February 10, 2026 | Proposal

Middle Peninsula Planning District Commission (MPPDC)

ELECTRONIC

REQUEST FOR PROPOSAL #FY26-GRIT1

Guinea Resilience & Innovation for Tidal Wetlands (GRIT)

Phase I Project




In partnership with:

EA Engineering, Science, and Technology, Inc., PBC

Schnabel Engineering, LLC

Academic Advisory Team

C. Scott Hardaway, Jr., MS
Virginia Institute of Marine Science, Shoreline Studies Program

Donna Milligan, MA
Virginia Institute of Marine Science, Shoreline Studies Program

Matt Kirwan, Ph.D.
Virginia Institute of Marine Science, Coastal Ecogeomorphology Lab

Todd S. Bridges, Ph.D.
University of Georgia, Institute for Resilient Infrastructure Systems

Industry Advisory Team

ECOncrete

Natrx, Inc.

Contractor Advisory Team

Coastal Design & Construction, Inc.

Cottrell Contracting Corporation

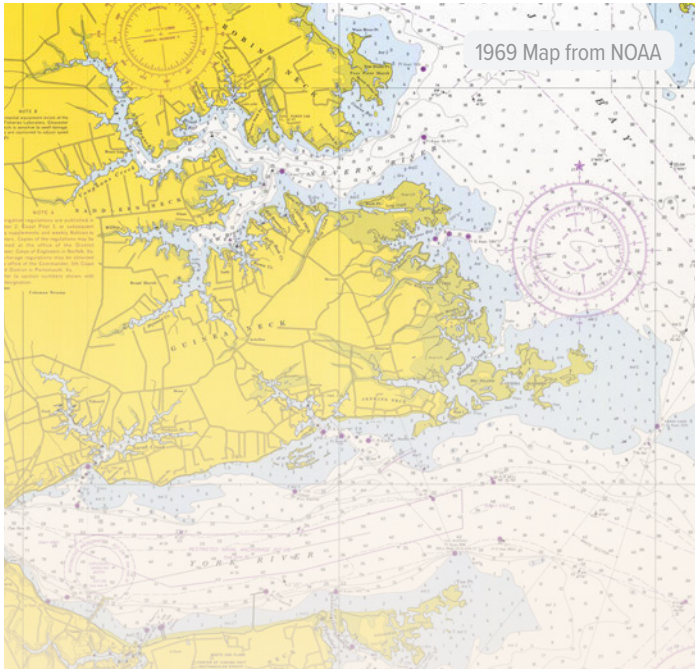
The ERM International Group Limited

Table of Contents

1 Cover Sheet

The VHB team developed an actionable sediment management framework for **Cape Hatteras National Seashore**, recommending beneficial use of dredged material to nourish coastal habitats and allow natural geomorphic processes to continue.


vhb



Prime Firm

Vanasse Hangen Brustlin, Inc. (VHB)

Office Location

351 McLaws Circle, Suite 3
Williamsburg, VA 23185

Key Representative

W. Bryce Corlett, PhD, PE, ENV SP
351 McLaws Circle, Suite 3
Williamsburg, VA 23185
757.279.2885
bcorlett@vhb.com

Authorized Signatory

Nancy Barker
Documentation showing Nancy's authorization are included on page 1-4.

Acknowledgment of Addendums

VHB acknowledges Addendum #1 and #2.

February 10, 2026

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

Re: RFP #FY26-GRIT1 Guinea Resilience & Innovation for Tidal Wetlands (GRIT) – Phase I Project

Dear Ms. Strevig and Members of the MPPDC Selection Committee,

Guinea Marsh, including the Wildlife Management Area and adjacent marsh islands of Mobjack Bay, is the backbone of local and regional resilience—sustaining working waterfronts, vital fish and wildlife habitat, and buffering nearby communities from storms and sea level rise. The GRIT Phase I Project is a pivotal opportunity to protect up to 1,000 acres of vulnerable tidal wetlands and to chart an adaptive path that can be replicated across the Middle Peninsula and the coastal Commonwealth. To successfully deliver such a critical project, you need a local consultant team that not only understands nature-based and hybrid shoreline solutions, but also brings proven experience establishing scalable models for resilient marsh systems that deliver ecological, economic, and community benefits for decades to come. **VHB** brings you that team.

In our response to this RFP, you will find that what sets VHB apart are these three attributes:

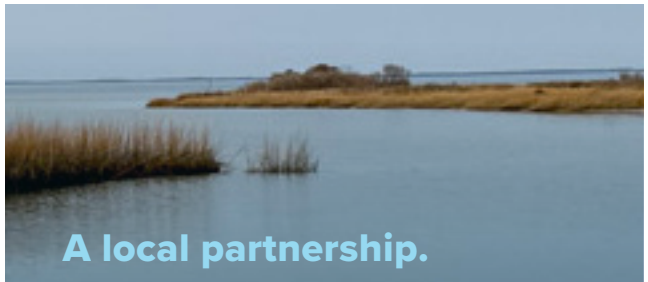
- Building on our extensive work in coastal resiliency, shoreline adaptation, and ecological restoration, we **design for resilience** through nature-based, adaptive, climate-ready solutions that are innovative yet practical and permittable.
- Rooted in VHB's deep presence in the region and our lasting engagement in initiatives such as Fight the Flood, we are committed to **a local partnership.**
- We are powered by **an integrated and insightful team** that can deliver the full GRIT Phase I scope—from developing the Comprehensive Existing Conditions Report through developing conceptual/preliminary designs, the Basis of Design Report, resilience feasibility and land conservation suitability assessments, and draft environmental and permitting documentation.

Designing for resilience.

Nature-based, adaptive, climate-ready solutions.

VHB designs for resilience—using nature-based, adaptive, climate-ready solutions that directly advance MPPDC's goals to enhance and protect tidal marshes, dunes, and beaches. We ground every concept in robust existing-conditions and feasibility analyses, producing site-appropriate designs. We pair innovation with constructability and regulatory practicality, focusing on concepts that are permittable, cost-efficient, and ready to advance to effective implementation.

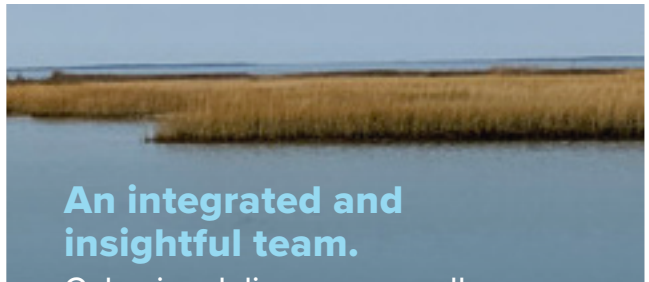
For MPPDC, selecting VHB means each option—thin-layer placement, nature-based shoreline stabilization, adaptive dunes and headlands, or hybrid structures—is evaluated for near-term performance, lifecycle cost, ecological uplift, and adaptability to sea-level rise. Our Yorktown Waterfront and Smith Island Martin National Wildlife Refuge projects show that our designs perform over decades, withstanding storms and rising seas for decades. **We design with the long-term in mind—benefiting MPPDC now and long into the future.**



A local partnership.

By and for the Middle Peninsula.

VHB's team is primarily based out of our Williamsburg, VA, office, and will be supported by other active Fight-the-Flood member firms. Our deep experience in this region will allow us to bring local context and offer insight into successful permitting and locally effective design. We understand how public waterfronts and working shorelines function in this region and know how to work alongside local governments, landowners, and watermen to co-develop solutions that reflect community priorities while building long-term resilience and support. Our team will coordinate closely with the MPPDC project team to support stakeholder engagement, incorporate local knowledge into design decisions, and keep project deliverables usable by the region beyond the scope of this grant. **This local partnership model builds trust and buy-in by showing how concepts respond to concerns about flooding, navigation, habitat, and access and streamlines permitting by proactively aligning the project with agency expectations—ultimately improving the likelihood that conceptual designs transition smoothly to permitting, funding, and construction.**



An integrated and insightful team.

Cohesive delivery across all GRIT tasks.

This project requires the integration of coastal engineering, marsh ecology, hydrodynamics, sediment management, regulatory strategy, GIS analytics, and community engagement into a single, coherent process—that type of complex working environment is where VHB's multidisciplinary team thrives. Our team structure allows us to seamlessly collect and manage desktop and field data (including LiDAR, bathymetry, and biological data), develop and evaluate nature-based design alternatives, carry out GIS-based land conservation analyses, and prepare draft Environmental Review and Joint Permit Application materials within one cohesive, quality-driven program. **This integrated approach reduces your risk—our strong partnership with MPPDC on past projects means that our workload planning and milestone-based schedule will precisely align with MPPDC's expectations for monthly coordination, review checkpoints, and quality-controlled deliverables that support final implementation planning and permitting.**

Together, these strengths position VHB to help MPPDC, DWR, and the broader Project Team develop a resilient, implementable project that protects up to 1,000 acres of tidal marshes, dunes, and beaches while promoting long-term marsh migration and providing regional community benefits. Our commitment to designing for resilience, our local partnership grounded in regional engagement and accessibility, and our integrated and insightful team directly align with MPPDC's goals for the project.

We are truly excited for this opportunity to partner with MPPDC, DWR, and the GRIT team to advance this critical investment in the resilience of the Guinea Marsh system and the broader Middle Peninsula. We appreciate your consideration of our proposal and would welcome the opportunity to discuss our approach, team, and relevant experience in more detail. Please contact Project Manager **Bryce Corlett, PhD, PE, ENV SP**, at 757.279.2885 or bcorlett@vhb.com with any questions.

Sincerely,

VHB

Nancy Barker, PWS
Senior Vice President
Authorized Signatory

R. Neville Reynolds, PWS
Principal-in-Charge

FIGHT THE FLOOD
MIDDLE PENINSULA

An Active member of the Fight the Flood Program

Our emphasis on innovative, feasible, and site-appropriate solutions for coastal resilience has long aligned us with MPPDC in implementing and championing nature-based and hybrid designs in Coastal Virginia. **VHB is proud to be an active member of the MPPDC Fight the Flood program, and to have supported MPPDC for over 20 years.**

We recognize that Guinea Marsh is both an ecological resource and a working landscape at the heart of the Middle Peninsula's identity and economy. Success here depends on meaningful, sustained engagement with local watermen, property owners, resource agencies, and community leaders, as well as a nuanced understanding of Virginia's regulatory environment. **VHB offers a local partnership grounded in geographic proximity to Guinea Marsh with longstanding, active engagement in regional resilience efforts.**

VANASSE HANGEN BRUSTLIN, INC.

Certificate of Vote

I, MaryAnn O'Leary, hereby certify that I am the duly elected Assistant Clerk of Vanasse Hangen Brustlin, Inc.

I hereby certify the following is a true copy of a Vote taken at a meeting of the Board of Directors of the Corporation, duly called and held on January 22, 2025, at which a quorum of the Board was present and voting.

VOTED:

That Nancy Barker is the Senior Vice President, Mid-Atlantic Regional Manager for Vanasse Hangen Brustlin, Inc. and is hereby authorized to execute any and all documents of every name and nature, unlimited as to subject matter or dollar amount, in the name and on behalf of Vanasse Hangen Brustlin, Inc. and to affix its corporate seal thereto, and any such document so executed shall be valid and binding upon Vanasse Hangen Brustlin, Inc.

I hereby certify that said vote has not been amended or repealed and remains in full force and effect as of this date, and that Nancy Barker is the Senior Vice President, Mid-Atlantic Regional Manager for this Corporation.

Date: 1/15/26

ATTEST:

Assistant Clerk

(Corporate Seal)

VANASSE HANGEN BRUSTLIN, INC. CORPORATE SEAL 1986 MASSACHUSETTS

2

Project Understanding, Approach, and Methodology

VHB, Scott Hardaway, and Coastal Design & Construction collaborated at **Smith Island, Martin National Wildlife Refuge** to enhance and restore the ecological communities that reside along the eroding coast. This project, constructed 10 years ago, continues to protect marshes, dunes, and submerged aquatic vegetation.


vhb

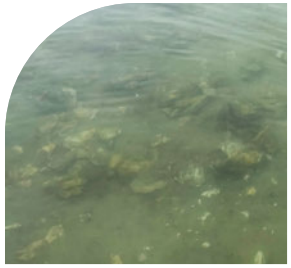
2 Project Understanding, Approach, and Methodology

2. Project Understanding, Approach, and Methodology Table of Contents

Guinea Marsh, including the Wildlife Management Area and adjacent marsh islands of Mobjack Bay, serves as the backbone for local and regional resilience: it provides habitat for countless fish, waterfowl, shorebirds, oysters, and blue crabs, and drives the local waterfront economy. Having lived and worked on the Middle Peninsula for decades, the **VHB** team recognizes how this critical project aligns with MPPDC's and DWR's mutual objectives to enhance climate resilience, and protect natural resources through nature-based and hybrid solutions. VHB is committed to delivering innovative, data-driven solutions that address immediate concerns at Guinea Marsh and establish an adaptive nature-based landscape approach that can scale across vulnerable Middle Peninsula sites and throughout the coastal Commonwealth.

VHB understands that the safeguarding and restoration of the Guinea Marsh system will require innovative and feasible nature-based and hybrid approaches to address immediate marsh degradation while also providing an adaptive path forward in anticipation of future climate conditions.

The VHB team has extensive experience across the arc of resilient coastal restoration, from planning, design, and permitting to construction and operations. Many in our diverse team of professionals have direct familiarity with the stakeholders, communities, waterways, and habitats that will be the subject of the Guinea Resilience & Innovation for Tidal Wetlands (GRIT) Phase I studies and conceptual designs. Over the past several decades, we have built long-term working relationships with local watermen and to the resource agencies that will be key to developing an innovative, feasible, and resilient approach for the long-term protection and restoration of the ecosystem. These relationships and the breadth of our team's coastal engineering and habitat restoration expertise make the VHB team uniquely qualified to execute this project effectively and efficiently.



An Integrated Team for Guinea Marsh

Together with **EA** and our subject matter expert liaisons in academia, industry, and marine construction, **VHB** brings a team with decades of experience in innovative nature-based designs and constructability across a variety of site morphologies—ranging from sandy vegetated dunes and eroding sandy beaches and marsh edges, to drowning marsh flats and shoaling channels. This combined experience will be critical when developing a holistic approach to the marsh complex—addressing multiple confounding sources of degradation while maintaining construction feasibility and maximizing long-term returns on investment. We look forward to working as a part of the project team to develop a comprehensive solution for the Guinea Marsh complex that provides continued coastal hazard protection for Guinea communities and sets the stage for successful long-term climate adaptation of the region.

Understanding the Guinea Resilience & Innovation for Tidal Wetlands (GRIT) – Phase I Project

The Guinea Marsh Wildlife Management Area and surrounding landscapes provide critical ecosystem services that sustain both regional ecological integrity and community resilience. These marshes serve as highly productive nursery and foraging habitats for finfish, blue crab, and invertebrates, while supporting populations of migratory and resident waterfowl, wading birds, and other marsh-dependent species. Established marsh vegetation stabilizes shorelines and attenuates wave energy, reducing erosion and protecting Gloucester communities. These systems also perform essential functions such as carbon fixation, as well as sediment and nutrient trapping—assimilating excess nitrogen and phosphorus before they reach the Chesapeake Bay. Collectively, these services underpin biodiversity, fishery productivity, and the resilience of surrounding communities, making Guinea Marsh a critical asset to both the Middle Peninsula and the broader Chesapeake Bay.

This system exists within a low-relief, tide-dominated landscape that is increasingly vulnerable to sea-level rise, land subsidence, and extreme storm events have driven long-term degradation. For decades, these marshes have experienced accelerated edge erosion, and prolonged inundation slowly migrating into adjacent coastal forests and farmland. Severn, Maryus, and Jenkins Neck are increasingly vulnerable to these changes as continued marsh loss has amplified flood risk and coastal hazards.

To address these vulnerabilities, the VHB team proposes implementing a suite of targeted nature-based and hybrid techniques designed to slow shoreline erosion, nourish existing marsh platforms, and conserve upland areas to facilitate future marsh migration.

These strategies will enhance ecological function, protect community assets, and build long-term resilience in the face of accelerating climate change.

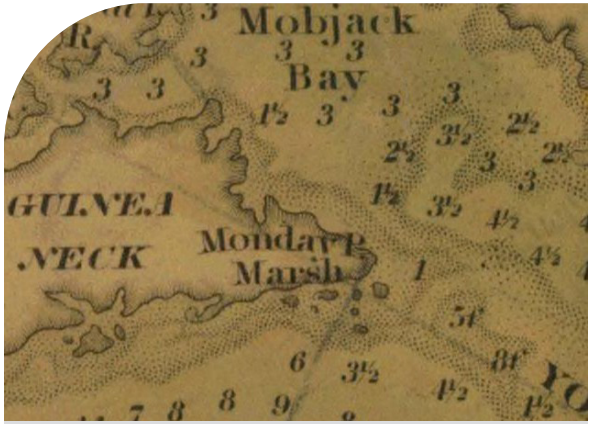
Our time-tested approach is to weave constructability into the development of the conceptual design, proactively anticipating potential hurdles and opportunities to limit impacts as part of the design process. As Guinea Marsh is surrounded by extensive submerged aquatic vegetation (SAV) beds, we will work closely with project partners **Natrx** and **ECOncrete** to develop site-specific approaches with limited footprints (and limited construction-phase impacts) while still providing resilient, adaptive solutions to address marsh shoreline erosion. Based on conversations with VMRC, we also anticipate that thin-layer placement will require sound, defensible justification to permit in areas of degraded, drowning marsh. Our team brings academic experts in marsh migration and geomorphology to proactively address VMRC comments, weaving lessons learned on previous projects directly into concept development.

We are confident that our team's deep bench of experience in local and national-scale marsh restoration projects, decades-long working relationships with regional regulators, and innovative designs, when combined with the leadership of the MPPDC will be able to bring this landmark project to fruition.

With permittable conceptual designs ready to advance through permitting, additional design phases, and implementation as the primary outcome of Phase 1, VHB understands that fundamental knowledge of Guinea and local geomorphic and dynamic processes are key for building feasible solutions.

Physical Setting

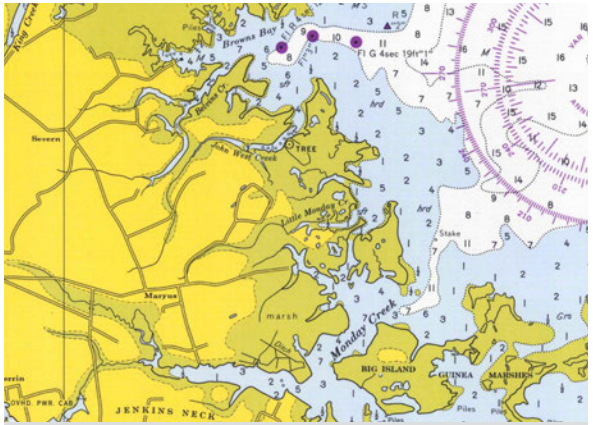
The Guinea Marsh complex, extending between the Severn and York Rivers along the Mobjack Bay, includes multiple peninsulas as well as Big Island, Hog Island, and a collection of smaller islands. The underlying geologic strata are sandy Pleistocene interfluves established during the last high sea level stand over 75,000 years ago, and much of the tidal marsh known today likely formed during a period of increased sea level rise (SLR) over 4,000 years ago. Maps of the Guinea Marsh complex during the early 1800s show a broad marsh with large islands separated by narrow channels. **Through centuries of storms and rising sea levels, the islands have become fragmented by shoreline erosion and internal marsh flooding**. The more exposed shorelines to the east and south are experiencing erosion rates of up to 5 ft/year, as **the irregular shoreline is consistently impacted by wave action**.



1840 Map from NOAA

1887 Map from NOAA

1916 Map from USGS Topoview



1969 Map from NOAA

1982 Map from USGS NHAP viaHistoric Aerials

2025 Map from NearMap

As Guinea Marsh islands become increasingly fragmented with erosion and sea level rise (SLR), the mainland marsh is becoming increasingly vulnerable to waves and storm surge.

Some low-lying areas near the perimeter of the marsh appear to be slowly drowning in place—being unable to keep pace with SLR. Although marshes can survive in place with SLR, this requires vertical accretion through sufficient sediment trapping.

In vulnerable systems with relatively low suspended sediment concentrations, such as areas of Guinea Marsh, periodic sediment supplementation through thin-layer placement or offshore nourishment may be necessary to allow the marsh to keep pace. The ultimate design goal for sediment supplementation is to boost the marsh up to appropriate elevations for the existing community to thrive, which requires a detailed understanding and anticipation of appropriate design horizons and site-specific sea level rise projections.

The VHB team brings forward-thinking practitioners and scientists together to develop the most appropriate, effective, and adaptive solution for Guinea Marsh. Our design elevations will be grounded in existing site conditions and will address SLR from the start, recognizing that published NOAA tidal datums near the site are roughly 6.5 inches lower than 2026 conditions.

With climate change, the storms that are driving much of the erosion of Guinea Marsh are only expected to increase in intensity. Over the past five years, the Guinea Marsh complex has seen two storm events that produced water levels approaching or at the 10-year storm level (4.13 ft in October 2025 and 4.23 ft in 2024 during Tropical Storm Ernesto).

Return Period	Guinea Marsh Stillwater Elevation (ft NAVD88)
10-year	4.25 ft
50-year	5.15 ft
100-year	5.55 ft

Ecological Context

The marsh complex—including extensive seagrass beds within the complex and along the periphery—is a critical site for ongoing marsh research, and vital habitat for blue crabs, native oysters, and juvenile spot, striped bass, croaker, and drum that fuels the local working waterfront economy. The sandy tidal channels of Guinea Marsh host eight oyster aquaculture leaseholds—largely in Browns Bay and Monday Creek—that provide oysters to restaurants across the nation, and the area immediately offshore of the marsh is further protected as public clamming ground.

Our team has already performed a high-level site assessment of the marsh to identify dominant ecotones to keep in mind while developing a vision of an adapting, resilient Guinea Marsh:

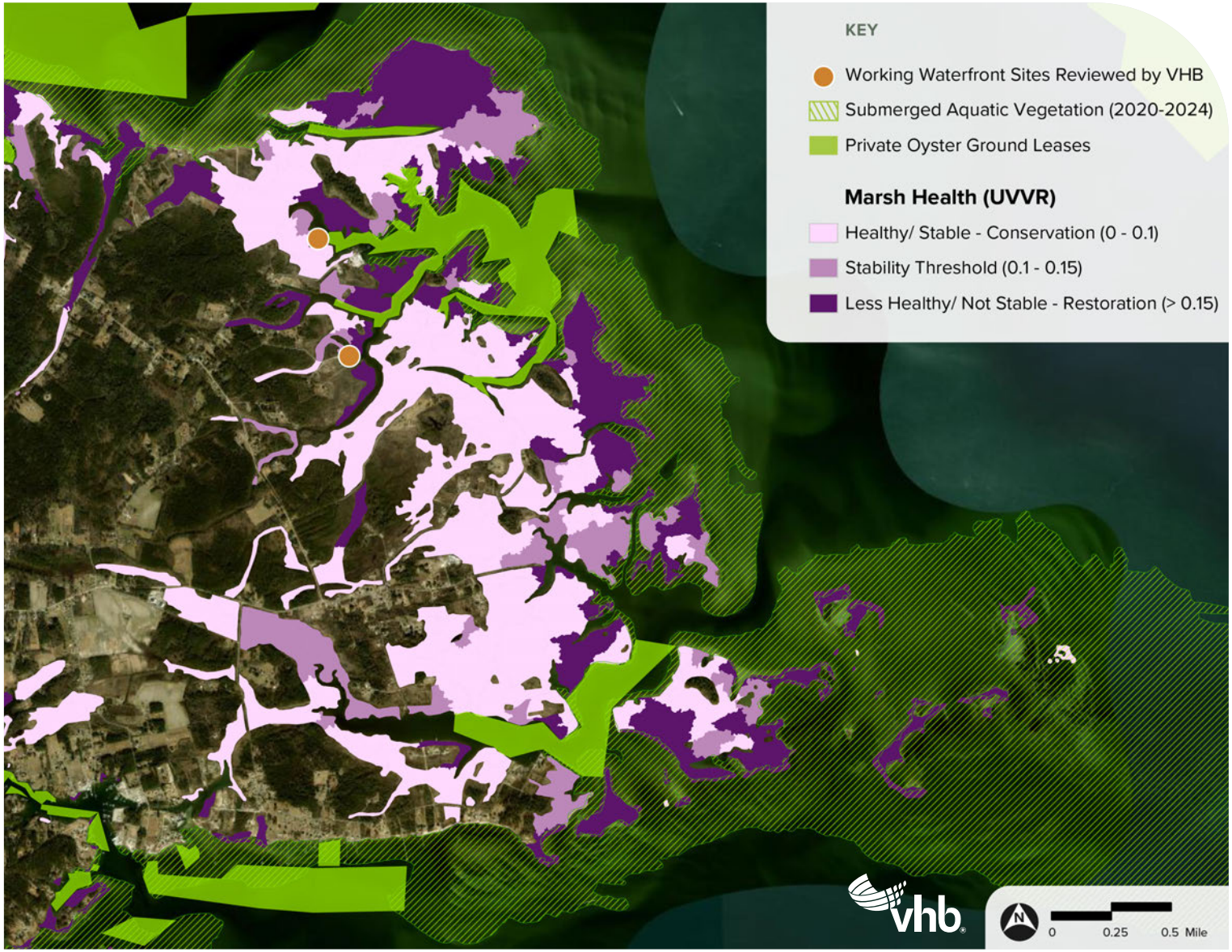
- **Low Marsh/High Marsh:** Low marsh zones are dominated by smooth cordgrass—tall form along flushed creek banks and short form across interior marsh flats. Landward, these areas transition into high marsh dominated by saltgrass and saltmeadow hay. Black needlerush occurs thoughout the marsh complex, often forming extensive stands.
- **Salt Bush and Maritime Forest:** At the Marsh elder, groundsel tree, and wax myrtle define the transition from marsh to maritime forest hummocks, where elevated ridges support loblolly pine, black locust, and eastern red cedar. Several of these hummocks are starting to transition to “ghost forests" as pines die back in response to rising sea levels.
- **Dunes:** Low bayside dunes fringe portions of the marsh and support a mix of marsh elder, saltmeadow hay, and groundsel tree. These dynamic features shift with wind and wave energy, creating a patchwork of vegetation and exposed sand.
- **Phragmites:** Disturbed or slightly elevated areas across the marsh—often near homesites, roadways, or maritime forest margins—support dense stands of the invasive common reed *(Phragmites australis)*. Its current distribution, which also includes occasional dune crests, will be a key consideration for restoration planning, and may shape site specific management approaches.
- **Salt Pannes:** Localized depressions within the marsh support hypersaline, largely unvegetated salt pannes. Formed by the natural closure or infilling of secondary channels, these features expand with sea-level rise and provide important ecological functions, including habitat for birds and aquatic species, and refugia for specialized plants. Thin-layer placement may help maintain these tidal panne habitats by preventing prolonged inundation and supporting their role as temporary tidal pools.

Climate Adaptation for Coastal Resilience

Long before resilience and sustainability were buzzwords, VHB’s engineers, scientists, planners, and designers were incorporating these principles into everything they touched: planning communities that are less vulnerable to changing conditions, engineering coastal shoreline protection and restoration to withstand severe weather events, creating stormwater management systems that protect valuable community assets, preparing for the unexpected, and leading post-disaster recovery and mitigation efforts. We know that our future communities and landscapes are shaped by decisions today.

Our changing climate poses threats to our communities and landscapes today while also placing long-term sustainability at risk. Reflected in VHB's team is our commitment to preserving and enhancing our communities for the long term. We take the long view to understand the risks posed to our communities, including the people, infrastructure, and natural resources that make up those communities. Our multidisciplinary team has the technical know-how to guide our clients in understanding risks and prioritizing implementable solutions grounded in reality.

The Guinea Marsh complex is surrounded by SAV beds and active oyster leaseholds, especially in Browns Bay and Monday Creek, and some of the most vulnerable regions of marsh are located along this fragile marsh edge. Our adaptation strategies will be developed to reflect this existing landscape and provide a resilient path forward for the marsh by minimizing disturbances to SAV and adjacent waterway uses.



Designing for Resilience

VHB routinely prepares designs, construction documents, plans, specifications, details, permit applications, and estimated cost opinions for dredging of access channels and basins, coastal and estuarine marsh restoration, and inlet and shore protection at the municipal, federal, and state levels. Our dedication to improving coastal habitats and developing constructable and permittable designs has meant that we are proud to count MPPDC, the Virginia Department of Conservation and Recreation, the Virginia Department of Wildlife Resources, the National Park Service, and Virginia coastal and waterfront communities such as Jamestown, Yorktown, Norfolk, West Point, Cape Charles, Accomack, Mathews, and Poquoson as repeat clients.

A Focus on Resilience & Adaptation through Nature-based and Hybrid Designs

Balancing environmental stewardship with sustainability is one of VHB's core principles. Our approach to projects involves designing to meet today's needs while anticipating tomorrow's challenges. VHB is a leader in sustainable and resilient design; we are a charter member of the Institute for Sustainable Infrastructure and have more than 100 staff that are accredited Envision Certified Sustainability Professionals (ENV SP). When it comes to developing coastal zone management strategies and mitigation, our approach is grounded in detailed understanding of both present and anticipated future conditions, and we use this deep awareness of the site and context to develop adaptive solutions that fully anticipate future changes in coastal hazards, landscape ecology and potential site use.

At VHB, environmental stewardship requires safeguarding our existing resources while also providing a path for future site adaptation through nature-based and hybrid approaches in light of our changing climate.

Our history in coastal habitat restoration began over 30 years ago as we worked closely alongside the Virginia Institute of Marine Science (VIMS) and Coastal Designs & Construction to **spearhead the permitting, design, and construction of nature-based shoreline protection before "nature-based design" was part of the common lexicon**.

At Yorktown, Kingsmill and others, our designs then, as now, leveraged natural features in the landscape to develop stable planforms, created space for critical wetland habitats, and provided opportunity for vertical marsh migration in light of sea level rise.

Our understanding of the permitting environment and longstanding professional connections with key agencies were critical to setting the foundation for nature-based design in the state, and we continue to leverage our expertise to push innovative coastal habitat restoration designs today.

Although we are known for our nature-based shoreline designs, VHB's team also brings **broad experience in coastal habitat restoration**—including permitting, design, and development of VDOT wetland mitigation banks, monitoring and development of long-term success thresholds for coastal wetland restoration projects with footprints ranging from 25 to over 1000 acres, and design and permitting of dredge material beneficial use projects throughout the lower Chesapeake Bay. VHB further brings **decades of experience in combined topographic and hydrographic surveying to support habitat restoration and dredge material management**. We have surveyed numerous navigational channels throughout Virginia's Middle Peninsula as a subcontractor to the VIMS and other partners, and have collected hydrographic, geotechnical, and sediment quality data.

Uniquely Familiar with Guinea Marsh

Two of the 63 working waterfront sites recently evaluated by VHB for resiliency and future infrastructure investment as part of a Working Waterfront Resilience Planning Study for MPPDC are located immediately adjacent to the Guinea Marsh complex—Brown's Bay Landing and Belvin's Creek Landing. Our analysis of local permitting hurdles for shoreline and in-water infrastructure, as well as awareness of adjacent protected species and habitats, has brought us uniquely up to speed for developing nature-based investments in the Guinea Marsh complex and working alongside the local waterman community to develop resident-supported solutions.

In addition to our understanding of physical site conditions affecting habitat restoration and shoreline stabilization, our coastal design team is acutely aware of the importance of the environmental regulatory process. We understand that the design must consider local, state, and federal regulations as well as the sensitivities and particular interests of both the permitting and advisory agencies. Our team brings **over three decades of experience with the Virginia regulatory process, specifically as it relates to dredging as well as in-water and above-water habitat restoration, and addressing potential effects of both on coastal processes and aquatic habitats**. We also understand the potential hurdles for permitting thin-layer placement (TLP) on Guinea Marsh, including potential placement impacts on adjacent oyster leases and developing sound justification for habitat conversion of vegetated and non-vegetated wetlands. The VHB team has successfully navigated these public conversations for decades in Virginia and elsewhere around the country, and we look forward to bringing this experience to serve MPPDC, DWR, and the project team in the advancement of TLP implementation in Virginia.

Thin-Layer Placement

VHB is partnering with EA to bring extensive experience in TLP as an innovative strategy to enhance marsh resilience, maintain critical ecosystem services and flood attenuation capacity to MPPDC, DWR, and the project team. TLP involves applying a layer of compatible sediment to marsh surfaces to restore elevation, improve habitat quality, and support natural sediment accretion and vegetation growth. EA has partnered with federal and state agencies, non-profit organizations, and local governments to design and implement TLP projects across diverse coastal regions, including the Lowcountry region of South Carolina, Albemarle–Pamlico Sounds in North Carolina, the Chesapeake Bay region, coastal New Jersey, and coastal New England.

In the process, EA has successfully navigated challenges unique to TLP projects—ranging from identifying potential dredge projects with compatible sediment, to achieving sediment approval held to varying standards, estimating short- and long-term consolidation, and re-vegetation design—and will bring this experience and insight to Guinea Marsh.

VHB has been the leader in the headland approach to shoreline management since the late 1980s—emulating the natural protective dynamics of headlands found throughout the world. The success of our longstanding hybrid approach can be seen throughout the region, with early designs still standing and functioning as designed—nearly 30 years and 6 inches of sea level rise later.

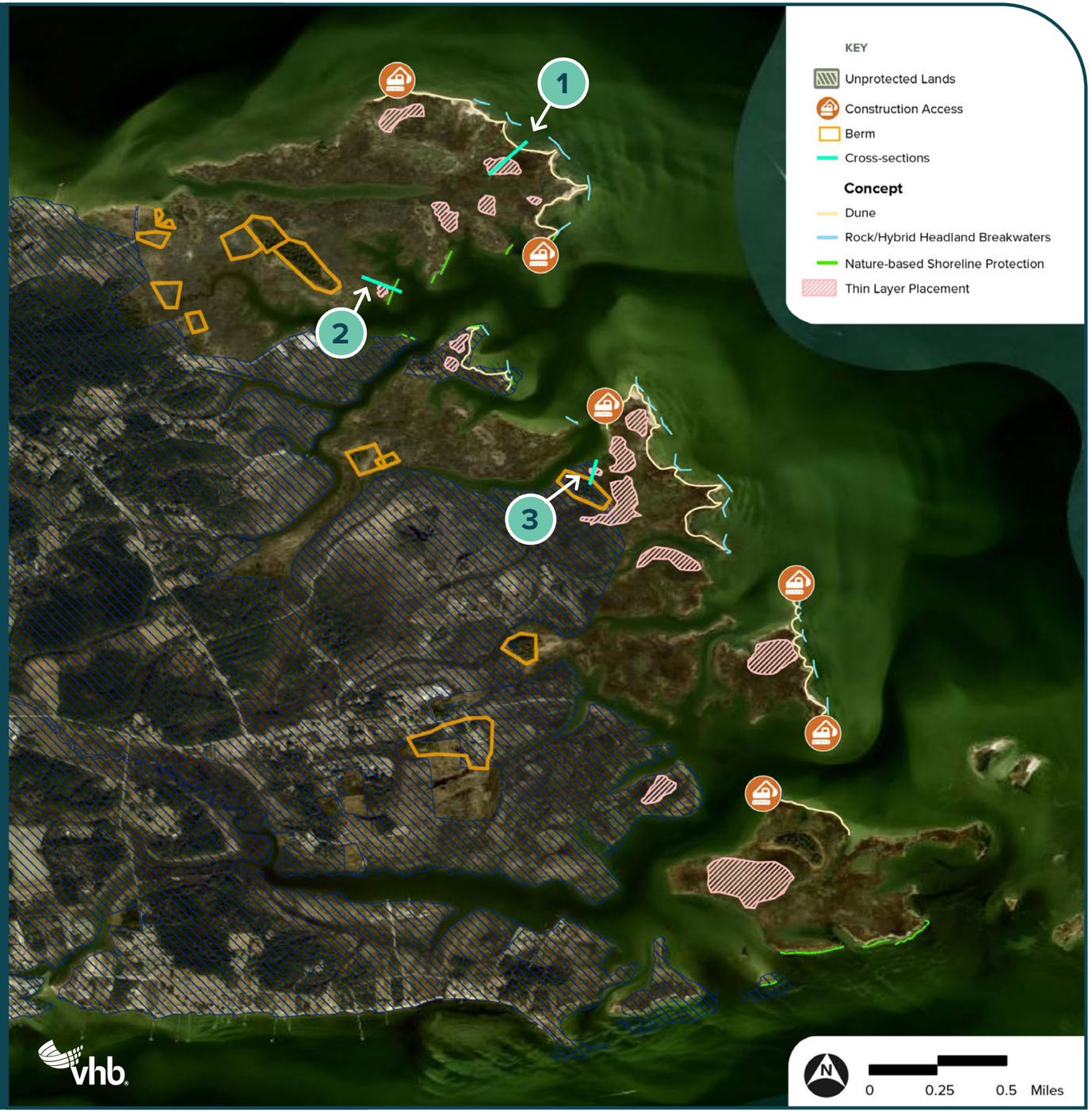
Conceptual Sketch

This high-level concept outlines a nature-based, adaptive shoreline resilience strategy that integrates multiple complementary coastal features across the marsh complex. Our intention is to provide a conceptual suite of feasible and site-appropriate strategies that could be implemented to enhance the long-term ecological and geomorphic function of Guinea Marsh with limited construction impacts. These core strategies will be vetted and refined through Task 3, with the identification of priority sites for implementation occurring through Task 3 as well as Tasks 4, 5, and 6 to address long-term resilience and adaptation capacity.

We approached Guinea Marsh as a whole—not limiting ourselves to protected lands—to identify regions of eroding shorelines with pre-existing headland features and sand dunes, as well as regions of low-lying marsh that are slowly becoming internal mudflats or salt pannes. As a result, some potential interventions in our concept are outside of public lands; however, this overlap in public and private benefit may strengthen stakeholder support as these strategies may provide opportunities to partner with local landowners in the future to implement measures that support the overall resilience of the marsh.

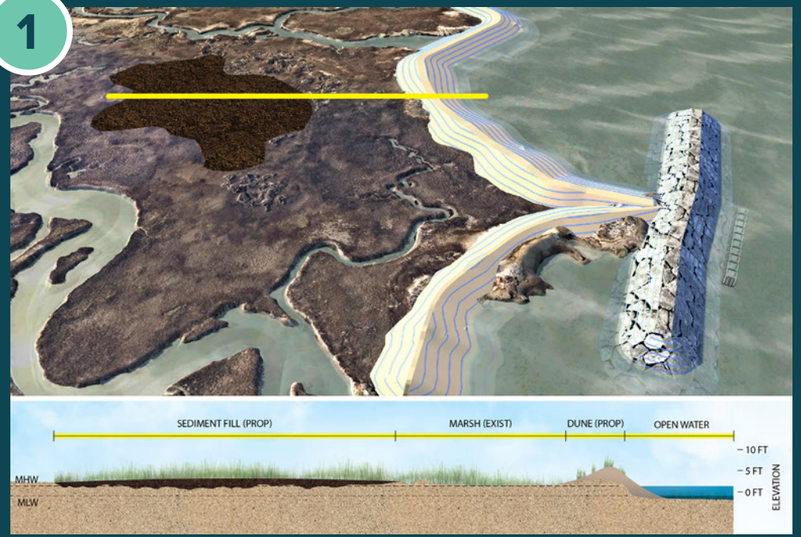
The strategies described below—ranging from headland breakwaters and sandy dunes to thin-layer placement and berm breaches—form an integrated, scalable concept that balances shoreline protection, ecological uplift, and adaptation to future conditions. **The goal is to illustrate how natural and nature-based features, supported where necessary by ecologically compatible structural interventions, can create a cohesive coastal resilience framework for the region.**

See following pages for more information on this concept as well as the three cross-sections highlighted on the map.



