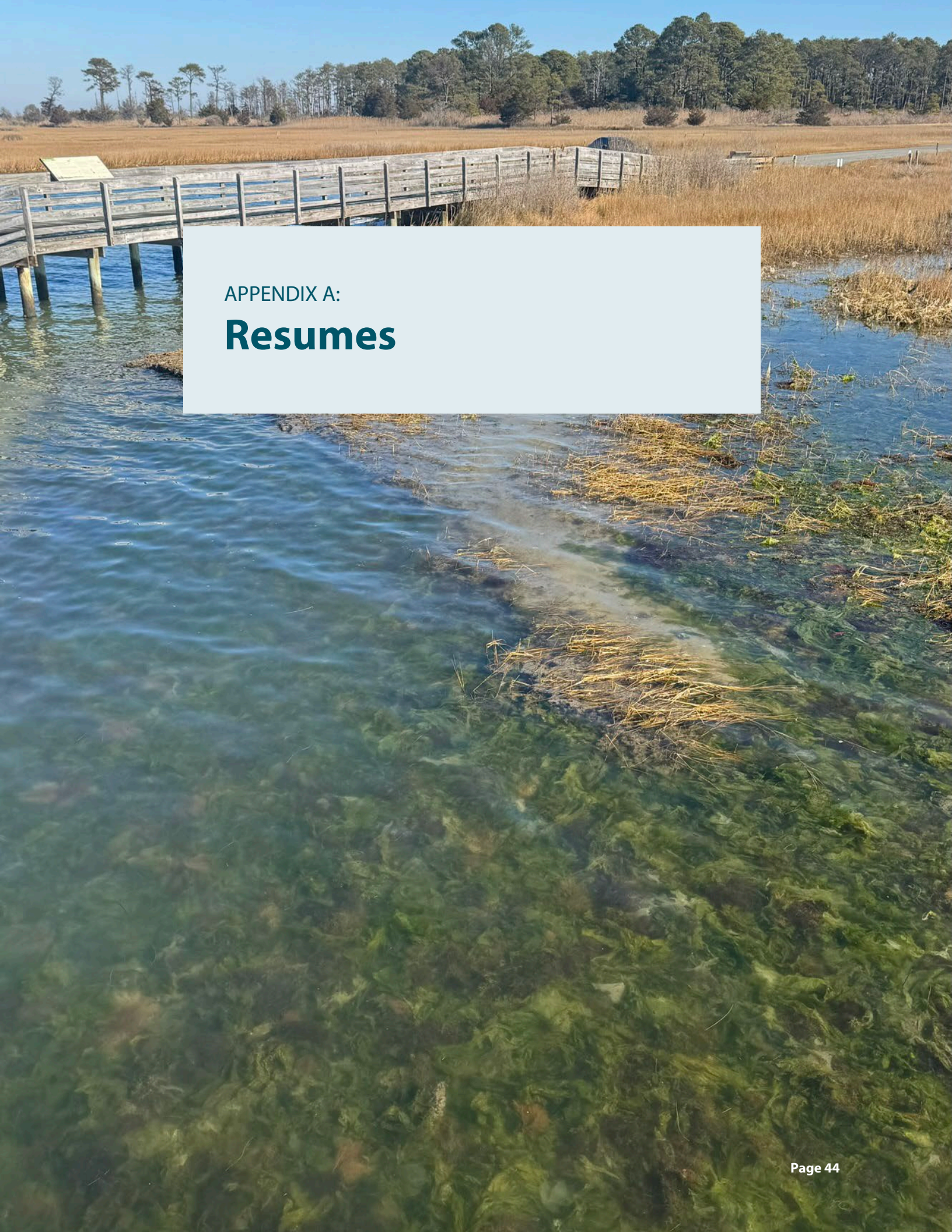
Our team has been involved in national and statewide efforts to advance BUDM with USACE and other local and national agencies, putting us at the **frontier of BUDM knowledge.**

For instance, our team members were involved in the development of The Nature Conservancy's recently published *Sediment Strategies: Considerations and Case Studies for Beneficial Use*. This visual guide to marsh restoration using dredged material focuses on the Chesapeake Bay. The document serves as a digestible encyclopedia for beneficial use and contains case studies that have been deconstructed to key details following conversations with stakeholders.

Our team also brings the benefit of additional Anchor QEA-developed tools, including:

- **Multicriteria climate risk assessment:** Our GIS-based tools can be used to conduct risk and resilience assessments for areas around the Middle Peninsula and create accessible graphics for a public audience.
- **Chesapeake Bay 3D operational wave and hydrodynamic model:** This model can provide detailed insight into water levels and wind-generated wave conditions at Guinea Marsh to support alternatives analysis and resilient project design.

Our GIS tools allow us to assess existing data and build a flexible multicriteria risk assessment tool to analyze climate scenarios, existing infrastructure, and proposed projects, like the ones proposed at the Guinea Marsh system. The assessment tool provides clear graphics for public communications to citizens, clients, and shareholders. It can also be used to optimize approaches to financial investments in coastal protection projects.



APPENDIX A:

Resumes

Josef Rieger

Project Manager

Joe is an accomplished environmental resilience program manager with more than 25 years of experience leading the planning, development, and execution of large-scale, nature-based projects across urban and rural coastal landscapes. His work integrates climate adaptation, ecological restoration, and community resilience with a consistent focus on delivering durable, science-based solutions that address complex environmental and social challenges. Joe has a proven record of guiding multifaceted initiatives from early concepts and feasibility through design, implementation, and long-term stewardship, often within highly regulated and stakeholder-rich environments.

Throughout his career, Joe has successfully built and led high-performing, multidisciplinary teams and fostered long-term partnerships across government agencies, non-profit organizations, academic institutions, and community groups. He has secured more than $22 million in competitive public and private funding and brings deep expertise in public engagement, applied research, and policy advocacy. Widely recognized as a thought leader in environmental resilience, Joe is known for advancing innovative, community-driven approaches that deliver measurable ecological benefits while strengthening social and economic resilience.

26 Years of Experience

6 Months with Firm

Education

Bachelor of Science, Biology, Ohio University, 1998

Master of Science, Ecology, Old Dominion University, 2003

Work History

Naval Facilities Engineering Systems Command, Environmental Resilience Program Manager, 2024 to 2025

The Elizabeth River Project, Deputy Director – Restoration, 2002 to 2024

The Ohio State University, Research Assistant, 1999 to 2000

Relevant Project Experience

Commonwealth of Virginia, Thin-Layer Placement Guidance Development (Norfolk, VA)
Joe is leading the development of the Commonwealth of Virginia's Thin Layer Placement (TLP) guidance document, supporting climate adaptation by enabling wetlands to withstand sea level rise (SLR) through strategic sediment application.

Virginia Marine Resources Commission, Beneficial Use of Dredged Material (Hampton, VA)
Joe is managing the development of guidance for the Virginia Marine Resources Commission on the beneficial use of dredged material (BUDM), promoting sustainable reuse practices to enhance habitat and shoreline resilience.

NAVFAC Mid-Atlantic, Mid-Atlantic Resiliency Program (Various Locations)
Joe led the execution of climate resilience initiatives across 13 states, collaborating with installation staff to identify mission-critical vulnerabilities and implement strategies to mitigate risks from extreme weather, ensuring operational readiness.