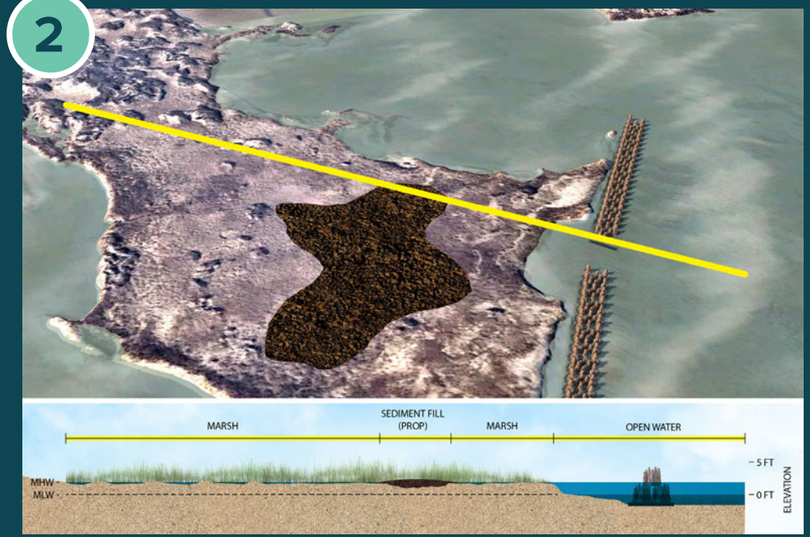
Typical Cross-sections

1



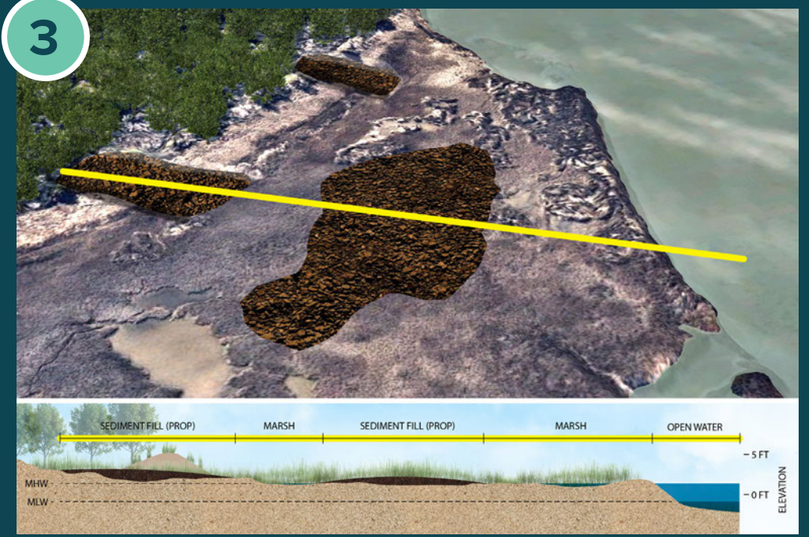
To support the protection and adaptation of the marsh with a minimal footprint, we would enhance eroding bay-facing shorelines with planted dune systems built above mean high water, serving both as a sacrificial buffer and a renewable sediment source that can migrate or be incrementally elevated over time to keep pace with rising sea levels. Where rapidly-eroding headlands or points require structural stability (along much of the exposed bay shoreline), the concept incorporates low-impact hardening through the use of stone with engineered units—such as ECOncrete blocks, Natrx exoforms, or similar—which use ecologically-enhanced materials to support further biodiversity. These engineered units typically offer improved surface complexity and marine compatibility, supporting oyster recruitment and biodiversity while providing wave attenuation in front of stone headlands and meeting permitting requirements regarding material suitability in marine environments. Where necessary, these engineered units could also be installed along the backslopes of sandy peninsulas—features restored with sand fill to shelter interior marshes and tidal creeks—to provide structural stability to the restored peninsulas as well as additional oyster habitat.

2



In moderate energy zones with slowly-eroding shorelines, modular units such as Natrx exoforms are envisioned as providing immediate shoreline protection and enhancing habitat for native oysters—limiting sediment sources that contribute to channel shoaling while further boosting the native oyster population. Many of these areas along the marsh channels are characterized by low-lying marshes that are slowly becoming internal mudflats or salt pannes and are slowly releasing sediment into the waterways. By lifting marsh elevations in these areas through thin-layer placement and intense native plantings (where needed to bolster revegetation success), this strategy is intended to further improve the marsh's natural ability to capture suspended sediment and slowly accrete material. The material for thin-layer placement, depending on need and material composition, could even come from adjacent channels to restore relict marsh material onto the platform while supporting continued access to the region by local watermen.

3



The Guinea Marsh platform is littered with remnants of relict berms. Some of these actively restrict upland migration of the surrounding marsh onto forest hummocks; others have already been breached by rising tides. Our initial proposal is to breach berms that may act as barriers for marsh species to reach future refugia, facilitating the long-term adaptation of the landscape through the transformation of existing upland into high marsh. These berms are often surrounded by low-lying areas of marsh that are in the process of conversion to mudflat or salt panne, which limits the ability of the surrounding marsh to migrate toward higher ground. These lower areas would be gently elevated through thin-layer placement—potentially sourcing material from adjacent creeks depending on need and material composition—and heavily planted to encourage rapid revegetation.

Those berms that have already been naturally breached may instead be repurposed as containment berms for thin-layer placement—facilitating the creation of future refugia rather than limiting access to high ground. In both cases, our strategy is to identify and maintain pathways for long-term marsh migration within the landscape, using existing features to guide the adaptation of the Guinea Marsh.

These illustrations were generated using artificial intelligence and are provided for illustrative purposes only; they are conceptual representations and do not depict the final design or outcome of the project.

Concept Elements

Guinea Marsh has diverse geomorphic features and ecological communities. An appropriate protection and enhancement strategy for the area will require a variety of approaches, each tailored to site-specific conditions (such as wave exposure and sediment composition as well as existing ecosystems and landforms) with consideration of the overall landscape-scale adaptation strategy.

		Resilience/Adaptation Benefits	Permitting Considerations	Construction Considerations
	Headland Breakwaters	» Stabilizes the shoreline by **attenuating wave energy, establishing stable beach planforms** that reducing erosion » Encourages natural sand accretion along the marsh edge » Promotes **diverse habitat** along breakwaters and within embayments	» Potential construction and post-construction impacts to **local ecosystems**, including vegetation, protected species, and benthic habitats » Potential impacts to local **turbidity** during construction » **Materials** must be environmentally suitable	» Materials must be compatible with **local wave, tide, and sediment conditions** » In-water **access** may be limited, and may require permitting and construction of temporary barge ports » Overland **access** may produce adverse effects on marsh platform, requiring additional site restoration post-construction
	Oyster Habitat Creation	» Habitat creation may grow vertically and alleviate impacts from **sea level rise** » Encourages **multiple ecosystem** services, including improved water quality through bivalve filtration and enhanced finfish nursery habitat	» **Materials** (e.g., concrete, composites) must be verified as non-toxic and suitable for marine environments » **Monitoring** of structural performance, oyster colonization, and habitat use may be required	» Design must be compatible with **local wave, tide, and sediment conditions** » **Long-term performance** depends on durability of materials, bivalve recruitment and population health, and biofouling
	Thin-Layer Placement	» Increases marsh platform elevation, helping wetlands evolve concurrently with **sea level rise** and subsidence » Enhances **marsh system health**, plant productivity, and sediment trapping capacity, improving long-term stability	» Subject to **sediment testing**, evaluation of hydrogen sulfide soils, and possible sediment treatment and **turbidity** controls » May require endangered species, **critical habitat** and/or wetland impact review and dredge-and-fill permits » **Monitoring** commitments are often required to demonstrate success and inform adaptive management	» Sediment delivery methods are dependent on distribution requirements, **turbidity**, and resuspension » Construction should consider **access and environmental constraints** (e.g., spawning seasons) » **Grading** may be needed to promote diverse habitat structure

These illustrations were generated using artificial intelligence and are provided for illustrative purposes only; they are conceptual representations and do not depict the final design or outcome of the project.

Concept Elements

		Resilience/Adaptation Benefits	Permitting Considerations	Construction Considerations
	Sand Dunes	» **Attenuates wave energy** and limits effects of wave runup and storm surge on uplands » Provides a dynamic, self-adjusting buffer that can migrate landward in response to storm surges and **sea level rise** » **Creates habitat** for critical coastal species	» Requires use of **compatible sand** and avoidance/minimization of impacts » May require endangered species or **critical habitat** review » Permit conditions often require **monitoring** and adaptive **management plans** (e.g., vegetation success, dune stability)	» Suitable **sand sources** and control of placement geometry may be difficult during construction » Vegetation planting should align with appropriate planting windows
	Berm Breaching	» Restores hydrological patterns and stabilizes water levels » Encourages marsh adaptation to **sea level rise** » Improves migration pathways and nutrient exchange	» Requires evaluation of changing flood risk impacts, sediment deposition, and erosion patterns » Possible consultation regarding effects to the local **ecosystem** » **Monitoring** and long-term **management plans** may be necessary	» Monitoring of **turbidity**, water quality, and flow control during construction » Consideration of breach design and **long-term site evolution**
	Channel Maintenance Dredging	» Restores or maintains tidal exchange, improving **marsh health**, salinity regimes, and nutrient cycling » May improve navigation conditions » Sediment acquired may supply beneficial use material for marsh or shoreline restoration projects	» Requires evaluation of impacts to wetlands, benthic **habitats**, fisheries, and water quality » Disposal or placement locations require designated approval » Long-term **maintenance plans**, including volume and frequency of maintenance, may be required	» Dredging method depends on channel size, **sediment type**, **access**, and desired placement strategy. » Coordination with beneficial use projects can cause delays and increased costs if not coordinated during planning

These illustrations were generated using artificial intelligence and are provided for illustrative purposes only; they are conceptual representations and do not depict the final design or outcome of the project.

Approach to Scope of Work & Methodology

VHB will bring an integrated team of coastal engineers, scientists, planners, and landscape architects to develop and provide an innovative, multifaceted solution that builds momentum for regional economic and ecological resilience. The narrative that follows represents our technical and management approach to each task, highlighting deliverables and advisory team member involvement at each stage.

Middle Peninsula Planning District Commission

vhb

EA Engineering, Science, and Technology, Inc., PBC + Schnabel Engineering

Academic Advisory Team

VIMS William & Mary Virginia Institute of Marine Science

University of Georgia

Contractor Advisory Team

Cottrell Contracting Corporation

ERM

Coastal Design & Construction, Inc.

Industry Advisory Team

ECOncrete

Natrx Adaptive Infrastructure

Project Management

The team will be led by Project Manager **Bryce Corlett**, who will serve as the project's main point of contact and provide consistent oversight, positive leadership, and proven management and communication skills. His experience on both private and public-sector projects enables him to effectively assemble design teams that can deliver innovative and sustainable projects. He has delivered multidisciplinary projects throughout the East Coast, and brings extensive experience delivering innovative marsh restoration and nature-based design projects in partnership with academic institutions and municipalities.

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

TASK 1 QA/QC

Overall Project Quality Control will be managed by Project Manager Bryce Corlett, PhD, PE, ENV SP, and QC Manager Megan Raymond, CFM, PWS, RSS

DELIVERABLES

- ✓ The approved Project Work Plan and schedule
- ✓ Monthly reports
- ✓ The final technical data package (all final deliverables consolidated)
- ✓ The final report that packages all other deliverables

VHB will support planning, initiation, and coordination throughout the project with an approved work plan and schedule, monthly reports, a final technical data package, and a final report packaging deliverables from all tasks.

1.1 Kickoff Meeting

At the kickoff meeting, VHB will be prepared with a work plan and schedule that responds to the Scope of Work defined in the RFP, which will be further defined and agreed upon before tasks begin. The VHB team will internally review and discuss these prior to the kickoff meeting to confirm roles and responsibilities as well as to confirm realistic subtask schedules.

1.2 Work Plan

Communication will be central to developing a Work Plan, with MPPDC, DWR, and among the project team members. VHB will prepare a Work Plan that meets the needs for each phase under the contract. Elements of the Work Plan will include:

- **Work Scope:** In this critical first step of the project, the scope will be captured and agreed upon by MPPDC and VHB before work on tasks begins. Mutually accepted success and performance measurement criteria will also be established. The VHB team also will hold an internal kick-off meeting to review and discuss these aspects with all team members.
- **Staffing:** This team has been developed to provide the best-qualified person for the role with budget and scheduling considerations in mind. The work plan will refine the roles and responsibilities for project participants.
- **Scheduling:** Realistic but streamlined task schedules will be key to success. When possible, VHB will seek to schedule subtasks concurrently, which often yields time and resourcing efficiencies.
- **Budget:** Balancing work scope, client expectations, funding availability, and cost consciousness will be key.
- **Communication:** VHB will emphasize establishing and maintaining regular communication with MPPDC, partners, and members of our project team.

To streamline the GRIT - Phase I Project effort, the Work Plan, as well as scheduling, budgeting, and task maintenance tools, will be made available to VHB team members and appropriate MPPDC staff following plan mutual approval.

1.3 Coordination

VHB will participate in **kickoff and coordination meetings** with MPPDC, DWR, and the project team, including attending **monthly coordination meetings and quarterly progress briefings, and will provide monthly progress update reports.** Project Manager Bryce Corlett will be available and in regular contact with the MPPDC Project Manager through in-person meetings, telephone or video calls, and email, depending on the needs of the situation. All communication will be documented, shared for review, and filed for reference.

VHB has found a **collaboration website** to be a valuable tool for project management on complex projects, especially with multiple stakeholders. VHB can establish and provide the project team with a website using Microsoft's SharePoint platform, creating a secure environment for sharing project documents and facilitating streamlined communication across the project partners.

In addition to meeting with and maintaining consistent communication with the MPPDC team, VHB will conduct **regular internal meetings** to give team members a solid understanding of their current tasks and are on schedule and within budget. VHB's Principal-in-Charge **Neville Reynolds** will conduct periodic project reviews to provide quality control and oversee that project procedures are being followed. Recommendations for improvements will be made to the team and implemented as required.

1.4 Schedule

Please see **Section 4. Schedule and Deliverables** for a proposed schedule that outlines milestones and benchmarks. Section 4 also discusses VHB's approach to maintaining a realistic schedule and mitigating potential project delays.

Timely and effective management of tasks is essential to meet the schedule milestones. As the project progresses, VHB will proactively analyze work against tasks and the Work Plan. Using our project management analytics throughout the project, VHB will continue to apprise the MPPDC of project status and communications received directly from other stakeholders.

1.5 QA/QC

At VHB, providing quality assurance and quality control (QA/QC) is mandatory on every project, with an internal Quality Plan developed for each individual project. This Quality Plan includes sections on schedule and cost as these are essential elements of all projects. QA/QC procedures are built into the project schedule, and QA/QC reviews are scheduled in the work plan and involve project technical advisor review as well as independent discipline reviews. Project Manager Bryce Corlett will work with QA/QC Manager Megan Raymond to develop a Project Quality Plan for this project.

Subject matter experts (academic, industry, construction) on this team will provide critical insights and innovative approaches at multiple stages in the project, one of which is providing a fundamental QA/QC role at each stage.

1.6 Community and Stakeholder Engagement

We understand that successful engagement will require diverse tools for **all stakeholders to be able to participate in the process in a way that is most comfortable and accessible for each**.

VHB has built a record of success by working with our clients to develop personalized community outreach plans with clear messages that resonate with target audiences.

VHB has the capabilities to support MPPDC, DWR, and the broader project team in interactions with the public and stakeholders, including public outreach materials/graphic design, facilitation, and interactive project feedback websites, and has provided these services to communities throughout the Mid-Atlantic region—**including the entire Middle Peninsula**. Our authentic approach resonates with community audiences, which leads to community consensus.

Community Meetings

To engage the community and stakeholders, VHB proposes supporting the project team through a series of meetings and workshops that encourage participation and authentic engagement throughout the study process:

» **Initial Community Meeting** – We have found that an initial open-house format community meeting can be incredibly valuable to introduce the project to the community and begin the engagement process, VHB building a foundation for future stakeholder support. This meeting will be conducted immediately following our documentation of existing conditions so that display materials can include mapping of resources and threats. An opening presentation would provide an orientation to project goals, timeline, and outcomes. It would also summarize important findings from the existing conditions assessment as well as types of potential strategies that might result from the plan. Communication would will focus on listening, understanding, and validating lived experience, utilizing multiple formal and informal formats to best capture concerns and important guiding insights.

  These **opportunities for interpersonal dialogues are critical for working productively with rural working waterfronts**. This timing and format will result in early input and engagement, enhancing the team's understanding of relevant issues and building meaningful relationships with key stakeholders.

» **Design Open House** – Our Conceptual Design Development task below includes a Design Workshop to engage stakeholders in developing alternative concepts. To present the draft concepts to the community and solicit input for refinement, VHB will conduct an open house gallery review, with a brief overview presentation followed by informal discussion of concept graphics.

A Local Partnership

Having recently worked with MPPDC, local waterman and community leaders on the Working Waterfront project, VHB has built relationships that will provide a strong foundation for the Guinea Marsh resilience effort.

The **presentation will connect the draft concepts back to the input gained from the initial community meeting, emphasizing the importance of people's engagement**. This approach will enhance community understanding of feasible strategies while generating additional ideas for refinement and prioritization of the design concepts.

» **Final Plan Presentation** – Following the concept development and Basis of Design, VHB will conduct a community meeting to present the final design approach. In addition to the design details and plans, this meeting will **include a summary of how the community's input was used to reach the Basis of Design**. The feasibility of the final concepts will be discussed, along with anticipated next steps for implementation and how community members can remain engaged.

Community Engagement Resources

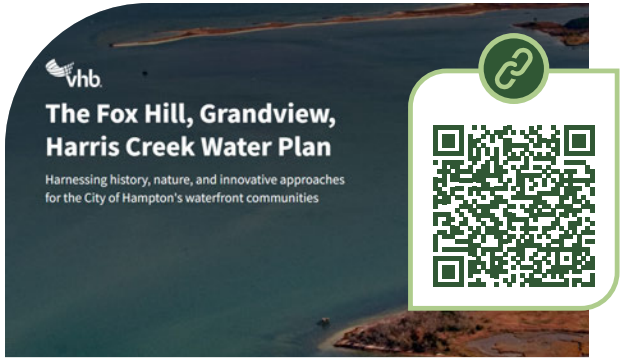
To support community meetings, we will work with MPPDC and the project team to develop a suite of outreach materials to help facilitate inclusive participation in the development of the design. Pending discussions with MPPDC and final project scoping, potential outreach materials could include:

» **Presentations:** We will develop slide decks for each of the community meetings. These will be designed to engage and inform, not overwhelm. They will present the goals of each workshop and the information to discuss in a manner that is easy to understand.

» **Virtual Project Room:** VHB proposes to develop a virtual project room to allow residents to interact with the project on their own won time and engage people who might not attend public meetings; we have successfully used this tool to share updates and capture additional community feedback on recent projects like the Tuckahoe Creek Park master plan in Henrico County.

» **StoryMap:** A StoryMap combines GIS mapping, embedded content, multimedia, and more into an interactive narrative that can create awareness, influence opinion, and affect change. We suggest that a StoryMap could serve as an effective tool for the GRIT project as well, allowing the team to document our background research, project understanding, and initial ideas for potential solutions. As the project progresses, the StoryMap will be updated with summaries of community feedback and site-specific project recommendations, including concept drawings. On recent similar projects like the Fox Hill, Grandview, and Harris Creek Water Plan in Hampton, VHB has deployed StoryMaps as an integral part of our community engagement process.

» **Infographics:** We propose to develop a series of simple, custom visuals to convey the specific flood risks, mitigation and adaptation goals, and potential solutions. Our team has done this in many other localities and provided the resulting educational products in a variety of formats, including a visual project timeline, one-page factsheets, online graphics and maps (such as StoryMaps), and large-scale posters for public meetings.



An integrated and insightful team

The VHB team leverages our integrated team to translate technical details into visual, easily-understood and interactive narratives that bring the project to life for the community. These narratives can be public-facing StoryMaps that are updated throughout the project duration (top) or interactive virtual rooms that combine multimedia with feedback capture (bottom). Click or scan the QR code above to see the Fox Hill StoryMap!

» **Videos:** A series of short (one to two minute) videos can be created to effectively and consistently present project information. Videos can be shown before community meetings, posted on social media, the MPPDC's website, and/or in the virtual project room for asynchronous viewing. Subtitles can also be incorporated in each video, as needed.

We recognize that this suite of digital tools is a supplement to **building authentic relationships of trust with key stakeholders**. VHB will work with MDDPC and the project team to address the positions and interests of community members with **targeted individual and small group meetings** as the need arises.

Designing for Resilience

For example, this video from VHB's recent work on Pungo Ferry Road in Virginia Beach was presented at the start of public meetings and shared on the Virginia Beach's website.

Task 2 – Comprehensive Existing Conditions Report (ECR)

TASK 2 QA/QC

Task 1 QA/QC will be managed by Doug DeBerry, in consultation with our Academic Advisory Team.

- ✓ Review 1: Outline and Table of Contents
- ✓ Review 2: Draft Data Figures and Maps
- ✓ Review 3: Draft Report

DELIVERABLES

- ✓ Draft + Final Comprehensive Existing Conditions Report
- ✓ Supporting GIS files and data files

The foundation of an effective resilience planning and implementation process is a clear and thorough understanding of the existing physical and biological conditions in the project area. Our team has already begun developing our fundamental understanding of the topography, hydrography, ecology, and existing infrastructure in Guinea Marsh, building on decades of experience in and around the marsh to develop a strong, detailed foundation for the planning and design process.

2.1 Desktop Analysis

The desktop analysis will build on previous work, including the 2023 Coastal Wetlands Plan for the York River, Piankatank River, and Mobjack Bay, the 2016 Gloucester County Shoreline Management Plan, and other documents, as well as publicly-available data sets and previously-collected site information from project partners to build a comprehensive summary of the physical, ecological, and cultural characteristics of Guinea Marsh. The goal of this effort is to develop a high-level understanding of marsh health and ecological function, determine key physical features in the landscape, and identify data gaps that will require additional field study to fully inform planning and design of stabilization, restoration, and adaptation techniques.

Key elements will address the physical setting (including site elevations and sediment conditions, existing and projected tidal datums, wave climate, shoreline change trends, and groundwater and surface water dynamics) as well as the ecological setting (including predominant as well as threatened and endangered species and critical habitat), historical context, and current land use. Key datasets for the initial assessment of marsh health and restoration/adaptation potential will likely include:

» **Detailed land use maps** from the Chesapeake Bay Conservancy that distinguish water, marsh, forest, residential, and agricultural land uses;

- **Present-day Marsh/Forest Boundaries** (Molino et al., 2021), addressing topographic slopes and elevations at potential migration points;
- **High-level Marsh Migration Projections** (Molino et al., 2022) associated with key sea level rise scenarios;
- **High-level Vegetation Health/Productivity Index maps** from Chen and Kirwan (2022) for present-day and documenting changes over time;
- **High-level and Detailed Unvegetated-Vegetated Ratio (UVVR) maps** from Ganju et al., (2024); and,
- **Updated Maps of historic berms** (updated from Hall et al., 2022), especially in relation to marsh migration corridors.

Understanding these factors is essential for developing projects that effectively reduce coastal hazards, meet regional resilience goals, and respect the area's ecological and cultural heritage.

2.2 Data Gap Identification

Building on this desktop effort the VHB team will be able to develop a comprehensive understanding of additional data needs. Through our integrated team, we will focus on needs that:

1. **Resolve unknowns** to support the development of conceptual restoration and protection designs;
2. **Refine site-specific information** in areas highlighted for high-level intervention;
3. **Ground-truth** the desktop understanding of existing site conditions; and,
4. **Provide environmental justification** for project implementation and future land conservation suitability analyses.

The VHB team brings deep experience in marrying desktop analyses with targeted data collection to address critical gaps by leveraging our integrated team as specialists in GIS and data analytics work alongside coastal engineers and ecologists.

From our experience, identifying data gaps early and providing time to strengthen this foundation of the project will streamline the design and permitting process, avoiding potential hiccups in downstream tasks.

2.3 Field Study & Data Assessment

The exact scope of the field study effort is difficult to define completely before the desktop analysis is complete, but we anticipate that the following field data will be required to address key design questions and justification:

- **Topographic & Bathymetric Elevations** will need to be collected using survey-grade equipment such as RTK GPS, LiDAR, and multibeam swath bathymetry, to confirm the accuracy of existing elevation data sources and to provide precise elevations and locations of key features in priority areas, including existing berms, habitat transitions (i.e., between low marsh and high marsh, or high marsh and the upland forest), tidal datums (i.e., mean low water, mean high water), and jurisdictional boundaries (1.5 times mean tide level). This effort will include the establishment of cross-shore transects in key areas. These transects will reach from the nearshore zone beyond mean lower low water to nearby upland areas, covering the beach, marsh zones, dunes, and upland transition.
- **Ecological assessments** will include vegetation plots on established transects to capture vegetation changes along the shoreline gradient and marshes. The VHB field team will document the elevation, habitat type, and vegetation species in each plot as well as vegetation changes, extent of invasive plants (especially *Phragmites*), characterization of wildlife habitat features (such as nests and/or feeding areas) and documentation of incidental wildlife observations.
- **Marsh and Historic Berm sediment samples** will be collected and evaluated for geotechnical properties to inform restoration design. This will provide an initial estimate of marsh bearing capacity to understand the potential consolidation of the marsh that may occur after implementation of beneficial sediment placement or shoreline protection measures. Samples of historic berms will focus on natural breaches berms to evaluate ideal spacing for new berm breaches and to quantify how much area of wetland will be created or restored for a given berm breach.


KEY
Virginia Protected Lands
Marsh
Low Marsh
High Marsh
Forests
Forest
Harvested Forest
Natural Succession
Tree Canopy over Turf Grass
Tree Canopy, Other
Based on existing site elevations and present-day tidal elevations, we're already seeing rising sea levels push marshes inland. Much of the protected area of Guinea Marsh is a patchwork of low marsh, as high marsh has been pushed into the surrounding communities and beneath existing forests.
N
0 0.28 0.55 Miles
vhb

- **Hydrodynamic data collection** will focus on developing site-specific tidal datums, documenting the magnitude and frequency of storm surge, and collection of site-specific wave data. Data will be correlated to nearby tidal gauges to understand long-term hydrodynamic conditions at key locations. This site-specific data will be critical for detailed design and permitting.
- **Additional water quality data** may be collected and evaluated in areas where submerged aquatic vegetation (SAV) and oyster reefs have been previously documented and/or at **locations identified as suitable for SAV or oyster reefs restoration** and creation to inform the viability of establishing these habitats to provide additional resilience benefits.

An integrated and insightful team

The VHB team brings the experience and expertise needed to proactively address data gaps. Additional details on our team's field capabilities are provided in Task 8.

2.4 Data Processing & Mapping

The integrated VHB team brings data processing to the forefront of the baseline assessment, using GIS to compile, standardize, and synthesize all relevant spatial datasets. Our team will identify, catalog, and evaluate shoreline studies, elevation and bathymetric data, SAV mapping, aerial imagery, hydrologic and hydraulic model outputs, and climate and SLR projections to provide that each dataset meets project needs for spatial accuracy, temporal relevance, and completeness. Following established geospatial best practices—including version control, source tracking, and standardized naming—VHB will reconcile overlaps, normalize datums and projections, and develop composite layers that accurately represent existing physical and ecological site conditions.

All processed spatial data will be delivered in an ESRI file geodatabase with clearly defined feature classes and raster datasets, referenced to a common horizontal and vertical datum agreed upon by the project team. Each deliverable will include fully compliant metadata describing sources, methods, processing steps, accuracy, limitations, and recommended uses. Organized folder structures and accompanying map documents will allow MPPDC and project partners to efficiently interpret, validate, and reuse these datasets throughout future planning, analyses, and design phases.

esri
Partner Network Gold

2.5 Existing Conditions Report

Once physical and biological conditions are understood, the VHB team brings the experience to implement a variety of hydrodynamic and morphologic modeling techniques to further establish baseline characteristics of the study area. Examples of the various methods that we employ are provided in support of Task 4 and the ultimate selection of this approach would be based on specific project assignments and site conditions.

Following the desktop data analysis, field data collection, and any necessary baseline modeling, the team will develop a concise but comprehensive evaluation of the existing conditions within the project area and will identify potential focal points for the conceptual design. The data assembled in support of Task 2 and the Existing Conditions Report will supplement past work and provide the comprehensive understanding of the physical and ecological conditions at the site necessary for identification of regional vulnerabilities and restoration opportunities.

Task 3 – Conceptual Design Development

TASK 3 QA/QC

Task 3 QA/QC will be managed by Rebecca Francese, in consultation with our Academic, Contractor, and Industry Advisory Teams.

- ✓ Draft Alternatives Summary
- ✓ Draft Sediment Availability and Timing Analysis Technical Memorandum (Optional)
- ✓ Design Review Workshop

DELIVERABLES

- ✓ Conceptual Design Drawings
- ✓ Draft and Final Alternatives Summary
- ✓ Draft and Final Design Review Workshop Notes
- ✓ Draft and Final Sediment Availability and Timing Analysis Technical Memorandum (Optional)

The VHB team will initiate conceptual design development through a structured, workshop-based process that engages the right stakeholders at the outset to align with community priorities, regulatory considerations, and the broader resilience objectives of the GRIT Project. The initial workshop will bring together MPPDC, DWR, academic partners, and local stakeholders to refine the project's needs and clarify areas of emphasis, including shoreline vulnerability, community expectations, ecological sensitivities, and opportunities for nature based adaptation across the Guinea Marsh complex based on results of the Existing Conditions Report. This early engagement is intended to directly incorporate local knowledge, lived experience, and the priorities of those who interact most closely with the marsh system into the conceptual alternatives—forming a grounded foundation and stakeholder support for the design work that follows.

3.1 Conceptual Design Alternative Development

Building on the Existing Conditions Report and stakeholder input gathered from the initial workshop, the VHB team—including key academic, industry, and construction advisory members as well as representatives from the project team—will conduct a working design workshop to collaboratively develop **three distinct conceptual alternatives**, each reflecting a different balance of constructability, cost, ecological uplift, and long term marsh adaptation. These concepts will draw directly from the GRIT Project's focus areas—marsh edge stabilization, dune and beach enhancement, wetland restoration, and hybrid nature based solutions—and will be framed using a "three sided Venn diagram" approach in which alternatives prioritize different combinations of **(1) practical constructability and cost efficiency, (2) protection and enhancement to restore historical conditions, and (3) adaptation to anticipated future conditions** under accelerating sea level rise to identify approaches that can work together to optimize marsh health and migration through active adaptive management.

Optional Add-on Task: Sediment Availability and Timing Analysis

To identify potential sources of dredged sediment for beneficial use on Guinea Marsh, the team will work with MPPDC and Middle Peninsula Chesapeake Bay Public Access Authority (MP-PAA) to leverage our understanding of prioritized dredging projects in proximity to the restoration sites while coordinating with key stakeholders, including the U.S. Army Corps of Engineers (USACE) Norfolk District and the Virginia Marine Resources Commission (VMRC), to evaluate options for beneficial use of dredged material.

This task will involve coordination with MPPDC, MP-PAA, and USACE to confirm project timelines and equipment availability, ensuring alignment between dredging operations and restoration activities. Findings will be documented in a summary of potential sediment sources, including dredge equipment considerations and proposed schedules to synchronize material availability with project implementation on Guinea Marsh. This proactive coordination is expected to ultimately reduce construction costs, minimize logistical challenges, and maximize opportunities for beneficial reuse of sediment.

These conceptual alternatives—each including preliminary drawings and an Engineer's Opinion of Probable Cost—may incorporate techniques such as sediment placement, oyster reef construction, submerged aquatic vegetation (SAV) bed development, sand motors, and dune restoration, as well as hybrid shoreline solutions.

The suite of design alternatives will be evaluated through a multi-criteria decision analysis (MCDA) that considers constructability, cost, performance, ecological enhancement (through habitat richness and function), and ability to evolve with shifting hydrodynamic and geomorphic conditions other relevant factors. The MCDA will be initiated by the VHB team and refined through an iterative, transparent process with project partners as part of the Design Review Workshop. Results of the MCDA will be documented in an Alternatives Summary, identifying a preferred alternative to advance to conceptual design.

3.2 Design Review Workshop

A final design review workshop will convene the full project team to evaluate the three conceptual alternatives, discuss preferred elements, and identify opportunities to integrate synergistic components across the options. Through this collaborative review, the concepts will reflect the combined expertise of coastal engineers, ecologists, modelers, GIS analysts, and community engagement specialists—**resulting in a preferred concept that is technically sound, ecologically responsible, and responsive to both current and future resilience needs**.

Through this iterative and multidisciplinary process, the final conceptual designs will emerge as cohesive, defensible, and actionable visions that capture the strengths of the entire project team while providing clear pathways for refinement during subsequent design phases.

Task 4 – Basis of Design Report (BOD)

TASK 4 QA/QC

Task 4 QA/QC will be managed by Rebecca Francese, in consultation with our Academic, Contractor, and Industry Advisory Teams.

✓ Draft Basis of Design Report, including supporting materials

DELIVERABLES

✓ Draft and Final Basis of Design Reports, including all supporting material

VHB's multidisciplinary coastal engineering and ecological design team will prepare a **comprehensive Basis of Design Report (BOD)** that documents the selected restoration and protection strategy for the Guinea Marsh complex and establishes the technical foundation necessary for subsequent design, permitting, and phased implementation. Building directly from the Existing Conditions Report and Conceptual Design process, the BOD will clearly articulate how site specific conditions, community priorities, regulatory considerations, and long term climate adaptation goals shape the final design approach.

1. Site characterization and sediment analysis (Task 2);
2. Hydrodynamic and wave modeling for design conditions (Task 4);
3. Compaction and consolidation modeling to refine placement elevations (Task 4);
4. Iterative design of containment and stabilization features (Task 3); and
5. Development of an adaptive management plan (Task 4/Task 5).

4.1 Design Approach and Criteria

The BOD will define the overarching **design philosophy** for the preferred nature based and hybrid suite of solutions, including marsh edge stabilization, thin layer placement (TLP), dune and beach enhancement, and upland conservation components as applicable. This section will document the role of **constructability, access logistics, environmental constraints**, and **long term resilience goals** in selecting the preferred alternative. Design criteria will translate site hydrodynamics, ecological conditions, sediment characteristics, and anticipated future sea level rise into actionable engineering parameters that guide component sizing, elevations, and material selection.

At a minimum, the BOD will establish:

- **Hydrodynamic conditions** including representative tidal elevations, surge levels, nearshore wave heights, wave periods, wind regimes, and wave exposure gradients across the marsh complex.
- **Future water level scenarios**, consistent with state-recognized sea level rise guidance, to keep all design elements adequately resilient under mid century and late century conditions.
- **Sediment design criteria** for TLP and beneficial use of dredged material—including grain size compatibility, organic content, lift thickness, consolidation behavior, and target post settlement elevations that promote marsh vegetation recovery.
- **Ecological design parameters** tied to marsh vegetation survival thresholds, habitat transitions, berm breach spacing, invasive species considerations, and opportunities for synergistic habitat creation (e.g., SAV expansion or oyster reef enhancement).
- **Constructability and permitting considerations**, acknowledging regulatory sensitivities related to SAV avoidance, oyster lease interactions, and habitat tradeoffs.

Design of TLP on Guinea Marsh, if appropriate and pursued, will be grounded in research by our academic partners and will follow updated guidance including the 2023 USACE Guidelines for Approaching Thin-Layer Placement Projects (Piercy et al. 2023), the recently published Wetland Restoration Using Thin Layer Placement: Best Management Practices for the Commonwealth of Virginia (Elizabeth River Project, 2025), and the upcoming VMRC Beneficial Use Guidelines for the Commonwealth of Virginia.

4.2 Model Results and Supporting Analyses

To establish defensible design conditions, the BOD will summarize results from project specific numerical modeling, including:

- **Two dimensional spectral wave modeling** (e.g., SWAN or similar) of the marsh complex under design storm conditions associated with present-day and anticipated future sea levels to capture the local refraction/diffraction effects, variable fetch, and direction dependent wave climate; and,
- **Consolidation and settlement modeling** based on geotechnical data to support design of TLP elevation targets and long term stability of placed sediment.

These analyses will be summarized in the BOD with clear graphics, maps, and tables to support design justification and future permitting discussions.

4.3 Phased Implementation Recommendations

Recognizing the scale of the Guinea Marsh complex and the need to align construction windows with sediment availability, ecological cycles, and regulatory requirements, the BOD will outline a **strategic phasing plan** that:

- Prioritizes areas with highest erosion rates, marsh vulnerability, and exposure to wave energy;
- Coordinates construction with anticipated dredging schedules identified during the sediment availability assessment;
- Sequences TLP implementation to allow for appropriate consolidation before subsequent phases;
- Aligns with upland conservation and marsh migration corridor goals;
- Identifies “early action” opportunities that can build momentum for broader restoration; and
- Integrates adaptive management checkpoints to refine design parameters as field conditions and monitoring results evolve.

Phasing recommendations will be fully integrated with cost estimates and supported by model derived insights into short and long term marsh performance.

4.4 Cost Estimates

The BOD will provide **Engineer’s Opinions of Probable Cost** for each major project component and implementation phase. Costs will include:

- Material sourcing and delivery (including dredged material availability and transport distances);

- Construction access and staging requirements;
- Mobilization/demobilization and containment structures;
- Marsh planting and ecological restoration elements;
- Monitoring and adaptive management needs; and
- Long term maintenance considerations tied to climate adaptation.

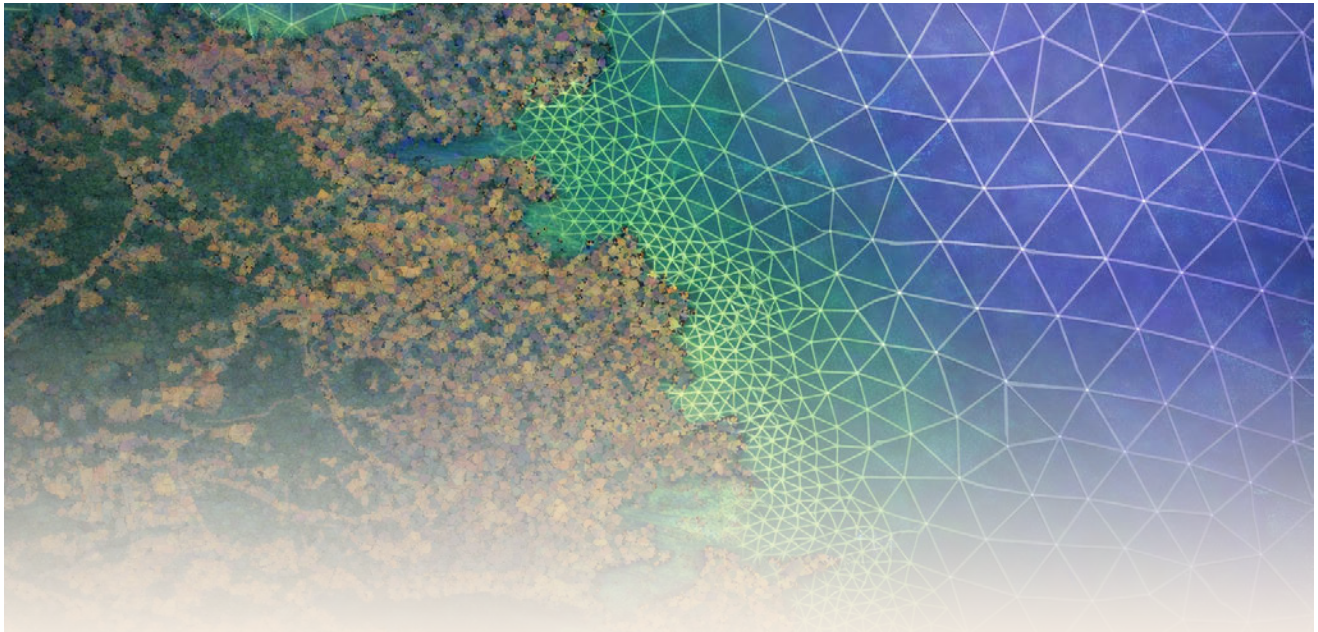
Cost ranges will reflect uncertainties inherent to early phase design but will be sufficiently detailed to support prioritization, funding discussions, and readiness for future stages.

4.5 Draft BOD Review Meeting

Prior to finalizing the BOD, VHB will participate in a **full project team review meeting**, bringing together MPPDC, DWR, academic partners, and other GRIT Project collaborators. This meeting will:

- Present draft modeling outputs, design criteria, cost estimates, and proposed phasing;
- Facilitate structured discussion, clarification, and refinement of assumptions;
- Incorporate regulatory, ecological, construction, and community priorities; and
- Build consensus on the preferred design approach before advancing into final documentation.

Feedback from this workshop will be consolidated into the **Final Basis of Design Report**, positioning the project for a seamless transition into future design phases and permitting.



Designing for resilience

Our team leverages advanced numerical modeling techniques to refine site-specific designs, building confidence in an advanced understanding of anticipated design conditions. VHB proposes to use the following parameters as input into the spectral wave model. These inputs will be confirmed with the project team prior to the start of spectral wave modeling and will be further detailed in the Basis of Design Report. Site-specific hydrodynamic data collected in Task 2 will be used for model validation.