NAVFAC Mid-Atlantic, Nature-Based Solutions Implementation (Various Locations)
Joe secured over $8 million in funding to deliver more than 15 high-impact resilience projects—including large-scale living shorelines, reforestation, and stormwater management systems—while providing technical oversight and guidance from design through construction.

NOAA, Lafayette and Eastern Branch Rivers Oyster Reef Restoration (Norfolk, VA)
Joe directed the design, permitting, and construction of more than 20 oyster reef projects, leading to the first fully restored tributaries for oyster habitat in the Chesapeake Bay system.

U.S. Navy, Nature-Based Solutions Manager (China Lake, Ventura County, and Lemoore, CA)
Joe is serving as project manager for three large-scale nature-based solutions projects across California, integrating shoreline protection, habitat restoration, and infrastructure resilience at military installations.

Relevant Project Experience

Coastal Virginia Conservancy, Sediment Remediation at Money Point, (Chesapeake, VA)
Joe managed the design, permitting, and construction for the removal of more than 32 million pounds of contaminated sediment and pioneered the nation's first community-led tidal wetland capping project, transforming a legacy industrial site into a thriving ecological corridor.

Elizabeth River Project, Living Shoreline at Ryan Resilience Lab (Norfolk, VA)
Joe secured over $600,000 in grant funding to support the replacement of hardened infrastructure with a naturalized living shoreline, significantly enhancing both habitat value and shoreline resilience. He also oversaw the design and construction of the $8 million Ryan Resilience Lab in Norfolk, Virginia, recognized as one of the most sustainable buildings in the state and located on the same site. The project stands as a model for innovative, climate-ready design.

NAVFAC Mid-Atlantic, National Resilience Team Coordination and Training Initiative (Various Locations)
Joe led cross-regional coordination with Navy Resilience Teams nationwide. He delivered specialized training to installation environmental staff on implementing nature-based solutions and conducted tree canopy assessments to inform installation-wide environmental planning and long-term sustainability objectives.

NAVFAC Mid-Atlantic, Climate Impact Assessment and Strategic Resilience Planning (Various Locations)
As program manager, Joe reviewed major Navy reports on climate risks, including SLR and extreme weather. He provided high-level recommendations to enhance installation resilience posture. And he advised NAVFAC leadership on integrating findings into regional planning frameworks to strengthen operational continuity and infrastructure protection.

The Elizabeth River Project: Urban Nature-Based Restoration Program – Regional Implementation (Chesapeake Bay Region, VA)
As program manager overseeing one of the nation's leading urban ecological restoration programs, Joe delivered high-impact projects resulting in measurable water quality improvement and habitat recovery. He coordinated with federal and state agencies, local governments, and non-governmental organizations to integrate climate adaptation and regulatory compliance into restoration design and to align program outcomes with Chesapeake Bay Total Maximum Daily Load, municipal separate storm sewer system permits, and climate policy goals.

The Elizabeth River Project, Ryan Resilience Lab Construction – Community Flood Mitigation Integration (Norfolk, VA)
Joe directed construction of the Ryan Resilience Lab, recognized as one of the most resilient structures in Hampton Roads. He managed coordination among architects, engineers, and contractors to incorporate nature-based elements, and he partnered with community stakeholders to integrate flood resilience measures along Colley Avenue, advancing regional adaptation capacity and public education.

NOAA Chesapeake Bay Program, Elizabeth River Project, Oyster Reef, Living Shoreline, and Sediment Restoration (Chesapeake Bay Watershed, VA)
Joe developed and managed regional climate resilience studies to assess water quality and flood mitigation outcomes. He guided research and project scoping to support strategic resilience investments across vulnerable coastal communities, and he aligned outcomes with federal climate priorities and integrated metrics into project reporting.

Coastal Virginia Conservancy, Elizabeth River Project, Money Point Sediment Remediation and Wetland Cap Installation (Chesapeake, VA)
Joe led the design, permitting, and implementation of the first community-led sediment remediation project in the United States. The project removed more than 32 million pounds of contaminated sediment and installed a living tidal wetland cap. Joe collaborated with state and federal agencies to ensure compliance and secure innovative funding mechanisms for environmental remediation.

Ram K. Mohan, PhD, PE, F.ASCE

Principal-in-Charge and Engineer of Record

Ram is a senior principal with over 40 years of experience in coastal engineering and ecosystem restoration projects involving most major estuarine and riverine systems in the United States. He is also a Professor of Practice at the University of Georgia's Institute for Resilient Infrastructure Systems (IRIS), where he co-directs the Sustainable Sediment Management Program. Ram is a former member of the National Academy of Sciences' Marine Board. He was on the Editorial Board of the U.S. Army Engineer Research and Development Center (ERDC) guidance on "Natural and Nature Based Features (NNBF)" and a co-author of the U.S. Army Corps of Engineers (USACE) guidance "Thin Layer Placement of Dredged Material." He recently served as a member of the USACE Environmental Advisory Board (part of the Army Science Board).

Ram is a former Chairman of the World Organization of Dredging Associations (WODA) and a recipient of the Western Dredging Association (WEDA) "Dredger of the Year" award. He is a long-time member of several professional organizations and has advised international scientific bodies for over two decades. He served on the Central Dredging Association (CEDA) Working Group on Adaptive Management Guidelines**.** An author of over 250 publications, Ram is frequently retained to provide peer review and expert analysis of high-profile navigation and environmental projects. In 2016, he was elected a Fellow by the American Society of Civil Engineers (ASCE).

40+ Years of Experience

19 Years with Firm

Education

PhD, Ocean Engineering, Texas A&M University, 1993

MS, Ocean Engineering, University of Rhode Island, Kingston, 1990

BS, Naval Architecture, Cochin University of Science and Technology, India, 1988

Select Licenses/Certifications

Professional Civil Engineer (PE), Virginia (0402052864) and 15 other states

Select Honors/Awards

USACE Environmental Advisory Board (2023–2025)

National Academy of Sciences: Marine Board (2016–2022)

Co-Author, USACE Guidance on Thin Layer Placement of Dredged Material, 2018–2021

WEDA Dredger of the Year, 2005

WEDA Director (2005–2019); Chairman of the Board, 2013–2016

Relevant Project Experience

Virginia Maritime Resources Commission (VMRC), Beneficial Use of Dredged Material Guidance (Norfolk, VA)

Ram is the project director for this VMRC project, funded by a National Oceanographic and Atmospheric Administration (NOAA) grant, that is developing regional guidance for BUDM. A regional BU database developed as part of the project will connect dredging projects with restoration sites to efficiently undertake BU projects in the future. The guidance will outline best practices and protocols for planning, designing, constructing and monitoring BU projects.

Elizabeth River Project, Thin Layer Placement (TLP) Design Guidance for Virginia and Design of Pilot TLP Projects (Norfolk, VA)

Ram is the engineer of record and principal leading an Elizabeth River Project effort, funded by a National Fish and Wildlife Foundation (NFWF) grant, to tailor the national USACE TLP guidance for specific features and conditions in the Commonwealth of Virginia. As a low-lying coastal region vulnerable to extreme SLR conditions, Virginia needs a proactive approach to building resilience, and TLP is one tool in the toolbox. Ram is also leading a team that is developing engineering designs for three pilot TLP projects.

U.S. Army Engineer Research and Development Center, Engineering With Nature (EWN) Tools and Techniques (Vicksburg, MS)

Ram is leading a project for ERDC to develop a costing tool and project ideas handbook to advance the implementation of EWN and NNBF projects throughout the United States. Working with a series of EWN proving ground Districts (San Francisco, Mobile, Philadelphia, and Buffalo), his team will review coastal zone challenges and develop potential large-scale solutions to combine EWN/NNBF with coastal protection and management. This work is conducted in partnership with ERDC and the Dredging Research Collaborative (DRC), a consortium of academic landscape architects.

Relevant Project Experience

Delaware Department of Natural Resources and Environmental Control, White Creek Dredging and Beneficial Use (Dover, DE)
Ram is the principal engineer and project director for this navigation dredging project along Delaware's inland bays. The dredged material from the project will be used to restore degraded wetlands and improve coastal resiliency and habitat functions. This is the first project in Delaware to use TLP of dredged material on a full-scale level. The project will be monitored by regulatory agencies for potential application at other similar wetland sites in the state.

U.S. Army Engineer Research and Development Center, Natural and Nature Based Features (NNBF) and EWN Project Development (Vicksburg, MS)
Ram led a project to develop the USACE's NNBF guidance document, working as part of an international collaboration between lead environmental and flood risk management organizations. As part of this work, he directed a team that reviewed various NNBF and EWN techniques along the coastal zone and riverine areas to assemble and develop this international guidance for practitioners.

Delaware Department of Natural Resources and Environmental Control, Dredging Guidance Document (Dover, DE)
Ram is leading a project to develop a framework for dredging and dredged material placement review and permitting for the State of Delaware, with a view to promoting sustainable, end uses for dredged material. The applied research conducted will include water quality standards, placement controls, and long-term monitoring protocols. Guidance from several states will also be reviewed to select best management practices for implementation in Delaware.

Audubon, Sunken Meadows State Park Wetland Restoration (Long Island, NY)
Ram is the principal engineer and project director for this NFWF-funded study to restore the wetlands at Sunken Meadows State Park in Long Island Sound that is prone to future SLR impacts. As part of our study, we are developing engineering designs to improve tidal flushing, restore new wetland areas, and improve the resiliency of existing wetlands via thin layer nourishment of dredged material.

Mississippi Department of Environmental Quality, Hancock County Marsh Living Shorelines (Hancock County, MS)
Ram is the engineer of record for the creation of more than 10 miles of living shorelines and back barrier habitat structure to protect this severely eroding Mississippi shoreline. Several configurations and habitat alternatives were evaluated and simulated using a 3D hydrodynamic model to select optimal alignment and gap width between structures. Our team is currently performing long-term monitoring at the site and developing an adjacent marsh system using dredged sediments.

Honeywell International, Brunswick Estuary Wetlands (Brunswick, GA)
As the lead engineer and principal, Ram directed a team that restored an estuarine wetland in Brunswick Harbor. This historically contaminated site received TLP of clean sediments to restore degraded wetlands. Several tidal channels and creeks were dredged and backfilled to improve overall environmental quality. This was the first major site in the United States to implement the concept of "thin layer cover" consisting of using a thin, clean sand layer placed over existing contaminated sediments in the wetlands to remediate and restore this sensitive habitat.

Delaware Department of Natural Resources and Environmental Control, Millsboro Wetlands Restoration (Dover, DE)
Ram is the principal and engineer of record for this project which involves using dredged material from a nearby navigation dredging project to restore 12 acres of historic marsh that was lost to edge erosion and SLR-induced processes. Using a low-perimeter berm, dredged material will be placed to restore the marsh planform by 0.5 to as much as 3.0 feet in elevation, followed by aerial seeding to revegetate the newly created marsh. Tidal channels will be monitored closely to see whether they will recut naturally over time, as the marsh re-establishes. This is the first "thick" layer restoration in Delaware and will be considered a research and development project by the State to collect best management practices for use elsewhere in Delaware.

Walt Dinicola, PE, F.ASCE

Technical Advisor: Dredging and Beneficial Use of Dredged Material

Walt has nearly 30 years of engineering design experience related to coastal engineering projects, dredged material disposal, and port and harbor planning and waterfront development. His design experience includes dredging design and delineation, DMCF design, dredged material transportation and placement techniques, subaqueous cap design, thin layer placement, wetland and marsh design, sediment remediation, development of construction plans and specifications, and construction equipment selection and cost estimating. He leads Anchor QEA's Port and Waterfront Market Sector, which evaluates ports, waterfront terminals, beneficial uses of dredge material, wetland restoration, coastal resiliency projects, and modeling efforts to support coastal protection and infrastructure design. Walt's experience includes working with regional stakeholders and regulatory agencies, including USACE, MDE, industry leaders, and private firms.

Walt serves on the Western Dredging Association (WEDA) Executive Board of Directors & Technical Paper Committee and was awarded 2024 Dredger of the Year. He is also a member of the American Association of Port Authority (AAPA) Harbors and Navigation and Environmental Committees. His participation in these organizations has enabled him to establish many contacts in the dredging and construction industries and to understand equipment, innovative technology, and the current dredging and construction market. He teaches the dredging short course at the ASCE COPRI PORTS conference, WEDA National Conference, NSRP Conference, and Texas A&M Dredging Engineering Program. He has also served on several committees as a technical expert in innovative reuse and BUDM in support of many Dredged Material Management Programs (DMMPs).

29 Years of Experience

19 Years with Firm

Education

Master of Science in Engineering, Civil Engineering, Johns Hopkins University, 1996

Bachelor of Science, Civil Engineering, Pennsylvania State University, 2002

Licenses

Professional Engineer,
Virginia – No. 52817
Maryland – No. 39876
District of Columbia – No. PE920990
Delaware – No. 213841
Pennsylvania – No. PE090136
West Virginia – No. 23642

Professional Affiliations

Western Dredging Association, (Executive Board of Director)

Maryland Society of Civil Engineers

American Society of Civil Engineers - Coasts, Oceans, Ports & Rivers Institute

Relevant Project Experience

Maryland Port Administration and Maryland Environmental Service, MPA Coastal Resilience and Climate Change Vulnerability Assessment (Baltimore, MD)

As program manager, Walt oversaw the design team that developed the GIS-based web application tool for MPA to integrate with existing databases and streamline climate resilience planning at marine terminal facilities. This tool will help MPA identify opportunities to proactively plan and implement preventive measures to address climate change impacts. He evaluated factors associated with nuisance flooding, extreme storms, and SLR that were integrated into an asset evaluation tool. The focus was on long-term flooding risks to port terminal facilities and dredged material facilities from SLR. Walt oversaw the development of interactive visual tools to streamline climate resilience planning at terminals.

Great Lakes Healthy Ports Futures Grant, Illinois Beach State Park Pilot Project (Illinois State Beach Park, IL)

Walt was the project manager and provided QA/QC and senior technical oversite for the coastal modeling and design of low-crested offshore reef structures that are being evaluated to reduce long-term erosion of a critical shoreline habitat. His work included determining the number, size, and extent of underwater breakwaters. The project was a collaboration with the Illinois Department of Natural Resources as part of the Healthy Port Futures Project.