- **Topography and Bathymetry:** Site-specific topographic and bathymetric survey will be completed as part of Task 2 as needed to supplement 2019 NOAA NGS Topobathymetric LiDAR and 2018 USGS LiDAR.
- **Wind:** NOAA NCEI stations will be used to develop site-specific wind conditions at the project site. VHB will use the available stations closest to Guinea Marsh to extract wind data for SWAN modeling with an initial cross-check against historical wind patterns observed at the Langley Air Force Base (1972–Present) and NDBC Station 44072 (York Spit, VA) will be used to confirm predominant wind conditions.
- **Stillwater (surge + tide):** VHB will use stillwater elevations from USACE NACCS to develop appropriate stillwater input conditions for the site-specific spectral wave model.
- **Sea-level Rise:** Site-specific sea-level rise projections will be applied for model scenarios representing conditions in 2030 (present-day), 2050, and 2070 to capture changing wave hazards along the marsh shoreline.

This image was generated using artificial intelligence and provided for illustrative purposes only.

Task 5 – Resilience Feasibility Assessment

TASK 5 QA/QC

Task 5 QA/QC will be managed by Doug DeBerry, in consultation with our Academic Advisory Team.

✓ Draft Feasibility Assessment Report

DELIVERABLES

✓ Draft and Final Feasibility Assessment Report

✓ Supporting GIS geodatabase with metadata and analysis files as appropriate

VHB will use a resilience lens throughout development of concepts to embed the **technical and economic feasibility** in the foundation of the alternatives. The long-term resilience of the marsh is ultimately determined by the resilience of the system as a whole, including how the materials used for shoreline protection age under rising seas and larger storms, how each design responds to large storm events, and how existing and planted vegetation responds to specific storm impacts along with more gradual trends of warming and SLR.

Our goal is to **integrate GIS analysis into this assessment to produce a more quantifiable and defensible feasibility evaluation of marsh resilience measures**, focusing on identifying where interventions can be implemented successfully, what they will cost, and how they will perform over time under changing coastal conditions. Using a combination of spatial data, scenario-based modeling, and map-driven decision support, we will **compare nature-based and hybrid interventions and translate findings into clear, actionable findings for engineering and ecological design development**. This work will be underpinned by our system-level understanding of marsh sustainability, recognizing that long-term performance ultimately depends on how all components function together.

5.1 Baseline Geospatial Data Compilation and Existing Conditions Integration

Building on the existing conditions assessment detailed in Task 2, we will compile and standardize the best available datasets to establish a **unified, geospatially-backed baseline** for modeling and design coordination. Key inputs include, but are not limited to, LiDAR-derived topography, bathymetry, shoreline change datasets, marsh vegetation and habitat mapping, sediment characterization, hydrodynamic modeling outputs, aerial imagery, and climate and SLR projections. All data will be normalized to consistent horizontal and vertical datums and delivered as part of a **structured geodatabase with complete metadata** with the requisite traceability and repeatability of analyses.

5.2 Intervention Suitability and Constructability Mapping for TLP and Dredged Material

Using spatial analysis, we will identify and screen candidate intervention areas based on parameters such as constructability, performance potential, and environmental constraints. For TLP, for example, we will evaluate elevation and tidal position, sediment characteristics, hydrologic conditions, and tolerance of vegetation to penetrate through thin layers to determine where placement can achieve a balance of effective marsh accretion without ecological harm or additional planting requirements. Similarly, for interventions which maximize beneficial use of dredged material, GIS will be used to assess dredge source proximity, material suitability, transport corridors, placement feasibility, and staging opportunities. This screening will result in **suitability maps and prioritized intervention zones that directly support concept-level development and cost estimation.**

5.3 Resilience Benefits Modeling Under SLR and Storm Scenarios

We will quantify resilience benefits by modeling the effect of interventions on marsh elevation, shoreline exposure, and overall vulnerability over time. GIS will serve as an integration platform for SLR scenario surfaces, storm surge extents, and geomorphology change projections.

We will evaluate performance of intervention under multiple future SLR conditions and explicitly test system response to extreme storm conditions. Geospatial outputs will include **spatial vulnerability indices, exposure maps, and change detection layers that illustrate how nature-based and hybrid interventions alter risk profiles for marsh habitat and adjacent infrastructure.**

5.4 System-Level Long-Term Resilience Assessment

Our approach emphasizes that marsh resilience is determined by the combined resilience of the system rather than by any single element. As such, GIS will be used to **link engineering and ecological performance into a unified spatial evaluation framework**. Engineering factors may include aging and durability of shoreline protection materials (e.g., erosion, displacement, loss of elevation), response to flood events, and long-term maintenance considerations. Ecological factors may include vegetation survivability, habitat suitability, and marsh migration potential. These combined factors will be integrated into a system performance matrix that evaluates how interventions function over time as both physical and biological conditions evolve under changing climatic conditions.

5.5 Economic Feasibility and Spatial Cost Drivers

To support economic feasibility assessment, we will develop GIS-based cost surfaces to support relative construction and lifecycle cost implications across intervention options. This will include travel time and distance for dredged material, access and staging constraints, constructability limitations, and maintenance/repair likelihood under varying hazardous condition scenarios. **Outputs generated from this analysis will inform unit-cost applications, alternative comparison, and cost-benefit narratives by linking costs to measurable resilience outcomes and service-life expectations.**

5.6 Coordination with Engineering and Ecological Assessments

Throughout this effort, GIS will function as a valuable coordination tool across disciplines. A shared geodatabase and map-based review products will serve to **align ecological constraints, engineering assumptions, and resilience metrics**. Iterative map reviews and checkpoint meetings will provide opportunities to validate assumptions, confirm interpretation of model outputs, and refine intervention footprints.

Task 6 – Land Conservation Suitability Assessment

TASK 6 QA/QC

Task 6 QA/QC will be managed by Doug DeBerry, in consultation with our Academic Advisory Team.

- ✓ Mapping Review and Ranking Discussion
- ✓ Draft Land Conservation Suitability Assessment Report

DELIVERABLES

- ✓ Draft and Final Land Conservation Suitability Assessment Report
- ✓ Supporting GIS geodatabase with metadata and analysis files as appropriate

The Land Conservation Suitability Assessment will similarly be conducted using a GIS-based, data-driven methodology that builds directly upon the compiled and synthesized datasets developed as part of the Existing Conditions Assessment. **This GIS-based approach provides analytical consistency across tasks, minimizes data duplication, and provides the necessary living, adaptable framework for identifying and prioritizing parcels and corridors suitable for future land protection or conservation easements.**

6.1 Data Foundation and Integration

The assessment will leverage and expand upon the authoritative GIS datasets compiled from previous assessments, including land use and land cover, parcel boundaries, ownership information, elevation and bathymetry-derived surfaces, ecological and habitat datasets, project inundation and sea level rise layers, and any relevant regulatory or conservation designations. All datasets will be reviewed for spatial accuracy, temporal relevance, and compatibility, and normalized to the coordinate system and vertical datum consistent with those compiled during the Existing Conditions Assessment. **As in Task 5, the team will take an integrated approach that looks across the whole of the system and recognizes that present day and future ecological value equates benefits such as migration potential on the fringe of the existing wildlife refuge.**

Where necessary, additional publicly available or agency-provided datasets will be incorporated to address data gaps related to conservation value, connectivity, or land management constraints. All data sources and assumptions will be documented in the metadata and within the assessment report for transparency.

6.2 Suitability Criteria Development

In coordination with other members of the project team, VHB will define a set of **suitability criteria aligned with project goals and stakeholder priorities**. These criteria will include, at minimum, land use and zoning, parcel size and ownership, elevation and vulnerability to future inundation, ecological value (e.g. presence of priority habitats, SAV, wetlands, or wildlife corridors), and proximity to existing conservation lands or natural corridors.

Each criterion will be standardized within GIS using appropriate classification methods (e.g., normalization scoring), with weighting factors applied to reflect relative importance and informed by project objectives and refined through project team and stakeholder input. This criteria framework will be documented and reviewed prior to final analysis.

6.3 GIS-Based Suitability Analysis

Using the established criteria and weights, VHB will perform a **multi-criteria GIS suitability analysis to identify the parcels and corridors with high conservation potential**. Spatial overlay as well as raster- and vector-based scoring techniques will be used to generate composite suitability outputs and parcel-level scores. The analysis will be designed to be repeatable through use of tools such as ESRI's ModelBuilder or Python, allowing assumptions and weights to be easily adjusted if needed during review.

Results will be summarized at both the corridor and parcel scale, with GIS outputs clearly distinguishing areas of high, moderate, and low suitability. **Prioritization will be given to areas such as those with ecological connectivity, resilience to current and future inundation, and opportunities for contiguous or strategic conservation outcomes.**

VHB recognizes that data and AI alone cannot fully capture site conditions. By pairing our Subject Matter Experts with experienced GIS Analysts, we are able to create a thorough prioritization framework that balances data-driven analysis and real-world insights. When feasible, desktop-level GIS screening is supplemented with on-site condition reviews, stakeholder feedback, and historical site data. This data is integrated into a normalized, multi-criteria ranking system that compares candidate parcels, corridors, or sites across all relevant variables to create a consistent and repeatable process, while remaining flexible to stakeholder priorities, equity considerations, and program goals.

6.4 Output Mapping and Data Deliverables

VHB will produce clear, publication-quality mapping deliverables illustrating suitability results, priority parcels, and conservation corridors. Parcel prioritization will be generated directly from GIS outputs and will include key attributes such as parcel ID, ownership, acreage, suitability score, primary consideration drivers, and identified constraints. Optionally, VHB can publish GIS outputs to our ArcGIS Online account for development of a web mapping application to allow stakeholders to dynamically engage with the data and aid in the prioritization review process.

As detailed in Task 2, all GIS deliverables will be provided in industry-standard formats and accompanied by metadata prepared in accordance with national recognized standards consistent with Virginia state GIS practices and guidance. **Metadata will document data sources, analytical methods, weighting assumptions, limitations, and appropriate use considerations.**

6.5 Project Team Review and Ranking Refinement

Prior to finalization, VHB will facilitate a structured mapping review and ranking discussion with the project team. Draft maps, suitability outputs, and parcel prioritization tables will be presented to solicit feedback, validate assumptions and confirm that results align with project objectives. This review will provide an opportunity to adjust criteria weights, thresholds, or exclusions based on collective expertise and stakeholder priorities. Feedback from this review will be documented and incorporated into the final suitability analysis and rankings, ensuring final results reflect both quantitative GIS analysis and qualitative project knowledge.

Task 7 – Environmental and Regulatory Documentation

TASK 7 QA/QC

Task 6 QA/QC will be managed by Rebecca Francese, in consultation with our Academic Advisory partners at VIMS.

- ✓ Draft Environmental Evaluation Summary
- ✓ Draft JPA Package
- ✓ Draft Regulatory Strategy Framework and Compliance Pathway Technical Memorandum

TASK 7 DELIVERABLES

- ✓ Complete Draft Environmental Evaluation Summary
- ✓ Complete Draft JPA Package
- ✓ Draft and Final Regulatory Strategy Framework and Compliance Pathway Technical Memorandum

Successful implementation of nature based and hybrid restoration at Guinea Marsh will require early, coordinated environmental documentation that clearly articulates the project's purpose, anticipated effects, and compliance pathways while proactively supporting regulatory review. Building on our longstanding relationships with resource agencies and our deep awareness of the permitting landscape for tidal marsh restoration, the VHB team will prepare clear, defensible materials that position the project team for efficient permitting in subsequent phases.

Our approach emphasizes early engagement, transparent justification, and documentation aligned with the realities of working in a complex tidal marsh system surrounded by SAV, public clamming grounds, and active oyster aquaculture leaseholds.

> **Permitting thin-layer placement (TLP) projects on tidal marshes often faces hurdles rooted in long-standing restrictions on placing fill within wetlands. The VHB team has successfully navigated these challenges by engaging regulatory agencies early, fostering frequent and meaningful collaboration, and reframing TLP as a restoration strategy rather than a fill activity. Demonstrating the ecological consequences of "no action", such as complete loss of the Guinea marshes under accelerating sea-level rise, has proven critical in gaining agency support.**

7.1 Environmental Evaluation Summary

The VHB team will prepare an **environmental evaluation summary** that synthesizes anticipated project effects, mitigation needs, regulatory requirements, and compliance pathways. This summary—developed in close coordination with MPPDC, DWR, and academic partners—will document:

- » **Anticipated temporary and permanent impacts** to tidal wetlands, marsh vegetation, shallow subtidal areas, and adjacent SAV beds.
- » **Indirect and cumulative effects**, including short-term turbidity or access impacts associated with beneficial use of dredged material, TLP implementation, and marsh edge stabilization.

- **Mitigation needs**, including opportunities for on site ecological uplift that can offset habitat conversions (e.g., low marsh to high marsh, mudflat to vegetated marsh, or increased marsh platform resilience).
- **Regulatory sensitivities**, such as proximity to oyster leaseholds, avoidance of mapped SAV (2020–2024), adherence to submerged lands mandates, and compliance with the Virginia Tidal Wetlands Act, Clean Water Act Section 404/401, and VMRC Subaqueous Lands permitting.
- **Compliance pathways**, including sequencing among the USACE, VMRC, DEQ, and local Wetlands Board, and identification of datasets required to support impact justification, alternatives analyses, and Coastal Zone Consistency evaluations.

This evaluation will be drafted for **review by MPPDC, DWR, and the project team** to provide clarity, completeness, and alignment prior to integration within the Joint Permit Application (JPA).

7.2 Joint Permit Application (JPA) Development

Recognizing that the conceptual designs must be structured to advance efficiently into the permitting environment, VHB will prepare **at least one draft JPA package** fully aligned with agency expectations and grounded in verified site conditions. Rather than simply compiling standard forms, our team will develop a defensible, field verified submittal package that supports regulatory confidence and minimizes future Requests for Additional Information (RAIs).

The draft JPA will include:

- JPA form and project description;
- Purpose and need statement aligned with the Basis of Design;
- Field verified existing conditions (photographs, elevation data, vegetation zones, oyster lease locations, SAV mapping, and hydrodynamic context);
- Impact tables and figures;
- Alternatives analysis demonstrating avoidance/minimization and justification for proposed habitat conversions;
- Preliminary grading, erosion and sediment control approaches;
- Coastal Zone Management Act consistency narrative (if applicable); and,
- Supporting memoranda summarizing sediment compatibility, TLP justification, and ecological uplift.

Because **the project involves eight oyster aquaculture leaseholds, significant SAV presence, and regionally important marsh habitat**, the draft JPA will clearly document impact avoidance strategies—including footprint refinement, construction access planning, staging location evaluation, and justification of TLP or beneficial use placement on ecologically appropriate substrates.

Optional Add-on Task: Monitoring and Adaptive Management Plan

Our team has found that Monitoring and Adaptive Management Plans, when integrated into permit conditions, serve as critical vehicles for post-implementation design modification to address habitat restoration success. This plan establishes baseline data, performance benchmarks, and contingency measures, enabling iterative adjustments, such as modifying placement thickness or adding vegetation, based on observed site response. By linking documentation to adaptive management, the project will have long-term resilience and ecological success under dynamic coastal conditions.

7.3 Pre-application Coordination

While **formal JPA submittal is not included** in this scope, VHB will conduct robust **pre-application coordination** so that once submitted, the JPA is positioned for timely and favorable review. This includes early engagement with:

- **U.S. Army Corps of Engineers (USACE)** – to clarify jurisdiction, TLP treatment, and wetland conversion considerations;
- **Virginia Marine Resources Commission (VMRC)** – to confirm submerged lands encroachment limits, SAV avoidance strategies, and rationale for beneficial use of sediment;

- **Virginia Department of Environmental Quality (DEQ)** – to confirm Virginia Water Protection requirements, potential VPP pathways, and CZMA consistency needs;
- **Gloucester County Wetlands/CBPA Board** – to review marsh restoration components between MHW and MLW and identify opportunities to streamline local approval; and,
- **DHR and NOAA Fisheries/USFWS**, as needed, to address cultural and endangered species considerations.

Each discussion will be documented and reflected in revisions to the draft environmental evaluation summary and JPA package. By engaging agency staff early—before design footprints are locked in—we will proactively address concerns, reduce the likelihood of significant design revisions, and build a shared understanding of site constraints and restoration goals.

7.4 Regulatory Strategy and Documentation Framework

To support MPPDC's readiness for future phases, VHB will prepare a concise regulatory pathway matrix summarizing the anticipated permits, regulatory triggers, and required documentation for TLP, marsh migration enhancements, dune restoration, and hybrid shoreline elements. This framework will also outline:

- Expected review timelines;
- Anticipated RAI topics and how our design reduces uncertainty;
- Opportunities for phased permitting tied to sediment availability; and,
- Alignment with state and federal resilience guidance (e.g., Coastal Resilience Master Plan, Habitat Focus Area priorities).

This matrix will serve as a roadmap for permitting once final design begins.

Task 8 – Optional Task – Field Services

This team has been assembled to provide MPPDC and the broader project team with the capabilities to address any field data needs that may arise as part of this project. Specific offerings are described below.

Survey and GIS

VHB's survey team tailors services to each project's environment and requirements, offering GIS, surveying, UAV, planning, engineering, and environmental expertise. With more than 100 surveyors and over 50 applied technology staff, we have broad experience collecting, integrating, processing, and visualizing geospatial data. Using an innovative GIS and data management platform, we improve how field data is collected and integrated, making it more effective for clients. We apply technologies such as LiDAR (terrestrial, mobile, and UAV) alongside strong fundamentals to support Enterprise GIS strategic planning, data development, implementation, application development, integration, 3D visualization, and spatial analysis, delivering creative, efficient, and cost-effective solutions.

Drone Services and Technology

VHB's award-winning UAV and USV team consists of commercially certified pilots experienced in using drone technology for inspections, engineering, surveying, and marketing. Having flown thousands of missions in 12 states, we help clients obtain data safely and efficiently. Our fleet of professional-grade aircraft is equipped with LiDAR, thermal imaging, and high-resolution cameras to support surveying, inspection, photography, and videography. Operations are supported by a real-time pilot and fleet management system that oversees training, experience, and maintenance to ensure high-quality service and strong safety performance. Our team operates in varied conditions and has obtained FAA waivers to work beyond standard Part 107 limitations, offering clients flexible, responsive deployment of aircraft and pilots.

LiDAR Point Clouds

VHB has the tools and expertise to process point clouds from aerial, mobile, terrestrial LiDAR, and UAV-collected orthophotography. Our technicians segment point clouds, extract features, and create surfaces using a range of specialized software. Depending on project needs, we use TopoDOT within Bentley Connect/OpenRoads for feature extraction, Leica Cyclone and Trimble Realworks for registering, segmenting, and modeling point clouds, ContextCapture for UAV photogrammetry, and Edgewise for BIM modeling. This breadth of capability allows us to efficiently transform raw point cloud data into accurate, usable deliverables.

Topographic Survey

VHB's in-house survey team initially uses existing GIS and aerial data, then applies on-the-ground topographic surveys as project alternatives become more defined to document constraints and existing conditions. These services are integrated with VHB's multidisciplinary capabilities and fully computerized CADD-based engineering workflows. Our Professional Land Surveyors have completed thousands of right-of-way, topographic, and aerial mapping surveys using advanced electronic instruments and GPS. All surveys are performed on a State Plane Coordinate System and known Vertical Datum, with methods adjusted to meet project accuracy requirements. For high-accuracy work, we use static and real-time kinematic GPS and differential leveling; for less stringent needs, we employ real-time network solutions with NOAA CORS. We can also prepare detailed geodetic reports documenting equipment, procedures, control, data formats, error analyses, and point inventories.

Bathymetric Survey

VHB provides specialized hydrographic surveying and related engineering services for maintenance and new work dredging in accordance with Corps of Engineers standards. With more than 47 years of experience on river, harbor, and coastal projects, we have supported federal, state, and local agencies, utilities, industry, shipyards, terminals, private developers, and AEC firms.

Our services include automated single- and multi-beam hydrographic surveys, specialized investigations such as tidal current studies and sediment and water sampling, and robust CADD capabilities for data processing and mapping. A fleet of six survey vessels, including enclosed cabin boats with booms and winches, allows us to deploy portable hydrographic systems in waterbodies ranging from small ditches and stormwater lakes to offshore Atlantic environments, enabling efficient and versatile survey operations.

Biological Surveys

Biological surveys are a core part of VHB's environmental services, including both general habitat assessments and species-specific surveys under the Endangered Species Act and the Bald and Golden Eagle Protection Act. We understand the requirements associated with Incidental Take under Section 10 and assessments under Section 7, which are often triggered by Section 404 permitting.

Our staff is prepared to survey for species such as Northern Long-eared Bat, Tricolored Bat, Eastern Black Rail, and Monarch Butterfly in areas like Guinea Marsh. Across the East Coast, we have conducted numerous rare, threatened, and endangered species surveys, working closely with clients, State Natural Heritage Programs, USFWS, and NOAA Fisheries. We help identify potential species presence, develop survey plans, conduct fieldwork, report results, and propose conservation and mitigation measures, addressing regulatory hurdles early to keep projects moving from concept to completion.

Natural Resource Investigations and Recordation

VHB has extensive experience performing wetland and stream determinations, delineations, and functional assessments across the Mid-Atlantic, covering linear corridors exceeding 55 miles and tracts over 5,000 acres in varied tidal and non-tidal habitats.

We use tablet-based GPS data collection and custom applications to efficiently confirm field conditions, refine existing databases, and document other resources such as farmlands, Section 4(f) properties, and floodplains. Our staff routinely conducts field inventories, jurisdictional determinations, regulatory coordination, technical reports, and permit application preparation. Using current delineation guidance such as the 1987 USACE Wetland Delineation Manual, we identify and flag jurisdictional resources, then have licensed surveyors map them. Where jurisdictional resources are present, we prepare Jurisdictional Determination requests to USACE and DWR, including required forms, mapping, and supporting information, and coordinate with agencies to verify resource boundaries, helping clients navigate evolving environmental regulations and make informed project decisions.

Sediment Characterization and Geotechnical Evaluation

To support sediment characterization and geotechnical evaluation in marsh environments, VHB has included Schnabel as a project partner. Schnabel specializes in subsurface exploration in soft, low-bearing-capacity and environmentally sensitive settings, using equipment such as ATV-mounted drill rigs, low-ground-pressure swamp rigs, temporary matting, and hand tools to obtain cores and samples with minimal disturbance. Explorations are overseen by geotechnical engineers or geologists to ensure quality and safety. Schnabel's three certified laboratories in Virginia perform tests such as grain size, Atterberg limits, organic content, density, consolidation, and shear strength to evaluate soil behavior. Field observations are correlated with lab results and, where needed, empirical correlations from penetration tests and similar indices, supplemented by comparison with analogous projects. This combined approach provides reliable characterization of marsh substrates to inform design decisions, constructability, and long-term environmental stability.

Feasibility of the Approach

VHB's approach begins with a clear, data-driven understanding of Guinea Marsh's physical and ecological setting and the mechanisms driving loss—marsh-edge erosion, prolonged inundation, island fragmentation, and localized shoaling—while explicitly designing for future sea-level rise and storm conditions rather than relying on historical baselines alone.

We appreciate that the proposed tasks follow our standard practice: front-loading the work that most directly determines implementation to rapidly develop a sound foundation for design. For Guinea Marsh, this will look like:

- Identifying primary construction access points as they will be integral to the design and permit process
- Identifying data gaps that affect design decisions
- Conducting targeted field assessments to validate elevations, habitat transitions, sediment properties, and site-specific hydrodynamics

This integrated foundation—delivered through mapped products and a structured geodatabase—creates a defensible basis for concept development and minimizes downstream redesign risk by ensuring that conceptual footprints, elevations, and materials are aligned with on-the-ground conditions from the outset.

Constructability and permitting feasibility are embedded into our process from the start, recognizing that successful marsh restoration and thin-layer placement in this setting must proactively address regulatory sensitivities, including avoidance and minimization of impacts to submerged aquatic vegetation, coordination with existing oyster aquaculture leaseholds, and justification of both temporary construction effects and longer-term habitat tradeoffs. We will weave constructability into the conceptual design stage by evaluating access and staging constraints, sediment compatibility and bearing capacity considerations, containment and retention requirements, and practical phasing that reflects recovery trajectories for marsh vegetation. In parallel, we will initiate early agency coordination and develop the documentation needed to support a streamlined review pathway—grounded in alternatives analysis, a clear basis of design, and site-specific modeling where appropriate—**so that the preferred concept is not only technically viable but also permittable within the realities of Virginia's regulatory environment.**

Finally, the long-term feasibility of the approach is strengthened by a transparent decision framework that integrates engineering performance, ecological uplift, and cost realism across multiple future scenarios. Through structured development of distinct conceptual alternatives and evaluation using multi-criteria decision analysis, we will identify a preferred pathway that balances constructability and cost efficiency with measurable resilience benefits and adaptive capacity under accelerating sea-level rise. GIS-supported feasibility and conservation suitability analyses further reinforce implementation readiness by pinpointing where interventions can perform successfully over time, where marsh migration corridors can be protected, and how investments can be staged and prioritized for maximum return. The result is an approach that is actionable in the near term, defensible to partners and regulators, and scalable as a model for other vulnerable Middle Peninsula sites.

Site access was very limited, requiring the use of an airboat to transport crew members and construction materials

Lower Wicomico Dredging and thin layer placement marsh enhancement. Straw bale dike.

Aerial of a portion of the installed straw-bale containment dike, prior to the construction of soil “plugs” across the mouth of each creek and “bay”. Once the “sand/soil plugs” were installed, gaps in the straw-bale containment structure were closed.

An integrated and innovative team

Our team’s designs will be grounded in decades of construction experience in thin-layer placement and nature-based design through our Construction Advisory Team, with Cottrell and ERM bringing first-hand knowledge of TLP and planting design success from projects throughout the East Coast.

This page intentionally left blank.

VHB developed resilient landscape protection alternatives for **Historic Jamestown** to support long-term protection of this low-lying national resource from the continuing threat of sea-level rise.

3 Innovation and Resilience Integration

3 Innovation and Resilience Integration

Designing for resilience

By enhancing and working with the surrounding environment, nature-based solutions typically deliver ecosystem services while also providing additional resilience—or ability to bounce back—from increasingly intense coastal hazards. Our proposed designs for Guinea Marsh will consider the long-term viability, dynamics, and interaction of multiple components of the marsh complex, and how nature-based solutions such as plantings, dune enhancement, and thin-layer placement—as well as hybrid solutions such as living shorelines with headland breakwaters or block-based marsh sills—might play a role in the long-term resilience of the complex.

VHB's integrated services are designed to provide innovate, effective, and resilient solutions from the start. Our teams are developed to bring together different points of view, areas of expertise, and levels of experience to effectively bring forward and test new ideas for long-term solutions, and this collaborative team of partners will be no different. From our decades of experience in marsh and shoreline restoration planning, permitting, design, and construction support, we understand the layers of complexity that are needed to drive the development and implementation of a forward-thinking comprehensive resilience strategy for the Guinea Marsh complex. We look forward to bringing this experience to serve the MPPDC project team.

A team grounded in nature-based and climate-resilient solutions

Our history in coastal habitat restoration began over 30 years ago as we worked closely alongside several of our project partners to spearhead the permitting, design, and construction of nature-based shoreline protection before "nature-based design" was part of the common lexicon. Our designs then, as now, leveraged natural features in the landscape to develop stable planforms, created space for critical wetland habitats, and provided opportunity for vertical marsh migration in light of sea level rise. Many of these designs have withstood decades of hurricanes and over 6 inches of sea level rise while still functioning as designed. Our understanding of the permitting environment and longstanding professional connections with key agencies were critical to setting the foundation for nature-based design in the state, and we continue to leverage our expertise to push innovative coastal habitat restoration designs today.

Designing for resilience

This team brings a comprehensive focus on nature-based solutions, understanding that the marsh complex will require a blend of complementary solutions to provide lasting resilience for this vital ecosystem and comprehensive protection for the Guinea community in the face of sea level rise. **Fundamentally, our team seeks to support the MPPDC project team in developing a strategy which allows the marsh to semi-naturally keep pace with sea level rise and ultimately allows migration of existing ecosystems to higher ground through a phased approach of sediment supplementation (dune construction, thin-layer placement), reinforcement of key features (barrier peninsulas and headlands), and transformation of existing degraded habitat into resilient, future-focused habitat.**

Although we are known for our nature-based shoreline designs, VHB's team also brings broad experience in coastal habitat restoration—including permitting, design, and development of VDOT wetland mitigation banks, monitoring and development of long-term success thresholds for coastal wetland restoration projects with footprints ranging from 25 to over 1000 acres, and design and permitting of dredge material beneficial use projects throughout the lower Chesapeake Bay. VHB further brings decades of experience in combined topographic and hydrographic surveying to support habitat restoration and dredge material management. We have surveyed numerous navigational channels throughout Virginia's Middle Peninsula as a subcontractor to the Virginia Institute of Marine Science (VIMS) and other partners, and have collected hydrographic, geotechnical, and sediment quality data for 12 creek channels throughout the Middle Peninsula over the past 5 years to support dredging and disposal design. EA complements our local shoreline experience with decades of experience in the study, planning, design, and permitting of beneficial use of dredged sediments—especially thin layer placement—at sites throughout the nation. Working alongside our academic and industry partners, we will leverage our combined experience to develop a robust suite of solutions that pinpoint areas which are both in need of intervention and will ultimately provide the greatest return on investment for the marsh complex as a whole.

Our coastal design team is also acutely aware of the importance of the environmental regulatory process in moving from studies and concepts to implementation. We understand that the design must consider local, state and federal regulations as well as the sensitivities and particular interests of both the permitting and advisory agencies. Our team brings more than 30 years of experience with the Virginia regulatory process, specifically as it relates to in-water and above-water habitat restoration, dredging, and the potential effects of both on coastal processes and aquatic habitats. We are also acutely aware of the potential hurdles for permitting shoreline protection and TLP on the Guinea Marsh complex specifically, including potential placement impacts on adjacent oyster leases and SAV beds, and the requisite need for developing sound justification for habitat conversion of vegetated and non-vegetated wetlands. The VHB team has successfully navigated these public conversations for decades in Virginia and elsewhere around the country, and we look forward to bringing this experience to serve MPPDC and the full project team in the development a resilient and forward-thinking restoration strategy for Guinea Marsh.

Opportunities for Innovation

Our team was developed to find the most appropriate route for long-term nature-based resilient design for Guinea Marsh from the start. Our colleagues at VIMS and UGA IRIS have dedicated their careers to understanding how estuarine landscapes evolve, providing key insights into which avenues may be most fruitful when examining resilience of the marsh complex as a whole.

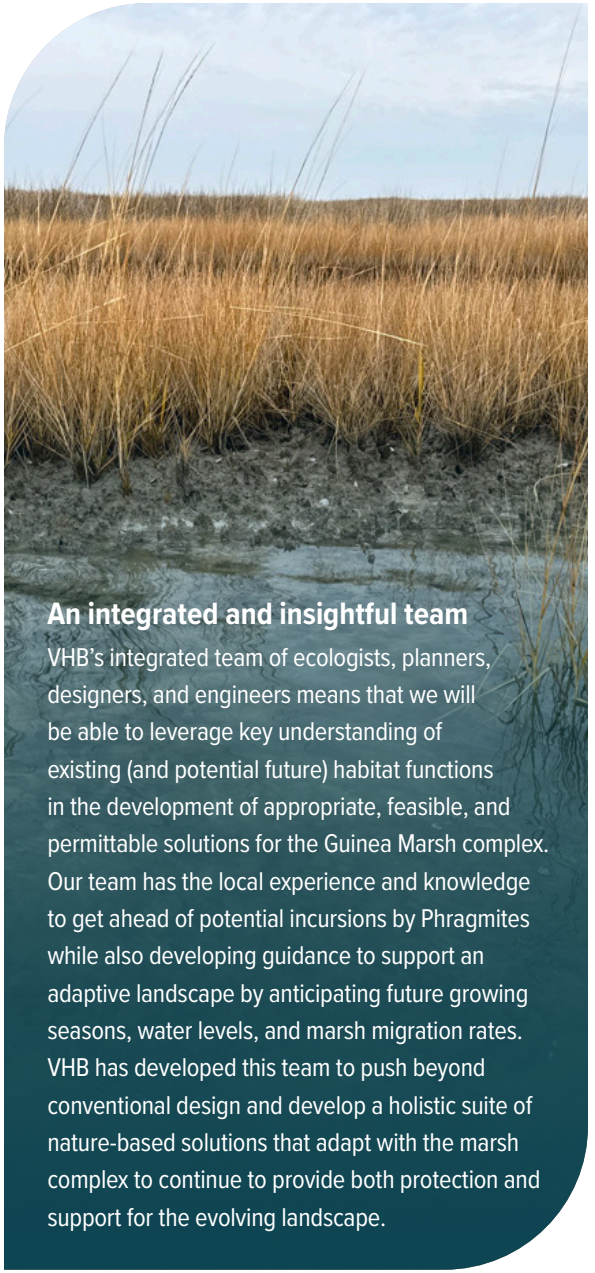
Colleagues at innovative industrial partners, including ECOncrete and Natrx, as well as other Fight-the-Flood partners, are actively pushing the boundaries of material use and structure typology to develop modular units that both enhance ecosystem services and protect vulnerable shorelines. Our construction partners have witnessed these landscapes change firsthand, and have decades of vital experience gained from constructing and watching innovative designs perform under challenging coastal conditions. VHB and EA further bring exceptional experience in developing nature-based shoreline and marsh restoration solutions which provide protection and ecosystem services both today and well into the future by design. Our team starts with nature-based solutions as the groundwork for resilience, and layers additional analyses and time-tested intuition to provide designs founded on a key understanding of physical and ecosystem function from day 1 through to the end of the design life.

Adaptive Designs for a Changing Landscape

With rising sea levels and increased storm activity, the Guinea Marsh complex is particularly vulnerable to declining marsh health, stability, and erosion. Portions of Guinea Marsh are eroding by up to 5 feet per year, and at least seven marsh islands within the Guinea Marsh complex have completely eroded away over the past century; several other islands—especially in the southeast—are fragments of their former extents.

Looking into the future, the existing marsh elevations are projected to be largely under water at low tide by roughly 2080.[1] Given the substantial change that has occurred over the past century and the increasing pace of change on the marsh, restoring the Guinea Marshes to a prior state, or holding a fixed line in the sand, is neither feasible nor sustainable. However, **the marsh complex can and should be adapted to changing conditions through a combination of nature-based and hybrid solutions, bolstering long-term ecological services and marsh migration through adaptive designs, site management, and forward-thinking land-use policy.**

Our team thrives on thinking three steps ahead in our designs. Shoreline protection designs, for example, need to be positioned to efficiently capture sediment and disperse wave energy today, designed to the proper height to provide wave protection tomorrow, and constructed effectively to minimize stone shifting or dislodging over time to provide long-term stability. For these fixed structures, the adaptation of the design may be in the ability of the material(s) to function both as wave protection now and as oyster habitat well into the future. Other, more dynamic solutions, such as backshore dunes, adapt by migrating landward or vertically over time—naturally responding to water levels and waves to provide a shifting layer of defense against wave attack and gradually feeding the marsh with additional sediment over time.



An integrated and insightful team

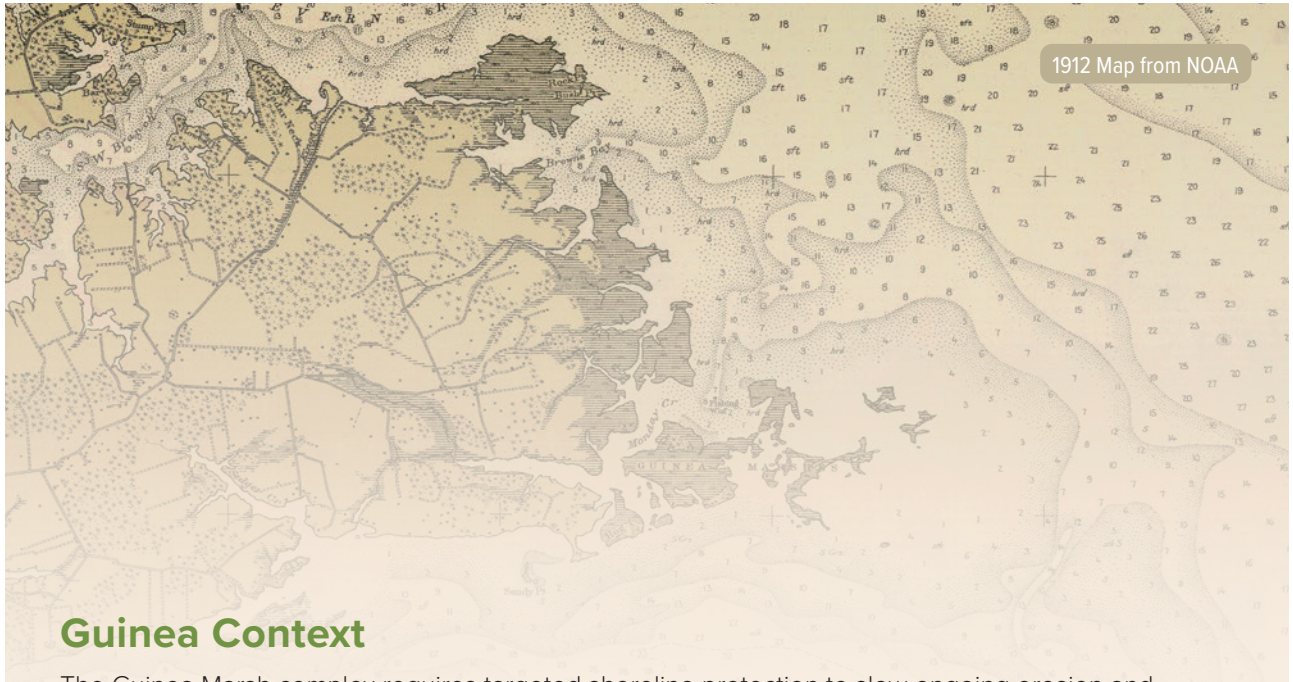
VHB's integrated team of ecologists, planners, designers, and engineers means that we will be able to leverage key understanding of existing (and potential future) habitat functions in the development of appropriate, feasible, and permittable solutions for the Guinea Marsh complex. Our team has the local experience and knowledge to get ahead of potential incursions by Phragmites while also developing guidance to support an adaptive landscape by anticipating future growing seasons, water levels, and marsh migration rates. VHB has developed this team to push beyond conventional design and develop a holistic suite of nature-based solutions that adapt with the marsh complex to continue to provide both protection and support for the evolving landscape.

1 NOAA (2022) Intermediate-High Sea Level Rise projection for Sewells Point applied to Yorktown USCG Training Station tidal datums, and compared against the predominant +2 ft NAVD88 elevation for the marsh complex.

Sediment added directly on top of drowning marshes through thin- or thick-layer placement could similarly be leveraged to allow the landscape to adapt to future conditions by reconnecting areas of high marsh that have become pockmarked with low marsh, mudflat, or salt pannes.

We recognize that the ultimate project success will require long-term adaptive management combining designs that provide near-immediate protection from wave-driven erosion with solutions that require years to provide peak ecological benefits and policies that require decades of implementation to create a viable upland migration corridor. This team brings the experience and foresight needed to think through these potential future use scenarios to create a sound plan and implementation justification for today as well as a comprehensive framework that can continue to guide the adaptation of the complex long after Phase I is completed.

Our industry partners are eager to work alongside our design team, MPPDC, and the larger Project team to identify new opportunities for innovation for nature-based physical protection of critical shorelines as well as improved ecological function of the site. ECOncrete brings over a decade of experience in the development and successful implementation of biophilic concrete mixes and designs that work with the native aquatic ecology to provide both additional intertidal habitat and functional wave protection for coastal sites. Collaborating with Natrx and other Fight-the-Flood shoreline practitioners, ECOncrete is eager to develop solutions that can stabilize banks while enhancing nursery habitat for species dependent on the marsh today, and will be able to provide suitable substrate for future aquatic communities as sea levels rise.



Guinea Context

The Guinea Marsh complex requires targeted shoreline protection to slow ongoing erosion and extend marsh longevity as part of a long-term adaptive management strategy, working alongside vulnerable SAV habitat as well as local stakeholders engaged in site recreation, commercial fisheries, and aquaculture. Successful restoration designs will need to integrate ecological resilience with community and environmental benefits by enhancing oyster and fisheries habitat, supporting recreation, improving water quality, and increasing blue carbon sequestration.

Our initial proposed methods include phased sediment supplementation, reinforcement of vulnerable marsh edges, and conversion of degraded zones into resilient habitat mosaics.

The area supports high biodiversity, though habitat loss and shoreline erosion have reduced seagrass cover and critical nesting sites for waterbirds both within Guinea Marsh and throughout the Chesapeake Bay. Parallel habitat enhancement using living shorelines, oyster reefs, and stabilized islands can reverse these trends. Oyster restoration—supported by positive resilience trends observed in recent decades—further offers a dual benefit of shoreline stabilization and habitat creation for prized native oysters. Design options such as oyster castles, shell middens, hybrid sills, and marine mattresses can be strategically applied to balance habitat value with protection goals.