Mississippi State Port Authority, Mississippi Restoration and Expansion Program; Port of Gulfport Expansion Dredged Material Management Plan, (Gulfport, MS)

Walt was the senior engineer involved with the design of a dredging and marsh complex expansion; he designed and constructed parts of the shore protection and is revising the long-term DMMP for their future expansion program. Walt evaluated the dredge prism and unsuitable material to be removed and beneficial reused at Deer Island. The BU area restoration and expansion at Deer Island received the Defender of the Gulf award.

Relevant Project Experience

Maryland Port Administration & Maryland Environmental Service, Innovative Reuse and Beneficial Use Program, (Baltimore, MD)
As the program manager, Walt supports MPA in the development of the Innovative Reuse and Beneficial Use Program. He is currently assisting the development of pilot testing initiatives for the innovative reuse process and dewatering of dredged material. As part of this project, Walt participated in the development of MDE's Innovative Reuse and Beneficial Use of Dredged Material Guidance Document and assisted in the creation of a testing and blending program to use dredged material on projects for embankment fill and topsoil. He has worked with multiple MPA committees as a technical representative for dredging engineering to support the Innovative Reuse and Beneficial Use of Dredged Material Program.

Maryland Port Administration, 20-Year Dredged Material Management Program Strategic Plan (Maryland)
Walt participated on various committees involved in the DMMP for the State of Maryland and for the USACE: Bay Enhancement Working Group (BEWG), DMMP Citizens Committee, DMMP Management Committee, Inner Harbor Team, and DMMP Executive Committee. He developed a program that was an integral part of the 20-year strategic plan. The program was also used to maintain the MPA's schedule to propose to the Maryland General Assembly a solution to meet the 20-year dredge material placement. He developed schedules, cost estimates, preliminary design, and capacity for all 27 options used to solve the 20-year dredging demand. Mr. Dinicola was also an integral part of developing the MPA's 20-year strategic plan alternatives that were presented to the Executive Committee.

Elizabeth River Group, Elizabeth River – Money Point Remediation (Norfolk, VA)
Walt is the project manager for the design team for the Elizabeth River Money Point Project restoration effort that includes dredging, capping**,** and restoration of sediments. The restored area will include a sand layer specially designed for habitat subzones using oyster shells, stones, and woody debris. This area will be part of a larger restoration zone in the river, which includes intertidal wetlands with storm-impact-reduction zones and nearshore habitat features.

Maryland Port Administration, Poplar Island Habitat Restoration Site Development Plan (Chesapeake Bay, MD)
As senior engineer, Walt participated in meetings and site visits for construction, operation, and maintenance of Poplar Island and prepared dewatering plans for eliminating 180 million gallons of water from the construction site. He used modeling software to develop a plan to lay out the filling schedule, amount of dredged material placed in each cell, input parameters, and thickness of each lift. Walt performed a technical analysis of four different types of material entering the confined disposal facility and developed alternatives to maximize the site capacity. In addition, he performed a technical analysis on the primary consolidation, secondary compression, and desiccation of dredge fill (PSDDF) computer software modeling program and prepared sections of an elevations modeling report documenting the results of PSDDF modeling with the assessment of dredge material elevations, cell volume, and capacity. Walt also developed cross sections for raising existing dikes from 10 to 20 feet where he calculated cut and fill quantities using Terra Model, a 3D land computer software package. He also prepared cross sections using Terra Model for the design and implementation of under drains to help dredge material consolidate more rapidly.

Maryland Port Administration, Fleming Park Restoration Project (Baltimore, MD)
Walt is the program manager and engineer in charge for the BU of navigation channel/dredged maintenance material with coastal resilient infrastructure. He developed the pre-design investigation program to characterize habitat, sediment, and geophysical site characteristics for the project site. He manages the 30% design engineering plans, a preliminary construction cost estimate, and construction schedule for the placement of dredged material. The 30% design will analyze dredged material transport and placement methods, site access and the staging area, constructability issues, public concerns, and options to minimize the cost and environmental impacts. Walt will oversee the coastal modeling to understand site dynamics, including wind, wave, and SLR effects on sediment accretion and erosion in the project area.

Matt Henderson, PE

Coastal Engineering and Resilience Lead

Matt has more than 25 years of experience as a coastal and environmental engineer focusing on evaluating coastal conditions and developing sustainable approaches and designs to ensure the stability of shorelines, coastal infrastructure, and natural resources. His expertise includes hydraulics and hydrodynamics, coastal engineering, coastal structure designs, living shoreline (LS) designs, BUDM, hurricane surge modeling, wave modeling, riverine flood modeling, and sediment transport assessments. He has performed shoreline erosion and protection designs for waterfront and restoration projects across the United States and Canada.

27 Years of Experience

18 Years with Firm

Education

Bachelor of Science, Civil Engineering, Worcester Polytechnic Institute, 1991

Master of Science, Coastal & Oceanographic Engineering, University of Florida, 1999

Licenses/Certifications

PE, New York, No. 083603-1; Maryland, No. 51652

Relevant Project Experience

National Audubon Society, Sunken Meadow State Park Salt Marsh Restoration (Long Island, NY)
Matt led the development of a multidimensional model to assist in evaluating alternatives to enhance drainage and improve tidal flushing for the marsh. The site is a dynamic tidal marsh that has experienced restricted tidal flow from an earthen berm breached in 2012 because of Hurricane Sandy. The restricted tidal flow led to marsh degradation and converted portions of the former salt marsh to brackish and freshwater marsh.

USACE ERDC, NNBF Design Guidelines (Nationwide)
Matt is providing support for developing pilot projects for NNBF and EWN (including technology development and post-project performance analysis) for the USACE San Francisco and Mobile districts. This project is a multiphase program to develop a framework for design and construction of NNBF and to promote EWN tools and techniques across all USACE districts. Anchor QEA developed a unique methodology to assist ERDC and the NNBF Work Group with technical, editorial, and graphic support for publication of an NNBF framework so that communities vulnerable to flooding, SLR, and storm surges can incorporate nature-based approaches into their resiliency strategies. Anchor QEA supported ERDC with the development of NNBF techniques for coastal storm reduction and flood risk management, validation of the NNBF framework, and performance review using case studies from around the world.

Buffalo Niagara Waterkeeper, Little Beaver Island Restoration (Grand Island, NY)
Matt led a coastal engineering analysis to design LS structures to protect a severely eroding shoreline and create nearshore habitat along Beaver Island State Park. The model results were used to assess wave conditions and size armor stone for the LS structures. Stabilization and restoration designs that included offshore breakwaters to reduce wind-driven wave energy and provide offshore tern nesting habitat were developed.

New York City Parks, Rockaway Beach Dune Restoration and Stabilization (New York, NY)
Matt provided coastal engineering services for a dune restoration evaluation for Rockaway Beach, which was damaged by Hurricane Sandy. He evaluated wave runup elevations for various storm surge conditions, as well as options for dune restoration. Matt led the evaluations of existing dune heights and beach slopes in the project vicinity and of installation techniques.

City of Ocean City, Shooting Island LS Breakwater and Wetland Restoration (Ocean City, NJ)
Matt led the coastal engineering and modeling evaluation of an approximately 3,200-linear-foot, multipart LS on a New Jersey bay island as part of an NFWF-funded Hurricane Sandy recovery grant. He designed the LS to protect degraded shoreline areas from continued erosion, developed a coupled wave and hydrodynamic model, and used the model results to design the marsh sill and determine the optimal location of habitat blocks. Planned future project phases are to include the BUDM to restore marsh edges and degraded areas of the island's interior.

Relevant Project Experience

Town of Westbrook, Four Shore Coastal Resiliency Study (Westbrook, CT)
Matt is leading the coastal engineering analysis for a regional Coastal Resiliency Plan that will result in a comprehensive understanding of risks associated with SLR and identify strategies and projects to reduce risk and build community resilience. As part of this work, a coupled wave and hydrodynamic model of Long Island Sound is being used to simulate SLR scenarios, including a 100-year storm.

Mississippi Department of Environmental Quality (MDEQ), Hancock County Marsh LS Design (Hancock County, MS)
Matt was the senior coastal engineer and modeler for the creation of an LS, a subtidal reef, and a 46-acre BU marsh. The project goal is to restore aquatic habitat damaged by the Deepwater Horizon oil spill and protect the severely eroding shoreline. Several configurations and habitat alternatives were evaluated and simulated using a coupled 2D wave and hydrodynamic model. Matt's team provided recommendations to MDEQ for the selected design.

National Audubon Society, Texas Rookery Islands Restoration (Matagorda Bay, TX)
Matt led the coastal engineering evaluations of two restoration and conservation projects that included conceptual project design, environmental analysis, opinions of probable construction costs, and permit development for constructing bird islands along the Texas coast.

USACE ERDC, EWN Tools and Techniques and Applied Research (Nationwide)
Matt provided support for a multiphase program to develop a framework for the design and construction of NNBF, advance concept solutions for USACE proving ground districts, and promote EWN tools and techniques across all USACE districts. He supported the development of concept-level projects for NNBF and EWN, including technology development and post-project performance analysis, for the USACE San Francisco, Mobile, Philadelphia, and Great Lakes districts. He led coastal modeling analyses for NNBF pilot projects in each district, including numerical hydrodynamic modeling of alternatives using Delft3D and HEC-RAS 2D. He simulated coastal and riverine conditions to evaluate and optimize NNBF for pilot projects. He collaborated with ERDC personnel to evaluate the effectiveness of a sediment distribution pipeline for TLP to enhance wetlands as part of the multiphase project.

Honeywell International Inc., Geddes Brook/Ninemile Creek Restoration (Syracuse, NY)
Matt served as the hydraulic modeling lead for developing the wetland and stream restoration designs for these tributaries to Onondaga Lake. The designs included 14 acres of diverse wetlands, including both emergent and forested wetlands. The designs also included relocating Geddes Brook and portions of Ninemile Creek. Matt led the development of a HEC-RAS model used to evaluate flow and water surface elevations and durations.

MDEQ, Opportunities for BU of Dredge Sediments in the Mississippi Sound (Jackson and Harrison Counties, MS)
Matt leads the coastal modeling evaluation for the engineering and design of BU sites, marsh habitat, and LS breakwaters. Work orders under this contract include the Western Sound BU Study, for which Matt evaluated coastal wave, hydrodynamic, and sediment transport patterns for a BU study for the western Mississippi Sound to determine the feasibility of alternative sites for BUDM, including material from the Port of Gulfport expansion and channel widening and deepening; the Greenwood Island BU Expansion, for which Matt's team used a coupled 2D wave and hydrodynamic model to evaluate the BU alternatives for creating and restoring 250 acres of coastal marsh using dredged material; and the Cat Island BU and Habitat Creation, in which Matt has evaluated coastal wave, hydrodynamic, and sediment transport for the existing conditions and is currently evaluating the proposed conditions for creating and restoring 660 acres of beach and marsh habitat using material from borrow sources.

MPA Climate Change Vulnerability Assessment (Baltimore, MD)
Matt served as the principal coastal engineer for the update and expansion of the MPA and MES Climate Change and Vulnerability Assessment and Recommendations Report. Phase 1 of the project focused on evaluating the long-term flooding risks to port terminal facilities and to MPA DMMP facilities due to SLR. This included developing a comprehensive vulnerability assessment to identify at-risk MPA assets and infrastructure.

Katie Haviland, PhD

Wetland/Habitat Restoration Lead

Katie is a scientist with nearly 10 years of experience across consulting and research fields assessing coastal sediment biogeochemistry, sediment transport, and plant ecology in coastal and terrestrial systems. Her areas of expertise include submerged aquatic vegetation (SAV) and wetland monitoring and restoration, water quality, sediment sampling and geochemical analysis, wetland, subaqueous, and upland plant sampling and analysis, ecosystem delineation, GIS and remote sensing, image analysis, and complex data analysis. Katie has been involved in several large-scale BU of dredged material planning efforts.

Katie has planned, led, and safely carried out remote coastal and terrestrial fieldwork in Chesapeake Bay marshes. She has also managed and analyzed large datasets, including remotely sensed imagery and water quality data; modeled future and present trends; performed biogeochemical analysis on sediments, soils, and plants; and published peer-reviewed papers and technical reports on findings.

8 Years of Experience

1.5 Years with Firm

Education

Doctorate, Biogeochemistry & Plant Ecology, Cornell University, 2023

Master of Science, Biogeochemistry, Cornell University, 2019

Bachelor of Science, Geographical Sciences, University of Maryland, College Park, 2017

Relevant Project Experience

Virginia Marine Resources Commission, Virginia Beneficial Use of Dredged Material Guidance (Virginia)
Virginia is looking to increase its BU capacity and address barriers to implementation. Katie helped coordinate and participated in researching, writing, and developing technical documents to promote the BU of dredged material in coastal Virginia. Katie balanced the interests of stakeholders throughout Virginia in developing the documents.

Elizabeth River Project, Thin Layer Placement Pilot Projects and Guidance: Elizabeth River, Virginia (Virginia)
The Elizabeth River Project seeks to increase BUDM in Virginia through a TLP guidance document, a GIS-based project planning tool, and three pilot project designs. Katie has been involved in all phases of the project, including stakeholder engagement and feedback, coordination with the team, field data collection and analysis, assisting the development of initial designs and site selection, drafting the guidance document, and writing the interim report.

The Nature Conservancy, Sediment Strategies: Considerations and Case Studies for Beneficial Use (Maryland)
Sediment Strategies is a 170-page visual document for BU in Maryland and the Chesapeake region more broadly, with a focus on regulatory considerations such as permitting and state and federal laws, logistics such as construction methods and siting, and implementation details such as containment, placement methods, and monitoring. Katie led the development of the document text, which includes a detail library of information on construction techniques and five case studies that are fully deconstructed to key details.

Ducks Unlimited, Texas Beneficial Use Master Plan (Texas)
As Texas looks to implement more BU projects, Ducks Unlimited hired Anchor QEA to help determine priority placement sites. Katie took part in developing a GIS-based web tool to map site feasibility for bird islands and wetland restoration. She researched, compiled, and assigned weights to site elements for spatial decision support systems that produced suitability maps of areas for different BU projects along the Texas coastline.