Working alongside the project team, VHB and our partners look forward to developing and prioritizing design alternatives for shoreline protection, marsh and reef restoration, and conservation measures that collectively increase both ecosystem and community resilience to sea level rise and intensifying coastal storms.

Integration with Regional Resilience and Dredging Programs

Regional Resilience

The VHB team offers synergies with resilience programs and projects throughout the region, as our local team has supported efforts ranging from parcel-level improvements and neighborhood-scale resilience plans to city- and county-wide implementation efforts to further the resilience of coastal communities along the Chesapeake Bay. We see the Guinea Marsh GRIT project integrating with regional resilience efforts by serving as a local, place-based implementation of the Middle Peninsula's broader resilience and infrastructure planning initiatives, such as the Working Waterfront study, and serving as a regional front-line for wave attack during hurricanes and nor'easters. Our team is familiar with sites surrounding the marsh complex, having evaluated the resilience and dredging requirements for waterfront improvements at sites in Browns Bay and Belvins Creek. As the low-lying front line for the Guinea community, Guinea Marsh is critical for diminishing wave hazards at these sheltered waterfronts, and has the potential to reduce damage from storm surge as well. Just as the health of the marsh is intimately tied to the economic lifeblood of the region, the extent and ecological health of the marsh is also tied to the protection of the surrounding community.

At the site scale, we will be able to leverage detailed knowledge gained during the Working Waterfront study to identify where dredging already occurs or is likely to be needed, and mapping how this sediment can be repurposed to nourish and elevate marshes rather than simply being disposed of. This technical work on sediment sourcing and placement dovetails with regional priorities to maintain safe navigation, protect water-dependent industries, and sustain access for commercial and recreational users. By coupling marsh restoration concepts with the real operational needs of local landings, the project builds a practical bridge between ecological enhancement, economic activity, and the kind of critical-infrastructure thinking embodied in broader resilience initiatives. Protecting this resource is the first step toward ensuring that this natural buffer and economic throughline is able to withstand extreme storms today and into the future.

The Guinea Marsh GRIT project provides the technical and planning framework to use Middle Peninsula Chesapeake Bay Public Access Authority (MP-PAA) sites as active resilience infrastructure—combining marsh migration, living shoreline and beneficial-use practices with community benefits such as public access, recreation, and working-waterfront support. This positions the project as one piece of a multi-scale resilience portfolio that includes larger initiatives like Gloucester County's work at the Gloucester Point waterfront and other regional flood-mitigation and nature-based projects supported by VHB.

In effect, Guinea Marsh GRIT functions as both a pilot and a template: it tests innovative, site-level solutions while aligning with regional policies and capital plans, and it demonstrates how investments in ecological function can be deliberately paired with economic and social value to strengthen overall community resilience.

Dredging Programs

VHB brings decades of experience in the local dredging sphere, serving private stakeholders as well as communities throughout the Chesapeake Bay and Eastern Shore. We proudly retain our institutional knowledge of numerous navigational channels throughout Virginia's Middle Peninsula, ranging from Aberdeen, Cedarbush, and Timberneck creeks on the York River, to Davis Creek on the Mobjack Bay, Whiting and Broad Creeks on the Rappahannock, and the Little Wicomico, Cranes Creek, and Hole in the Wall Creek on the Chesapeake Bay. Two of these creeks have been dredged in the past five years—sediment from Hole in the Wall Creek was completed in April 2025, with sandy material beneficially reused along Haven Beach, and Broad Creek was completed in June 2025, with fine sand placed in the adjacent U.S. Army Corps of Engineers confined disposal area. Middlesex County is currently permitting contractors to remove the material for beneficial use as construction aggregate.

The maintenance material in the channels throughout the Middle Peninsula typically consists of sandy silt, which may present opportunities for beneficial use. Confined disposal areas can temporarily store and dry material while appropriate strategies are identified.

Additionally, Davis Creek is the closest current dredging site to Guinea Marsh with an estimated project volume of approximately 24,000 cubic yards. While the material is a silty sand and is generally too fine for beach placement, it may be suitable for wetland enhancement or thin layer placement in drowning marshes. Similar material may also be sourced from several small unmarked channels, such as within the Severn River, Browns Bay, or Monday Creek.

VHB Receives SAG Award at Esri's 2025 User Conference

VHB thought leaders gathered at the 2025 Esri User Conference, a global event for Geographic Information Systems (GIS), where VHB was honored with the Special Achievement in GIS (SAG) Award for development of our NET+ solar site analysis and assessment tool. This award recognizes organizations setting new precedents throughout the GIS community. Please scan or click the QR code to read more!

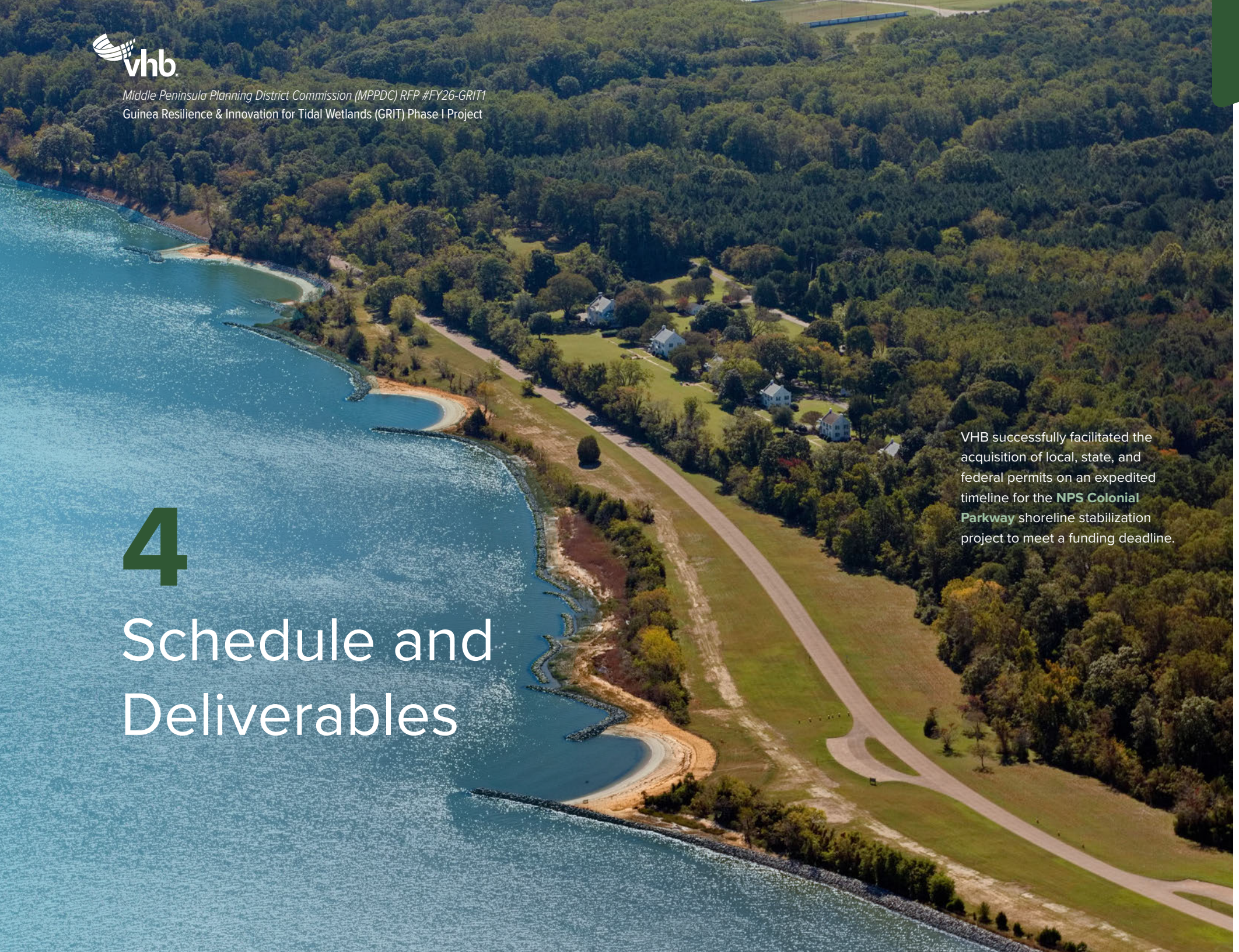
Leveraging Technology for Restoration

VHB's strength lies in our integrated services and range of capabilities necessary to meet MPPDC's needs. This breadth of available services underscores the comprehensive understanding VHB brings to each of its projects. VHB's approach is a departure from traditional firms, in that there is constant collaboration between our professionals in coastal engineering, planning and design, landscape architecture, land development, technology, transportation, and community engagement work together, rather than cobbling together piecemeal components from separate studios to form a deliverable. This experience, flexibility, and integration gives VHB the vision to see the complete picture and provide the integrated services each client needs based on their individual goals within their circumstances and geography. VHB's holistic approach provides clients with comprehensive assessments and well-planned approaches, saving MPPDC time and money.

We have a long history of successfully serving local, state, and federal clients with all aspects of GIS planning and implementation. VHB is a trusted advisor to our clients, finding innovative and creative ways to employ geospatial technologies to solve problems. As both a trusted GIS advisor and an active, daily user of geospatial technology, VHB brings hands-on experience grounded in real-world application, placing us at the forefront of geospatial innovation and enables us to deliver solutions that are forward-looking, practical, and aligned with long-term goals.

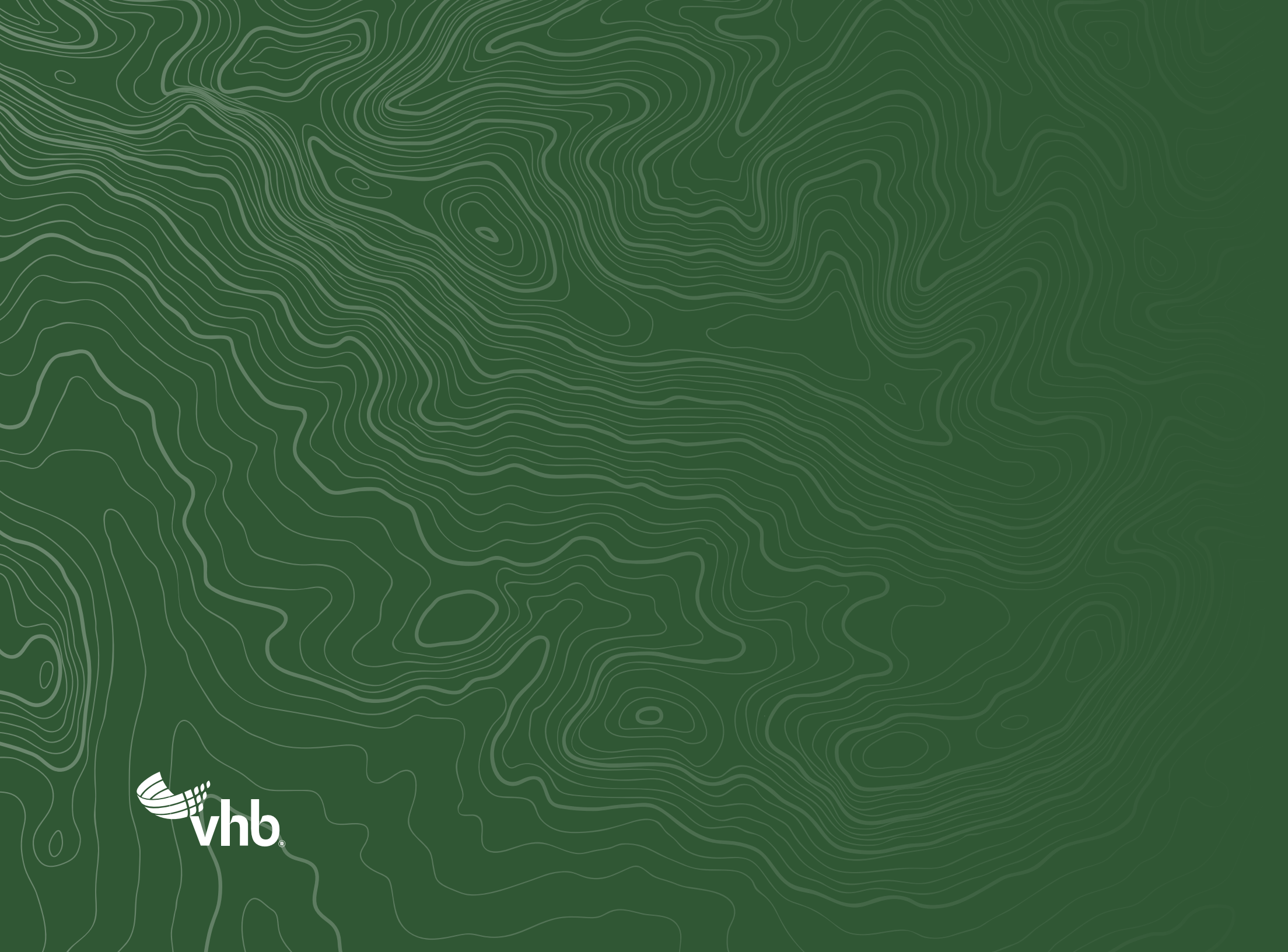
We support organizations at every stage of GIS maturity, from needs assessments and strategic planning to system modernization, optimization, and long-term expansion. Our team regularly conducts GIS audits, develops actionable implementation roadmaps, evaluates return on investment, and identifies innovative, practical ways to apply geospatial tools to complex planning and operational challenges.

As part of a NEPA study for the proposed widening of US-98 in Florida, VHB conducted a detailed environmental analysis due to the presence of Lake Powell, the largest coastal dune lake in Florida and a rare habitat as well as the project's proximity to Camp Helen State Park, wetlands, floodplains, coastal barrier resources, and historic and archaeological resources. Our technology enablement team played a central role in the analysis by integrating environmental constraints, roadway alternatives, land ownership, and agency resource data to assess and quantify potential impacts, compare alternatives, and support avoidance and minimization strategies. GIS-based mapping and analysis were leveraged to support multi-agency coordination with FDOT, USFWS, FDEP, SHPO, and local partners, and to clearly communicate environmental impacts and tradeoffs to stakeholders, helping reduce effects on sensitive natural and cultural resources.



4 Schedule and Deliverables

VHB successfully facilitated the acquisition of local, state, and federal permits on an expedited timeline for the **NPS Colonial Parkway** shoreline stabilization project to meet a funding deadline.

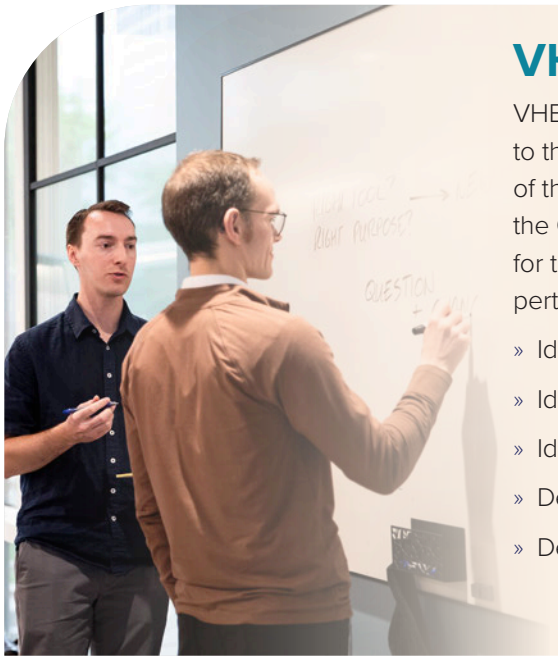

vhb

4 Schedule and Deliverables

At **VHB**, we understand the critical importance of delivering high-quality design solutions within stringent timeframes. Our proposed project schedule for this endeavor is meticulously crafted to meet the specific milestones and deadlines outlined in the RFP.

Proposed Schedule

VHB understands that all work shall be completed as soon as possible, but ideally no later than December 31, 2026. Work will commence promptly upon receiving the Notice to Proceed (with an estimated start date of March 1, 2026) and will continue consistently through project completion with an estimated duration of 10 months (with an estimated completion by January 1, 2027). To meet this deadline, tasks will be carried out simultaneously to the maximum extent practicable with two weeks allotted to each draft deliverable review by the MPPDC project team. Our proposed project schedule outlines key phases and milestones aligned with the Scope of Work, Tasks, and Project Timeline provided in the RFP.

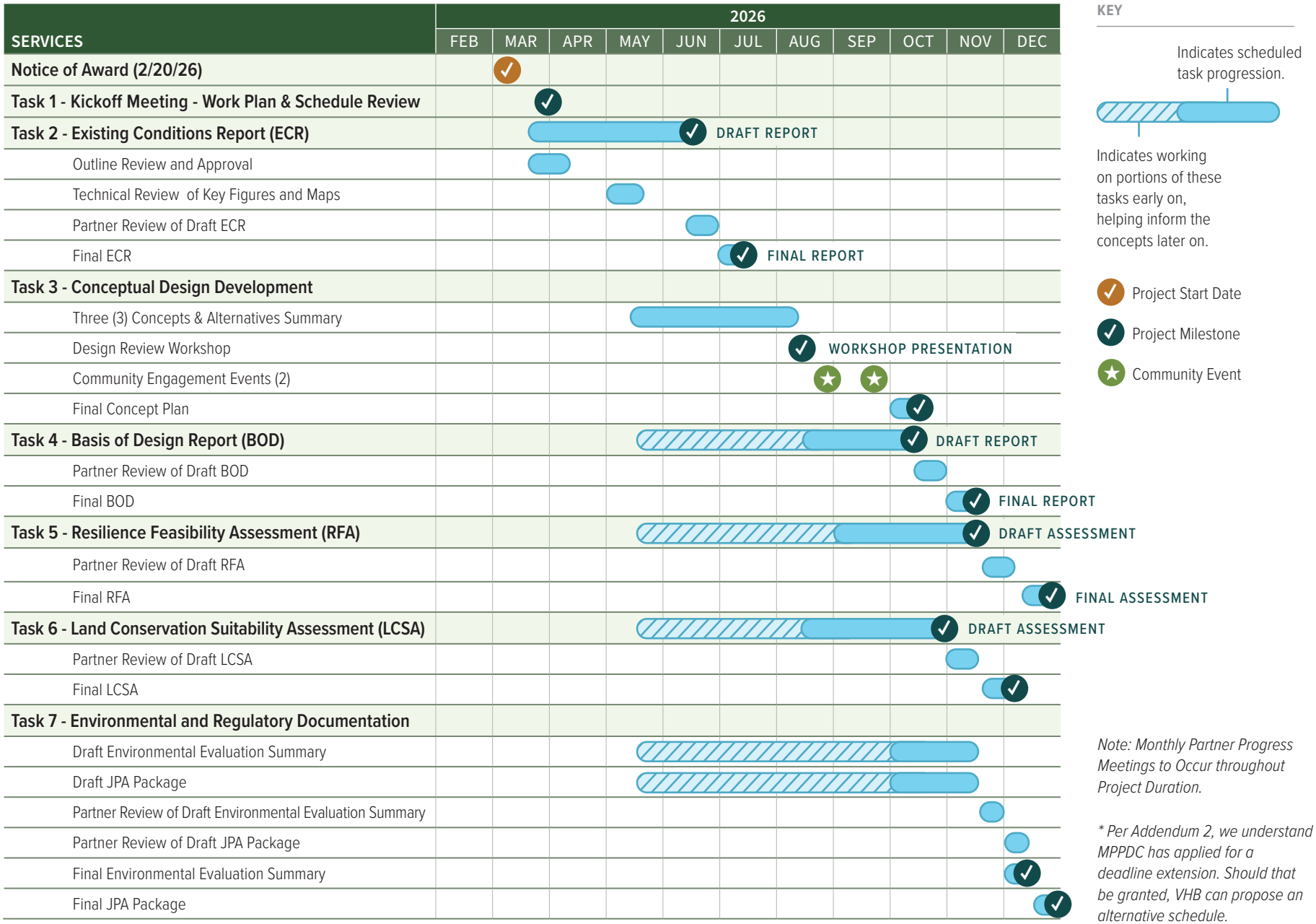


VHB's Proven Work Plan

VHB's Work Plan and refined schedule will be developed in coordination with the MPPDC and presented to the project team at the kick-off meeting. It is used to communicate general information and background of the project, client goals and objectives, project organization, project scope, budgets and schedule, the Quality Plan, communication protocols, checklists, and all other pertinent data that the team needs for the success of the project. The Work Plan is a living document and is revised as necessary to include pertinent information. The Work Plan achieves the following objectives:

- Identifies all interim and final products with responsible parties
- Identifies software packages and protocols before the project gets underway
- Identifies appropriate methodologies to be used throughout the project
- Develops workflows for each milestone deliverable
- Develops a milestone schedule that includes sufficient time for internal QA/QC and for client review

Guinea Resilience & Innovation for Tidal Wetlands (GRIT) - Phase I Project Schedule*



Note: Monthly Partner Progress Meetings to Occur throughout Project Duration.

** Per Addendum 2, we understand MPPDC has applied for a deadline extension. Should that be granted, VHB can propose an alternative schedule.*

Key components and controls of the Work Plan include:

- **Subconsultant Oversight.** Project Manager, Bryce Corlett, will provide oversight to the subconsultant team so that the MPPDC sees **one team** rather than a series of consultants. The VHB team will have constant communication with the subconsultants to enable adherence to the project design standards, goals, QA/QC, schedule, budget, and scope. Invoicing and contracts will all be made through VHB as a single entity. Bryce will coordinate communication between subconsultants and the MPPDC.

- **Cost and Schedule Control.** VHB will analyze any potential schedule delays, determine alternatives that will achieve the cost, schedule, and/or project objectives, and develop a plan to meet the needs of all stakeholders. In addition, careful planning and anticipation are skills that Bryce uses to maintain his outstanding record of on-schedule delivery and cost control. We will measure our progress against key milestones and adjust as necessary to meet the schedule demands. Bryce will also use VHB's proprietary BusinessTrak™ software, which will provide one secure portal through which the team can access and maintain all information on tasks, deliverables, schedules, costs, and personnel for this project.

- **Quality Control.** A critical component of any VHB Work Plan is a robust Quality Control plan, to promote the quality, technical accuracy, and presentation of any work product. Quality Control (QC) is the specific review and checking procedures used on the project to minimize errors of technical, procedural, and judgmental natures. To maintain VHB's commitment to quality, all team members will follow each project's Quality Plan outlined by the Project Manager throughout the life of the project. The Project Manager is responsible for making sure that the Quality Plan is followed throughout the project. QC resources are used by all project and task managers and are implemented early on and throughout the project.

  QC processes consist of design quality reviews, technical reviews, and detail checks. Design quality reviews establish a design approach for the project that includes incorporating innovative design aspects and consideration of how the design meets requirements. An initial design quality review will be conducted when design work is initiated on the project and at mid-phase and final-phase check-ins. Technical reviews will be performed by a senior team member, such as Neville Reynolds, who is deeply familiar with the project and extremely experienced with resiliency projects throughout the Chesapeake Bay region. The technical review includes a review conference at mid-phase to confirm project and documentation approach and constructability, and a detailed recorded review at the end of each task (i.e., Existing Conditions Report, Basis of Design Report, etc.). The focus of the reviews will be technical accuracy, meeting the client's objectives and expectations, and the scope of work as described in the contract. Detail checks will focus on confirming that the information is correct and free of errors. Both the checklist and the markup are filed in the project directory.

  Subconsultants must provide and follow their own Quality Plan; however, all subconsultant products delivered to the client will also undergo a VHB quality review.

- **Schedule.** Our team has reviewed the expected completion date of December 2026 and feel that the proposed work tasks can be accomplished within that timeframe; however, we anticipate that the deadline extension may be required to accommodate any extensive onsite surveys, investigations, or modeling efforts. We understand that the scope of work is reliant upon harvesting existing, available data on the site in order to develop the conceptual plans and conduct a resiliency feasibility study of the preferred concept. Given the amount of previous studies and research conducted within Guinea Marsh, we concur that this is the proper approach. As you will see in the presented schedule, many of the specific tasks are shown tracking concurrently in order to meet the December deadline; however, we feel the concurrent tracking is absolutely necessary in order for critical information such available lands for conservation and the outcomes from the Resiliency Feasibility Assessment provide insight on the conceptual plans. Information from those latter tasks is absolutely critical in developing sound alternatives to be evaluated/considered by the team and presented to the stakeholders at the designated community engagement events. The presented schedule assumes fairly quick reviews by the client with two calendar weeks shown for each draft product slated for partner review.

Potential Challenges

Schedule is a key component to delivering a successful project, and having a plan to manage schedule risks is an important element in successful delivery. VHB's approach to maintaining critical schedule paths is to work diligently to identify and communicate potential risks early and partner with clients to properly manage those risks. Use of Early Action design packages and early Notice of Intents are some of the many strategies we employ to manage those risks.

Delayed Client Reviews

The schedule assumes **two weeks for each draft product review**. Any extension to these review windows could disrupt subsequent task starts, especially given the high level of concurrent tasking.

Possible Solutions:

- **Early delivery of partial/preliminary materials** to support rolling review and allow the client to begin evaluating content before full draft completion.
- **Standing biweekly check ins** to confirm review progress and address questions in real time.
- **Provide a "review guidance sheet"** to encourage focused, actionable comments that reduce rework cycles.

Delays in Subconsultant Data or Materials

Subconsultant inputs are required early so conceptual design, feasibility assessment, and conservation suitability can proceed concurrently. Any lag in these materials may stall multiple downstream tasks.

Possible Solutions:

- **Detailed subconsultant micro schedules** aligned with critical path deliverables.
- **Weekly coordination huddles** (15 minutes) to flag concerns early.
- **Pre-authorized "backup paths"** (e.g., preliminary analysis using existing data) to maintain progress while awaiting final materials.

Extended On Site Surveys

The schedule is predicated on using **existing available data** and avoiding new extensive surveys. If new fieldwork becomes necessary, it could significantly affect timing.

Possible Solutions:

- **Early data gap assessment** during kickoff to confirm all necessary datasets are available.
- **Rapid mobilization protocols** with field teams and partners if limited supplemental surveys are required.
- **Prioritize desk based analysis** using historical datasets to buy time for any emergent field requirements.

An integrated and insightful team

We leverage our in-house ecological experience to develop site-appropriate planting plans that accurately account for the existing ecosystem while actively anticipating future conditions. Delineated present-day boundaries between low marsh and high marsh vegetation, for example, may sit at elevations that are lower than would be expected based on water levels as it takes time for vegetation to respond to a slowly increasing sea level. Our team will increase odds of plant survival by leveraging our knowledge of existing dominant species, modifying planting elevations to increase odds of survival, and developing site-specific plans to support rapid coverage of exposed sediment.

This illustration was generated using artificial intelligence and is provided for illustrative purposes only.

Concurrent Tasking

The schedule relies on **many tasks tracking concurrently** in order to meet the December 2026 deadline. Heavy overlap—especially between feasibility analysis, conceptual design, and conservation suitability—creates dependency risks.

Possible Solutions:

- **Define integration checkpoints** at logical handoff points—e.g., after initial feasibility results—to provide alignment across workstreams.
- **Adopt "living document" workflows through a Project SharePoint site**, especially for conceptual design, so informed refinements occur without major redesign late in the schedule.

Community Engagement Timing Constraints

Stakeholder engagement relies on having **sound alternatives developed** before events occur. Any delays to preliminary tasks could compress preparation windows.

Possible Solutions:

- **Prepare engagement materials in modular form** so updates can be swapped in quickly.
- **Schedule early "placeholder" meeting dates** with stakeholders to secure calendars.
- **Establish a minimum content threshold** required for each engagement event to avoid scope creep in presentation materials.

Risks Due to Staffing or Resource Conflicts

Multiple teams and subconsultants will be working in parallel, and resource availability may fluctuate.

Possible Solutions:

- **Cross training within the team** so multiple individuals can cover key roles.
- **Maintain a resource loading forecast** within BusinessTrak™ to catch conflicts early.
- **Document escalation pathways** for rapid decision making when resource issues arise.

Emerging Risks Identified During Weekly Team Meetings

Ongoing coordination may surface new risks that threaten schedule alignment. The plan emphasizes weekly discussions of risk factors.

Possible Solutions:

- **Establish a risk register** updated weekly with probability, impact, and mitigation strategies.
- **Adopt a "no-surprises" rule** requiring team members to flag risks as soon as they are identified.
- **Use color-coded milestone health dashboards** to visualize impacts and adjust scope or sequencing early.

An integrated and insightful team

The VHB team is eager to continue our support of MPPDC in developing a resilient, adaptive Guinea Marsh. Our active Academic Partners at VIMS and Construction Partners at Coastal Design & Construction developed and built shoreline protection systems along eroding portions of Jenkins Neck, and bring decades of experience working with nature-based shoreline protection solutions.

Methods of Optimization

VHB is no stranger to optimizing workflows to achieve rapid, well coordinated project delivery. Our integrated teams are structured to work efficiently within compressed timelines, leveraging concurrent tasking, early integration checkpoints, and rigorous QA/QC processes to maintain alignment across disciplines. By grounding our approach in existing data, employing shared digital workspaces, and engaging in proactive communication with clients and subconsultants, we streamline decision making and reduce rework. This methodology has proven successful for even complex, multi-layered resilience, and planning projects, moving forward with clarity, consistency, and sustained momentum.

On this project, the VHB team will leverage the following methods to provide effective and efficient support for MPPDC and the project team:

- **Overlapping key project phases** so workstreams constructively build on the same baseline information and avoid sequential bottlenecks.
- **Advancing resilience feasibility and conservation suitability in lock-step with conceptual design**, so that alternatives are informed by feasibility outcomes and broader resilience goals (e.g., marsh migration corridors).
- **Leveraging existing available data** to minimize the need for new surveys or modeling, reducing schedule risk and maintaining a fast project cadence.
- **Using structured QA/QC and integration checkpoints** to keep concurrent workstreams aligned, avoiding downstream redesign and maintaining clarity across the team.
- **Employing a shared project workspace** (BusinessTrak™) to centralize deliverables, schedule information, and resource tracking, reducing versioning errors and improving coordination efficiency.
- **Establishing rolling reviews and partial draft submissions** to initiate client feedback earlier and maintain momentum while full drafts are completed. This also reduces rework cycles and compresses review durations.
- **Utilizing weekly coordination meetings and subconsultant micro-schedules** to surface risks early, maintain accountability, and quickly adjust work sequencing as needed.
- **Preparing modular engagement materials** that can be quickly updated as technical content evolves, ensuring community engagement remains on schedule even with concurrent design updates.
- **Implementing proactive resource management**, including cross-training team members and forecasting workload demands to maintain adequate staffing during critical path activities.

Risk Management Strategies

VHB maintains a comprehensive and integrated Risk Management Program designed to address and mitigate diverse organizational risks. This program is structured to encompass key areas of focus, including Health and Safety, Facilities Management, Legal, and Human Resources, providing a holistic approach to risk management across our organization.

VHB has a dedicated Legal/Risk Management Group that reports directly to the CEO as well as a separate risk management team dedicated to design-build projects that works in conjunction with the Risk Management Group and brings past experience to all risk-related decisions. VHB's approach to reducing risk starts with early identification of potential risk areas and creating plans to mitigate risk. Prior to the start of any project, VHB's Project Manager, in coordination with the Risk Management Group, reviews project-specific risk elements and discusses risk avoidance techniques as part of the project's kickoff meeting. All team members participate in this discussion. In addition, each project has regularly scheduled team meetings—usually on a weekly basis—to discuss all relevant issues, including risk factors.

Core Components of VHB's Risk Management Process

1. Risk Identification:

- Conducting systematic evaluations to identify risks across operations and projects and potential risks to employee well-being
- Utilizing advanced tools such as incident reporting systems, employee feedback mechanisms, and independent audits to uncover potential vulnerabilities

2. Risk Assessment and Analysis:

- Assessing the likelihood and potential impact of identified risks
- Applying both qualitative and quantitative methodologies to prioritize risks based on their potential effects on personnel, assets, and business continuity

3. Risk Mitigation Planning:

- Developing targeted strategies to manage, reduce, or eliminate identified risks
- Fostering cross-departmental collaboration, such as integrating health and safety protocols into project workflows

4. Implementation and Monitoring:

- Implementing control measures, including updated policies, advanced technological solutions, and tailored training programs
- Continuously monitoring risk indicators through structured reviews and automated tracking systems to validate the effectiveness of implemented controls

5. Incident Response and Recovery:

- Maintaining a robust incident response framework to effectively manage emergencies and minimize operational disruptions
- Incorporating clear communication protocols, effective disaster recovery strategies, and thorough post-incident evaluations to enhance program resilience

6. Continuous Improvement:

- Regularly reviewing and refining the Risk Management Program to align with evolving industry standards and regulatory requirements
- Leveraging advancements in technology and best practices to drive ongoing program optimization

Core Anticipated Risks & Proactive Strategies for GRIT

VHB's approach to risk management for GRIT is built around **early clarity, disciplined integration**, and **adaptive delivery**. We will begin with a kickoff Data Gap Assessment to validate the sufficiency of existing datasets and to define any targeted field verification required to support a complete and permittable draft JPA (e.g., MLW/MHW and 1.5× mean tide range checks). This keeps Optional Task 8 tightly focused and prevents scope creep from delaying downstream analyses.

Given the project's **condensed and non linear task schedule**, we will deploy micro schedules per task, with integration checkpoints to align the Existing Conditions Report, feasibility assessment, conceptual design, and conservation suitability. To maintain cadence and reduce bottlenecks, we will use rolling reviews and a shared project workspace for version control and transparent comment resolution. Our aim is to protect the December 31, 2026, completion date while reducing rework.

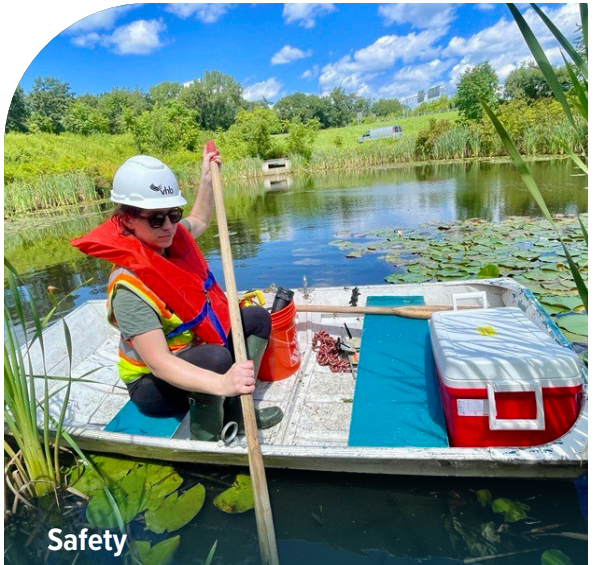
For **permitting**, we will mitigate complexity through early regulatory touchpoints with VMRC, USACE, and other partners, circulating Early Action design packages for concept alignment—especially where the project explores dredged material use, runnel creation, dune creation, and shoreline protection. A live VHB regulatory tracker documents agency questions, submittal timing, and responsibilities, keeping approvals predictable.

For **stakeholder engagement**, we will work in concert with MPPDC and the broader project team to lock "placeholder" dates early to secure attendance. We will prepare modular engagement materials that update quickly as technical content evolves, and we will maintain a single, consistent message across technical and outreach teams—supporting the three meeting (minimum) engagement strategy outlined in the NFWF plan.

Finally, we will manage **ecological and performance uncertainty** through early scenario and sensitivity modeling (SLR/storm regimes) and design charrettes with VIMS/UGA to validate assumptions. Our deliverables will incorporate adaptive design elements—allowing the team to refine components without wholesale redesign—and we actively coordinate with parallel aquaculture investments to avoid siting conflicts and to maximize co benefits for marsh protection, SAV recovery, and habitat.

Commitment to Excellence

By committing to embedding risk management principles into all facets of our operations, VHB proactively safeguards our people, assets, and organizational integrity. This highlights our commitment to resilience, operational efficiency, and a culture of continuous improvement. Additional details or specific elements of our Risk Management Program can be provided upon request.



Safety

The Corporate Health and Safety Program written for VHB strives to promote a safe and healthy environment for all employees, including field, laboratory, or office personnel. At a minimum, it is the goal of this written program to protect the health and safety of employees and to assure compliance with Occupational Safety and Health Administration (OSHA) regulations located at 29 CFR 1910 and 1926. The Program describes several key topics including corporate training, personal protection, medical monitoring, standard operating procedures, emergency response, and other issues associated with field and laboratory activities and general office safety. Employees who work out in the field or at jobsites are required to attend relevant training sessions for their work and to wear appropriate, sanctioned, job/site-specific clothing and safety gear.

For the **Ohio Creek Watershed project**, VHB team members Neville Reynolds, Kim Blossom, and Chris Frye helped engage a historically underserved community to identify a range of cost-effective and implementable nature-based and traditional infrastructure solutions.

5 Qualifications and Experience of the Firm and Project Team

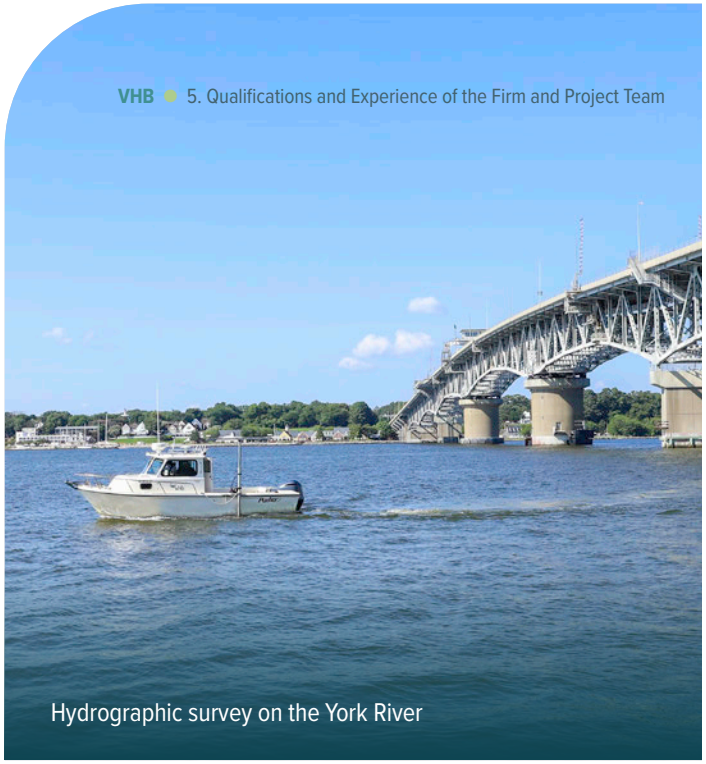
5 Qualifications and Experience of the Firm and Project Team

5. Qualifications and Experience of the Firm and Project Team Table of Contents

Leading Practitioners in Adaptive Coastal Designs

VHB's coastal team supports a wide variety of project types, bringing deep experience in coastal processes and gaining regulatory approvals for complex projects. This includes complex numerical modeling, design of sustainable and resilient shoreline protection, beach nourishment, and coastal structures, and a comprehensive understanding of the regulatory framework in the coastal zone to get projects efficiently permitted and constructed. Our coastal team includes coastal and water resources engineers, structural engineers, landscape architects, natural scientists, and resiliency planning specialists. Together, our team develops unique, sustainable solutions aimed at mitigating risks and enhancing the long-term resilience of coastal zones.

Neville Reynolds, PWS, specializes in the intricacies of coastal restoration, emphasizing the strategic interplay between natural systems and engineered solutions to enhance and protect shorelines. Senior Coastal Engineer **Bryce Corlett, PhD, PE, ENV SP**, brings uniquely robust experience in designing adaptive coastal environments. With his extensive experience in coastal engineering, Bryce will provide critical insights into coastal adaptation measures through his expertise in blending advanced hydrodynamic modeling with nature-based solutions. Bryce's proficiency in designing multi-layered coastal systems will help to make certain that designs like managed realignment dunes balance ecological restoration with engineered resilience.