John Laplante, PE, ENV SP

Geotechnical Engineering Lead

John has nearly 30 years of experience in geotechnical and environmental engineering, providing services as a design and field engineer, construction inspector, and project manager for shoreline habitat restoration projects nationwide. He is adept at developing and implementing geotechnical and environmental field investigations, reviewing Environmentally Critical Areas, preparing feasibility and design studies, creating and reviewing plans and specifications, estimating construction costs, and providing technical oversight throughout the construction process.

John's project experience includes marsh and shoreline restoration, thin layer marsh placement for nourishment, levee design, earthwork, pedestrian and vehicle trails, culverts and stream crossings, shoreline slope stability, and seismic design. His geotechnical restoration project experience ranges from the Atlantic to the Gulf Coasts, Great Lakes, California, and the Pacific Northwest.

27 Years of Experience

23 Years with Firm

Education

Bachelor of Science, Mechanical Engineering, Bucknell University, 1992

Master of Engineering, Civil Engineering, Massachusetts Institute of Technology, 1998

Licenses/Certifications

Professional Engineer, Maryland, 56123, and 22 other jurisdictions.

Relevant Project Experience

CBB&EP, Dagger Point Coastal and Marine Habitat Protection and Restoration (Austwell, TX)
John provided geotechnical engineering oversight of proposed bluff stabilization alternatives being considered for coastal protection. Work included soft sediment probing to efficiently characterize subsurface conditions over more than 5 miles of shoreline and to inform a more cost-effective subsurface geotechnical investigation.

Mississippi Department of Environmental Quality, Greenwood Island Beneficial Use (Mississippi Coast)
John oversaw the geotechnical evaluation of this BU project. He developed and oversaw the exploration program and was responsible for the analysis of bearing capacity, settlement, and slope stability of containment structures. Due to the soft subgrade, John developed recommendations for staged construction to mitigate mud waves and improve the subgrade strength to support the berms.

Mississippi Department of Marine Resources, Pelican Key Beneficial Use Facility (Mississippi Sound)
John was the lead geotechnical engineer for the design of containment berms for this 900-acre restoration project. He oversaw the field investigation planning and implementation using offshore cone penetrometer tests and subsurface borings to characterize the subgrade. John also oversaw evaluations of berm stability, settlement, and bearing capacity, and he developed construction risk mitigation recommendations.

Ducks Unlimited and NOAA, Texas Dredged Material Planning for Wetland Restoration (Texas Gulf Coast)
John was the engineer of record and lead geotechnical engineer for the design of several marsh restoration BU sites. These sites are being proposed as placement areas for beneficially reusing maintenance dredge material to restore subsided marsh areas. John oversaw the team developing engineering drawings and design analysis reports.

VMS and USACE, Barren Island Phase 1 and Phase 2 Value Engineering Studies (Baltimore, MD)
John was the civil engineer on the value engineering team that studied options for improving constructability and cost and reducing risk for the proposed project. The team identified and studied alternatives that included optimizing breakwater geometry for cost effectiveness, improving resiliency against future SLR, and alternate construction sequencing. The study identified more than $5 million in cost savings opportunities, more than $5 million in future cost avoidance, and more than 4 months of project schedule savings.

USACE Mobile District, Deer Island Ecosystem Restoration (Biloxi, MS)
John served as the geotechnical technical advisor supporting the design and modeling of nature-based shoreline protection measures. He provided input for sediment characterization, TLP methods, and integration of geotechnical constraints into hydrodynamic modeling and habitat restoration design.

BAY ENVIRONMENTAL, INC.
Environmental Consulting Services

C. JAMES CAHOON, III

29 YEARS OF EXPERIENCE

24 YEARS WITH FIRM

EDUCATION/TRAINING

Virginia Polytechnic Institute, Bachelor of Science, Environmental Science, 1994.

Various courses in wetland science, Virginia Institute of Marine Science and Virginia Commonwealth University

Virginia Certified Professional Wetland Delineator #3402000100

OSHA 40-hour HAZWOPER Certification

ESRI Certified Arcview Geographic Information System (GIS) training

FEMA Disaster Debris Management Training

PROFESSIONAL AFFILIATIONS

Chesapeake Groundwater Committee, 1996 to 1999, chairman 1998 to 1999

Regional Stormwater Management Committee, HRPDC, 1996 to 2000

Ad Hoc Wetland Legislation Initiative Group, HRPDC, 1999 to 2002

Chesapeake Environmental Improvement Council, 2000 to 2004

Chesapeake Wetlands/CBPA Board, 2001 to 2009, Chairman, 2007

Chesapeake Planning Advisory Team, Comprehensive Land Use Plan, Wetlands Board Representative, 2002 to 2004

Chesapeake Stormwater Board, 2010 to 2016, Chairman 2013 to 2016

Virginia Association of Wetland Professionals, 2008 to present, President, 2013

SUMMARY OF QUALIFICATIONS

Mr. Cahoon has 29 years of environmental management experience involving all phases of private and municipal development and maintenance projects. He is experienced in conducting and managing a wide range of issues including:

- Environmental assessments.
- Wetland Assessments, Delineations and Permitting.
- Stream Assessments; perennial flow determination - unified stream assessment methodology.
- Compliance, planning, and permitting.
- Stormwater permitting and Pollution Prevention Plans.
- Landfill Monitoring and Maintenance.
- CBPA determination and coordination.
- GPS/GIS data collection and analysis.
- Living Shoreline design, permitting, and construction.

SUMMARY OF EXPERIENCE

Bay Environmental, Inc., Co-Owner and Vice President, 2002 to present
Responsible for all aspects of business management and completion of environmental service projects including wetland delineation, stream assessments, permitting, Phase I and II Environmental Site Assessments, soil and groundwater sampling, wetland mitigation planning and monitoring, living shoreline planning and permitting, and NEPA document preparation.

LandMark Design Group, Project Manager, 2000 to 2002
Managed all aspects of municipal environmental annual services contracts including billing, invoice processing, workload analyses, and staffing; delineated tidal and nontidal wetlands; obtained environmental permits from regulatory agencies for development and maintenance activities; delivered testimony as an expert witness in condemnation cases in multiple municipalities; located, designed, and monitored wetland mitigation areas; performed Phase I and II Environmental Site Assessments; prepared and delivered wetland permitting training for municipal clients.

Chesapeake Public Works, Environmental Scientist, 1996 to 2000
Environmental Scientist/Engineer charged with obtaining and managing environmental permits for City projects; delineated tidal and nontidal wetlands; located, designed, and monitored wetland mitigation areas; performed hydrogeologic and water quality studies; managed the development of GIS layers; performed GIS mapping and analysis; coordinated the Department's Emergency Operations Plan; represented the City in State legislature technical negotiations.

Johnathan Barker, PG
Professional Geologist

22 Years of Experience | 17 Years with Firm

Credentials

B.S. Oceanography – Eckerd College (2003)
Professional Geologist – Delaware (#S4-0001299); Florida (#2662); North Carolina (#2347); Texas (#11471)

Highlights

Mr. Barker has experience in coastal geology and geomorphology, sand searches, project management, maintenance and new work dredging projects, beach restoration design, construction management, and geologic, geophysical and geotechnical investigations. Mr. Barker has experience in geotechnical investigations involving vibracoring and standard penetration test borings. Mr. Barker also has experience in geologic laboratory analysis. He has drafted and reviewed numerous geologic, geotechnical and geophysical investigations and reports. Mr. Barker has experience with single beam hydrographic surveys, sub-bottom profiling surveys, and side scan sonar surveys. He has served as project manager for geophysical surveys investigating geologic hazard potential utilizing electrical resistivity, ground penetrating radar and multi-channel analysis of surface waves (MASW).

Representative Project Experience

2024 | New Haven Harbor Deepening Geophysical and Geotechnical Investigation, New Haven, CT ■ *Geologist* ■ GBA completed hydrographic, geophysical and geotechnical field investigation services for the New Haven Harbor Deepening project. The bathymetric condition survey and site characterization investigation were conducted in two phases. The first phase was a hydrographic and geophysical survey, followed by the second phase of a geotechnical boring investigation. Following the geophysical survey, a geotechnical investigation was initiated to collect standard penetration test borings, including rock cores, for soil classification and geotechnical laboratory analysis. Sediment and Rock core samples were collected during the investigation. Mr. Barker participated and oversaw all geotechnical field data collection, data processing, laboratory analysis and report preparation.

2023 | Carraizo Reservoir Geophysical and Geotechnical Investigation, Carraizo, PR ■ *Geologist* ■ GBA completed hydrographic, geophysical and geotechnical field investigation services for this reservoir dredging project investigation area as part of the Design Build team working as a sub-contractor to Great Lakes Dredge and Dock. The bathymetric condition survey and site characterization investigation were conducted in two phases. The first phase was a hydrographic and geophysical survey, followed by the second phase of a geotechnical vibracore investigation. Following the geophysical survey, a geotechnical investigation was initiated to collect 31 vibracores, up to 6.1 m in length, for soil classification and geotechnical laboratory analysis. An Ocean Instruments RIC 5500 Vibracore was utilized for all sampling activities. These sections were appropriately sealed, labeled with proper identification, and transported to the Jaca & Sierra Geotechnical Laboratory for analysis. Mr. Barker participated and oversaw all field data collection, data processing laboratory analysis and report preparation.

2022 | Clean Path New York Vibracore Investigation, Hudson and Harlem Rivers, NY ■ *Geologist* ■ GBA and S.T. Hudson Engineers were retained by Mott MacDonald provide geotechnical services for a marine cable route investigation between Frasier, NY and Queens, NY. The investigation involved collecting approximately 150 vibracores up to 20' in length. An Ocean Instruments RIC -5500 vibracore

system was deployed from two different vessels. The Danielle Miller, a 145' survey vessel, was used in the Hudson River. The R/V Yeti, a 38' Survey vessel, was used in the Harlem River. Cores were collected, logged and analyzed for physical and chemical properties, as well as in-situ thermal resistivity. Mr. Barker participated and oversaw all field data collection, data processing and report preparation.

2020 | Illinois Beach State Park Sand Source Survey, Lake Michigan, MI ■ *Geologist* ■ GBA performed a reconnaissance level offshore investigation of potential sand sources for use as beach nourishment material offshore of the Illinois State Park Beach. The sand search sought to identify areas where the compatible, surficial sand thickness was sufficient to economically mine, and the material is suitable for beach nourishment. The initial phase of the sand investigation involved the performance of a single beam hydrographic survey to obtain the regional bathymetry, and a Compressed High Intensity Radar Pulse (CHIRP) sub-bottom survey to identify subsurface material layers within 3-5 miles of the potential beach nourishment site at the Illinois Beach State Park. Grab samples and vibracores were collected to ground truth the geophysical surveys. Sediment lab analyses were performed on the grab samples, vibracore samples, as well as native beach samples collected from the existing park beach. Samples from three vibracores were also tested for metals at a chemical laboratory. Volumes of the beach quality material were developed from the survey, sampling and vibracore data. Mr. Barker participated and oversaw all field data collection, data processing laboratory analysis and report preparation.

2017 | Town of Jupiter Island Beach Restoration Program – Borrow Site B Expansion, Jupiter Island, FL ■ *Geologist* ■ To meet the Town's need for beach compatible sand for future nourishment projects, GBA was tasked with developing and permitting a new offshore borrow site. Sufficient suitable resources were located adjacent to the existing site, and the permitting of a 13 million cubic yard borrow site expansion is underway. Mr. Barker analyzed hydrographic and geophysical survey data in support of the borrow site B expansion. The surveys included sub bottom, side scan, and magnetometer. Mr. Barker also performed sediment compatibility analysis of prospective borrow sites through laboratory analyses of native beach samples and borrow site samples.

2014-2015 | Delaware Bay Sand Investigation, Dover, DE (Delaware Department of Natural Resources and Environmental Control)■ *Geologist* ■ GBA was contracted by the Delaware Department of Natural Resources and Environmental Control (DNREC) to provide engineering and geotechnical services to locate and obtain beach quality sand to fulfill the nourishment needs of several beaches on the Delaware Bay. This sand search included the compilation, processing, and analysis of existing data sets, performing new single bean hydrographic surveys, delineating potential sand source areas, vibracore collection, laboratory analysis of sediment samples, statistical analysis of the physical properties of the sediment samples, borrow area volume calculations, and report preparation. GBA located 21 million cubic yards of sand, greatly exceeding the Delaware Bay Beaches' future renourishment needs. As project manager, Mr. Barker oversaw and was responsible for all aspects of the project, including data collection, data analysis and interpretation, laboratory analysis, report writing, and client interaction.

2013 | Midbay Island Subsurface Exploration Phase I, Chesapeake Bay, MD ■ *Geologist* ■ CENAB conducted subsurface investigations for an island restoration project near James Island and Barren Island. The exploration program consisted of standard borings, cone penetration testing, dilatometer testing, field vane shear, direct push soil sampling, and collection of undisturbed samples. The soil materials and data gathered from the exploration and sampling program will be used to determine engineering properties of dike foundation conditions and dike fill borrow materials. Mr. Barker reviewed logs and data from all field operations.

ANDREW W. LARKIN

6033 Westwood Terrace / Norfolk, VA 23508 / H (757) 201-8913 / W (757) 317-0442
andylarkin1775@gmail.gov / www.linkedin.com/in/andrew-larkin-3708515

PROFESSIONAL SUMMARY: Skilled coastal resilience and habitat restoration professional with nearly 30 years of experience leading community-based, regional, and national initiatives, managing multi-million dollar federal grants, and fostering partnerships across governmental, academic and non-profit sectors. Proven ability to translate complex environmental policies into actionable strategies, with a strong track record in stakeholder engagement and public and legislative outreach. Previous positions at the White House Council on Environmental Quality, the U.S. Senate, and as an adjunct professor at William & Mary School of Law. Recipient of 3 NOAA Administrator's Awards.