Hydrographic survey on the York River


Field inspections for Fox Hill resiliency project in Hampton, Virginia


Avian monitoring in support of the Hampton Roads Bridge Tunnel expansion


Aliza at work on MDI Oyster Farm in Bar Harbor, Maine

Qualifications and Responsibilities of the Team

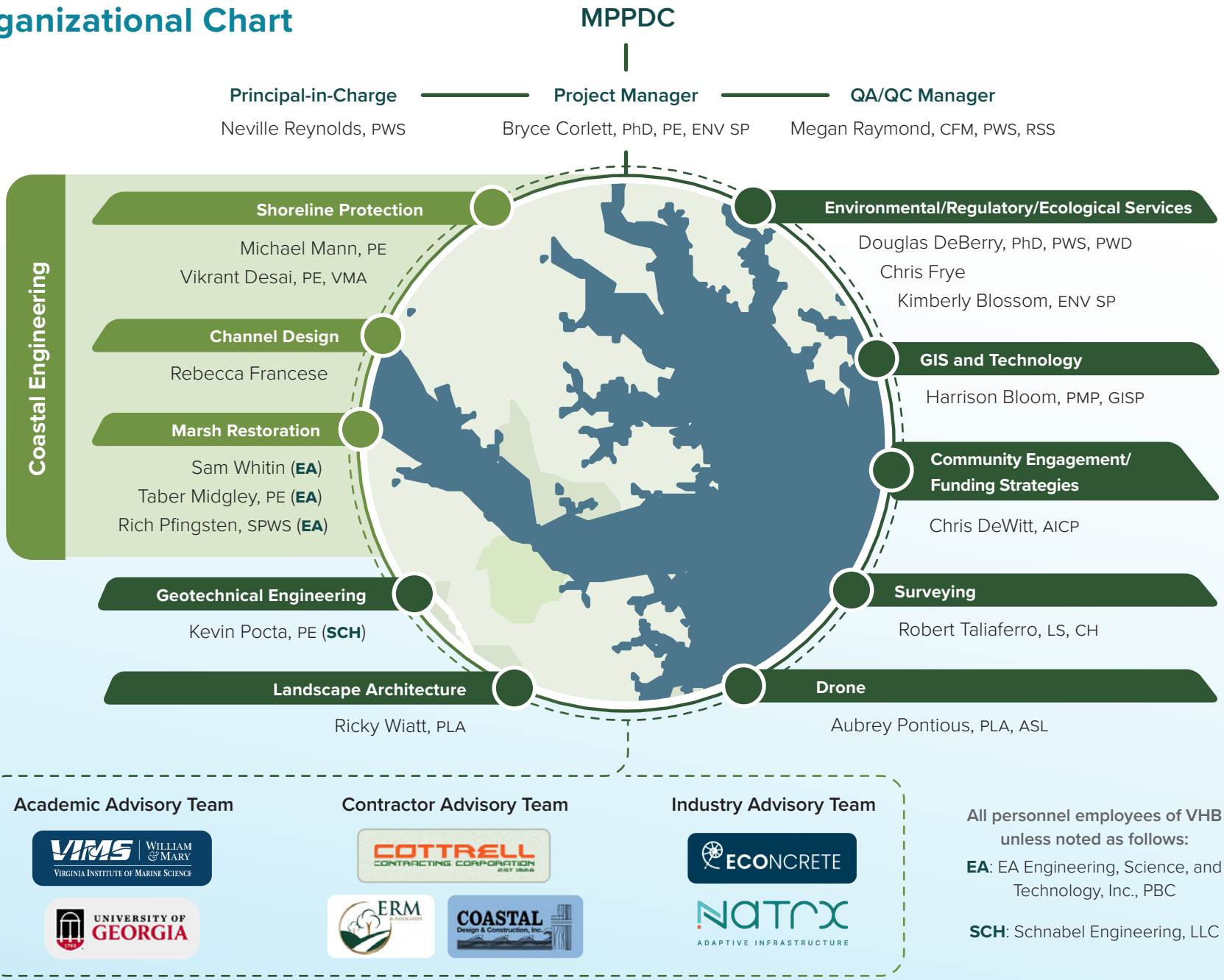
We recognize this task as the core of this contract and that resilience is the ability of ecosystems, communities, and infrastructure to withstand and recover from natural or human-induced disturbances or changes. It involves the capacity of these systems to absorb shocks, adapt to new conditions, and maintain their essential functions and services. Resilient environmental systems can resist, absorb, and recover from disturbances such as extreme weather events, pollution, habitat loss, or climate change impacts. Resiliency planning, therefore, is most effectively when conducted by a multidisciplinary team, which can identify and understand the myriad of considerations for sustainable community adaptations.

The VHB team has long-term experience in evaluating and identifying climate vulnerabilities, assessing risk, and designing and implementing solutions to protect against sea-level rise, increased precipitation, and increased heat.

The need for and development of effective solutions should be conducted in collaboration with the public and stakeholders in order to gain a holistic perspective, make use of anecdotal information, and to achieve progressive buy-in and acceptance of community impacting actions.

VHB has assembled an internal team and selected qualified subconsultants to partner on completing the scope of work outlined for the GRIT Phase I Project. This project also offers a unique opportunity to bring together additional perspectives for collaboration to yield the best possible nature-based, adaptive, climate-ready solutions for Guinea Marsh. The three advisory panels, shown on the organization chart and explained below, will provide additional expertise to the team.

Organizational Chart



All personnel employees of VHB unless noted as follows:

EA: EA Engineering, Science, and Technology, Inc., PBC

SCH: Schnabel Engineering, LLC

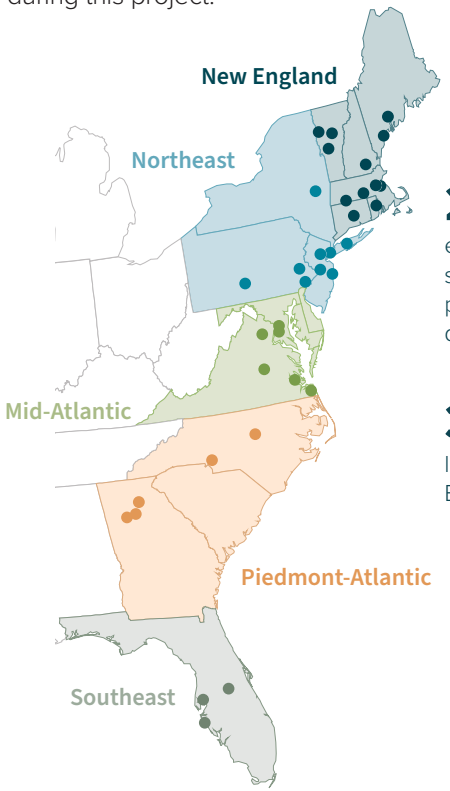
Responsibilities of the Project Team Members

Resumes for our key team members begin on page 5-8.

Firm & Personnel Name		Discipline	Responsibility
VHB	**Neville Reynolds, PWS**	Coastal Engineering	Principal-in-Charge
	W. Bryce Corlett, PhD, PE, ENV SP	Coastal Engineering	Project Manager
	Rebecca S. Francese	Coastal Engineering: Channel Design	Senior Environmental Scientist
	Douglas A. DeBerry, PhD, PWS, PWD	Coastal and Estuarine Ecology	Senior Environmental Scientist
	Chris Frye	Environmental/Regulatory/ Ecological Services	Senior Coastal/ Environmental Scientist
	Kimberly Blossom, ENV SP	Environmental/Regulatory/ Ecological Services	Senior Environmental Scientist
	Michael Mann, PE	Coastal Engineering: Shoreline Protection	Technical Support | Senior Coastal Engineer
	Richard (Ricky) Wiatt, PLA	Landscape Architecture	Community Engagement | Landscape Architect
	Chris DeWitt, AICP	Community Engagement/ Funding Strategies	Senior Planner
	Megan Raymond, CFM, PWS, RSS	Environmental/Regulatory/ Ecological Services	QA/QC Manager
	Robert (Bob) Taliaferro, LS, CH	Surveying	Surveying
	Aubrey Pontious, PLA, ASLA	Drone	Drone Pilot
	Vikrant Desai, PE, VMA	Coastal Engineering: Shoreline Protection	Civil Engineer
	Harrison Bloom, PMP, GISP	GIS and Technology	Technology Lead
EA	**Sam Whitin**	Coastal Engineering: Marsh Restoration	Coastal Scientist
	Taber Midgley, PE	Coastal Engineering: Marsh Restoration	Water Resources Engineer
	Rich Pfingsten, SPWS	Coastal Engineering: Marsh Restoration	Senior Ecologist
SCHNABEL	**Kevin Pocta, PE**	Geotechnical Engineering	Geotechnical Engineer

Professional Staffing Available for Development, Training, Implementation, and Support Services

VHB has assembled a team of professionals (shown on the organizational chart and table) who are equipped to collaborate on the GRIT Phase 1 Project. In addition to those scientists, planners, engineers, and designers, we are able to call upon subject matter experts across our footprint if needed. Our team possesses the skills, technical expertise, and capacity to respond to all development, training, implementation, and support services that could arise during this project.



2,300+
engineers, scientists, planners, and designers

35
locations on the East Coast


© Elaine Odell

VHB's comprehensive approach to coastal engineering and resiliency includes integrating multiple services, from hydrographic survey and water resource engineering to transportation planning and design to urban, waterfront, and resilience planning. Combined with our knowledge of and experience with shoreline protection and restoration, marina and waterfront design, regulatory strategy, and grant funding programs, this holistic approach results in sustainable and adaptable solutions. By addressing both the natural and built environments in a balanced manner, we enhance coastal resilience, improve function, and deliver comprehensive solutions that safeguard and fortify waterfront investments.

VHB will lead the GRIT Phase I Project, coordinating with the team of subconsultants and advisory panels, and providing MPPDC with a qualified project manager to oversee all of the tasks outlined in the scope of work.

Proposed Subcontractors

EA Engineering, Science, and Technology, Inc., PBC

EA brings extensive hands-on experience in coastal adaptation and resilience planning for the Chesapeake Bay region. They have delivered results at local, state, and national levels through technical expertise, strong partnerships, and trusted leadership in initiatives like the Northern Chesapeake Bay Coastal Resilience Plan. For over 30 years, EA has supported federal partners such as the National Park Service (NPS) with coastal risk assessments, utilizing advanced modeling, Geographic Information System (GIS) mapping, and integrated design approaches that align with federal and state climate guidelines.

EA's commitment to natural and hybrid infrastructure is seen in collaborations with the U.S. Army Corps of Engineers (USACE), U.S. Army Engineer Research and Development Center (ERDC), Naval Facilities Engineering Systems Command (NAVFAC), United States Marine Corps (USMC), and National Oceanic and Atmospheric Administration (NOAA), restoring habitats and designing nature-based solutions tailored to regional needs.

For the GRIT Phase I Project, EA will apply their technical depth, regional knowledge, and innovative approaches within the Middle Peninsula region to the implementation of natural and hybrid infrastructure.

Previous Work Experience with VHB

As part of the National Fish and Wildlife Foundation's (NFWF) National Coastal Resilience Funded (NCRF) project in Newport, Rhode Island, VHB and EA are collaborating to better understand compound flooding concerns over a range of sea level rise scenarios in order to develop designs which daylight a coastal stream and also restore salt marsh habitat in order to reduce flooding impacts to infrastructure and the surrounding community.

As part of the NFWF National Coastal Resilience Fund (NCRF) project in Hampton, Virginia, VHB and EA are jointly supporting engagement with the Fox Hill, Grandview, and Harris Creek communities, as well as project partners and regional stakeholders. This collaboration is helping stakeholders understand how the City of Hampton's Water Plan initiatives align with the Natural Infrastructure projects underway in the Back River Estuary. By coordinating these parallel efforts, the team is advancing a cohesive regional strategy that strengthens climate and coastal resilience and delivers long term benefits to surrounding neighborhoods and Joint Base Langley–Eustis.

Schnabel ENGINEERING

In continuous operation since 1956, **Schnabel** specializes in geotechnical, environmental, pavement, dam, tunnel engineering, construction monitoring, and material testing services. Schnabel's multidisciplinary staff of 650+ professionals, consisting of more than 250 registered professional engineers, geologists, and scientists, operates from 30 offices nationwide, including two locations in Glen Allen and Newport News, Virginia.

Schnabel brings expertise in coastal engineering, environmental engineering, ecological assessment, and resilience planning, making the firm well-suited to support initiatives like the GRIT Phase I Project. With a strong commitment to quality and a collaborative approach, Schnabel will deliver innovative and sustainable solutions to MPPDC.

Previous Work Experience with VHB

VHB has trusted Schnabel on a wide range of their projects over the years. Below is a sampling of our firms' shared experience:

- Virginia Beach Chubb Lake Design-Build, Virginia Beach, VA
- Garber's Church Road Path, Harrisonburg, VA
- VRE Crystal City Station Improvements, Arlington, VA
- JGBS Crystal City Corner Retail Building, Arlington, VA
- WMATA Crystal City Station East Entrance Design-Build Phase, Arlington, VA
- Crystal City to DCA Pedestrian Bridge, Arlington, VA
- Naval Air Station (NAS) Oceana Building 603 Generator Pad, Virginia Beach, VA
- Port Republic Bluestone Drive & Bradley Drive Improvements, Harrisonburg, VA
- VPRA Staples Mill Station Improvements, Richmond, VA
- VPRA Staunton Station Improvements, Staunton, VA
- VDOT Statewide On-Call - Traffic Operations, Statewide, VA
- UVA Darden Housing - Pond 2, Charlottesville, VA
- Tuckahoe Creek Park - Phase III, Henrico County, VA

Academic Advisory Panel

VIMS William & Mary Virginia Institute of Marine Science

University of Georgia

The Academic Advisory Panel will provide VHB with the opportunity to collaborate with additional professionals who can offer innovative ideas and insights on marsh resilience and wetlands restoration. We have formed relationships with these respected individuals on other projects and welcome their contributions to the GRIT project. Their qualifications are provided later in this section.

Contractor Advisory Panel

Cottrell Contracting Corporation

ERM & Associates

Coastal Design & Construction, Inc.

The firms included as part of the construction advisory panel will provide a sounding board for proposed solutions. Their expertise will give perspective on the implementation of any actions, keeping a strong focus on practical and permittable designs. VHB would look to these same firms to become partners on future GRIT phases. Qualifications for these firms would be included when responding to a future Request for Proposal for a scope of work that covers the implementation and construction of solutions.

Industry Advisory Panel

ECOncrete is a global leader in nature-inclusive marine and coastal infrastructure, delivering engineered concrete solutions that enhance biodiversity, strengthen resilience, and meet the structural demands of critical coastal assets. Their technology integrates ecological performance directly into hybrid infrastructure—transforming seawalls, revetments, breakwaters, ports, and offshore structures into long-term habitat assets without compromising engineering integrity.

ECOncrete's solutions combine bio-enhanced concrete mix designs, science-based surface geometries, and project-specific ecological engineering to measurably improve marine habitat while meeting or exceeding conventional structural standards. Their products are compatible with traditional construction methods and are deployable at scale across nearshore, offshore, and estuarine environments.

Independent monitoring across dozens of projects globally has demonstrated significant increases in native species richness, biomass, and ecological function, supporting regulatory compliance, mitigation obligations, and emerging habitat and biodiversity credit frameworks.

With projects across North America, Europe, Asia, and Australia, ECOncrete brings global best practices tailored to local ecological, regulatory, and engineering conditions. As a collaborator on GRIT, they will collaborate from concept through monitoring to provide outcomes that are durable, defensible, and measurable.

Natrx is a proven leader in providing nature based, habitat-specific coastal resilience and marine infrastructure solutions that perform better and are more cost effective than traditional solutions. Natrx founders have over twenty publications and five issued patents for advanced nature-based coastal protection, and have deployed over 50,000 tons of biogenic living shoreline solutions in the past 15 years.

With Natrx's perspective, the GRIT project can take a technology-first approach to coastal resilience and infrastructure that is innovative, sustainable, and cost-effective.

Resilient Shoreline Design: Protecting & Enhancing Ecosystems

Click or scan the QR code to hear Principal-in-Charge Neville Reynolds speak on resilient shoreline design.

A Local Partnership

Our team includes several innovative industry partners who are eager to combine forces to develop a unique set of diverse restoration, protection, and adaptation measures for Guinea Marsh. We have a long history of working closely with local partners as one united team, and we look forward to bringing others—such as Native Shorelines, Ready Reef (both now part of Davey Solutions), Biogenic Solutions, Atlantic Reefmaker, and others—onto the team in nonbinding design advisory roles as appropriate to support the development of a successful long-term adaptive approach for the Guinea Marsh complex.

Neville Reynolds, PWS

Principal-in-Charge

Neville is VHB's Coastal Engineering & Resilience Leader, with expertise in shoreline response to coastal structures and the development of shoreline restoration plans that incorporate strategic placement of stone structures coupled with beach nourishment and wetland and dune vegetation. He is skilled in coastal processes evaluations, wave climate analysis, sediment transport calculations, beach nourishment source evaluation and cost analysis for comprehensive beach enhancement and restoration plans.

36 Years with VHB

42 Total years of professional experience

Education

MS, Oceanography, Old Dominion University, 1990

BA, Geology, Millersville University, 1984

Registrations/Certifications

Professional Wetland Scientist

Affiliations/Memberships

Society of Wetland Scientists

Virginia Association of Wetland Professionals

Virginia Marine Resources Commission-Living Shoreline Advisory Committee

Virginia Marine Industry Advisory Committee

Virginia Maritime Association

Virginia Tidal Wetland Mitigation Banking Advisory Committee

American Shore & Beach Preservation Association

Middle Peninsula Planning District Commission (MPPDC), Designing Multimodal Working Waterfronts, Middle Peninsula, VA

Neville serves as Principal-in-Charge for this region-wide planning project to address the needs of commercial seafood and marine industries at publicly owned, rural, working waterfronts in Virginia's Middle Peninsula region.

U.S. Fish & Wildlife Service, Fog Point Living Shoreline Restoration, Smith Island Martin NWR, Ewell, MD

Neville was a co-team leader for the design and permitting for nearly four miles of living shoreline at Martin National Wildlife Refuge, working with Scott Hardaway/Coastline Design and Coastal Design & Construction. This design-build project incorporated 22 headland breakwaters and two sills located at particularly vulnerable areas along the shoreline. The armor stone structures were accompanied by sand fill and over 8 acres of wetland and dune grass plantings. The layout was developed to complement and enhance/restore the various ecological communities that reside along the eroding coast, including marsh, dune, and submerged aquatic vegetative communities. The project spans nearly four miles along the northern shoreline of Smith Island in Maryland.

York River Shoreline Erosion Control Design/Build, Virginia Institute of Marine Science (VIMS), Gloucester Point, VA

Neville served as VHB Project Manager for this design-build shoreline stabilization project with Coastal Design and Construction. The project included site improvements, rock structures, storm water piping extensions, sand replenishment, and plantings on the VIMS shoreline at Gloucester Point, VA. The project is located on the north shoreline of York River on both the east and west sides of the Coleman Bridge. Five breakwaters of varying lengths were designed and constructed as free-standing rock structures within the subtidal reaches of the York River. The shoreline behind the breakwaters received new beach sand and portions of the newly created beach and backshore were planted with coastal dune plants, such as *Spartina patens* (saltmeadow hay) and *Ammophila brevigulata* (American beachgrass). The project obtained all federal, state, and local permits.

"Having spent many summer days on Mobjack Bay and around Guinea Marsh, it's exciting to have an opportunity to bring our experience with large-scale coastal restoration to bear so close to home."

Neville Reynolds, PWS

U.S. Fish & Wildlife Service, Fog Point Living Shoreline Restoration, Smith Island Martin NWR

Langley Air Force Base Shore Protection/Restoration Project, City of Hampton, VA

Neville was the Project Manager for this design-build shoreline stabilization project which encompassed over 7,000 linear feet of shoreline surrounding the base. The design incorporated revetments, sills, spurs and the establishment of marsh fringes comprised of *Spartina alterniflora* (cordgrass), *Spartina patens* (saltmeadow hay) and *Ammophila brevigulata* (American beachgrass). He was responsible for acquisition of all federal, state, and local permits.

United States Navy/VIMS, Penniman Spit Living Shoreline Design-Build Project, York County, VA

Neville served as the Principal in Charge and Project Manager for this design-build project involving coastal spit restoration for the U.S. Navy and VIMS. VHB is responsible for wave climate and coastal processes analysis, engineering design, preparation of construction plans and specifications and construction oversight. Through sand nourishment and strategic placement of breakwaters and sill structures, this critical coastal feature was restored to continue to provide protection to valuable U.S. Navy property exposed to high energy fetches near the mouth of the York River.

NPS, Colonial National Historical Parkway, Shoreline Stabilization Alternatives and EA, York County, VA

Neville was the Project Manager and Principal-in-Charge for the $110 million York River shoreline stabilization which included rehabilitation and enhancement of armor stone revetments as well installation of offshore breakwaters with beach nourishment to establish pocket beaches and sill structures to establish and enhance fringe marshes along 3 miles of estuarine high energy shoreline. Neville oversaw the wetland and cultural resources identification and impact analysis, Value Analysis, and preparation of the Environmental Assessment. He was also responsible for acquisition of all local, state, and federal environmental permits.

Presentations

"Living Shorelines: Design Considerations for Improving the Edge," Marshall Hall, Center for Leadership and Ethics, Virginia Military Institute; 22nd Annual Environment Virginia Symposium; April 2011

W. Bryce Corlett, PHD, PE, ENV SP

Project Manager

Bryce brings diverse experience ranging from identifying sea level rise acceleration along the East Coast; guiding local, state, and national organizations through climate adaptation; and developing resilient, climate-forward coastal designs. His work combines comprehensive hydrodynamic modeling with probabilistic coastal designs to guide long-term coastal climate adaptation. He aims to incorporate cutting-edge climate science and coastal engineering practices into resilience planning and engineering design.

1	Years with VHB
16	Total years of professional experience

Education

PhD, Physical Oceanography, Massachusetts Institute of Technology, 2019

MS, Coastal Engineering, University of Southampton (UK), 2013

BS, Civil Engineering, Old Dominion University, 2012

BS, Ocean & Earth Science, Old Dominion University, 2012

Registrations/Certifications

Professional Engineer (Civil): VA, CA

Envision™ Sustainability Professional

FAA Certified Remote Pilot for Small Unmanned Aircraft Systems

Affiliations/Memberships

American Society of Civil Engineers, Virginia Section, Norfolk Branch

Coasts, Oceans, Ports & Rivers Institute

American Shore & Beach Preservation Association

Middle Peninsula Planning District Commission, Multimodal Working Waterfront Resilient Designs, Mattaponi, VA

Bryce is overseeing resilience planning and coastal design for the redevelopment of aged, low-lying public wharves and landings on the Middle Peninsula in eastern Virginia. His analysis of present-day and future (2050–2080) coastal conditions (addressing wave hazards, water levels, and long-term erosion) at each of over 60 sites winnowed the initial group down to 11 pilot project sites. The waterfront and landside designs at each site provide the Planning District Commission with feasible, site-appropriate, adaptive designs that thoughtfully incorporate projections of site use and future climate conditions.

City of San Diego, Mission Bay Program EIR, San Diego, CA

Prior to joining VHB, Bryce served as Project Manager and Lead Coastal Engineer for feasibility and impact analyses of a 143-acre urban wetland restoration project in Mission Bay. He led development of site-specific design conditions using advanced observational instrumentation and numerical models, resulting in a preliminary restoration design now under review by the California Coastal Commission.

City of Hampton, Fox Hill, Grandview, and Harris Creek Water Management Plan, Hampton, VA

Bryce is spearheading the understanding and communication of site-specific coastal hazard information, determination of site-specific design conditions, and co-development of coastal adaptation solutions for the low-lying neighborhoods of Fox Hill, Grandview, and Harris Creek within the City of Hampton as part of the latest iteration of the citywide Water Plan. These neighborhoods are nearly flat, with little high ground to retreat to during recurring storms and stand to be largely inundated with a 2-year storm by 2040. Bryce is working alongside City staff as well as colleagues specializing in permitting, landscape architecture, community engagement, and transportation engineering to ensure that the community's vision of resilience is grounded in a detailed understanding of potential sea-level rise, tidal inundation, winds, waves, and currents. His team will ultimately provide design conditions and conceptual solutions for the region to be fast-tracked for implementation.

"Having grown up sailing on Mobjack Bay, I've always felt deeply connected to this landscape. This opportunity to develop a suite of resilient solutions for Guinea Marsh is an exciting opportunity for me to give back to a place that shaped my career."

W. Bryce Corlett, PHD, PE, ENV SP

Synergy Oil & Gas, LLC, Upper Los Cerritos Wetlands Mitigation Bank, Del Mar, CA

Prior to joining VHB, Bryce served as Lead Coastal Scientist in the development of monitoring thresholds and mitigation success criteria during construction of a 68-acre wetland mitigation bank within a larger 150-acre area of active and former oil fields. Bryce spearheaded conversations with regulators to define critical success metrics for the restoration project, directly supporting conversations which led to the creation of a $2.2 million endowment to maintain the mitigation bank in perpetuity.

Nature Collective/San Elijo Lagoon Restoration & Monitoring, Cardiff, CA

Prior to joining VHB, Bryce served as Lead Coastal Scientist in the pre- and post-construction water quality monitoring for the 979-acre San Elijo Lagoon Restoration Project. His technical expertise in hydrodynamic monitoring and data management was instrumental in providing critical feedback on the restoration's performance, which directly informed inlet management decisions. In addition, Bryce established methods and protocols which will continue to define restoration success metrics for the site over the remainder of the planned 50-year monitoring program.

City of Carpinteria, Carpinteria Living Shoreline Project, Carpinteria, CA

Prior to joining VHB, Bryce served as Project Coastal Engineer in the preliminary design of beach nourishment and vegetated dune (buried cobble) construction along Carpinteria City Beach to provide critical protection for the low-lying community. He worked closely with the City, USGS, and local ecological restoration advocacy groups to co-develop designs which would enhance the resilience of the shoreline while preserving its ecological function. Bryce led the evaluation of design alternatives for wave overtopping and erosion protection under sea level rise and storm conditions, and spearheaded public communication of design constructability and potential levels of protection. This preliminary effort supported the City's successful bid for $1.62 million from the State Coastal Conservancy to refine previous efforts to 65% engineering design.

City of Hampton, Fox Hill, Grandview, and Harris Creek Water Management Plan

Presentations

"Overcoming Policy Barriers to Living Shorelines" Providence, RI. Society of Wetland Scientists Annual Meeting; July 2025.

"Tidal Restoration: Five Years in San Elijo Lagoon" Long Beach, CA. American Shore & Beach Preservation Association Annual Meeting; September 2023

Rebecca S. Francese

Senior Environmental Scientist

Rebecca is a Senior Environmental Scientist with experience in coastal and environmental projects ranging from environmental site assessments to coastal zone management, including dredging studies, dredged material management, sediment contaminant analysis and beach renourishment. She is knowledgeable regarding federal and state permitting requirements. Rebecca has led field crews in surveying, water and soil sampling, geotechnical investigations, and various phases of environmental assessments.

28 Years with VHB

39 Total years of professional experience

Education

MA, Marine Science, College of William & Mary, 1988

BA, Environmental Science, University of Virginia, 1983

Affiliations/Memberships

Virginia Maritime Association

American Shore & Beach Preservation Association

Virginia Lakes and Watersheds Association

North American Lake Management Society

Development of Technical Guidance Document, Project Feasibility Decision Framework and Stakeholder Engagement for Beneficial Use of Dredged Material in Coastal Virginia, Virginia Marine Resources Commission

As a subcontractor, Rebecca provided technical guidance on permit regulations surrounding beneficial use of dredged material and assisted with workshops and stakeholder engagement.

Broad Creek Maintenance Dredging Project, Middlesex County, VA

Rebecca served as Project Manager and Scientist on a maintenance dredging project at Broad Creek in Deltaville, Virginia. Her responsibilities included volume calculations for various dredging designs and project permitting. She was also responsible for project monitoring, stakeholder engagement, and weekly progress reports.

City of Norfolk Department of Public Works, Annual Contract for Dredging and Environmental Permitting – Consulting and Engineering Services, Norfolk, VA

Rebecca is the Senior Environmental Scientist and Project Manager on this contract. Her tasks include dredging management planning, environmental permit development, dredging design, plans and specifications and construction management for the neighborhood navigation projects and municipal stormwater outfall maintenance. Living shoreline design and marsh enhancement have also been conducted for projects in the Lafayette River.

City of Hampton, Salt Ponds Dredging and Beneficial Use, Hampton, VA

As Project Manager, Rebecca has assisted the City of Hampton with the maintenance of Salt Ponds Inlet for more than 25 years. She has designed, permitted, developed plans and specifications and performed construction management on 12 inlet dredging cycles with more than 200,000 cubic yards of sandy material placed on the downdrift shoreline.

Rebecca S. Francese

Buckroe Beach
Renourishment Project

North End Point (Factory Point) Breach Restoration, Hampton, VA

As Project Scientist, Rebecca evaluated historical shoreline change, geotechnical data and existing conditions to restore a breach that had separated Factory Point from Grandview Nature Preserve. The project design included five breakwaters and two sills to stabilize the shoreline and then approximately 150,000 cubic yards were pumped from the offshore to restore the beach. The beach design included a recreational beach with a restored primary dune. The project has served as a successful living shoreline for more than 15 years.

Dredged Material Contaminant Evaluation, Various Clients

Rebecca has performed sediment analysis for dredged material disposal for the majority of the shipyards, bulk transport facilities and municipalities throughout southeast Virginia. Clients have included the Virginia Port Authority, Huntington Ingalls, Cities of Hampton, Norfolk and Virginia Beach, Kinder Morgan, Dominion Terminal Associates, BAE, Colonna Shipyard, Lyon Shipyard, River Port, W.F. Magann, Perdue, Ergon, and NGL Energy Partnership.

City of Virginia Beach, Annual Services Contracts for Lake Maintenance and Various Drainage Designs, Virginia Beach, VA

Rebecca is the Senior Environmental Scientist responsible for site investigations, review of sediment data, permitting and regulatory coordination on a variety of lake and storm water maintenance projects.

City of Hampton, Salt Ponds Inlet Infrastructure Improvements, Hampton, VA

Rebecca was the Senior Environmental Scientist responsible for Salt Ponds inlet infrastructure improvements including channel relocation, dredging design, structure tightening and enhanced rock jetty designs.

A-NPDC, Kings Creek Maintenance Dredging, Cape Charles, VA

This project was a maintenance and new work dredging project and included the beneficial use of dredged material. Rebecca performed the beach placement design, sediment sampling, geotechnical analysis and permit preparation for maintenance dredging of Kings Creek in Northampton County. The dredged material was successfully placed along the public beach at Cape Charles.

Douglas A. DeBerry, PHD, PWS, PWD

Senior Environmental Scientist

Doug is a Senior Environmental Scientist with experience in natural resource assessment, biological inventory and monitoring, impact assessment, and habitat restoration. Doug is one of only eight biologists approved by the USFWS to conduct surveys for all listed plants species in Virginia. He served as a Virginia Governor-appointed board member for the Professional Wetland Delineator Certification Program and on the Executive Board for the Flora of Virginia Project.

19 Years with VHB

33 Total years of professional experience

Education

PhD, Marine Science, College of William & Mary, 2006

MA, Biology, College of William & Mary, 1999

BA, Environmental Sciences, University of Virginia, 1993

Registrations/Certifications

Professional Wetland Scientist

Professional Wetland Delineator (PWD), VA

Virginia State Waters Delineator (VSWD), VA

U.S. Fish and Wildlife Service Approved Surveyor (RTE-listed Plant Species in VA), VA

Affiliations/Memberships

Research Assistant Professor of Environment & Sustainability, College of William & Mary

Society of Wetland Scientists

Flora of Virginia Project

NPS, Colonial Parkway, York River Shoreline Stabilization Project, York County, VA

For the National Park Service (NPS), Doug served as technical lead for resource identification and assessment on a shoreline stabilization project sited on the south shore of the York River adjacent to the Colonial Parkway. Tasks included wetland delineation, endangered species surveys, cultural resource evaluation, NEPA coordination, and developing planting specifications for shoreline enhancement elements of the project.

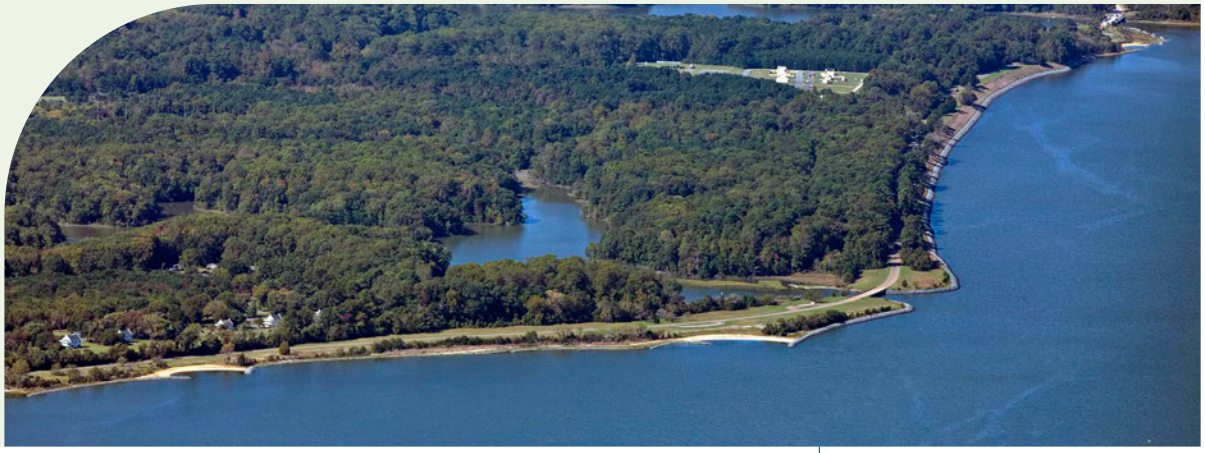
US Fish & Wildlife, Martin National Wildlife Refuge, Smith Island Shoreline, MD

Doug was Task Manager and Technical Lead on a Hurricane Sandy relief coastal restoration project for more than 5 miles of eroding shoreline at Martin National Wildlife Refuge on Smith Island in Maryland. The project involved design and plant specifications of multiple “living shoreline” restoration practices to encourage shoreline stabilization and erosion prevention. Upland (dunes) and wetland habitats, SAV beds, and overlapping jurisdictions (Section 404 of the Clean Water Act and NPS DO #77-1) required developing a balanced and multifaceted technical approach. Doug was responsible for the comprehensive biological assessment, vegetation plant specifications, and biological benchmark identification.

City of Norfolk, Ohio Creek Watershed Transformation Plan, Norfolk, VA

Doug is serving as Technical Lead for all natural resource tasks for this community resiliency project in the City of Norfolk. The project involves NEPA compliance through a HUD Environmental Impact Statement, natural systems design, shoreline design, and local, state, and federal environmental permitting. Doug led the wetland delineation efforts as well as the Chesapeake Bay Preservation Area determination task, and developed a statistical model to evaluate elevations weighted by plant species abundances in reference wetlands throughout the project area. He also worked with landscape architects to develop planting strategies for upland components of the project with commensurate goals of ecological function and aesthetic quality. Recent work has included conducting annual monitoring or living shorelines and mitigation wetlands as well as oyster reef assessment and invasive species remediation.

Douglas A. DeBerry, PhD, PWS, PWD



NPS, Colonial Parkway, York River Shoreline Stabilization Project

NPS, Colonial National Historical Park, Natural Resources Assessment, Jamestown, VA

Doug served as Technical Liaison for endangered plant species surveys and integration of resource management information related to rare species habitat. He provided summary data for historical analysis of plant demographic information to inform management decisions related to habitat preservation and maintenance of native endangered species populations. He reviewed of potential management options available to the Park Service, particularly in consideration of aspects such as public opinion and the ultimate goal of managing native vegetation communities affected by deer predation. Doug also provided summary data for historical analysis of plant demographic information to inform management decisions related to habitat preservation and maintenance of native endangered species populations.

EPA National Wetland Condition Assessment (NWCA), Virginia

Since 2011, Doug has served as the Virginia state botanist for the Environmental Protection Agency (EPA)-led National Wetland Condition Assessment, a nationwide survey of wetland status and condition within each state. The field component of the assessment is executed every five years and includes detailed data collection on wetland plant communities, structure, function, and abiotic characteristics. In each of the past three mobilizations (2011, 2016, and 2021), the project has included tidal field sites on the Middle Peninsula of Virginia, including coastal wetland sites in Gloucester and Mathews Counties.

Selected Publications

DeBerry, D.A. and D.M. Hunter. 2024. Impacts of invasive plants on native vegetation communities in wetland and stream mitigation. Biology 13(4) p.275.

Hunter, D.H. and D.A. DeBerry. 2023. Environmental drivers of plant invasions in wetland mitigation. Wetlands 43(7) p.81.

DeBerry, D.A., J.A. Thompson*, et al. 2021. Coefficients of Conservatism (C-values) for the Flora of Virginia. Banisteria 55:112-149.

Nakahata, E.S., D.A. DeBerry, and J.A. Thompson*. 2020. Floristic Inventory of the James River Park System, Richmond, Virginia. Castanea 85:244-258.

Chris Frye

Senior Coastal/Environmental Scientist

Chris is a Senior Coastal/Environmental Scientist with experience in the permitting and design of natural systems restoration and coastal resiliency projects including sills/breakwaters/beach nourishment and marsh terraces, dunes, with vegetative stabilization. He has developed technical support documentation and permit applications for a multitude of projects successfully constructed within the coastal areas of the Mid-Atlantic.

28 Years with VHB

37 Total years of professional experience

Education

MS, Geological Oceanography, Old Dominion University, 1988

BS, Geology, Bowling Green State University, 1983

Affiliations/Memberships

Virginia Maritime Association – Environmental Committee Member

American Council of Engineering Companies Virginia – Environmental Committee Member

Virginia Institute of Marine Science (VIMS), York River Shoreline Erosion Control Design-Build, Gloucester Point, VA

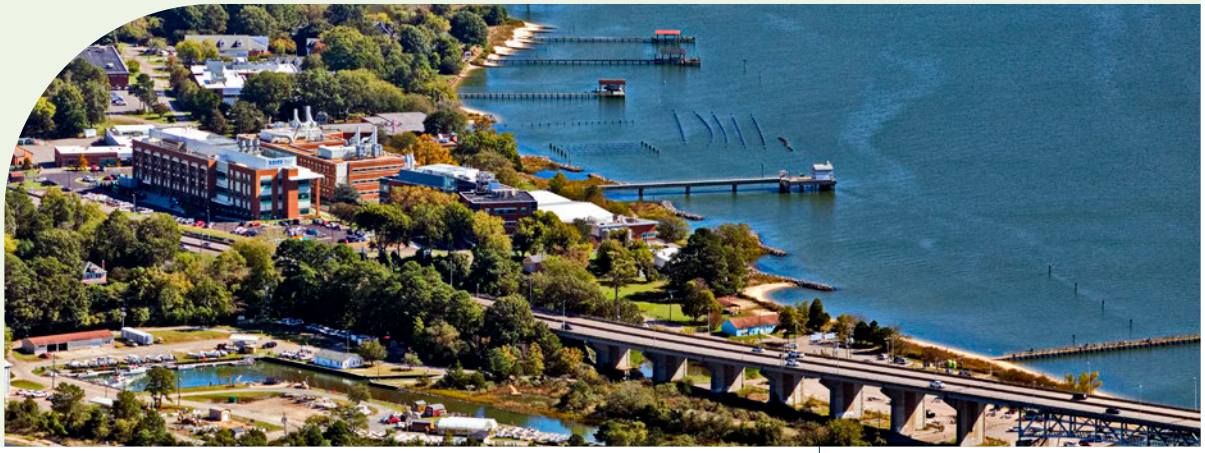
Chris served as a Task Manager for another design/build shoreline stabilization project with Coastal Design & Construction that included a gapped breakwater shore protection plan, storm water piping extensions, sand replenishment, and marsh and dune plantings on the Virginia Institute of Marine Science (VIMS) shoreline at Gloucester Point. The project design had to conform to many of the existing uses on the waterfront campus, that included waterfront access for research projects and existing infrastructure. Five breakwaters of varying lengths were placed on the eastern shoreline as free-standing rock structures within the subtidal reaches of the York River. The shoreline behind the breakwaters received new beach sand and portions of the newly created beach and backshore have been planted with coastal wetland plants, such as *Spartina patens* (saltmeadow hay) and *Ammophila brevigulata* (American beachgrass). VHB developed construction plans, specifications, and a joint permit package for the project.

Smith Island, Martin National Wildlife Refuge, Living Shoreline Design-Build, Ewell, MD

Chris was part of a multi-disciplinary design/build team led by Coastal Design & Construction for a living shoreline protection project along approximately 20,000 linear feet of shoreline on Martin National Wildlife Refuge. Based on a clear understanding of acting coastal processes and long-term shoreline change, the plan incorporated headland control techniques to instill stability in the shoreline while allowing natural processes to continue. The plan incorporated 22 headland breakwaters and two sills located at particularly vulnerable areas along the shoreline. The armor stone structures are accompanied by sand fill and over 8 acres of wetland and dune grass plantings. The layout was developed to complement and enhance/restore the various ecological communities that currently reside along the eroding coast, including marsh, dune and submerged aquatic vegetative communities. VHB assisted in the design, preparation of construction plans and specifications and acquisition of local, state and federal environmental permits.