28 Years of Experience | 6 Months with ODU

CORE COMPETENCIES

- Community Engagement and Stakeholder Collaboration
- Coastal Resilience and Habitat Restoration
- Federal Grant Management and Technical Assistance
- Legislative Affairs and Policy Development
- Science Communication and Public Outreach
- Interagency Coordination and Partnership Building

WORK EXPERIENCE

OLD DOMINION UNIVERSITY (ODU) July 2025 - Present
Institute for Coastal Adaptation & Resilience, Norfolk, Va.
Assistant Director for Engagement

- Connect ODU research and coastal resilience expertise with Virginia communities facing risks from flooding, erosion, and other coastal hazards.
- Manage internal coastal resilience and adaptation grant funding opportunities for ODU researchers working with Virginia communities.

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION (NOAA) Aug. 1997 – April 2025

NOAA Chesapeake Bay Office/NOAA Restoration Center, Norfolk, Va. Jan. 2005 - April 2025
Senior Program Analyst/Federal Program Officer

- Lead NOAA Middle Peninsula of Virginia Habitat Focus Area, a non-regulatory initiative to achieve place-based coastal resilience and habitat restoration goals by engaging with regional partners and building local capacity. Chair the Habitat Restoration Steering Committee of the York River Roundtable in support of these projects and to communicate the latest in NOAA-supported academic research. Led the group to create the Coastal Wetlands Plan for the York River, Piankatank River, and Mobjack Bay.
- Manage over $50 million in federal grants in FY2024, including providing technical assistance on awards funding coastal resilience projects in Virginia at the Mattaponi Indian Reservation, Ragged Island Wildlife

Management Area, and Chincoteague National Wildlife Refuge. Oversee competitive application review and NEPA compliance process for awarded projects. Mediate issues between grantees and NOAA legal and financial representatives. Review performance progress reports and conduct site visits to ensure proper use of federal funds.

- Provide technical assistance to applicants for federal, state, and foundation grant opportunities in support of coastal resilience and habitat restoration project planning and implementation, including a new proposed project at New Point Comfort Natural Area Preserve.
- Co-Chair the Virginia Oyster Restoration Workgroup, a partnership of federal, state and local government agencies, and non-governmental organizations, leading them to develop and implement the Lynnhaven River oyster restoration blueprint and to adopt new methods for tracking oyster restoration goals and progress.
- Serve on the Virginia Statewide Wetlands Technical Team, created by the Governor to support strategies for wetlands restoration and resilience.
- Draft reports to Congress detailing NOAA engagement in Chesapeake Bay monitoring, research, climate resilience, and restoration.
- Engage with coastal stakeholders and decision-makers in Virginia, including the U.S. Navy, the Virginia Institute of Marine Science, Virginia Coastal Zone Management Program, and the Virginia Marine Resources Commission, to integrate NOAA-supported academic research into their programs. Consulted with the U.S. Naval Facilities Mid Atlantic on model sea level rise impact language that was incorporated into environmental planning documents at Joint Expeditionary Base - Little Creek - Fort Story.
- Develop and implement legislative, partnership and public outreach strategies to promote NOAA's products and programs including drafting presentations, speeches and talking points for senior NOAA leadership.

College of William and Mary, School of Law, Williamsburg, Va. January – May 2023
Adjunct Professor

- Co-instructed a course on coastal law and policy under the Virginia Coastal Policy Center, which included the Coastal Zone Management Act. Guided students through legal research projects and facilitated connections with coastal policy makers and scientists.

NOAA National Ocean Service (on detail from Chesapeake Bay Office) 2017 - 2018

- Managed and administered more than $3 million in coastal zone management grant funds awarded to the states of Maryland, Delaware, and Virginia while serving as **Acting Coastal Program Liaison**, Chesapeake Region. Provided guidance to grantees on coastal resilience projects and NOAA coastal zone management priorities, including a project funding an assessment of Hampton Roads' coastal hazard vulnerability. Reviewed proposed grant actions to ensure compliance with the National Environmental Policy Act (NEPA). Led a successful effort to use the authority of the Coastal Zone Management Act to permit the transfer of $575,000 between NOAA divisions to support oyster restoration in Lynnhaven River.
- Served as the **Acting Mid-Atlantic Navigation Manager** communicating NOAA's hydrographic surveying priorities and nautical chart updates to the U.S. Coast Guard, U.S. Army Corps of Engineers, Virginia pilots and Virginia Maritime Association. Coordinated key NOAA waterway surveys in Hampton Roads in support of reopening the Port of Virginia after Hurricane Sandy.

White House Council on Environmental Quality, Washington, D.C. April 2004 - December 2004
NOAA Representative

- As part of an interagency task force, drafted a portion of the U.S. Ocean Action Plan, the President's official response to the report of the U.S. Commission on Ocean Policy.
- Coordinated approval of marine transportation and coastal policy proposals with senior agency officials.

NOAA Office of Legislative Affairs, Washington, D.C. April 1999 - April 2004
Senior Congressional Affairs Specialist/Congressional Affairs Specialist
- Principal liaison between NOAA and Members of Congress and Congressional staff.
- Communicated NOAA's position to Congressional staff on pending legislation, including reauthorization of the Coastal Zone Management Act.
- Drafted and edited testimony and prepared senior NOAA officials for Congressional hearings and briefings.
- Analyzed legislation to determine potential impact on NOAA's policies and programs

United State Senator Frank Lautenberg, Washington, D.C. August 1998 - March 1999
Congressional Fellow (on assignment from NOAA)
- Drafted legislation on water pollution, historic preservation and natural resource issues.
- Represented the Senator in meetings with constituents and liaisons from EPA, NOAA, and the Department of the Interior.
- Wrote memoranda, floor statements, talking points and letters for the Senator on various environmental and transportation issues and made recommendations to the Senator on environmental votes.

EDUCATION

COLLEGE OF WILLIAM & MARY SCHOOL OF LAW, Juris Doctorate.
- Teaching assistant for Professor Lynda Butler for graduate level environmental policy course.

UNIVERSITY OF FLORIDA, Bachelor of Arts, Political Science, graduated *cum laude*.
- Summer semester at Trinity College, Dublin, Ireland.

OLD DOMINION UNIVERSITY, completed *Introduction to Geographic Information Systems (GIS)* course in 2017.

Key Publications
- Coastal Wetlands Plan for the York River, Piankatank River, and Mobjack Bay, 2023
- Lynnhaven Oyster Restoration Tributary Plan 2018.
- Virginia & Chesapeake Bay Oyster Restoration Update 2017 through 2024
- NOAA Chesapeake Bay Office Biennial Report to Congress 2009-2020
- NOAA in the North Atlantic quarterly electronic newsletter 2009-2015

Honors
- *NOAA Administrator's Award 2023*, for successfully establishing the Middle Peninsula Habitat Focus Area, implementing multiple nature-based infrastructure projects.
- *NOAA Administrator's Award 2009*, for contributing to the creation of the first interpretive buoy system in the Chesapeake Bay.
- *NOAA Administrator's Award 2004*, for contributing to the designation of the San Francisco Bay National Estuarine Research Reserve.

Associations/Organizations:
- City of Norfolk Wetlands Board Member (2009 to 2014)
- Boy Scout Troop 24 Fundraising Chair (2016 to 2020) / Cub Scout Pack 24 Den Leader (2012 to 2015)
- The Hermitage Museum & Gardens - Young Associates Board Member (2010-2012)

anchorqea.com