Prior to joining VHB in 1997, Chris worked for the Virginia Marine Resources Commission and the Virginia Department of Conservation and Recreation, Shoreline Erosion Advisory Service.

Chris Frye



VIMS, York River Shoreline Erosion Control Design-Build

City of Norfolk, Ohio Creek Watershed Transformation Plan, Norfolk, VA

Chris serves as Deputy Project Manager on this $123 million community resiliency project in the City of Norfolk. In a subconsultant role, VHB's responsibilities for this federally funded project have included development of an Environmental Impact Statement (EIS), wetland delineations and RPA determinations, design services for approximately 4,500 linear feet of living shoreline design, and obtaining all necessary regulatory approvals. Project construction is just now completed and VHB provided construction observation and post-construction monitoring services on the project.

Langley Air Force Base, Shoreline Stabilization and Restoration, Hampton, VA

For a design-build contract, Chris participated in the design and permitting of over 10,000 linear feet of shoreline stabilization and restoration measures. The “living shoreline” had native coastal grasses established with coastal structures to create a sustainable coastal fringe habitat. He obtained permits from the City of Hampton Wetlands Board, the Virginia Marine Resources Commission (VMRC), and the U.S. Army Corps of Engineers (USACE). VHB also provided construction oversight services, which Chris supported.

City of Suffolk, James River Shoreline Design, Suffolk, VA

Chris is a key member of a multidisciplinary team working for the City of Suffolk to evaluate, plan, and design public, open space along the shoreline of the James River. The restoration and riverfront stabilization covers approximately 1.3 miles of the riverfront that is a former military depot located at the confluence of the Nansemond River and the James River. VHB services include an existing conditions inventory, base mapping and analysis, program workshops, conceptualized alternatives and refinements, wetland delineation, and topographic and water survey.
The City has expressed interest in incorporation of living shorelines along this highly dynamic reach and the current VHB plan includes proposed wetland terraces, sill structures, and segments of revetment. Chris will assist in the final design of the shoreline plan and lead the efforts to secure local, state, and federal permits.

Kimberly Blossom, ENV SP

Senior Environmental Scientist

As a Senior Environmental Scientist, Kim's responsibilities include regulatory strategy and support associated with nontidal and tidal wetlands, stream channels, submerged lands, and Chesapeake Bay Preservation Areas. Kim provides reporting, data assessment for compliance reporting, environmental resource inventories, and permit and NEPA documentation. Her project experience includes shoreline, marina and dredging permitting, water and sewer utility lines, and mitigation banks.

18 Years with VHB

22 Total years of professional experience

Education

BS, Biology, Christopher Newport University, 2002

Registrations/Certifications

Inspector for Erosion and Sediment Control, Virginia, VA

Envision™ Sustainability Professional

DCR, Westmoreland Shoreline Stabilization, Westmoreland, VA

As Environmental Scientist, Kim assisted with federal and state agency coordination and permitting of two separate shoreline projects located along the Potomac River and James River.

James City County, Jamestown Beach Shoreline Project, Jamestown, VA

Kim provided regulatory strategy and support to obtain permits from the U.S. Army Corps of Engineers and the Department of Environmental Quality for impacts associated with shoreline protection structures along the James River.

SPSA, Third-Party EIS for Landfill Expansion Project, Suffolk, VA

As Project Manager for a third-party EIS, Kim led a team to develop an EIS as an extension of staff for the U.S. Army Corps of Engineers. The applicant's proposal for expansion of the landfill would result in 110 acres of wetland impacts and would require a permit under Section 404 of the Clean Water Act. VHB also supported Section 7 compliance of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and other laws and authorities.

RISE, NEPA Compliance Support, Roadway Energy Harvesting, Power Storage and Operating Functions (REX), Norfolk, VA

RISE is a 501 (c)(3) non-profit organization that supports the development of innovative resilience pilot projects throughout the Hampton Roads region by providing funding awarded by a Community Development Block Grant – Disaster Recovery (CDBG-DR) through HUD. Due to the use of federal funding, NEPA compliance was required. As NEPA Lead, Kim helped RISE navigate compliance requirements, including determining the appropriate level of review, and supporting the project's NEPA compliance needs.

VIMS, Shoreline Stabilization Project, Gloucester Point, VA

For the Virginia Institute of Marine Science (VIMS), Kim prepared and coordinated Department of Environmental Quality approval of an Environmental Impact Report for two different campus projects, including a shoreline erosion control project and the construction of the Eastern Shore Seawater Laboratory.

Kimberly Blossom, ENV SP

DCR, Westmoreland Shoreline Stabilization

VIMS, York River Shoreline Erosion Control Design-Build, Gloucester Point, VA

Kim assisted in obtaining the necessary local, state, and federal permits required from the U.S. Army Corps of Engineers to construct a shoreline stabilization project that included five breakwaters of varying lengths that were placed on the eastern shoreline within the subtidal reaches of the York River. The project is located on the north shoreline of the York River on the Virginia Institute of Marine Science (VIMS) campus in Gloucester Point. Kim also prepared and coordinated the approval of a state Environmental Impact Report.

City of Norfolk, Ohio Creek Watershed Transformation Plan HUD EIS, Norfolk, VA

Kim served as Deputy Project Manager for the preparation of the Environmental Impact Statement (EIS) necessary to demonstrate NEPA compliance under HUD grant requirements. The EIS involved close coordination with the U.S. Army Corps of Engineers and was completed within 15 months. The project combined multiple coastal defense strategies to create a layered sea level rise resiliency plan.

Henrico County, Tuckahoe Creek Park Master Plan Process and Environmental Documentation, Henrico County, VA

VHB produced a Master Plan for the creation of Tuckahoe Creek Park located along the western boundary of the County. The County's Division of Recreation and Parks planned the development of a trail/boardwalk network with a trailhead connecting to an open-pile, elevated, boardwalk. The boardwalk extends out into Tuckahoe Creek and its associated wetlands for the purposes of wildlife viewing, experiencing nature, and environmental interpretation. Kim completed the necessary environmental review which included preparation of NEPA compliance documents, coordinating the Historic Preservation Act (Section 106 compliance), the Endangered Species Act (Section 7 compliance) and the Coastal Zone Management Act. Kim also coordinated with Virginia Marine Resources Commission, Virginia Depart of Environmental Quality, and the U.S. Army Corps of Engineers to obtain permits for Phase I of the park master plan. Kim provided regulatory support through the completion of the environmental review required to apply for federal funding and through her coordination with regulatory agencies to obtain state and federal permits.

Michael Mann, PE

Senior Coastal Engineer

Michael is a Senior Coastal Engineer with extensive experience in waterfront and coastal projects including design of dredging projects, beach nourishment, coastal armoring, marinas, and living shorelines. He is skilled in the design of shoreline stabilization projects, development of permit applications, specifications, construction bid packages, construction administration, and post construction monitoring.

2 Years with VHB

16 Total years of professional experience

Education

BS, Ocean Engineering, Florida Institute of Technology, 2008

Registrations/Certifications

Professional Engineer (Water Resources and Environmental): VA, SC, GA, FL, NC

Virginia Institute of Marine Science (VIMS), US Navy Penniman Spit Marsh Enhancement, York County, VA

VHB is assisting the VIMS with the design of shore protection/marsh enhancement on the York River. Michael was the Engineer of Record on this project, providing the final design layout and structural design of the coastal structures. He conducted a coastal analysis to determine design conditions at the site using the Coastal Engineering Manual and CEDAS. He also used the CEM to determine the size of the armor stone necessary to withstand the design storm and determine the underlayers. AutoCAD Civil 3D was then used to determine the quantity of sand required to nourish the shoreline behind the structures.

Town of Duck, Town Park Shoreline Project, Duck, NC

Michael is the Project Manager for a shoreline stabilization project along the Town of Duck Town Park shoreline. He completed a wind-wave analysis to develop design conditions for coastal structures and analyzed historic aerial photographs and survey data to determine the rate of erosion along the shoreline. He developed a system of coastal structures to prevent further erosion along the property which has started to threaten the uplands at the Town Park.

Safe Harbor Rockland, Rockland, ME

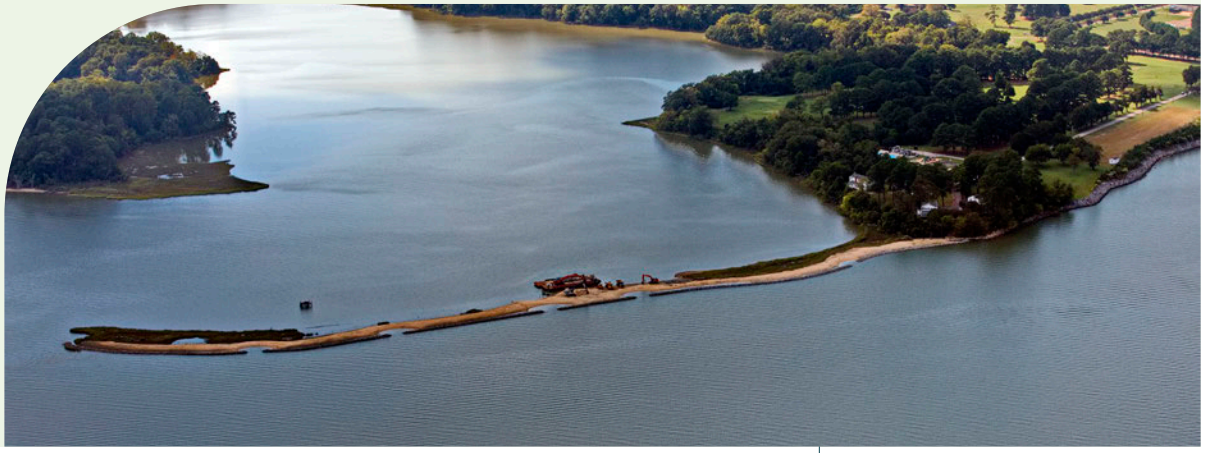
Prior to joining VHB, Michael developed dredge plans to update the marina to accommodate megayachts. He used ASCE-50 guidelines to determine appropriate depths and turning basins to allow safe maneuvering for all vessels at the marina. He calculated quantities of material required to meet dredge depths and stepped the dredge depths to reduce volumes and still provide ample room below the draft of vessels for safe mooring.

Glynn County, St. Simons Island Revetment Rehabilitation Hazard Assessment, St. Simons Island, GA

Prior to joining VHB, Michael was the Project Manager for the design, permitting, bidding, and construction. He developed design conditions at the site using the offshore buoy data to determine wave height and water levels reaching the shore. He used CSHORE to estimate updated revetment response to storm conditions and determine the overtopping of waves. Michael led presentations to keep the Town informed of project status, participated in community engagement events to provide project details, discussed the project with residents of St. Simons, and he managed construction observations and final acceptance of the project.

Michael uses different coastal modeling packages including Delft3D FM, CMS/SMS, CSHORE, and CEDAS to model shoreline conditions and determine valuable coastal information at project sites.

Michael Mann, PE



Penniman Spit Enhancement

Bellport Marina, Village of Bellport, NY

Michael led efforts to develop plans to update a historic marina in Bellport, NY. He met with the client and waterfront commission to understand the needs and wants for the marina. He completed an analysis of the existing marina to determine the existing conditions of the marina structures and estimate the potential useful life of the structures. He led efforts to lay out wave attenuation options to protect a marina that has been subject to frequent high-energy wave attacks.

Fore Points Marina, Layout, Portland, ME

Prior to joining VHB, Michael worked to develop the layout for a marina that consists of a wide range of vessel sizes that reaches up to 300 feet. He located the marina to avoid the shallow nearshore and avoid dredging. He provided ADA compliant access and laid out the connections between the docks to allow access to certain locations by golf carts. He developed technical specifications and construction drawings for the project.

Six Senses Resort, Wind Wave Analysis, Turks and Caicos

Prior to joining VHB, Michael completed a desktop wind wave analysis for the site to determine environmental conditions. He prepared and ran the SMS STWAVE model to determine maximum wave heights reaching the project site, and prepared cut/fill calculations for a proposed lagoon area.

Charleston County Parks and Rec., Cooper River Marina, North Charleston, SC

Prior to joining VHB, Michael completed an assessment of floating docks and marina components and determined accretion in the marina using historic survey data. He developed a shoreline stabilization plan to prevent erosion along the southern end of the property caused by passing tugboats.

Jensen Beach and Manatee Pocket Mooring Fields, Martin County, FL

Prior to joining VHB, Michael led the permitting package development including applications and plans for two mooring fields. His tasks included the layout of dock access structures and mooring field swing radius.

Richard (Ricky) Wiatt, PLA

Landscape Architect

Ricky is a Landscape Architect with deep experience in coastal site planning and design, including landscape architecture design for waterfronts, shoreline restoration, and grant coordination. Ricky also has expertise in securing and managing funds for infrastructure and planning projects. Ricky is also an active community leader with extensive board experience across Virginia, consistently demonstrating commitment to civic engagement, organizational stewardship, and community enrichment.

9 Years with VHB

20 Total years of professional experience

Education

BLA, Landscape Architecture, Virginia Polytechnic Institute and State University, 2005

Registrations/Certifications

Professional Landscape Architect: VA

Affiliations/Memberships

Urban Land Institute, Virginia

HRSD, James River Land Improvements, Newport News, VA

Ricky is serving as lead Landscape Architect to develop a linear park, trail system, and shoreline restoration project at the confluence of the James River and Deep Creek. The project will provide public access to the riverfront, connect to Riverview Park and City Farm Park, and extend an existing trail network.

Town of Duck, Town Park and Boardwalk and BRIC Grant, Duck, NC

Ricky served as Landscape Architect for master planning and engineering design services for the Town's park. The project includes trails, a waterfront boardwalk, a public amphitheater, a Town Green, boating access to Currituck Sound, pervious parking, and low-impact stormwater management improvements. VHB also developed concepts for living shoreline enhancements. Ricky helped coordinate Building Resilient Infrastructure and Communities (BRIC) grant funding for the project, leading the Town to secure over $500,000 in funding.

Town of Duck, NC-12 Pedestrian Improvements, Duck, NC

Ricky was Landscape Architect for this multi-phase streetscape project along NC 12, which includes a multi-purpose trail and continuous sidewalk improvements to provide pedestrian connectivity and accessibility along a major corridor. Ricky coordinated with private landowners and HOA boards for land agreements and led the design team with the development of construction documents including trail and sidewalk alignments as well as a grading, drainage, and landscaping plan that included fill limits, planting zones, and target elevations for selected marsh plants for a living shoreline.

Mathews County, Main Street Enhancement, Mathews, VA

Ricky was Landscape Architect for this Federal Transportation Enhancement project to improve watershed protection and create a streetscape enhancement project. The $1.5M project created new sidewalks and crosswalks, improved accessibility, and provided traffic calming, lighting, and landscaping for a four-block section of Main Street. Richard finalized the design, managed the bidding process, and performed construction administration.

Richard (Ricky) Wiatt, PLA

Hoskins Creek/Captain Thomas Site, Tappahannock, VA

Ricky is serving as Project Manager to develop a vision for the property along Hoskins Creek as a destination for both waterside and land side access. The project includes a shoreline restoration project and will provide public access to the creek with an ADA accessible kayak launch, floating dock system, pedestrian boardwalk, bathhouse, and mixed-use commercial area. Ricky has helped secured multiple grants, including a Tier II – Boating Infrastructure Grant from the U.S. Fish & Wildlife Service.

City of Newport News, Mariners Museum Multi-Purpose Trail, Newport News, VA

Ricky served as Landscape Architect for this 1-mile-long multipurpose trail across the Mariners Museum property along the heavily traveled Warwick Boulevard. The federally funded CMAQ grant project required close coordination with the Museum and the City for establishment of permanent easement for construction of the trail. Ricky also assisted in the preparation of design development and construction documents and managed the bidding and construction administration process.

Dare County Tourism Board, The Soundside Event Site, Nags Head, NC

Ricky served as Landscape Architect for the improvements to an event site in the Town of Nags Head. The project included enhanced site access, public pavilion, parking, event space, pedestrian walkways, and low-impact stormwater management. Ricky assisted the design team with preparation of construction documents including site layouts, grading and drainage details, and landscaping. The plan sought to provide continuity to the campus, building on the successful components of earlier construction, through the careful integration of new entrance portals, improved circulation and connectivity for all types, and coordination with new expansion opportunities.

Town of Cape Charles, Beachfront Master Plan, Cape Charles, VA

As Project Manager, Ricky oversaw the comprehensive master plan that involved an inventory of existing physical, environmental and cultural conditions to establish a long-term resilient and sustainable master plan. VHB is working closely with the Town staff, council members, project oversight committee to seek input from the town citizens on the development of the master plan.

Recently, Ricky was part of the team that was honored with the **2024 APA-NC Marvin Collins Planning Award** for the Town of Duck's Living Shoreline and Resiliency Project.

Read more about it by scanning or clicking the QR code below.

Chris DeWitt, AICP

Senior Planner

Chris is a Senior Planner whose diverse work experience ranges from coastal resilience planning to public involvement and grant funding. He has worked with a variety of local, state, federal, and institutional clients to improve mobility, develop sustainable public open space, and enhance communities. Prior to joining VHB, Chris served as Senior Planner for Gloucester County, Virginia; his local government experience adds a unique dimension to the VHB team.

26 Years with VHB

34 Total years of professional experience

Education

BS, City Planning, University of Virginia, 1991

Registrations/Certifications

American Institute of Certified Planners

Affiliations/Memberships

American Planning Association, Virginia Chapter

Urban Land Institute, Virginia Livable Communities Council,

League of American Bicyclists

Rails-to-Trails Conservancy

Association of Pedestrian and Bicycle Professionals

American Institute of Certified Planners

City of Hampton, Fox Hill, Grandview, and Harris Creek Water Plan, Hampton, VA

Chris is Project Manager for this effort to develop a flood resilience plan for this low-lying northeast quadrant of Hampton. The project will result in a Water Plan focused on thriving with water. Employing an extensive community engagement campaign, VHB is developing a plan to recommend a range of nature-based and hybrid infrastructure strategies for this flood-prone area.

Town of Tappahannock, Hoskins Creek/Captain Thomas Site, Tappahannock, VA

Chris is serving as Technical Advisor to develop and implement a vision for the property along Hoskins Creek as a destination for both waterside and land side access. The project includes a shoreline restoration project and will provide public access to the creek with an ADA accessible kayak launch, floating dock system, pedestrian boardwalk, bathhouse, and mixed-use commercial area. Chris has helped secured multiple grants, including a Tier II – Boating Infrastructure Grant from the U.S. Fish & Wildlife Service.

Mathews County, Main Street Enhancement, Mathews, VA

Chris was Project Manager for this Federal Transportation Enhancement project to improve watershed protection and create a streetscape enhancement project. The $1.5M project created new sidewalks and crosswalks, improved accessibility, and provided traffic calming, lighting, and landscaping for a four-block section of Main Street. In addition to creating a safer and more inviting public space, the project significantly improved drainage along Main Street, reducing the frequency and severity of flooding.

Middle Peninsula Planning District Commission, Tappahannock Waterfront Park, Essex County, VA

Chris was Project Manager for this effort designed for the Town of Tappahannock. Utilizing a multidisciplinary team, the project resulted in a conceptual plan for development of a waterfront park. Issues included enhancement of the Town's historic center, pedestrian accessibility, pier reconstruction, traffic management, and eco-tourism. The final product included phasing and funding recommendations, and supporting documentation that was used by the client to secure grant funding. Coordination with affected property owners was an important project element.

Megan Raymond, CFM, PWS, RSS

QA/QC Manager

Megan is an Environmental Scientist and Project Manager with experience leading complex environmental planning, permitting, and restoration efforts. She specializes in coastal and inland wetland systems, geomorphology, and climate adaptation, and has led multidisciplinary teams to develop innovative, nature-based solutions. As QA/QC Manager, she will provide technically sound feedback and guidance that supports high-quality deliverables and overall project success.

<1	Years with VHB
20	Total years of professional experience

Education

MS, Physical Science, College of William & Mary, 1999

BS, Geological Sciences and Environmental Science, Tufts University, 1995

Registrations/Certifications

Professional Wetland Scientist

Certified Floodplain Manager

Professional Soil Scientist

City of New Haven, East Shore Park Living Shoreline, New Haven, CT

Prior to joining VHB, Megan was the Project Manager of a benthic assessment to assist the City of New Haven in placing proposed rock sills along the 3,000-linear-foot of shoreline on New Haven Harbor in conjunction with a living shoreline project. She worked with the benthic data and geomorphology of the manipulated coastline, instructed rock sill location, composition, and geometry during construction.

City of New Haven, On-Call Soil Scientist and Coastal Area Management Review, New Haven, CT

Megan is the on-call soil scientist for the City of New Haven, as well as facilitating coastal area management reviews. Working with the New Haven City Plan Commission, Megan reviews Application for Development permit applications and provides guidance to the City Plan Commission to ensure consistency with the Coastal Area Management Act and the Inland Wetlands and Watercourse Act.

CTDOT, Bridge Permitting, State-wide, Local and State Roadways and Highways, Statewide, CT

Megan is facilitating environmental permitting for bridge replacement and repair over inland wetlands and watercourses and coastal watercourses and tidal wetlands. Megan prepares permit application packages to facilitate local, state and federal regulatory approvals consistent with state and federal laws for wetlands and waterways.

Farmland Restoration Grant Program, Statewide, CT

Prior to joining VHB, Megan was the Project Manager for the Farmland Restoration Grant Program and Farmland Resiliency Grant Program on-call soil scientist for the Connecticut Department of Agriculture. She visited multiple farms across the state to evaluate farmland restoration and resiliency grant projects; assessed projects specific to existing conditions including wetlands, soils, and slopes; and prepared summary conditions report detailing site conditions and proposed recommendations for each project.

Robert (Bob) Taliaferro, LS, CH

Surveying

Bob has more than four decades of experience in all types of field surveys, and oceanographic and environmental and data acquisition. He has performed geodetic control, cadastral, topographic and hydrographic surveys in Virginia and in most other states in the Mid-Atlantic region. Bob also has in-depth experience in field investigations and environmental sampling for dredging projects, surveys for precise quantity determinations, diving inspection investigations, side scan sonar and magnetometer surveys.

45 Years with VHB

45 Total years of professional experience

Education

Professional Land Surveyor, VA

Level 2 Certified Hydrographer

Affiliations/Memberships

The Hydrographic Society of America

Virginia Association of Surveyors

Professional Development

Annual HyPack Hydrographic Software Seminars, 2022

USACE Norfolk District, IDC for A/E Services, Minor Civil Works Projects, Norfolk, VA

Bob was Survey Manager on six previous IDCs providing over $4,500,000 in professional services to the ACOE. Tasks Orders included geodetic control, topographic and hydrographic surveying; tidal current studies; water and sediment sampling on numerous civil works and military projects.

City of Hampton, Various Dredging, Design, and Permitting Projects, Hampton, VA

Bob served as the Director of Surveys on various dredging design & permitting projects for the City of Hampton, VA. Tasks have included stake-out, topographic, before dredge, after dredge, and condition surveys of Salt Ponds Inlet and Channel; surveys of breakwaters at Salt Ponds Beach; and surveys of breakwaters and Buckroe Beach.

City of Virginia Beach, Western Branch of Lynnhaven River Maintenance Dredging Hydrographic Surveys, Virginia Beach, VA

Bob is the Project Surveyor for extensive hydrographic surveys in support of design, plans and specifications on the Western Branch of Lynnhaven River Maintenance Dredging Project.

City of Norfolk Department of Public Works, Annual Contract for Dredging and Environmental Permitting – Consulting and Engineering Services, Norfolk, VA

Bob is the Director of Surveys for this annual contract. Tasks have included: hydrographic surveys of Haven Creek Boat Ramp, Sussex Place, a CSRM hydro survey of the Norfolk Floodwall, and hydrographic surveys for River Point Dredging, South Blake Road Dredging, Pretty Lake Main Channel Maintenance Dredging, and USS Wisconsin Dredging.

City of Virginia Beach, Annual Services Contract for Beach Profile Monitoring Program, Virginia Beach, VA

Bob has been the Survey Manager responsible for Open-End Annual Contracts for beach profile monitoring of the City's public beaches from 2002–2005 and 2009–2023. Profiles are taken on 500-foot centers and include onshore and near-shore topography and offshore hydro segments.

Huntington Ingalls-Newport News Shipbuilding, Annual Maintenance Dredging Surveys, Newport News, VA

Bob was the Project Surveyor responsible for performing numerous condition surveys, before and after dredging hydrographic surveys in connection with waterfront facilities.

Aubrey Pontious, PLA, ASLA

Drone Pilot

Aubrey is a licensed Landscape Architect with experience on more than 280 projects across public, private, and non-profit sectors, known for integrating technical precision and creative vision to deliver sustainable, community-focused designs. Guided by integrity, creativity, and stewardship, he is recognized for relationship-driven leadership and is also an FAA-certified sUAV pilot and advocate for innovative AEC design technologies.

1 Years with VHB

7 Total years of professional experience

Education

MLA, Landscape Architecture, University of Oklahoma, 2018

BFA, Metalsmithing Specialization, Southern Illinois University – Carbondale, 2011

AA/AS, Arts & Sciences, Rend Lake College, 2008

Registrations/Certifications

Licensed Landscape Architect, VA

Presentations

Speaker, “What is Landscape Architecture”, Come to the Bay Conference (2024)

“What to Know Before You Drone Out” (2021), Drones 101-1000 Webinar (2020)

Preservation Virginia, Jamestown Pedestrian Access Resiliency, Williamsburg, VA

Aubrey serves as Landscape Architect on this project to provide surveying, planning, design, and engineering for a new pedestrian access walkway from the Historic Church to the Archaerium at Jamestown.

City of Hampton, Briarfield Park Master Plan, Hampton, VA

Briarfield Park is an existing 49-acre green space located along Briarfield Road and E Street in Hampton, Virginia. VHB is developing a comprehensive Master Plan and report to guide redevelopment of the park in a way that is resilient, constructible, and tailored to meet the community's needs. Aubrey serves as Landscape Architect for the project.

WPL Land Design, Landscape Architect & sUAV Pilot, Virginia Beach, VA

Prior to joining VHB, Aubrey served as Landscape Architect & sUAV Pilot for WPL Land Design. In this role, he managed design and documentation across 280+ projects, balancing multiple clients and timelines, and directed project workflows from proposal to billing, ensuring seamless coordination across multidisciplinary teams.

Notable projects include:

- Mount Trashmore Park Playground Slides & Stairs
- Hero Kids Foundation GLOBE Garden
- Adventure Park at VA Aquarium Phase 2
- Fishing Point Recovery Center & Clinic
- The Hallow Samaritan House
- HRSD Woodstock Park
- Martha’s Way Trail Study & Implementation
- Resort Area Strategic Action Plan Update
- Retain Your Rain Residential Guide

Vikrant Desai, PE, VMA

Civil Engineer

Vik is a Civil Engineer with extensive experience supporting Virginia Department of Conservation and Recreation (DCR), Department of Wildlife Resources (DWR), municipalities across Virginia, and the National Park Service (NPS). He manages projects of all sizes and complexities, including historic renovation and revitalization projects, parks and recreation master planning, and coastal, shoreline, and marina projects. Vik is highly proficient in the development of engineering plans, specifications, and construction bid packages.

20 Years with VHB

20 Total years of professional experience

Education

BS, Civil Engineering, Virginia Polytechnic Institute and State University, 2005

Registrations/Certifications

Professional Engineer, VA

Value Methodology Associate (VMA)

DCR, Widewater State Park, Phase I and II, Stafford County, VA

Vik was Project Manager for Phase I of the project that included construction of 370 LF of living shoreline, 370 LF of rock sill, two canoe/kayak launches, and other park buildings, playgrounds, roads, and utility systems. Vik was also Project Manager for Phase II of the project, consisting of two 140-feet-long breakwaters, 340 LF of rock sills, 230 LF of stone revetment, 140 LF of living shoreline, beach sand fills, boat ramps, and associated timber tending piers. Vik also led the effort for submittal and shop drawing reviews and inspections during construction for both phases.

NPS, Emergency Shoreline Stabilization of South Manitou Island's Lighthouse Complex, Sleeping Bear Dunes National Lakeshore, Empire, MI

Vik is Project Manager for a multidisciplinary project delivering sustainable, resilient access and maintenance solutions for North and South Manitou Islands in Lake Michigan. The work includes replacing fixed timber piers, dredging for new docks, upgrading utility systems, and preserving historic structures, with Vik leading VHB's team through construction documents, specifications, and ongoing construction administration.

Maryland Department of Natural Resources, St. Clements State Park Shoreline, St. Mary's County, MD

Vik assisted in erosion and sediment control and stone structure design for this design-build project to constructed shoreline erosion control measures at St. Clements Island State Park. Work included approximately 80 feet of shoreline revetment placed between the existing park boat ramp and headland, transitioning into sill and marsh terrace around the headland. Spurs were constructed at both ends of the sill segment to create an appropriate transition with adjacent shorelines. The shoreline plan made use of the existing rubble found along the shoreline to accentuate the toe of the newly constructed structures.

DWR, Various Boat Ramp Projects, VA

Vik has been the Lead Project Engineer and Project Manager for various concrete boat ramps and associated timber/aluminum tending pier replacement projects throughout Virginia. He led the design effort to replace boat ramps and tending piers, and improvements to adjacent parking lots at Red Bank Landing in Northampton County and Shell Landing in Northumberland County. Shell Landing included 235 LF of rock revetment and Briery Creek Lake Landing included replacing the timber tending pier.

Harrison Bloom, PMP, GISP

Technology Lead

Harrison is the Mid-Atlantic GIS lead at VHB. He has 15 years' experience in GIS project and program management, application development, database creation and management, and spatial analysis. He leads a variety of GIS tasks and projects for federal, state, and local clients. Harrison's areas of expertise include geodatabase development & management; python programming; spatial analysis and modeling; project & program management; and data collection methodologies.

1	Years with VHB
15	Total years of professional experience

Education

MS, Geospatial Engineering, State University of New York, College of Environmental Science & Forestry, 2013

BS, Environmental Science and Policy, University of Maryland, 2010

Registrations/Certifications

Project Management Professional (PMP)

Geographic Information Systems Professional (GISP)

City of Hampton, Fox Hill, Grandview, and Harris Creek Water Management Plan, Hampton, VA

Harrison is leading the development of a comprehensive ESRI Storymap to provide the residents of the Fox Hill, Grandview, and Harris Creek communities with a means to understand the project and provide feedback about local flooding issues and community points of interest to be protected from flooding. The feedback aspects were created using Survey123 and embedded into the StoryMap. Because this Storymap is meant to be a living document that is updated throughout the project, Harrison will be collaborating with project staff and stakeholders to make updates.

US Army Corps of Engineers, Waterborne Commerce Statistics Center, Transportation Operations, Washington, DC

Prior to joining VHB, Harrison served as project director and GIS technical lead for nearly $1 million in work supporting USACE's modernization of their Transportation Operations Waterborne Statistics, improving record accuracy, reducing manual maintenance, and strengthening vessel routing with advanced auto-routing of commercial vessels using Esri Network Analyst and ArcPy.

City of Hampton, Stormwater Modeling: GIS Improvements, Hampton, VA

The City of Hampton has received funding to develop a comprehensive hydrologic and hydraulic (H&H) stormwater model to strength the City's resiliency and infrastructure planning. This project aims to assess flooding risks, prioritize mitigation strategies, and improve stormwater infrastructure asset management. During the first phase of this project, VHB is leading GIS data improvements, integrate real-time flood sensors, and develop dashboards for monitoring. The project includes data collection, gap analysis, and a pilot study in the Newmarket Creek Watershed to refine methodologies before scaling citywide. Outcomes include a comprehensive GIS database for the city's stormwater assets, real-time flood monitoring and dashboard integration, and a framework for future stormwater modeling. As part of the pilot study, Harrison has been working to update the existing methodology to ensure a more even distribution of sensors over the study area and led the development of the memo detailing this methodology and its downstream benefits for the City.

Sam Whitin

Coastal Scientist

EA Engineering, Science, and Technology, Inc., PBC

Sam has 26 years of multi-disciplinary experience in ecosystem restoration and risk reduction projects in the coastal environment. He has managed restoration and research activities related to coastal vulnerability assessments and risk and evaluated and implemented adaptation/restoration options to create more resilient natural systems in the coastal environment.

26 Years with EA

26 Total years of professional experience

Education

B.S., Biology, Bates College, 1999

M.S., Environmental Engineering and Science, Bates College, 2021

Registrations/Certifications

USDOT NEPA and Transportation Decision-Making

National Audubon Society, Currituck Sound Marsh Assessment and Restoration Design for Pine Island Sanctuary Mid-Currituck Marsh Complex, Currituck, NC

EA supported Audubon North Carolina to develop restoration projects in two priority areas at the Pine Island Sanctuary in Currituck Sound, North Carolina. EA worked with Audubon North Carolina and project partners to collect data and analyze proposed conceptual alternatives to improve coastal community resiliency and promote and enhance marsh habitat for birds. In coordination with Audubon North Carolina, EA developed design alternatives for these sites. Development of design alternatives was informed by field data collected by the EA team on marsh elevation and habitat as well as existing information provided by project partners and available information. EA developed a site assessment, performed an alternatives analysis, advanced designs to the 90% design stage, and support permit approval for the projects. The features to be constructed include a coir log soft sill, Christmas tree breakwater, and 9 acres of thin-layer placement on degraded marsh islands. Sam served as senior ecologist and senior technical reviewer for this project.

Planning for Coastal Resiliency in the Northern Chesapeake Bay, Harford County, MD

Sam provided quality assurance and control for the overall project. This project provides a listing of coastal resiliency strategies and associated measures that can be used to reduce risks from flooding, storm surge, and wave action in the project area. These coastal resiliency measures include nature-based, structural and non-structural measures, and outlined steps necessary to develop management plans to decrease the risks associated with sea level rise that are science based and are appropriate in terms of scale and time.

U.S. Fish and Wildlife Service, Assessing the Resiliency of the Sachuest Point Landfill – Sachuest Wildlife Refuge, Middletown, RI

Sam provided ecological and general project support for the assessment of the Sachuest Point Landfill's vulnerability to coastal storm events. This included support in the development of goals and objectives to assess impacts of sea level rise and to improve coastal resiliency for a landfill located in a coastal environment. The project involves the development of wave-runup modeling efforts being conducted by a subcontractor. Conceptual designs included natural and hybrid infrastructure to protect the landfill under varying sea level rise scenarios, including complete removal of the landfill and returning the area to natural coastal salt marsh habitat.

Taber Midgley, PE

Water Resources Engineer

EA Engineering, Science, and Technology, Inc., PBC

Taber has 14 years of diverse experience in civil and environmental engineering, including coastal engineering, construction management and oversight, environmental due diligence and compliance, environmental remediation, stream/wetland restoration, and stormwater management. His responsibilities include preparing construction drawings, cost estimates, design reports, engineering calculations, hydrologic and hydraulic models, and technical specifications.

11 Years with EA

14 Total years of professional experience

Education

Advanced Certificate, Coastal Engineering, 2021

MS, Biosystems Engineering, 2012

BS, Biosystems Engineering, 2010

Registrations/Certifications

Professional Engineer: VA

USACE/NAVFAC Construction Quality Management for Contractors, 2020

Sustainable Sediment Management Course, 2025-2026

USACE ERDC, Coastal Resilience and Natural Infrastructure Research, Joint Base Langley-Eustis (JBLE), Hampton, VA

Taber served as program manager and senior engineer for an extensive project located on Langley Air Force Base to address impacts of sea level rise and to increase coastal resilience by providing natural protection through nature-based techniques. The project included development of a existing conditions assessment report summarizing the current and anticipated future conditions and hazards of JBLE-Langley. EA hosted an onsite design workshop with a wide variety of stakeholders to discuss these hazards, identify the three highest-priority sites, and developed a series of alternatives to address the hazards. EA then advanced these designs to a conceptual 10% stage. Nature-based techniques evaluated under this project include living breakwaters and sills, enhancement of subaquatic vegetation, oyster castle reef structures, and marsh nourishment through thin layer placement.

USACE ERDC, Increasing the Resilience of USMC Resources Using NBS, MCAS Cherry Point (North Carolina), MCAS Beaufort (South Carolina), and MCB Hawaii

Taber managed a series of five projects at three U.S. Marine Corps installations including Marine Corps Base Hawaii (MCBH), Marine Corps Air Station (MCAS) Cherry Point, and MCAS Beaufort. Each of the five projects included a desktop site assessment, field data collection to support project design, deployment of a pilot project to evaluate effectiveness of NBS nature-based techniques, and advancement of conceptual designs and development of construction cost estimates for full-scale projects. Taber served as project manager and senior engineer for the project at MCBH Marine Corps Training Area Bellows (MCTAB) located near Waimānalo on the windward coast of O'ahu. This project aimed improve the resilience of the beach system by removing the invasive common ironwood trees, establishing native dune vegetation to support passive dune growth, and implementing features to reduce disturbance to the beach and dune system by the public and military training activities. Taber served as senior engineer for the efforts associated with the four other projects. A second project at MCBH included an evaluation of the beach system and development of a proposed design at the Pu'uloa Range Training Facility (PRTF). Two projects at MCAS Beaufort (South Carolina) included development of full-scale conceptual designs and implementation of pilots projects for a marsh nourishment (thin-layer placement) and streambank stabilization projects. The final project at MCAS Cherry Point involved development of a marsh nourishment (thin-layer placement) and living breakwater to improve resilience to coastal hazards at training area BT-11 on Piney Island, located within the Pamlico Sound in North Carolina.

Rich Pfingsten, SPWS

Senior Ecologist

EA Engineering, Science, and Technology, Inc., PBC

Rich is a Project Manager and Wildlife and Fisheries Biologist with over 41 years of experience in ecological restoration. He supports natural and water resource assessment, planning, design, and construction, with expertise in tidal and nontidal wetlands, wetland mitigation and restoration, stream restoration, environmental permitting and agency coordination, watershed planning, NEPA compliance, and construction and post-construction monitoring.

3 Years with EA

41 Total years of professional experience

Education

B.S., Wildlife and Fisheries Biology, Management with Biology Minor, 1984

Registrations/Certifications

Senior Professional Wetland Scientist (SPWS) – Society of Wetland Scientists (No. 1105)

City of Virginia Beach, Great Neck Park and Brock Center Conceptual Restoration Design, Virginia Beach, VA

Rich served as EA's Contract Manager and Senior Technical Reviewer for the preparation of two conceptual living shoreline design projects at park sites known as Great Neck Park and the CBF Brock Center in the City of Virginia Beach. He oversaw completion of background data review, reconnaissance site visits and post-site visit map development, and preparation of the draft concept design plans and report. The designs focused on addressing nutrient and sediment load reductions to local waterways, while also providing improved coastal resiliency and habitat restoration at the sites.

USACE-ERDC, Progressing EWN Process & Performance Monitoring Techniques, Aberdeen Proving Ground, MD

Rich served as Senior Technical Reviewer for a multidisciplinary research effort focused on documenting processes unique to the implementation of natural infrastructure (NI) at APG and surrounding communities. He provided review and ecosystem restoration guidance on multiple project deliverables including a Data Gathering and Synthesis Report, Basis of Design Report, and Draft Site Selection and Coastal Resilience Alternatives Report.

Confidential Client, Cove Point Coastal Ecosystem Restoration & Resilience Options, Lusby, MD

Rich served as project manager, senior restoration ecologist, and construction manager for the design and implementation of over 11 acres of tidal salt marsh and 2,700 linear feet of barrier beach and dune creation to protect a 190-acre freshwater marsh on the western shore of Chesapeake Bay. He led subsequent analyses using updated sea level rise data to assess storm-related breaches, evaluate hydrodynamic and SLR vulnerability, and develop coastal resiliency design alternatives using nature-based, structural, and hybrid treatments. He prepared base mapping, conceptual shoreline stabilization options with cost ranges, and a technical memorandum summarizing findings, recommended alternatives, and potential grant funding sources.

DC Department of Energy and Environment (DOEE), Kingman Lake Wetland Restoration, Washington, DC

Rich served as project manager and senior restoration ecologist for the 138-acre Kingman Lake restoration along the Anacostia River, leading design and implementation of freshwater tidal wetlands, mudflats, native SAV plantings, invasive species management, and other habitat enhancements in partnership with DOEE and NPS.

Kevin Pocta, PE

Geotechnical Engineer

Schnabel ENGINEERING

Kevin Pocta has experience in geotechnical engineering and construction monitoring in Virginia. By combining his experience in both design and construction, he brings an understanding of constructability to design, as well as an understanding of design to construction projects.

15 Years with Schnabel

15 Total years of professional experience

Education

Bachelor of Science, Civil Engineering, Virginia Polytechnic Institute and State University

Registrations/Certifications

Professional Engineer: NC, VA

USACE Norfolk, NASA Wallops Island Breakwater, Wallops Island, VA

As Project Engineer, Kevin performed analyses for settlement of proposed breakwaters outboard of the NASA Wallops Island Flight Facility. He was responsible for coordination of the subsurface exploration, the laboratory testing program, and report preparation. He also created drilling agendas, location plans, and prepared the report.

USACE Norfolk, NASA Wallops Island Beach Renourishment, Wallops Island, VA

As an Associate Engineer, Kevin was responsible for the coordination of the subsurface exploration, the laboratory testing program, and report preparation for the borrow area study associated with this project. This study involved the use of a 175 ft class liftboat operated 11 miles offshore of Wallops Island. This project was a continuation of the breakwater project we previously worked on and supported the beach renourishment of the island.

MDOT, Governor Harry Nice Bridge Replacement, Newburg, MD, to Dahlgren, VA

The purpose of the project is to replace a 1.9-mile long, 59-span bridge for US Route 301 across the Potomac River between Maryland and Virginia. Kevin was a Project Engineer, responsible for data management of the subsurface exploration and laboratory testing program. He created drilling agendas, GIS site for field coordination, and project website for inter-office coordination.

NNS, 65th Street Storm Drain Rehabilitation, Newport News, VA

Kevin served as Senior Engineer on this project to evaluate and repair the existing 96-inch diameter storm sewer underneath 65th Street in the Newport News Shipyard. He reviewed existing subsurface exploration data from the site and performed analyses for stresses induced by the transporter on the sewer, shallow spread footings for a land bridge, and deep foundation recommendations for a land bridge.

VDOT, Route 178 over Occohannock Creek Bridge, Accomack County, VA

As Project Engineer, Kevin was responsible for review of the subsurface exploration, laboratory testing program, geotechnical analyses, and report preparation for the replacement and widening an existing bridge on Route 178 over Occohannock Creek. He performed and reviewed analyses for global stability of sheet pile walls, settlement of fill, pavements, and pile foundations.

C. Scott Hardaway, JR.

Geologist

Primarily focused on shoreline processes, including coastal geomorphology, wave mechanics, sediment transport, numerical modeling of hydrodynamics and shoreline change, and breakwater and beach fill performance. Currently serves as Director of the Shoreline Studies Program in the Department of Physical Sciences, leading applied research in shoreline management planning and living shoreline design, including field surveys, conceptual design, and securing state and federal permits.

40 Years with VIMS

40 Total years of professional experience

Education

M.S., Geology, East Carolina University, 1980

B.S., Geology, East Carolina University, 1973

Registrations/Certifications

Professional Geologist: VA, NC

Publications

Milligan, D.A. C.W. Green, C.S. Hardaway, C.A. Wilcox, C.M. Rae and J.C .Kowal, 2025. **Joint Base Langley-Eustis Fort Eustis Shoreline Management Update and Coastal Resiliency Plan**, Contract Report for DOD Legacy Resource Management Program by Shoreline Studies Program, VIMS, College of Wiliam and Mary, Gloucester Point, VA

Green, C.W., D.A. Milligan, C.S. Hardaway, C.A. Wilcox, 2024. **Marine Corps Base Quantico Shoreline Management and Coastal Resiliency Plan**. Contract with Northern Virginia Regional Commission for United States Marine Corps, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA

Green, C.W., D.A. Milligan, C.S. Hardaway, C.A. Wilcox, 2022. **Machicomoco State Park Shoreline Management Plan**. Contract Report for the Virginia Department of Environmental Quality's Coastal Resource Program. Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA.

Hardaway, C.S., D.A. Milligan, C.A. Wilcox and R. Herzick, PE, 2020. **Penniman Spit, Living Shoreline and Oyster Restoration Project**. Design and permitting. Shoreline Studies Program, VIMS, Gloucester Point, VA. For Naval Weapons Station Yorktown, York County, VA.

Hardaway, C.S., D.A. Milligan, and C.A. Wilcox, 2016. **Blossom Point Research Facility, Shoreline Management Plan for Potomac River and Nanjemoy Creek**. Shoreline Studies Program, VIMS, W&M, Gloucester Point, VA For U.S. Army Garrison Adelphi Laboratory Center, Maryland and Galveston, TX

Hardaway, C.S., D.A. Milligan and R. Herzick, PE, 2016, **Werowocomico Living Shoreline Project, Gloucester County, VA.** : Design, permitting and construction management Performed under grant contract to National Fish and Wildlife Foundation, Washington D.C. Installed 2019.

Matthew L. Kirwan

Wetlands Scientist

VIMS | William & Mary
Virginia Institute of Marine Science

Matthew is a Professor at the VIMS whose work focuses on the geomorphology and ecology of coastal wetlands, sea-level rise, and the coastal carbon sink. He leads interdisciplinary research on tidal wetland stability, marsh migration, and ghost forests, and regularly advises state and federal agencies, conservation organizations, and coastal planners on climate resilience and restoration strategies. His experience combines high-impact scientific research with applied guidance for coastal management and policy.

13 Years with VIMS

19 Total years of professional experience

Education

Ph.D., Duke University, 2007

B.S., College of William and Mary, May 2002

Awards

2021 Class of 1964 Distinguished Term Professorship

2019 Presidential Early Career Award for Scientists and Engineers (PECASE)

2018 Plumeri Award for Faculty Excellence, College of William and Mary

2017 NSF CAREER Award

Publications

Kirwan, M.L., Michael, H.A., Gedan, K.B., Tully, K.L., Fagherazzi, S., McDowell, N.G., *Molino, G.D., Pratt, D., Reay, W.G., and Stotts, S. 2024. Feedbacks regulating the salinization of coastal landscapes. In press, **Annual Reviews of Marine Science**.

*Chen, Y. and Kirwan, M.L. 2023. Upland forest retreat lags behind sea-level rise in the mid-Atlantic coast. **Global Change Biology** 30, e17081. https://doi.org/10.1111/gcb.17081.

*Molino, G.D., Carr, J.A., Ganju, N.K., and Kirwan, M.L. 2022. Variability in marsh migration potential determined by topographic rather than anthropogenic constraints in the Chesapeake Bay region. **Limnology and Oceanography Letters** 7: 321-331, https://doi.org/10.1002/lol2.10262.

*Smith, A.J. and Kirwan, M.L., 2021. Sea-level Driven Marsh Migration Results in Rapid Net Loss of Carbon. **Geophysical Research Letters** 48, e2021GL092420. https://doi.org/10.1029/2021GL092420.

Kirwan, M.L., and Gedan, K.B., 2019. Sea-level driven land conversion and the formation of ghost forests. **Nature Climate Change** 9, 450–457.

Kirwan, M.L., Noyce, G., *Smith, A.J., Megonigal, J.P., 2023. Geomorphic and ecological constraints on the coastal carbon sink. **Nature Reviews Earth & Environment**. https://doi.org/10.1038/s43017-023-00429-6.

*Chen, Y. and Kirwan, M.L., 2022. Climate-driven decoupling of wetland and upland biomass trends on the mid-Atlantic coast. **Nature Geoscience**. https://doi.org/10.1038/s41561-022-01041-x.

*Langston, A., *Coleman, D., *Jung, N., Shawler, J., *Smith, A., Williams, B., Wittyngham, S., Chambers, R., Perry, J., and Kirwan, M. 2021. The effect of marsh age on ecosystem function in a rapidly transgressing marsh. **Ecosystems**. https://doi.org/10.1007/s10021-021-00652-6

*Valentine, K., *Herbert, E.R., *Walters, D.C., *Chen, Y., *Smith, A.J., and Kirwan, M.L., 2023. Climate-driven tradeoffs between landscape connectivity, ecosystem extent, and the maintenance of the coastal carbon sink. **Nature Communications 14**, 1137. https://doi.org/10.1038/s41467-023-36803-7.

**Denotes student, technician, or postdoc in Matthew's lab.*

Donna Milligan

Marine Scientist

Marine scientist and program administrator for the Shoreline Studies Program, specializing in research-based analyses of coastal geomorphology and physical processes to inform shoreline management. Experience includes wave mechanics, sediment transport, beach surveying and analysis, numerical modeling of hydrodynamics and shoreline change, and living shoreline design and performance.

35 Years with VIMS

35 Total years of professional experience

Education

PhD Candidate, William & Mary, Educational Policy, Planning & Leadership Program: Higher Education Administration

Master of Marine Science, William & Mary, VIMS, 1994

Bachelor's in Marine Science, Coastal Carolina College, University of South Carolina, 1991

Project Experience

The following projects were designed, permitted , and contracted by the Shoreline Studies Program:

- Captain Sinclair's Recreational Area, Gloucester County, VA
- Occohannock on the Bay, Accomack County, VA
- Penniman Spit Hybrid Living Shoreline Restoration Project

Publications

Milligan, D.A, Hardaway, Jr., C.S., Wilcox, C. A., & Green, C.W. (2023). **Naval Weapons Station Yorktown and Cheatham Annex Shoreline Management and Coastal Resiliency Plan**. Virginia Institute of Marine Science, William & Mary.

Green, C.W., D.A. Milligan, C.S. Hardaway, and C.A. Wilcox, 2022. **Machicomoco State Park Shoreline Management Plan**. VIMS, W&M, Gloucester Point, VA. https://scholarworks.wm.edu/reports/2850/

Milligan, D.A., C.S. Hardaway, C.A. Wilcox, and N.J. DiNapoli, 2021. **Living Shoreline Sea-Level Resiliency: Performance and Adaptive Management of Existing Sites, Year 3 Summary Report**. VIMS, W&M, Gloucester Point, VA. https://scholarworks.wm.edu/reports/2487/

Hardaway, C.S., D.A. Milligan, and K. Duhring, 2021. **Living Shoreline Design Guidelines for Shore Protection in Virginia's Estuarine Environment. Special Report in Applied Marine Science and Ocean Engineering #473**. VIMS, W&M, Gloucester Point, VA. https://scholarworks.wm.edu/reports/2863/

Milligan, D.A., Hardaway, Jr., C.S., Wilcox, C.A., & DiNapoli, N.J., 2021. **Dredging Implementation Prioritization and Management for Middle Peninsula Shallow Draft Channels**. Virginia Institute of Marine Science, William & Mary, Gloucester Point, VA. https://scholarworks.wm.edu/reports/2532/

Hardaway, C.S., D.A. Milligan, C.A. Wilcox and R. Herzick, PE, 2020. **Penniman Spit, Living Shoreline and Oyster Restoration Project**. Design and permitting. Shoreline Studies Program, VIMS, W&M, Gloucester Point, VA. For Naval Weapons Station Yorktown, York County, VA.

Hardaway, Jr. C.S., Milligan, D.A., Wilcox, C., & DiNapoli, N.J., 2020. **Hog Island Shore Protection and Habitat Restoration Living Shoreline Project**. Virginia Institute of Marine Science, William & Mary, Gloucester Point, VA. https://scholarworks.wm.edu/reports/2316/

Todd S. Bridges, PH.D.

Professor of Practice, Resilient and Sustainable Systems

Dr. Bridges' teaching, research, and practice are focused at the intersection of natural and engineered systems. Before joining UGA in 2023 and ESA in 2025, Todd was a scientist with the U.S. Army Corps of Engineers for 30 years, where for 17 years he served as the Senior Research Scientist (ST) for Environmental Science for the U.S. Army and USACE. Over his career, he has led more than $250 million in research projects and programs and in 2010 founded the Corps' Engineering With Nature® program.

3	Years with UGA
42	Total years of professional experience

Education

Ph.D., Biological Oceanography, North Carolina State University, 1992

M.A., Biology, California State University, 1988

B.A., Biology-Zoology, Summa Cum Laude, California State University, 1985

Affiliations/Memberships

The Nature Conservancy's Sediment Strategies Group, 2025-present

Scientific Advisory Panel, Singapore Marine Climate Change Science Program, 2022-present

Editorial Board, Journal of Marine Environmental Engineering, 2020-present

Board of Directors, Western Dredging Association, 2018-present

Army Engineer Association, Lifetime Member

USACE North Atlantic Coast Comprehensive Study - Natural and Nature-Based Features

As Lead Chapter Author, Dr. Bridges led the focus on Natural and Nature-Based Features supporting the USACE North Atlantic Coast Comprehensive Study following Hurricane Sandy. The effort resulted in the production of the first technical report to guide engineering assessment and operations on the use of NBS to support coastal resilience. The two-year study addressed coastal storm and flood risk to vulnerable populations, property, ecosystems, and infrastructure affected by Hurricane Sandy in the North Atlantic region of the United States.

The study was designed to help local communities better understand changing flood risks associated with climate change and to provide tools to help those communities better prepare for future flood risks. It builds on lessons learned from Hurricane Sandy and attempts to bring to bear the latest scientific information available for state, local, and tribal planners. The conclusions of the study, as detailed in the final report, include several findings, outcomes, and opportunities, such as the use of a nine-step Coastal Storm Risk Management Framework that can be customized for any coastal watershed.

Dredging Operations Environmental Research Program

Dr. Bridges led the USACEs largest research program, the Dredging Operations Environmental Research Program from 2006-2023 as Technical Lead and Program Manager. The program advanced dredging, sediment management, beneficial use, and environmental assessments through R&D and demonstration projects supporting USACE's >$5 billion Civil Works program in river and coastal systems. Annually, the program included between 25-40 projects involving >50 research scientists and engineers and a budget of $5-$10 million.

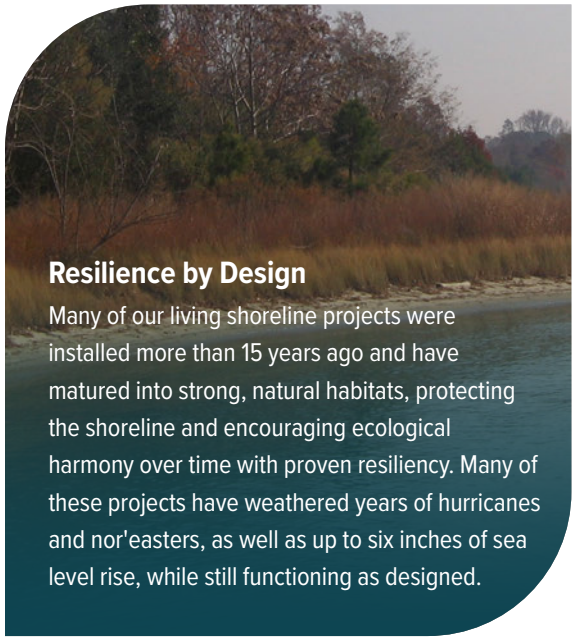
First U.S. National Nature Assessment – by the Nature Record

Dr. Bridges is a Lead Author for the U.S. National Nature Assessment by the Nature Record. The assessment was first commissioned by President Biden through Executive Order 14072 in 2022 to take stock of the contributions of nature to the US economy, health, climate, environmental justice, and national security. The assessment is now a privately funded by a consortium of non-profits and private donors. I was selected to serve as one of 14 lead authors of the NNA, which will be published as a book by MIT Press in 2026 following review by the National Academies and the public. He led the chapter on "Nature and Risk, Resilience and Security in the U.S."

Project Experience

The VHB team brings extensive experience in coastal habitat restoration, particularly in dunes and interdunal marshes. We have a strong track record in designing and implementing coastal engineering solutions for living shorelines along the East Coast, including in Virginia and the Mid-Atlantic region. Our experience highlights our ability to effectively apply climate adaptation strategies in managing dynamic coastal environments. The demonstrated durability and effectiveness of our shoreline protection designs emphasize our ability to create sustainable and resilient solutions. Our sustained and dedicated local leadership further reinforces our unique qualifications to complete the GRIT project for MPPDC.

As requested in the RFP, the following is a list of projects which demonstrate VHB's experience relative to this specific type of work. Descriptions, graphics and key details for each project, as required in the RFP, are included on the pages that follow.



Resilience by Design

Many of our living shoreline projects were installed more than 15 years ago and have matured into strong, natural habitats, protecting the shoreline and encouraging ecological harmony over time with proven resiliency. Many of these projects have weathered years of hurricanes and nor'easters, as well as up to six inches of sea level rise, while still functioning as designed.

VHB Projects

- Smith Island, Martin National Wildlife Refuge Shoreline Stabilization
- NC 12 Resilience and Living Shoreline Project
- Historic Jamestown Sitewide Resiliency Master Plan & Seawall Repair Project
- Penniman's Spit Marsh Enhancement
- James River Land Improvements
- George Washington Memorial Parkway, Dyke Marsh Restoration Project
- Colonial National Historical Park Shoreline Restoration
- Prudence Island Mill Creek Culvert Engineering/ Salt Marsh Restoration
- Rumney Marsh Salt Marsh Restoration
- Designing Multimodal Working Waterfronts to Meet the 21st Century Needs of Rural Coastal Seafood and Maritime Industries
- Regent Road Marsh Restoration
- North End Point (Factory Point)
- Yorktown Waterfront Revitalization
- Ohio Creek Watershed Transformation Project
- Padanaram Causeway Rehabilitation and Salt Marsh Restoration

EA Engineering Projects

- Natural Infrastructure Strategies to Build Coastal Resilience in the Back River Estuary
- Adaptation Planning for Coastal Resilience in Northern Chesapeake Bay
- Coastal Engineering and Hazards Support
- Using Nature-Based Solutions to Promote Resilience

VHB Team Project Experience Map

The VHB team has virtually scores of coastal projects in Chesapeake Bay and its tributaries. We have decades of experience with design, permitting and construction of shoreline stabilization and habitat enhancement.

Other relevant VHB projects not in the highlighted projects list are indicated with ○. EA projects are labeled with □. VHB Office locations are distinguished by 📍.

#	Highlighted Projects	Type of Project				
		Dredge	Marsh	Shoreline	Survey	Permit
1	Smith Island, Martin National Wildlife Refuge Shoreline Stabilization		●	●	●	●
2	Penniman Spit Marsh Enhancement		●	●	●	●
3	Colonial National Historical Park Shoreline Restoration		●	●	●	●
4	Designing Multimodal Working Waterfronts to Meet the 21st Century Needs of Rural Coastal Seafood and Maritime Industries (multiple locations)	●		●		●
5	Yorktown Waterfront Revitalization Design and Permitting			●	●	●
6	Ohio Creek Watershed Transformation Project		●	●		●

This map represents a small sampling of VHB environmental projects, limited by this geography.

Smith Island, Martin National Wildlife Refuge Shoreline Stabilization

Ewell, Maryland ● VHB

As part of a design build team, VHB worked on a comprehensive plan for the design, permitting, and construction of a living shoreline protection project along approximately 20,000 linear feet of shoreline at the Martin National Wildlife Refuge.

Based on a clear understanding of coastal processes and long-term shoreline change, the plan incorporated headland control techniques to instill shoreline stability while allowing natural processes to continue. The plan resulted in more than 8 acres of low marsh habitat behind the headland breakwaters. VHB partnered with Scott Hardaway and Coastal Design & Construction for design and construction.

The project included multiple "living shoreline" restoration practices to encourage shoreline stabilization and erosion prevention. Upland dunes, wetland habitats, submerged aquatic vegetation (SAV) beds, and overlapping jurisdictions (Section 404 of the Clean Water Act and NPS DO #77-1) required a balanced, multifaceted technical approach. VHB provided hydrographic and topographic survey, a biological assessment, vegetation specifications, biological benchmarks, and permit and construction drawings and specifications.

The plan incorporated 22 headland breakwaters and two sills at vulnerable shoreline areas, with armor stone structures, sand fill, and more than 8 acres of wetland and dune grass plantings. The layout was designed to complement and restore existing ecological communities along the eroding coast, including marsh, dune, and SAV communities. Construction access was from the water, using barge ports and offshore moorings for more than 10 barges, with sand initially placed to establish haul routes and final grades planted with marsh and dune vegetation.

Project Relevancy. This project is very similar to the Guinea Marsh restoration effort both in scale, wave exposure and design strategy. It exhibits our team's ability to assess, design and permit a comprehensive marsh habitat protection and enhancement project on the open waters of Chesapeake Bay. Like Guinea Marsh, all construction access for equipment and materials occurred by water. The team permitted multiple barge ports and offshore moorings to enable construction.

Client: Coastline Design, P.C.

Owner: U.S. Fish and Wildlife Service

Cost (VHB Fee with Amendments): Scheduled: $94,000 | Actual: $94,000

Completion: Scheduled: September 2016 | Actual: August 2017 due to FWS review delays

Office: Williamsburg, VA

Type of Project:

Dredge **Marsh** **Shoreline** **Survey** **Permit**

Project Relevancy. This project navigated a complex permitting environment and used a hybrid shoreline approach to avoid impacts to project-adjacent sub-aquatic vegetation.

NC 12 Resilience and Living Shoreline Project ●

Duck, NC ● VHB

To alleviate flooding and increase the resiliency of the roadway infrastructure, VHB designed a living shoreline to reestablish sub aquatic vegetation and provide an energy dissipating land-water interface, a stone revetment to serve as a last line of defense for an improved roadway profile, and a new roadway cross section. VHB provided all services required to implement this project: initial planning, natural resource assessment, including a survey of submerged aquatic vegetation (SAV), wetland delineation, coastal processes assessment using CEDAS modeling software, coastal engineering, roadway design and development of an innovative stormwater management strategy that included a low impact collection system and underground retention cisterns. The constructed improvements have dramatically improved multimodal access, community character, and infrastructure resilience.

Client: Town of Duck, NC

Cost: Budget: $494,520 | Actual: $494,520

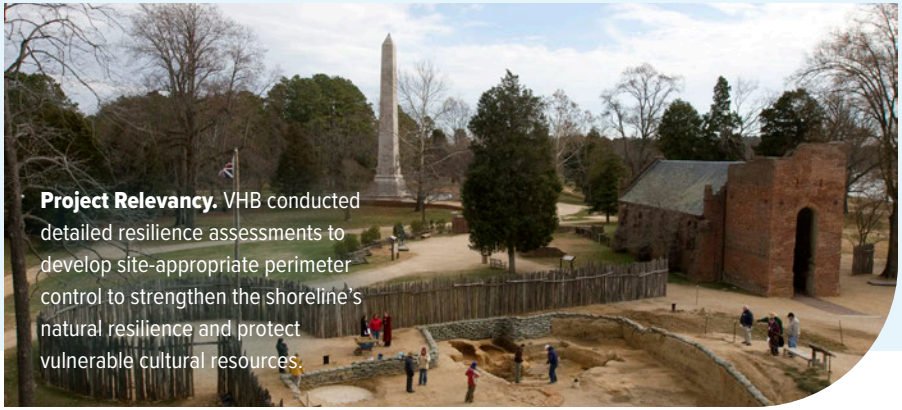
Completion: Scheduled: May 2024 | Actual: May 2024

Office: Williamsburg, VA

Type of Project:

Dredge | **Marsh** | **Shoreline** | **Survey** | **Permit**

The VHB team provided a holistic and integrated approach to resiliency, where each infrastructure component reinforces the other, to create an adaptable corridor capable of withstanding the uncertainties of a changing climate.



Project Relevancy. VHB conducted detailed resilience assessments to develop site-appropriate perimeter control to strengthen the shoreline's natural resilience and protect vulnerable cultural resources.

Historic Jamestown Sitewide Resiliency Master Plan & Seawall Repair Project ● Jamestown, VA ● VHB

VHB prepared a resiliency master plan for Jamestown Island to mitigate inundation of archaeological resources, safeguard nationally significant artifacts, and enhance connectivity for visitors. The plan establishes a framework for future projects addressing water management, visitor experience, sea level rise, and sustainable landscape design. Using photo interpretation, field verification of environmental constraints, LIDAR, tidal gauge data, and sea level rise projections, VHB recommended perimeter berms, raised walkways, culvert upgrades, tide gates, a pump station, and flood-proofed archival and learning facilities, while also helping secure funding to advance design. A related Seawall Repair project restored structural integrity to the 1903 U.S. Army Corps–designed seawall along 2,000 feet of James River shoreline while preserving its historic character.

Client: Preservation Virginia

Cost: Budget: $290,000 | Actual: $290,000

Completion: Scheduled: 2022 | Actual: June 2023 due to expanded scope to include funding outreach

Office: Williamsburg, VA

Type of Project:

Dredge | **Marsh** | **Shoreline** | **Survey** | **Permit**

Penniman's Spit Marsh Enhancement

York County, VA ● VHB

VHB was the lead coastal engineer for this design-build project involving coastal spit restoration for the U.S. Navy and the Virginia Institute of Marine Science (VIMS). In partnership with Coastal Design and Construction, Inc., Penniman spit is an eroding coastal feature that provides protection to abrupt embankments at the Yorktown Naval Weapons Station on the York River.

A series of robust, gapped sills that protected and accentuated geomorphic features along the shoreline were designed as perimeter protection while sand fill material was brought in to raise interior spit elevations and to establish appropriate elevations for marsh and dune vegetation. Building on work conducted by the Virginia Institute of Marine Science (Scott Hardaway and Donna Millegan) VHB was responsible for wave climate and coastal processes analysis, engineering design, preparation of construction plans and specifications and construction stakeout and oversight.

Construction materials and equipment was delivered to the site via water and temporary barge ports situated on the lee side of the spit feature. This critical coastal feature has been restored to continue to provide protection to valuable U.S. Navy property exposed to high energy fetches near the mouth of the York River.

Project Relevancy. VHB provided site assessment, survey, design, and construction oversight for the restoration of this low-lying marsh spit on the York River with challenging access only available by water.

Client: VIMS

Cost (VHB fee): Budget: $100,000 | Actual: $100,000

Completion: Scheduled: August 2024 | Actual: August 2024

Office: Williamsburg, VA

Type of Project:

Dredge **Marsh** **Shoreline** **Survey** **Permit**

Project Relevancy. This project required innovative solutions including retrofitting an existing BMP to save initial project costs and to provide the City with Excess Nutrient Credits. The hybrid shoreline stabilization used living shorelines and stone revetments.

James River Land Improvements ● Newport News, VA ● VHB

As part of the Sustainable Water Initiative for Tomorrow (SWIFT) program and commitments to the City of Newport News, the Hampton Roads Sanitation District (HRSD) completed a shoreline restoration project and developed a linear park and trail system. The project enhances public access to river views and extends the existing trail network while protecting HRSD assets from erosion. VHB developed concept-level plans and final construction documents for shoreline restoration measures, supported by detailed habitat inventory and shoreline change mapping. Shoreline restoration used a hybrid approach with a sill and marsh terrace backed by an armor stone revetment to protect critical wastewater infrastructure and enhance marsh habitat and resilience. At Riverview Farm Park, where several feet of marsh were lost annually, VHB accentuated natural headland features with breakwaters and sand fill to create stable beach planforms that provide long-term stability for restored marshes, beaches, and graded embankments.

Client: Hampton Roads Sanitation District

Cost: Budget: $966,340 | Actual: Pending

Completion: Scheduled: 6/01/2025 | Actual: Pending (Schedule extended due to addition of City property to shoreline plan)

Office: Williamsburg, VA

Type of Project:

Dredge | **Marsh** | **Shoreline** | **Survey** | **Permit**

Project Relevancy. Sand placement and native tidal vegetation plantings work together to rebuild the marsh platform, stabilize sediments, and create resilient habitat.

George Washington Memorial Parkway, Dyke Marsh Restoration Project ● Fairfax County, Virginia ● VHB

VHB served as subject matter experts in support of this $26-million freshwater tidal marsh restoration effort in the Potomac River. VHB provided expertise and assistance in the design of shore protection strategies involving armor stone sills, sand placement, and the establishment of freshwater tidal vegetation with the goal of restoring up to 100 acres of marsh habitat previously destroyed by mining activities. VHB also prepared a Water Quality Impact Assessment and provided costing analysis to develop the government estimate of project costs. We guided development of the Joint Permit Application, conducted a wetland functional value assessment, assisted in impact analysis, and in the preparation of supporting documentation. Key issues included balancing marsh restoration and the placement of fill material in the Potomac River with impacts to aquatic resources such as submerged aquatic vegetation and anadromous fish habitat. VHB's role required extensive coordination with all Virginia regulating agencies, the Norfolk District U.S. Army Corps of Engineers, National Marine Fisheries Service, and Maryland environmental regulatory agencies.

Client: NPS (guidance provided to Baltimore District Corps)

Cost: Budget: $42,500 | Actual: $42,500

Completion: Scheduled: July 2018 | Actual: July 2018

Office: Williamsburg, VA

Type of Project:

Dredge | **Marsh** | **Shoreline** | Survey | **Permit**

Colonial National Historical Park Shoreline Restoration

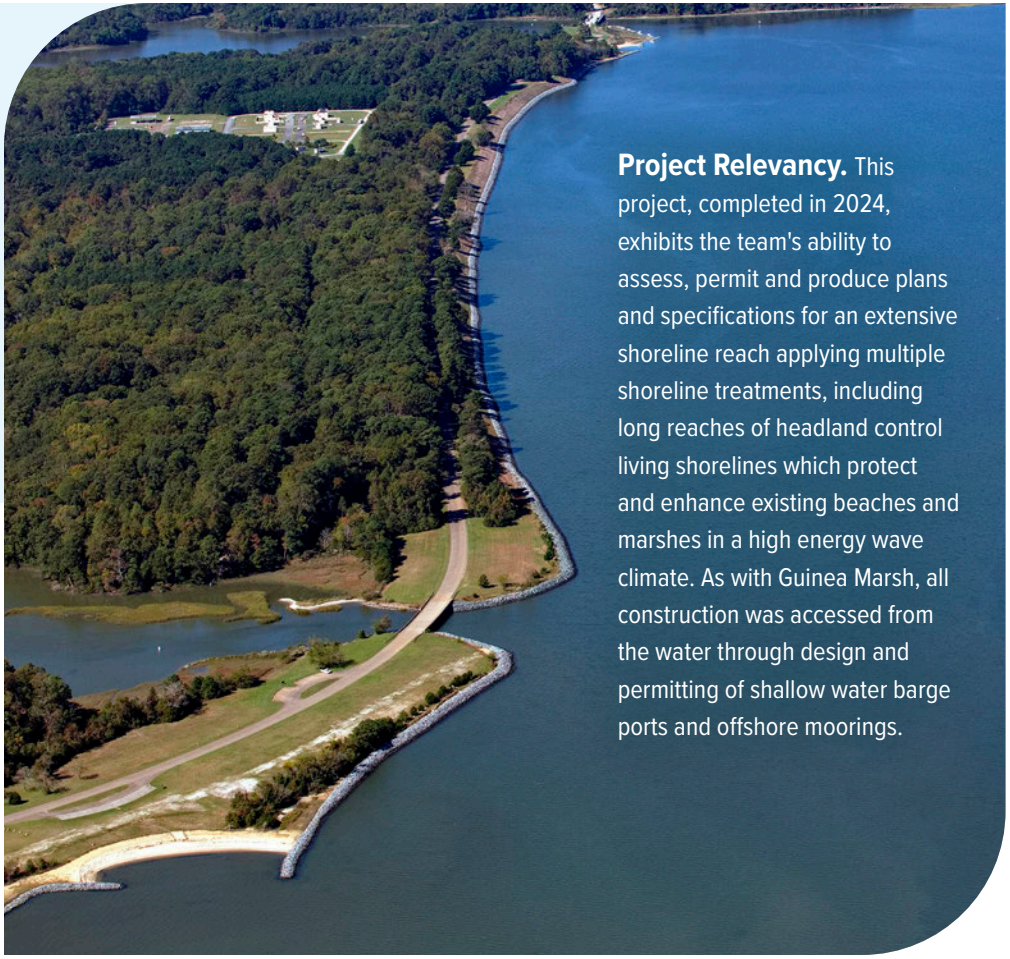
Yorktown, Virginia ● VHB

VHB has helped the National Park Service (NPS) and Colonial National Historical Park enhance and preserve park amenities for more than two decades through landscape architecture, coastal engineering, and environmental permitting.

The project is a comprehensive, design-build, shoreline stabilization plan funded through the Great American Outdoors Act (GAOA) and led by VHB and Coastal Design & Construction. The work repaired and stabilized approximately 3 miles of York River shoreline that was experiencing severe erosion, threatening significant archeological and natural resources in the park and several sections of the scenic Colonial Parkway. VHB's coastal engineers, ecologists, and regulatory specialists provided solutions that included reconstruction of shoreline revetments to raise crest heights and new rock sills and breakwaters to establish protective beaches and restore marsh habitat. Stone oyster reefs were installed at strategic locations near creek mouths.

The armor stone and sand required to protect this shoreline had to be delivered by water. To accommodate this, four barge ports were developed and offshore moorings for multiple barges were secured during the permit process. To stabilize the 30-foot banks adjacent to the shoreline, comprehensive upland drainage control was needed to limit runoff from spilling down the embankments. A low berm feature and series of nine drop inlets collected runoff and routed it via outfall pipes through constructed revetments and breakwaters. To direct and control public access to the waters edge, the design included sand fencing and strategic planting of shrubs to screen certain areas and contain public use to planned access points.

This section of shoreline is now protected from further erosion caused by wind generated waves, ensuring the continued stability and usability of the historic Colonial Parkway.



Project Relevancy. This project, completed in 2024, exhibits the team's ability to assess, permit and produce plans and specifications for an extensive shoreline reach applying multiple shoreline treatments, including long reaches of headland control living shorelines which protect and enhance existing beaches and marshes in a high energy wave climate. As with Guinea Marsh, all construction was accessed from the water through design and permitting of shallow water barge ports and offshore moorings.

Client: National Park Service

Cost (VHB fee): Budget: $660,000 | Actual: $660,000

Completion: Scheduled: 11/23/2024 | Actual: 9/23/2024

Office: Williamsburg, VA

Type of Project:

Dredge **Marsh** **Shoreline** **Survey** **Permit**

This project, completed approximately 2 months ahead of schedule was accomplished by expediting permit approvals and efficient assessment and design procedures enabled construction to begin within a tight funding deadline.

Project Relevancy. VHB combined detailed numerical modeling with site hydrodynamic observations to develop a site-specific design that both provides effective flood reduction and increases local marsh health.

Prudence Island Mill Creek Culvert Engineering/ Salt Marsh Restoration ● Portsmouth, RI ● VHB

VHB assisted the Town of Portsmouth in replacing the existing Narragansett Avenue crossing over Mill Creek on Prudence Island. The crossing was prone to flooding and the undersized culvert restricted tidal exchange, contributing to the upstream wetland's decline. VHB conducted hydrologic, hydraulic, and tidal flushing analyses, then proposed alternative culvert and bridge configurations. They deployed four pressure transducers and two salinity monitors over two months to collect data, leading to their recommendation of a seven-foot-tall by 16-foot-wide single-span embedded box culvert. This solution will reduce flooding and restore tidal exchange, benefiting the ecosystem.

Coastal Hydraulic Analysis and Modeling. To aid in culvert sizing, VHB developed hydrologic and hydraulic models using HEC-HMS, HEC-RAS, and Aquaveo's SMS with RMA2/4 software to size culverts. The team calibrated models with field data and proposed three alternatives.

Client: Town of Portsmouth, RI

Cost: Budget: $119,630 | Actual: $119,630

Completion: Scheduled: July 2024 | Actual: July 2024

Office: Providence, RI

Type of Project:

Dredge ● Marsh ● Shoreline ● Survey ● Permit

Project Relevancy. VHB developed designs and permits, provided construction support, and is now providing post-construction monitoring of the restoration of a critically important marsh in coastal Massachusetts.

Rumney Marsh Salt Marsh Restoration ●

Revere and Saugus, MA ● VHB

Rumney Marsh, a significant salt marsh system in Greater Boston's Area of Critical Environmental Concern (ACEC), required mitigation for Massport's 22R Runway Safety Area and DCR's Nahant Beach Reservation Rehabilitation Project. VHB developed site plans for design and permitting and executed a sampling plan to assess the suitability of non-native material placed in the marsh from past municipal projects.

Salt Marsh Restoration Design. VHB designed a 2-plus-acre salt marsh restoration and established soil sampling using a surveyed grid, meeting Beach Nourishment Best Management Practices, Water Quality Regulations, and Oil and Hazardous Materials standards. The restoration successfully reclaimed salt marsh by rehabilitating two previous embankment areas VHB developed civil engineering plans for permitting and construction and construction phase services. The team specified proposed topography and vegetation of newly created mud flat, lower marsh, and upper marsh areas. VHB also provided construction phase services, and post-construction monitoring of the salt marsh restoration.

Client: NPS

Cost: Budget: $282,903 | Actual: $282,903

Completion: Scheduled: March 2025 | Actual: March 2025

Notes on Cost/Schedule: Work was completed over multiple phases.

Office: Watertown, MA

Type of Project:

Dredge ● Marsh ● Shoreline ● Survey ● Permit

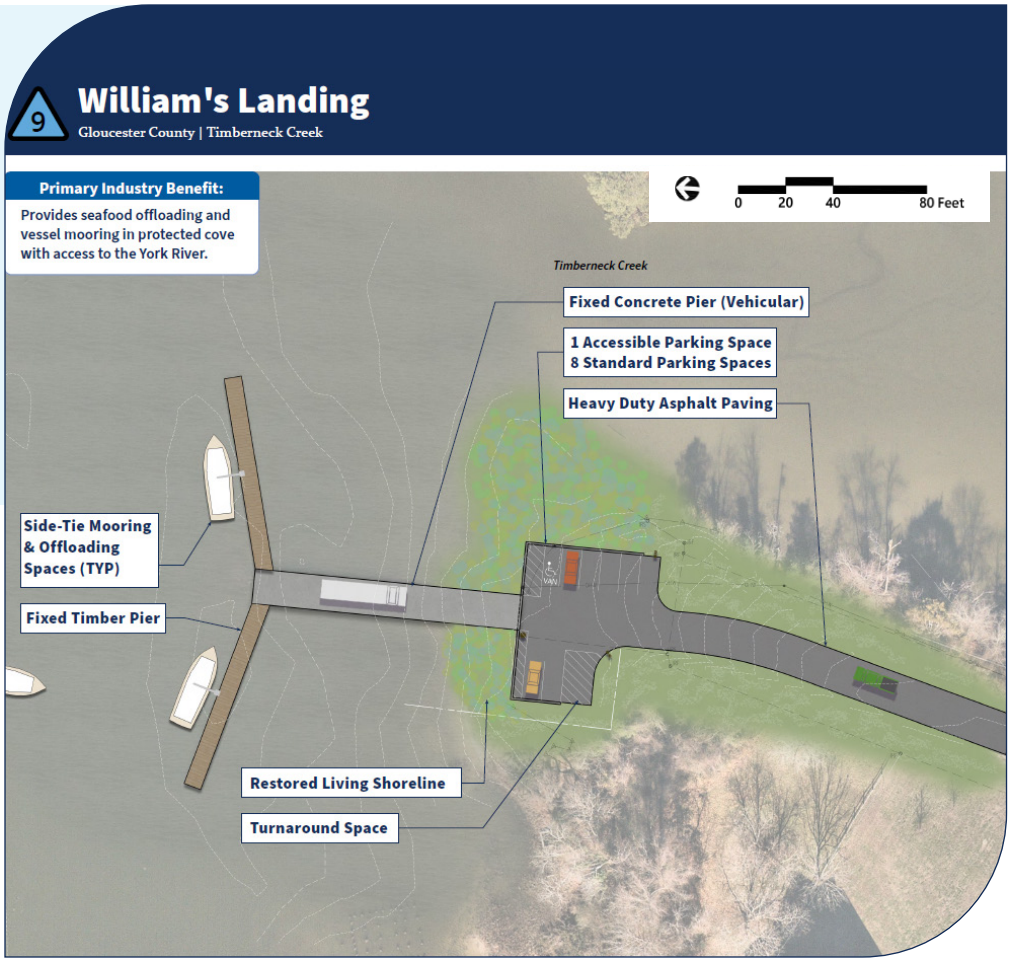
Designing Multimodal Working Waterfronts to Meet the 21st Century Needs of Rural Coastal Seafood and Maritime Industries

Middle Peninsula, VA ● VHB

VHB led a regionwide planning project to address the needs of commercial seafood and marine industries at publicly owned, rural, working waterfronts in Virginia's Middle Peninsula region.

Commercial watermen across Virginia's six-county Middle Peninsula rely on a dispersed network of public wharves, landings, and harbors to offload seafood and reach markets, but many facilities are challenged by aging infrastructure, limited access, shallow water, shoreline erosion, and increasing vulnerability to sea-level rise. VHB was engaged to develop a data-driven, stakeholder-informed framework to evaluate conditions, prioritize investments, and advance implementable designs. The team assessed 60 publicly owned working waterfront sites through desktop GIS analysis and detailed field investigations, using mobile data collection to capture geolocated photos, infrastructure attributes, and site constraints and create a consistent regional baseline of existing conditions.

Building on this dataset, VHB applied a structured prioritization methodology that ranked sites by physical condition, operational function, safety and access, environmental and resilience factors, and industry benefit, allowing MPPDC to move beyond anecdotal needs and establish defensible investment priorities. In parallel, VHB led targeted outreach with commercial watermen, industry representatives, and agency partners to ensure real-world operational needs informed a rigorous alternatives analysis. This combined technical and stakeholder-driven process identified 12 priority sites for concept-level planning, with site-specific improvements such as dredging, shoreline stabilization and living shoreline strategies. All concepts are informed by sea-level rise projections to extend service life, improve resilience, and protect long-term public investment.



Client:
Middle Peninsula Planning District Commission (MPPDC)

Cost: Budget: $1,800,000 | Actual: $1,800,000

Completion: Scheduled: October 2024 | Actual: October 2024

Office: Williamsburg, VA

Type of Project:

Dredge Marsh **Shoreline** Survey **Permit**

Project Relevancy. A regionwide, GIS-based asset inventory provided MPPDC with a single, consistent platform for comparing working waterfront conditions across all 60 sites. This digital foundation will streamline grant applications, funding decisions, and future design efforts.

Project Relevancy. This project beneficially used dredged sediments to restore a nearly-drowned marsh.

Regent Road Marsh Restoration ● Norfolk, VA ● VHB

The City of Norfolk proposed dredging two neighborhood channels, West Belvedere and Regent Road, to improve recreational boating access to the Lafayette River. To offset the impact of shoaling within the tributaries, the City implemented a compensatory mitigation project consisting of the restoration of a drowned marsh adjacent to Regent Road and the construction of a living shoreline designed to provide additional water-quality benefits. VHB designed and permitted the living shoreline and provided construction documents and prebid assistance. Components included the installation of a low-level sill for site protection; sand placement to raise existing site elevations; signage to discourage boating within the area; placement of vegetated wetlands; and the placement of concrete for an oyster reef habitat. Construction was completed on time and on budget.

Client: City of Norfolk, Public Works

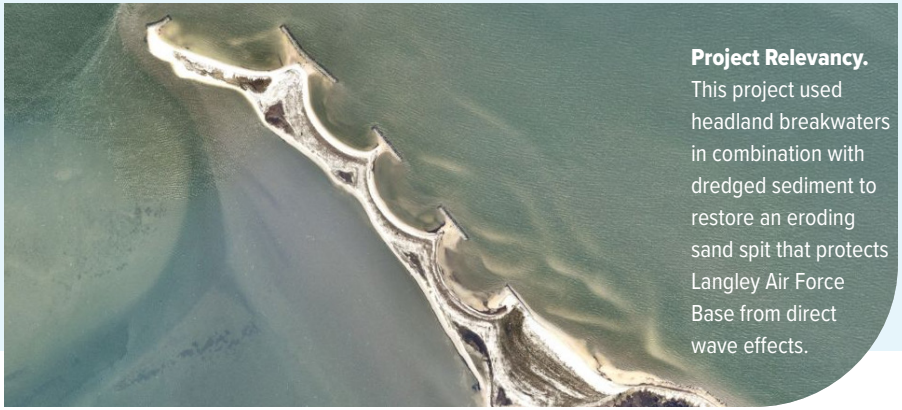
Cost: Budget: $495,000 | Actual: $495,000

Completion: Scheduled: June 2019 | Actual: June 2019

Office: Virginia Beach, VA

Type of Project:

Dredge ● Marsh ● Shoreline ● Survey ● Permit



Project Relevancy. This project used headland breakwaters in combination with dredged sediment to restore an eroding sand spit that protects Langley Air Force Base from direct wave effects.

North End Point (Factory Point) ● Grandview Nature Preserve, Hampton, VA ● VHB

VHB evaluated historical shoreline change, geotechnical data and existing conditions to restore a breach that had separated Factory Point from Grandview Nature Preserve. The project design included three breakwaters and two sills to stabilize the shoreline and then approximately 150,000 cubic yards were pumped from the offshore to restore the beach. The beach design included a recreational beach with a restored primary dune. The project has served as a successful living shoreline for more than 15 years and has exceeded the proposed design life by more than eight years.

Client: AECOM | **Owner:** City of Hampton

Cost: Budget: $3.5 million | Actual: $3.5 million

Completion: Scheduled: April 2010 | Actual: May 2010

Notes on Cost/Schedule: Nor'Ida in 2009 caused delays and some change orders

Office: Virginia Beach, VA

Type of Project:

Dredge ● Marsh ● Shoreline ● Survey ● Permit

Yorktown Waterfront Revitalization Design and Permitting

Yorktown, VA ● VHB

The historic Yorktown Waterfront was once threatened by storm surge and high wave energy. An aging seawall provided limited protection and did not offer a long-term solution to resilience.

Working for York County, VHB master planned, engineered, permitted, and funded a phased system of improvements that delivered a resilient beach and living shoreline, recreational and commercial mooring facilities, pedestrian access, waterfront plazas, and opportunities for private investment.

Starting with shore protection strategies that included offshore breakwaters, beach nourishment and revetments, VHB's solutions integrated multimodal transportation, elevating roadways, drainage system upgrades, streetscape and urban design measures to transform the threatened waterfront into a premier destination. To help the County realize this vision, VHB assisted with securing funding from multiple grant sources to implement phased improvements consistent with the overall master plan. The site's dynamic coastal energy context required engineering considerations be integrated into master plan concepts. The vision for the site helped set public expectations that were met by the realistic and constructible improvements proposed by VHB. The project has withstood 20 years of storm events, including Hurricane Isabel, and six inches of sea level rise.

Many of our proposed team members worked on the Yorktown Waterfront Revitalization including Neville Reynolds, Chris DeWitt, Ricky Wiatt, and Chris Frye. Our plans and engineering solutions are designed with the long-term future in mind. When Neville, Chris, and the team developed this plan in 2001, they knew they would want to still be visiting the Yorktown Waterfront in 2025.

Project Relevancy. This project is a testament to how our integrated thinking approach leads to long-term success. VHB completed all aspects of planning and design of both waterside and landside improvements, assisted the County in obtaining millions of dollars in grant funding (TIGER, BIG, Public Beach Board, etc.) and obtained all environmental and site plan approvals.

Client: York County, VA

Cost: Budget: $1.5M | Actual: $1.5M

Completion: Scheduled: October 2006 | Actual: October 2006

Notes on Cost/Schedule: Multiple phases completed over 12 years

Office: Williamsburg, VA

Type of Project:

Dredge | Marsh | **Shoreline** | **Survey** | **Permit**

Project Relevancy. EA is currently working alongside VHB to support the City of Hampton in developing a comprehensive suite of nature-based measures, including thin-layer placement, that can be used to support long-term adaptation of the Fox Hill and Grandview neighborhoods along Back River.

Natural Infrastructure Strategies to Build Coastal Resilience in the Back River Estuary ● Hampton, VA ● EA

EA, under a subcontract agreement with Hazen and Sawyer, was tasked with executing the National Coastal Resilience Fund NCRF grant-sponsored project, Developing Landscape-Scale Natural Infrastructure Strategies to Build Resilience in the Back River Estuary, for the City of Hampton, Virginia Hampton.

Hampton, a low-lying coastal city in Virginia's Tidewater region, is highly vulnerable to flooding from rainfall, storm surge, and sea-level rise. The area experiences some of the highest rates of relative sea-level rise on the East Coast, driven by land subsidence and climate change. By 2080, projections indicate significant increases in flood exposure, wetland loss, shoreline erosion, and habitat degradation, threatening the Back River Estuary and its extensive marsh complexes, which provide critical habitat and natural storm protection.

Client: City of Hampton, VA

Cost: Budget: $724,348 | Actual: $724,348

Completion: Scheduled: 2027 | Actual: Ongoing

Office: Hunt Valley, MD

Type of Project:

Dredge **Marsh** **Shoreline** Survey Permit

Project Relevancy. EA developed a series of existing condition assessments, resilience assessments, and recommendations for long-term adaptation for a series of bay-fronting counties in Maryland.

Adaptation Planning for Coastal Resilience in Northern Chesapeake Bay ● Harford, Cecil, and Kent Counties, MD ● EA

EA prepared the study Coastal Resiliency in the Northern Chesapeake Bay to develop a regional climate adaptation strategy to address sea level rise and storm events that have the potential to impact the entire region. For this project, the EA team provided guidance to Aberdeen Proving Ground and the surrounding counties of Harford, Cecil, and Kent regarding climate adaptation strategies. EA used GIS modeling to present sea level rise scenarios, identify vulnerable areas prone to flooding and recommend best options. The team identified areas to focus management efforts and provided information needed to develop an adaptation plan to inform selection of coastal resilience strategies. The project tasks included:

- Climate Impact Assessment of Projected Conditions with Sea Level Rise
- Assessment of Coastal Resilience
- Development of Regional Strategies
- Water Quality Implications in Northern Chesapeake Bay

Client: Harford County, Maryland

Cost: Budget: $80,000 | Actual: $80,000

Completion: Scheduled: 2019 | Actual: 2019

Office: Hunt Valley, MD

Type of Project:

Dredge **Marsh** **Shoreline** Survey Permit

Ohio Creek Watershed Transformation Project

Norfolk, VA ● VHB

The Ohio Creek Watershed Transformation Plan is a sea level rise resiliency plan that protects the City of Norfolk's Chesterfield Heights neighborhood. Developed to address storm surge and frequent flooding threats to Norfolk's resiliency, the project originated in Virginia's application for assistance in the National Disaster Resilience Competition (NDRC) through the US Department of Housing and Urban Development (HUD). Virginia was awarded Community Development Block Grant Disaster Recovery (CDBG-DR) funds in January 2017.

The Ohio Creek Watershed Project consists of layered resiliency and community enhancement strategies. The first layer protects the shoreline and perimeter so that high water levels in the river do not enter the neighborhood or the stormwater system. The second captures rainfall across the watershed to slow its flow into the stormwater system and provides additional rainwater storage keeping water from pooling in the streets. The third introduces a living shoreline feature to minimize erosion and increase environmental wellness. These water-management strategies add new and improved natural habitat, and increase resilience to flooding. The improvements also work within the context of this historically underserved community, by enhancing neighborhood character and connectivity.

VHB was part of a multidisciplinary design team that combined coastal defense strategies including earthen berms, tide gates, raised roads, living shorelines, and floodwalls to protect this community. Ecologists assessed the existing wetland systems and guided the development of project alternatives. A sensitivity analysis of the tidal marsh systems assessed its ability to withstand extended periods of fresh water retention as an integral part of the pump station discharge/stormwater management system. The VHB team developed the shore protection engineering design to offset necessary wetland impacts, participated in public outreach meetings, prepared the HUD Environmental Impact Statement (EIS), conducted agency coordination, and acquired local, state, and federal environmental permits.

Project Relevancy. This project involved assessment of existing infrastructure and natural systems leading to a comprehensive resiliency plan for this Community. Extensive collaboration with a diverse stakeholder group included private residences and industrial waterfront operations. Shoreline and tidal wetlands design, challenging regulatory coordination and NEPA compliance were performed to meet a tight grant time schedule.

Client: City of Norfolk, VA

Cost: Budget: $1,700,000 | Actual: $1,700,000

Completion: Scheduled: 2026 includes performance monitoring | Actual: Slated for October 2026

Office: Williamsburg, VA

Type of Project:

Dredge | **Marsh** | **Shoreline** | Survey | **Permit**

StoryMap Highlight

Click or scan the QR code above to see a project StoryMap created by VHB.

Project Relevancy. EA is providing resilience data assessment and management recommendations for dynamic coastal settings.

Coastal Engineering and Hazards Support ●

Williamsburg and the Northern Neck, VA ● EA

Under EA'S GSA Multiple Award Schedule, the firm provides coastal engineering and hazards support to the Coastal Program of the National Park Service. EA has provided technical review of proposed coastal engineering concepts, designs, models, reports, compliance documentation, and technical proposals that are focused on nature-based solutions; guidance, protocols, modeling support, and execution of coastal data collection in wetland and shoreline areas; conducted wetland delineations and biological habitat assessments; and provided resilience planning for the effects of climate change on park resources.

EA has completed this work at over 88 national park system units located across the country, including five units in Virginia. While the specific scope of work at each site location can vary, EA conducted extensive work relevant to this project scope at Colonial National Historical Park in Williamsburg, Virginia and George Washington Birthplace National Monument in the Northern Neck of Virginia.

Client: NPS

Cost: Budget: $350,000 | Actual: $350,000

Completion: Scheduled: Ongoing | Actual: Ongoing

Office: Hunt Valley, MD

Type of Project:

Dredge **Marsh** **Shoreline** Survey Permit

Project Relevancy. EA provided data analysis of erosion and resilience leading to recommendations for long term resilience strategies applying nature based solutions.

Using Nature-Based Solutions to Promote Resilience ●

MCAF Quantico, VA, and MCB Camp Lejeune, NC ● EA

Under a subcontract agreement with Credere Associates, EA executed this project at MCAF Quantico in Virginia and MCB Camp Lejeune in North Carolina to identify projects on these installations that would benefit from the implementation of nature-based techniques to improve facility resilience against natural hazards. Both installations have encountered hazards related to coastal processes that threaten mission resilience. EA and Credere worked with project partners at both installations, USMC Headquarters, and the USACE ERDC Engineering With Nature group to facility stakeholder meetings, identify critical vulnerabilities, and develop conceptual stage nature-based projects to address those vulnerabilities.

Specific to MCAF Quantico in Virginia, which sits on the western shore of the Potomac River, EA identified coastal hazards impacting the mission, identified specific at-risk sites, completed a site assessment, and developed a series of nature-based concepts. Three areas of concern were identified, including the Chop Creek inlet and two reaches of shoreline on the western bank of the Potomac River.

Client: USACE ERDC

Cost: Budget: $93,652 | Actual: $93,652

Completion: Scheduled: 2025 | Actual: 2025

Office: Hunt Valley, MD

Type of Project:

Dredge **Marsh** **Shoreline** **Survey** Permit

Padanaram Causeway Rehabilitation and Salt Marsh Restoration

Dartmouth, MA ● VHB

The Padanaram Causeway is a vital connection between the Dartmouth community and Apponagansett Beach and Padanaram Village. For years, the causeway had experienced significant structural and safety deficiencies due to tides and waves from Apponagansett Bay, which compromised the roadway subgrade and led to sinkholes and potholes.

This comprehensive rehabilitation project included complete roadway reconstruction, rehabilitation of the Padanaram Bridge, repair or replacement of retaining walls to address causeway scour, and installation of two new culverts.

Salt Marsh Restoration Design. VHB led the design efforts, managing all aspects from roadway improvements and structural design to drainage replacement, environmental permitting, right-of-way, and contract documentation.

In coordination with the Town's Conservation Commission, the twin box culverts were added to the causeway to provide tidal flushing to the adjacent slat marsh area. The two new culverts play a crucial role in mitigating the causeway's environmental impact by restoring tidal flushing and improving the biodiversity of the adjacent salt marsh.

Environmental Impact Assessment. The project was meticulously planned to minimize disruptions to adjacent environmentally sensitive areas while ensuring sustained and safe access across the causeway.

Project Relevancy. VHB worked closely with local permitting agencies to obtain approval of an innovative causeway design which both supports safe transportation routes and prioritizes restoration of the local marsh.

Client: Town of Dartmouth, MA

Cost: Budget: $487,288 | Actual: $487,288

Completion: Scheduled: June 2018 | Actual: June 2018

Office: Watertown MA

Type of Project:

Dredge | **Marsh** | **Shoreline** | **Survey** | **Permit**

6 Response Capability

Achieving shoreline stabilization, resiliency, sustainability, and open space planning for the **James River Shoreline** was possible through collaboration from VHB's coastal, environmental, survey and planning, and design teams.


vhb

6 Response Capability

All members of the **VHB** team are available to provide the necessary resources to meet the requirements of this project's schedule and budget. We are committed to the success of this project and will make necessary resources available should the need arise to meet unanticipated project demands.

Staffing Availability

VHB has put together a qualified team of individuals who have the capacity to take on the Guinea Marsh project for MPPDC. Our Project Manager is committed to seeing this project through from start to finish and will lead coordination between MPPDC and the technical team. We have a mix of senior and junior staff prepared to work on this project, keeping it on-schedule and within budget. The table to the right shows the anticipated availability of each of our key personnel for the duration of the project.

VHB has more than **2,300 professionals across our East Coast footprint** and will call upon any resources required to support MPPDC in this effort.

	Firm & Personnel Name	Role	Availability
VHB	Neville Reynolds, PWS	Principal-in-Charge	15%
VHB	W. Bryce Corlett, PhD, PE, ENV SP	Project Manager	50%
VHB	Rebecca S. Francese	Senior Environmental Scientist	35%
VHB	Douglas A. DeBerry, PhD, PWS, PWD	Senior Environmental Scientist	25%
VHB	Chris Frye	Senior Coastal/Environmental Scientist	35%
VHB	Kimberly Blossom, ENV SP	Senior Environmental Scientist	15%
VHB	Michael Mann, PE	Technical Support | Coastal Engineering	35%
VHB	Richard (Ricky) Wiatt, PLA	Community Engagement | Landscape Architect	35%
VHB	Chris DeWitt, AICP	Senior Planner	15%
VHB	Megan Raymond, CFM, PWS, RSS	QA/QC Manager	20%
VHB	Robert (Bob) Taliaferro, LS, CH	Surveying	25%
VHB	Aubrey Pontious, PLA, ASLA	Drone Pilot	5%
VHB	Vikrant Desai, PE, VMA	Civil Engineer	35%
VHB	Harrison Bloom, PMP, GISP	Technology Lead	15%
EA	Sam Whitin	Coastal Scientist	25%
EA	Taber Midgley, PE	Water Resources Engineer	35%
EA	Rich Pfingsten, SPWS	Senior Ecologist	25%
SCHNABEL	Kevin Pocta, PE	Geotechnical Engineer	15%

This page is intentionally left blank.

7 Insurance

VHB applied nature-based solutions including wave screen sills and shoreline stabilization to the **Town of Duck's NC12 Resilience and Living Shoreline Project** to avoid impacts to submerged aquatic vegetation and to protect wetland habitats in a sensitive permitting environment.


vhb

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 07/22/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Christopher A. Poole	
Brown & Brown Insurance Services, Inc. 107 Audubon Rd Wakefield MA 01880	PHONE (A/C, No, Ext): (781) 245-5400	FAX (A/C, No): (781) 245-5463
	E-MAIL ADDRESS:	

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A :	Valley Forge Insurance Company	20508
INSURER B :	American Casualty Company of Reading, Pennsylvania	20427
INSURER C :	XL Specialty Insurance Company	37885
INSURER D :	The Continental Insurance Company	35289
INSURER E :		
INSURER F :		

INSURED
Vanasse Hangen Brustlin, Inc.
P. O. Box 9151
Watertown MA 02471

COVERAGES **CERTIFICATE NUMBER:** 25-26 7/19 PL **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR ☒ Contractual Liab. ☒ Blanket Waiver GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC ☐ OTHER:	Y	Y	6018141932	05/01/2025	05/01/2026	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG Employee Benefits	$ 1,000,000 $ 1,000,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $ 1,000,000
B	AUTOMOBILE LIABILITY ☒ ANY AUTO ☒ OWNED AUTOS ONLY ☒ SCHEDULED AUTOS ☒ HIRED AUTOS ONLY ☒ NON-OWNED AUTOS ONLY	Y	Y	6018203376	05/01/2025	05/01/2026	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) Medical Expense	$ 1,000,000 $ $ $ $ 5,000
D	☒ UMBRELLA LIAB ☒ OCCUR ☒ EXCESS LIAB ☐ CLAIMS-MADE ☐ DED ☒ RETENTION $ 10,000	Y	Y	6018203362	05/01/2025	05/01/2026	EACH OCCURRENCE AGGREGATE	$ 14,000,000 $ 14,000,000 $
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N: N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	6017185236	05/01/2025	05/01/2026	☒ PER STATUTE ☐ OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
C	Arch/Eng Prof Liab. incl Pollution			DPR5045577	07/19/2025	07/19/2026	Per Claim Aggregate	5,000,000 5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

For Proposal Use Only

CERTIFICATE HOLDER

Vanasse Hangen Brustlin Inc.
P. O. Box 9151
Watertown MA 02272

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

ACORD 25 (2016/03) **The ACORD name and logo are registered marks of ACORD**

Additional Named Insureds

Other Named Insureds

VHB ENGINEERING, SURVEYING, LANDSCAPE ARCHITECTURE & GEOLOGY P.C.

VHB ENGINEERING, NC, P.C.

Vanasse Hangen Brustlin, LLC.

OFAPPINF (02/2007)

The nature-based shore protection VHB designed at the **Yorktown Riverfront** has proven its resiliency through more than 30 years of storm events and sea level rise.

8 References

8 References

Client satisfaction is at the forefront of any contract the **VHB** team undertakes. VHB's passion for designing and creating smart, implementable solutions for our clients is reflected in our relationships. We have identified references who can speak to our technical experience providing similar services to those needed for the Guinea Resilience and Innovation for Tidal Wetlands project. We encourage you to contact these references. Their comments will reinforce our record of outstanding past performance.

City of Norfolk, VA

Kyle Spencer, Chief Resilience Officer
501 Boush Street, Norfolk, VA 23510
757.441.2602 | kyle.spencer@norfolk.gov

Ohio Creek Living Shoreline

VHB worked with the City of Norfolk on the design, environmental permitting, and NEPA compliance for 2,500 linear feet of living shoreline. Our team is currently engaged on performance monitoring and permit compliance. We have supported the City of Norfolk on more than 40 projects.

Testimonial

> **"I would like to express my appreciation to you and your team at VHB for the high quality of dedicated services that are being provided to the City of Norfolk in support of the Ohio Creek Watershed Project located in Chesterfield Heights and Grandy Village, within the City of Norfolk. VHB has provided us with a broad range of services, including preparing an Environmental Impact Statement, conducting onsite natural resource studies to identify wetlands and Resource Protection Areas, overseeing cultural resources investigations, hazardous materials investigations, preparing final design plans for 2,500 linear feet of living shoreline, regulatory permitting, and participating in construction oversight and review as our construction project has been initiated. The VHB team has provided outstanding services and has been exceptionally responsive to a multitude of task orders under this contract with the City's Office of Resilience. We are very pleased to have the VHB team on the project and would recommend your team, without hesitation."**

Kyle W. Spencer, City of Norfolk, Deputy Chief Resilience Officer

Town of Duck, NC

Drew Havens, Town Manager
1200 Duck Road, Duck, NC 27949
252.255.1234 | dhavens@townofduck.com

NC 12 Resilience and Living Shoreline

For the Town of Duck, North Carolina, VHB designed a roadway elevation project to address storm surge flooding on NC 12 (Duck Road). In addition to raising the road (a storm evacuation route), VHB integrated into the design a living shoreline habitat protection and restoration. VHB also helped the Town secure funding from multiple sources, including a Building Resilient Infrastructure and Communities (BRIC) grant. The constructed project recently won an award from the North Carolina Chapter of the American Planning Association.

VHB recently provided stormwater design and engineering for Phase 4 of the Resilient Coastal Communities Program (RCCP).

City of Hampton, VA

Olivia Askew, City of Hampton Resilience Office
22 Lincoln Street, 5th Floor, Hampton, VA 23669
757.727.6301 | olivia.askew@hampton.gov

Fox Hill, Grandview, and Harris Creek Water Plan

VHB, along with a team of qualified subconsultants, are working with the City of Hampton to develop a comprehensive water plan with actionable flood resilience strategies for the Fox Hill, Grandview, and Harris Creek neighborhoods.

City of Virginia Beach, VA

Christina Ammens, Project Manager
2569 George Mason Drive,
Virginia Beach, VA 23456
757.385.5639 | cammens@vbgov.com

Pungo Ferry Road Improvements

VHB is currently working with the City of Virginia Beach on reconstructing Pungo Ferry Road to raise its profile to address flooding. The team is providing hydrology and hydraulics, drainage design, and preparing NEPA compliance documentation.

Department of Wildlife Resources (DWR)

John Kirk, Capital Programs Manager, VCCO
7870 Villa Park Drive, P.O. Box 90778,
Henrico, VA 23228-0778
804.754.6895 | john.kirk@dwr.virginia.gov

Engineering Term Contract

Under an IDIQ Contract, VHB has provided civil, environmental, geotechnical, surveying and dam safety engineering services. VHB has completed multiple boat ramp and tending pier design.

Shell Landing Road Boat & Pier Renovation

VHB provided engineering services to replace an existing two-lane, concrete boat ramp with tending piers along Cockrell Creek in Northumberland County. The facility had been in place for more than 20 years and the ramps were in various states of repair. We prepared preliminary layout plans, working drawings, and project management coordination and administration services.

Jamestown Rediscovery/Preservation Virginia

Michael Lavin, Director of Collections and Conservation Jamestown Rediscovery
1365 Colonial Parkway, Jamestown, VA 23081
757.784.3929 | mlavin@preservationvirginia.org

Jamestown Resiliency Plan

VHB is responsible for the preparation of a sitewide resiliency master plan and report for Preservation Virginia (PV) for previously developed areas within their 22-acre site located on Jamestowne Island in Jamestown, Virginia. VHB conducted site evaluation studies leading to the development of three resiliency alternatives for long-term protection of this national resource from the continuing threat of sea-level rise. The plan includes installing perimeter berms, raising infrastructure, and improving site drainage.

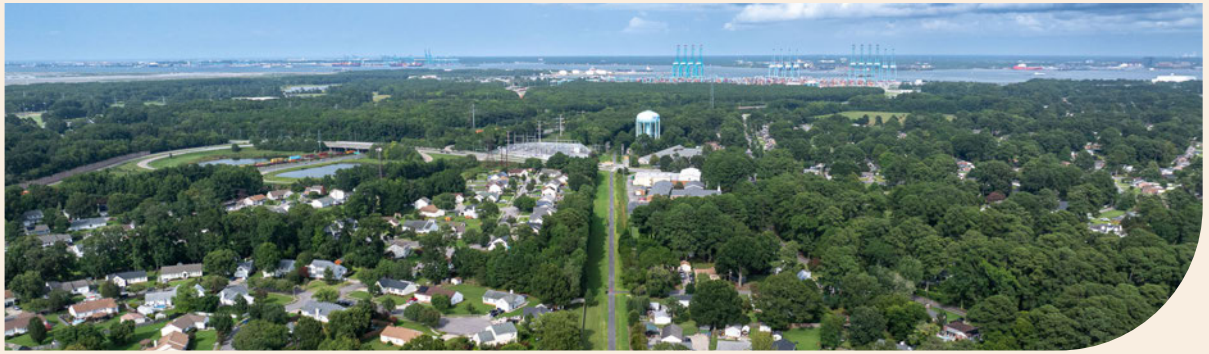
> **VHB demonstrated remarkable expertise in integrating coastal engineering and environmental science with historical preservation efforts [on the Jamestown Resiliency Plan and additional projects at Jamestown Island in collaboration with Preservation Virginia]. This multidisciplinary team devised a holistic resiliency plan that skillfully balanced the need to safeguard Jamestown's rich cultural heritage against looming environmental threats. VHB tackled complex problems with tailored solutions that reflected a deep understanding of both the ecological dynamics and the historical significance of the site. Throughout the projects, VHB maintained constant communication and adapted swiftly to evolving project requirements. VHB brought a wealth of creativity to the table, finding clever ways to balance Jamestown's history with the need to protect it from future environmental changes. They truly embraced our vision to preserve the past while planning for what lies ahead. In short, I can't recommend VHB enough. VHB's capacity to deliver cutting-edge, integrated services makes them an outstanding choice for any project requiring innovative and comprehensive planning and engineering solutions.**
>
> *Michael Lavin, Director of Collections, Jamestown Rediscovery/Preservation Virginia*

U.S. Army Corps of Engineers

Melissa Nash, Environmental Scientist,
USACE Norfolk District, Regulatory Branch
803 Front Street, Norfolk, VA 23510
757.201.7489 | melissa.a.nash@usace.army.mil

Southeastern Public Service Authority (SPSA) Landfill Expansion Project

VHB is supporting the U.S. Army Corps of Engineers with environmental compliance to include the preparation of an Environmental Impact Statement (EIS) for a landfill expansion project. The applicant's proposal for expansion of the landfill would result in 110 acres of wetland impacts and would require a permit under Section 404 of the Clean Water Act. Through the EIS process, VHB is also supporting the Corps Norfolk District to comply with Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act and other laws and authorities.



Other Testimonials

City of Portsmouth, VA

VHB has served the City of Portsmouth for more than 5 years, providing a wide range of on-call civil engineering services.

> **"No matter what challenge we present them with, the VHB team rises to the occasion. From routine traffic studies to more complex policy and strategy requests, VHB works with us to develop appropriate solutions that meet our goals for the City."**

James Wright, PE, City Engineer, City of Portsmouth

City of Suffolk, VA

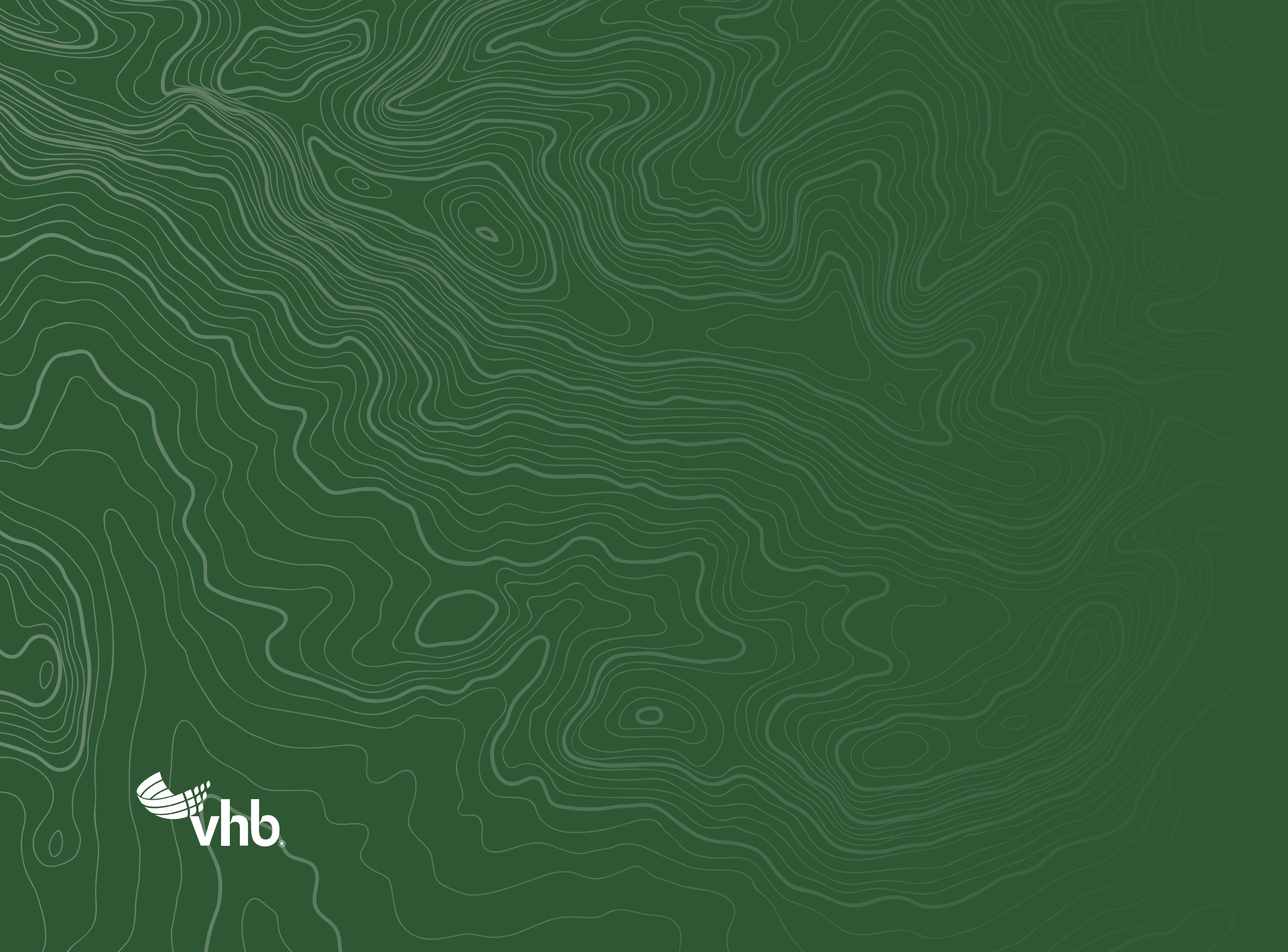
For the City of Suffolk, VHB provided site/civil engineering services during Construction Administration for Phase 2 of Pughsville Drainage Improvements. Our team is also working for the City on 1.5 miles of shoreline stabilization and linear park development along the James River Shoreline.

> **"I would like to personally thank you for all your hard work and support you have provide the City of Suffolk and me as a consultant engineer. You have always strived to put your best into every task you have performed. It has been noticed and greatly appreciated. VHB with your assistance has been outstanding in its support of the City of Suffolk Public Works' CIP program with a number of projects completed and many more under way."**

Robert E. Lewis, Retired, Director of Public Works, City of Suffolk, VA

For decades, VHB has worked on the **VIMS** campus, completing all shoreline stabilization projects, hydrographic survey and dredging plans for the boat basin channel and is currently completing design for boat basin improvements that will berth the RV Virginia.

9
Other Supporting Data


vhb

9 Other Supporting Data

VHB is deeply familiar with the Guinea Marsh area and the broader Middle Peninsula because we live and work here. Our primary project team is based out of our Williamsburg, VA office, giving us regular, on-the-ground exposure to local shoreline conditions, tidal dynamics, and the working-waterfront character that defines Guinea Marsh and Mobjack Bay. This proximity allows us to visit the site easily, respond quickly as project needs evolve, and bring current, firsthand observations into our technical analyses and design decisions.

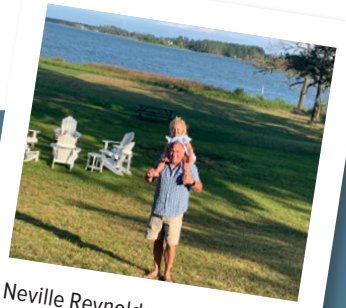
Several members of our team also live in the region and are personally invested in the long-term resilience of local communities, working landscapes, and natural resources. That local perspective shapes how we approach Guinea Marsh—not as an abstract project site, but as part of a connected system of marshes, waterways, and communities that we know well and care about sustaining.

FIGHT THE FLOOD
MIDDLE PENINSULA

Our long-term involvement in the **Fight the Flood** program further demonstrates our commitment to the region's sustainability. Through this initiative, we have worked alongside MPPDC, local governments, and private property owners to promote nature-based and hybrid shoreline solutions that reflect local priorities and regulatory realities. This experience gives us a nuanced understanding of what works in practice at Guinea Marsh and across the Middle Peninsula, both technically and in terms of community acceptance and permitting viability.

VHB lives, works, and plays on Guinea Marshes...

A local to Mathews, Ricky Wiatt spends his summers with family in and around the Guinea Marshes.



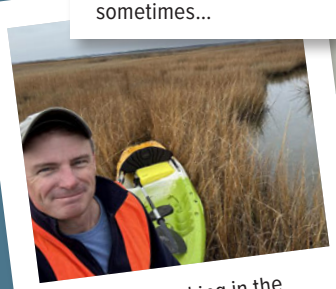
Neville Reynolds and his youngest granddaughter, Claire, spending time together on Bryant Bay, south of the Guinea Marshes.

Kim Blossom and her cousin eating homemade ice cream before an afternoon of "chicken-necking" in the summer sunshine along the York River!

Doug DeBerry spent his childhood summers in and around the Guinea Marshes. You can still catch him there sometimes...

Summertime fun! Kim Blossom and her beloved Granddaddy watching the local watermen navigate the Narrows.

In the summer you can find Bryce Corlett out on the water, sailing in the Mobjack Bay by the Guinea Marshes.



Doug went kayaking in the Guinea Marshes, capturing photos included on the cover and throughout this proposal.

Back in 2011, Tim Davis performed a wetland delineation in the area—a memorable experience because he remembers he suffered the worst deer fly biting experience in his 35-year career!

We understand the importance of keeping access, navigation, and working-waterfront needs in balance with habitat protection and tidal wetland resilience. We will bring that perspective into design workshops, stakeholder meetings, and alternative evaluations—using what we know about local concerns and preferences to shape concepts that are both technically sound and locally supported. Our Fight the Flood experience will further guide us in framing designs so they are implementable, permittable, and replicable across the Middle Peninsula.

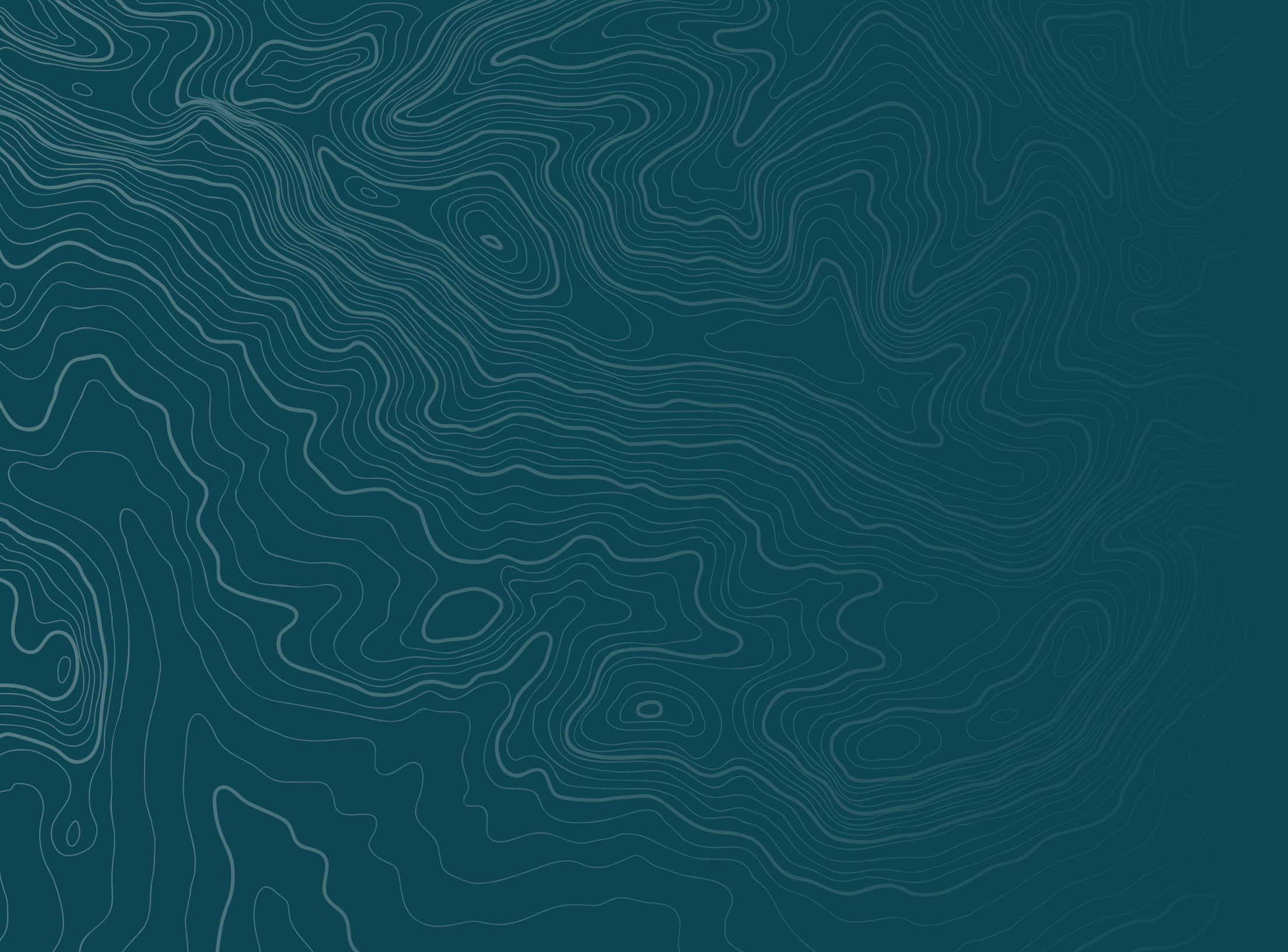
As conditions change, our proximity and long-term commitment to the region mean that VHB will be here to observe how Guinea Marsh responds, support adaptive management, and continue refining approaches that keep these marshes, and the communities they protect, thriving over the long term.

We are genuinely excited to help MPPDC and its partners translate this project from planning to on-the-ground improvements that we will be able to see and experience for years to come.

Matt Whalen worked as a VIMS Research Scientist for CCRM at VIMS conducting research on living shorelines and tidal wetlands in this region. He also spends a lot of time fishing in and around the water of the Guinea Marshes.

VMRC, AnchorQEA, and Rebecca Francese went on a field trip for the Beneficial Use Guidelines project for VMRC at the New Point Comfort Lighthouse. VHB did this revetment design!

This page is intentionally left blank.




vhb
www.vhb.com